SAHYADRI
COLLEGE OF ENGINEERING & MANAGEMENT
MANGALURU

Department of Information Science and Engineering			
AY 2018-19			

Course Code	NBA Code	COs Code	CO Descriptions
17MAT31	C201	C201.1	Understand and use Fourier series to expand periodic functions.
		C201.2	Apply Fourier transforms and work out the basic problems on Z-transforms .
		C201.3	Understand the concepts of curve fitting, statistical methods and solving algebraic and transcendental equations numerically.
		C201.4	Apply the concept of forward, backward and divided differences on simple problems and the techniques of numerical integration.
		C201.5	Find the surface and volume integrals .Apply Green's theorem, Divergence Theorem and Stokes theorem in various applications
17CS32	C202	C202.1	Explain the operations of JFETs, MOSFETs, Operational Amplifier circuits and their applications.
		C202.2	Explain Combinational Logic, Simplification Techniques using Karnaugh Maps, Quine McClusky technique
		C202.3	Demonstrate Operation of Decoders, Encoders, Multiplexers, Adders and Subtractors, working of Latches, Flip-Flops, Designing Registers
		C202.4	Design of Registers and counter , its implementation using HDL
		C202.5	Explain the operations of various types of A/D and D/A converters
17CS33	C203	C203.1	Acquire knowledge of: • Various types of data structures, operations and algorithms • Sorting and searching operations • File structures
		C203.2	Demonstrate application of appropriate data structures for solving computing problems
		C203.3	Implement all the applications of data structures in a high-level language
		C203.4	Examine the performance of - Stack, Queue, Lists, Trees, Graphs, Searching and Sorting techniques
		C203.5	Explore and evaluate the tools and architectures for problem solving that employ data structures
17CS34	C204	C204.1	Explain the basics of computer organization, structure and operation of computers, performance, machine instructions, number representation, addressing techniques, generic assembly language features, simple input/output programming.
		C204.2	Discuss different ways of communicating with I/O devices and standard I/O interfaces, Interrupts, DMA methods, bus protocols and standards with PCI, SCSI, and USB standards.
		C204.3	Describe the components and organization used to implement the memory, cache memory and virtual memory concepts.

		C204.4	Apply the arithmetic and logical operations with integer and floating-point operands.
		C204.5	Explain the basic processing and organization of simple processor, multiple processor systems and the techniques employed to achieve parallelism.
17CS35	**C205**	C205.1	Explain multi user OS UNIX and its basic commands
		C205.2	Demonstrate UNIX file system and interpret its commands
		C205.3	Demonstrate vi editor and interpret basics of the shell
		C205.4	Create shell programs, perl scripts
		C205.5	Illustrate UNIX process mechanism
17CS36	**C206**	C206.1	Identify the correctness of an argument using mathematical logic and construct the proof for the propositions using direct proof, indirect proof and proof by contradiction.
		C206.2	Construct the proofs using mathematical induction, recursive method and solve the problems using counting techniques.
		C206.3	Solve the problems associated with relations and functions.
		C206.4	Solve the problems involving principle of inclusion-exclusion with its applications and recurrence relations.
		C206.5	Apply the different concepts of graphs and trees in the field of computer science.
17CSL37	**C207**	C207.1	Demonstrate Analog Electronic Circuits based on Op-Amps and 555 Timers.
		C207.2	Demonstrate the implementation of combinational logic circuits using digital logic design.
		C207.3	Demonstrate the implementation of sequential logic circuits using digital logic design.
		C207.4	Show the simulation of Analog Circuits using circuit simulation software.
		C207.5	Show the simulation of Digtal Circuits using Hardware Description Language.
17CSL38	**C208**	C208.1	Demonstrate array and string data structures by designing and implementing the relevant function required
		C208.2	Demonstrate stack and queue data structures by designing and developing the required functions with its applications
		C208.3	Demonstrate the concepts of SLL,DLL and SCLL by designing and developing the required functions with its applications
		C208.4	Demonstrate trees and graphs by designing and implementing the relevant function required
		C208.5	Illustrate the application of file data structures by designing suitable hash techniques also analyze the collision problems and develop suitable functions to resolve collision problem
17MAT41	**C212**	C212.1	Use appropriate single step and multi-step numerical methods to solve first order ordinary differential equations
		C212.2	Evaluating second order differential equations and understanding the basics of Bessel's function and Legendre's polynomials.
		C212.3	Applying the concepts of analytical functions, residues and poles and working out problems on complex valued functions and complex integration
		C212.4	Work out problems on random variables and probability distributions using statistical methods.
		C212.5	Evaluate the problems in joint probability distributions, Sampling techniques and Markov chains
		C213.1	Develop C++ programs by using different Object Oriented concepts like inheriretance, polymorphism, nested classes, Constructors, Destructors.

17CS42	**C213**	**C213.2**	Analyze and understand the basic Object Oriented concepts using Java with the help of Data types, variables and arrays, Operators, Control Statements.
		C213.3	Inspect inheritances, exceptions, packages concepts and exception handling using JAVA.
		C213.4	Utilize the concept of Threading, Multi-threading and event handling for demonstrating real time applications.
		C213.5	Analyze simple java applications and GUI using the concepts of applets and swings.
17CS43	**C214**	**C214.1**	Illustrate the correctness of algorithms using inductive proofs and invariants.. Analyze worst-case, best case and average case running times of algorithms using asymptotic analysis for non-recursive and recursive algorithms and also explain the different data structures used for different data types.
		C214.2	To dissect and solve recurrences describing the performance of divide-and-conquer using algorithms. Also demonstrate the decrease and conquer paradigm using topological sort.
		C214.3	Illustrate the greedy technique and explain when an algorithmic design situation calls for it. Synthesize greedy technique, and analyze them using diferent algorithms. Also dissect the transform and conquer approach.
		C214.4	Synthesize dynamic-programming algorithms, and analyze them using different examples.
		C214.5	Ability to apply algorithm design principles to derive solutions for real life problems, NP class problems and comment on complexity of solution.
17CS44	**C215**	**C215.1**	Describes the architecture, addressing modes & instruction assembling of 8086 microprocessor
		C215.2	Design & Develop an Assembly Language Programs on 8086 using the x86 instruction set.
		C215.3	Apply the x86 instruction set for signed numbers & string operations & construct the Interfacing of Memory & I/O devices model with 8086
		C215.4	Describes the architecture, design philosophy of ARM & Embedded Systems, addressing modes & Instruction Set of ARM.
		C215.5	Design & Develop an assembly level programs for ARM processors using ARM Instruction set.
17CS45	**C216**	**C216.1**	Explain the process of building software, outline professional and ethical responsibility and illustrate the concept of Requirements Collection and Requirement Engineering Process.
		C216.2	Develop various models used for designing software systems. Explain various UML concepts used for Object Oriented Software Design. Identify and discuss various design and implementation issues.
		C216.3	Demonstrate software testing and identify various types of testing. Infer Software Evolution. Illustrate Legacy System Management
		C216.4	Analyze various project planning phases and inspect the Software Quality Management.
		C216.5	Explain the concept of Agile technique and demonstrate the Agile Software Development process.
17CS46	**C217**	**C217.1**	Illustrate basic of computer network, different topologies and the layers of OSI model with its function compared with TCP/IP model with a detailed explanation of physical layer.
		C217.2	Examine the functions of physical layer with transmission, bandwidth utilization and describe the different types of switching.
		C217.3	Make use of different techniques for error detection and correction and explain different protocols used in Data Link Layer.
		C217.4	Explain the medium access control protocols for reliable and noisy channels and illustrate wired and wireless LAN's Ethernet.
		C217.5	Illustrate different Network Layer protocol and other wireless protocols with its applications.

17CS47	**C218**	**C218.1**	Apply and implement the learned data structures to solve the real world problems.
		C218.2	Design algorithms using Divide and Conquer technique and analyze the performance of algorithms
		C218.3	Develop variety of algorithms using Greedy technique for graph related problems.
		C218.4	Design and implement algorithms using the technique of Dynamic Programming for network related problems
		C218.5	Apply the concept of Backtracking for combinatorial problems.
17CS48	**C219**	**C219.1**	Demonstration of Assembly Language programs for 8086 using MASM.
		C219.2	Demonstration of Assembly Language and C Program for ARM using Keil.
		C219.3	Demonstration of Assembly Language programs to interface 8255 based kits with 8086.
		C219.4	Demonstration of C program to interface LCD Module with ARM based LPC2148 Microcontroller.
		C219.5	Demonstration of C program to interface Stepper Motor with ARM based LPC2148 Microcontroller.
15CS51	**C301**	**C301.1**	Explain and illustrate the Management, Organization, Planning and outline their importance in entrepreneurship.
		C301.2	Explain Staffing and identify the traits of leadership. Demonstrate the importance of Coordination, Communication, Directing and Controlling.
		C301.3	Explain Entrepreneurship, its status in India. Relate different traits of becoming an Entrepreneur.
		C301.4	Examine the steps involved in undertaking a project, importance of maintaining reports. Inspect Enterprise Resource Planning and its use.
		C301.5	Contrast case studies of various Small Scale Industries, Government policies, Institutional supports for small scale industries.
15CS52	**C302**	**C302.1**	Explain principles of Application Layer Protocols
		C302.2	Analyze Transport Layer services and infer UDP and TCP protocols.
		C302.3	Examine Routers , IP and Routing algorithms in Network Layer.
		C302.4	Demonstrate Wireless and Mobile Networks covering IEEE 802.11 Standard.
		C302.5	Illustarte Multimedia Networking and Network Mangement.
15CS53	**C303**	**C303.1**	Identify,analyze and define database objects,enforce integrity constraints on a database using RDBMS
		C303.2	Make use of relational algebra and structured query language (SQL) for database manipulation
		C303.3	Design and develop database applications.
		C303.4	Apply and analyze normalization forms on database.
		C303.5	Demonstarte the concepts of transaction processing, concurrency control and recovery in databases.
15CS54	**C304**	**C304.1**	Make use of central concepts of Automata Theory and construct FSM for different formal languages.
		C304.2	Construct and simplify the regular expressions and build the proofs for regular languages.
		C304.3	Construct and simplify the grammars and build PDA for different formal languages.
		C304.4	Discuss the pumping theorem and closure properties of CFL and Construct TM for different formal languages.
		C304.5	Discuss the variants of TM and Examine the decidability and intractability of Computational problems.
		C307.1	Apply advanced java concepts of enumerations and annotations.

		C307.2	Develop modular and efficient programs using Advanced Java Collection Framework.
15CS553	**C307**	**C307.3**	Apply the features of Strings.
		C307.4	Examine how Servlets fit into java-based web application architecture.
		C307.5	Develop database connection using JDBC API.
		C313.1	Construct applications on Visual Studio .NET platform by understanding the syntax and semantics of C#.
		C313.2	Demonstrate Object Oriented Programming concepts in C# programming language.
15CS565	**C313**	**C313.3**	Design custom interfaces for applications and explore the available built-in interfaces in building applications.
		C313.4	Illustrate the use of generics and collections in C#.
		C313.5	Compose queries to query in-memory data and define own operator behavior.
		C314.1	Analyze the networking scenarios with respect to implementation issues-exp7,exp11
		C314.2	Demonstrate the working of networking concepts.-exp8,exp12
15CSL57	**C314**	**C314.3**	Explain the fuctionalities of Protocols-layers-exp(9,10)
		C314.4	Ilustate the Connection oriented networks using suitable tools-exp(1,2,3)
		C314.5	Ilustrate the working of Wireless networks-exp(4,5,6)
		C315.1	Use SQL programming and different concepts of DBMS to create, update and query on the Library and College databases.
		C315.2	Demonstarte SQL programming and different concepts of DBMS to create, update and query on the Order database.
15CSL58	**C315**	**C315.3**	Illustrate the concepts of SQL programming and DBMS to create, update and query on the Movie database.
		C315.4	Create, update and query on the Company database by using different concepts of DBMS and SQL programming.
		C315.5	Design, implement and demonstrate a mini project using front end tools and database and Compile the working with well document using modern tool.

		C318.1	Outline the various cyber attacks, defence strategies & techniques, Cipher properties and cryptographic techniques
		C318.2	Analyze the vulnerabilities in any computing system and hence be able to design a security solution using various cryptographic algorithms like RSA, Hashing and Diffie Hellman.
15CS61	**C318**	**C318.3**	Discover the efficient key manangement techniques, Simple authentication and Mutual authentication, IKE,Kerberos, NS-Protocol and SSL.
		C318.4	Analyze the vulnerabilities, attacks in WLAN Security as per IEEE 802.11 Standards based on authentication, confidentiality and integrity.
		C318.5	Outline the Ethics and Cyber laws to create awareness about cyber crimes based on e-commerce and EVM cards.
		C319.1	Choose an appropriate file structure for storage representation and their mechanism to store different types of files.
		C319.2	Explain the oraganization of files using object oriented concepts and retrieve the same using advanced concepts like inverted lists, selective indexes.
15CIS62	**C319**	**C319.3**	Identify a suitable sorting techniques to arrange the data and use of multi-level indexing and B-tree techniques for organization of data in a file.
		C319.4	Choose a suitable indexing mechanism and hashing technique for better performance of file accessing.
		C319.5	Examine some advanced file storage structures like extendible hashing for better performance.

15IS63	**C320**	**C320.1**	Explain bugs, Errors,Failures and outline the importance of software testing
		C320.2	Examine the functional nature of a program to identify test cases for the program and apply various testing techniques to develop range based test cases.
		C320.3	Make use of Path testing and Dataflow testing for designing of flow graph and demonstrate various approaches for creating run time support for test execution
		C320.4	Summarize the principles that characterize various approaches for testing.Describe planning and monitoring of the processes interwined with documentation.
		C320.5	Illustrate the concepts of integration and component based testing techniques and demonstrate the various levels of testing .
15CS64	**C321**	**C321.1**	Understand the basics of operating systems, concepts of process.
		C321.2	Understand threads Process Synchronization & apply the concepts of Process Scheduling.
		C321.3	Apply the concepts of deadlocks, methods of handling deadlocks, the different memory management strategies
		C321.4	Understand File System & its Implementation & apply the concepts of virtual memory.
		C321.5	Apply the concepts of secondary storage structure & secondary memory management, & Understand the concept of system protection.
15CS653	**C324**	**C324.1**	Explain the importance of operations research by formulating an LPP model for the real world problems and Solve it using graphical method and analytical method.
		C324.2	Explain the essence of the simplex method and Solve the various LP problems by using appropriate optimization techniques.
		C324.3	Apply the principle of duality and make use of dual simplex method to solve the various LP problems.
		C324.4	Solve the transportation and assignment problem and obtain the optimal solution.
		C324.5	Apply the game theory concepts for the decision making problems and outline the meta heuristics techniques.
15CS565	**C329**	**C329.1**	Examine Python syntax and semantics and demonstrate proficiency in Python flow control, functions, String handling and File Systems.
		C329.2	Apply python programming in Iteration, Strings, Files to gain efficient skill in python .
		C329.3	Create, run and manipulate Python Programs using core data structures Lists, Dictionaries, Tuples, Regular Expressions
		C329.4	Apply python programming in object oriented concepts like Classes and objects, Classes and functions, Classes and methods
		C329.5	Build applications related to Network Programming, Web Services and
15ISL67	**C332**	**C332.1**	Design and develop testcases based on Boundary value Analysis testing method
		C332.2	Create testcases using Equivalence class partitioning ,execute testcases and discuss the results
		C332.3	Design and develop testcases using Decision table approach ,analyze the testcases along with the results
		C332.4	Analyze structural testing techniques using Data flow approach.
		C332.5	Examine structural testing through basis path testing technique,discuss the test cases and results
15ISL68	**C333**	**C333.1**	Apply the concepts of Unix IPC to implement a given function.
		C333.2	Develop the operations related to files and apply the objectives of file system to produce the given application.
		C333.3	Build a program to implement operations on given file system using indexing
		C333.4	Apply hashing alogorithm to implement cosequential and K-way merge

		C333.5	Build file application projects using different concepts such as Document processing, transaction management, indexing and hashing, buffer management, configuration management
15CS71	**C401**	**C401.1**	Illustrate the syntax and symantic structures of HTML and CSS to build web pages
		C401.2	Construct and visually format tables and forms using HTML and CSS
		C401.3	Create a well-structured, easily maintained JavaScript code for client side scripting and server side scripting using PHP to generate and display the contents dynamically
		C401.4	Apply object oriented programming concepts and exceptional handling using PHP
		C401.5	Inspect Javascript frameworks like AJAX, jQuery,Backbone MVC to create dynamic ,interactive websites
15CS72	**C402**	**C402.1**	Identify and describe a design pattern, Classify design pattern catalogue, explain various object oriented design concepts.
		C402.2	Summerize the requirements,Illustrate conceptual classes and relationships among the classes.
		C402.3	Explain various architectural styles with various case studies.
		C402.4	Explain the concepts of Interactive systems and summerize MVC architecture.
		C402.5	Identify the design process related to Distributed Objects and identify its roles in building an object oriented system.
15CS73	**C403**	**C403.1**	Explain concept learning and hypothesis searching using Find-S and Candidate Elimination Algorithms
		C403.2	Apply Decision Tree learning to classify data
		C403.3	Apply Artificial Neural Networks,Perceptrons and Backpropagation Algorithms
		C403.4	Explain Bayesian Learning concepts such as Naïve Bayes Classifier,Bayesian Belief Networks and EM Algorithm
		C403.5	Evaluate Hypothesis and explain Instance Based Learning and Reinforcement Learning Concepts
15CS743	**C406**	**C406.1**	Illustrate the Cryptanalysis using various Ciphers
		C406.2	Apply the Hash techniques in Digital platforms to enhance security
		C406.3	Analyze the vulnerabilities in the existing system using Crytographic protocols
		C406.4	Explain the need of Key management
		C406.5	Outline the need for security in various Digital world applications
15CS753	**C410**	**C410.1**	Outline the importance and the roles of Information Systems in the business processes and also understand the basic competitive strategies
		C410.2	Identify various cross functional enterprise systems and how they can provide significant business value to a company.
		C410.3	Summarizing the benefits and challenges of CRM, ERP and SCM.
		C410.4	Choose the needs of essential processes, categories and business values of e-commerce applications
		C410.5	Illustration of evolution taking place in the business processes and the use of decision support systems to tackle the changes
15CSL76	**C412**	**C412.1**	Design and develop testcases based on Boundary value Analysis testing method
		C412.2	Create testcases using Equivalence class partitioning ,execute testcases and discuss the results
		C412.3	Design and develop testcases using Decision table approach ,analyze the testcases along with the results
		C412.4	Analyze structural testing techniques using Data flow approach.

		C412.5	Examine structural testing through basis path testing technique,discuss the test cases and results
15CS77	C413	C314.1	Analyze the designing of the web pages using html,CSS and Javascript.
		C314.2	Inspect an XML document designed to store the information in a webpage and use CSS to display the document
		C314.3	Examine a PHP program to understand the server side scripting technologies
		C314.4	Create a php program to analyze the working of databases with web technologies
		C314.5	Build web application projects using the languages and concepts using web technologies and frameworks and databases.
15CSL78	C414	C414.1	Demonstrate the conceptual understanding and sound technical knowledge of engineering disciplines through theory and practice
		C414.2	Analyse complex Engineering problems and apply appropriate engineering techniques and design processes
		C414.3	Acquire and evaluate research regarding technological advancement in engineering disciplines and their social, cultural, environmental and legal context.
		C414.4	Execute responsibilities as a team member and contribute innovative ideas to accomplish the defined objectives.
		C414.5	Prepare a high-quality engineering documents and present a clear and coherent presentation of these to a range of technical and nontechnical audiences.
15CS81	C415	C415.1	Summarize the Impact and Challenges posed by IoT networks and the precursor for the new architectural models for IoT.
		C415.2	Identify and Describe the deployment of smart objects and the technologies used to connect them to network.
		C415.3	Summarize various IoT protocols for efficient network commmunication by classifying and comparing them.
		C415.4	Outline the need for Data Analytics and Security in IoT.
		C415.5	Identify different sensor technologies for sensing real world entities and identify the application of IoT in Industry.
15CS82	C416	C416.1	Summarize the conceptualisation of HDFS and MapReduce framework, benchmarks along with practicing the MapReduce programming.
		C416.2	Demonstrate Hadoop related tools for Big Data Analytics and perform basic Hadoop Administration. Also illustrate the Hadoop YARN Applications and Apache Ambari.
		C416.3	Identify and Illustrate the role of Business Intelligence and its applications. Further summerize the concept of Data Mining, Data warehousing and Visualization in decision making.
		C416.4	Inference the importance of core data mining techniques for data analytics like Regression, Artificial Neural Networks, Cluster Analysis.
		C416.5	Inspect and contrast outcomes of different Text Mining Techniques Naïve-Bayes Analysis, Support Vector Machines, Web Mining, Social Network Analysis.
15CS834	C421	C421.1	Illustrate the importance of system simulation and make use of different techniques to simulate various systems.
		C421.2	Analyze the real world phenomena by using appropriate statistical models and perform the the analysis of queing models through simulation.
		C421.3	Analyze and examine the properties of random numbers and generate random variates using different techniques.
		C421.4	Examine the use of input models in simulation by choosing the statistical distributions and perform the output analysis of simulation.
		C421.5	Interpret the output performance of simulation data and discuss the verification and validation process of the simulation model.
		C422.1	Relate the Hypothesis and basic knowledge acquired and apply them to the real-world scenario.

15CS84	**C422**	**C422.2**	Realize and report the structural flow of the organization and critical issue management process.
		C422.3	Realize and practice the modern tools and techniques to solve complex engineering problems at appropriate level
		C422.4	Demonstrate Professional values by satisfying requirements and code of conduct of Industrial practices
		C422.5	Interact effectively with industrial stakeholders to acquire the experience and enable life-long learning
		C422.6	Monitor the workflow day to day activities and document the findings in a presentable format
		C422.7	Present effectively the knowledge and experience gained during Internship.
15ISP85	**C423**	**C423.1**	Acquire and evaluate latest developments in the research regarding technological advancement in engineering disciplines and their impact on social, cultural, environmental and legal aspects
		C423.2	Analyse complex Engineering problems and apply appropriate engineering tools and techniques in design process
		C423.3	Work collaboratively with interdisciplinary departments, industries and agencies while planning and executing the project/research to appraise the advance technologies
		C423.4	Design and develop solutions to the complex engineering problems through innovative approaches
		C423.5	Execute responsibilities as a team member and contribute innovative ideas to accomplish the defined objectives and outcomes
		C423.6	Demonstrate a responsible, ethical and professional attitude regarding the role of engineers in society, including financial and cultural aspects
		C423.7	Prepare a high-quality engineering documents and exhibit a clear and coherent presentation of project/research findings to a range of technical and nontechnical audiences
15ISP86	**C424**	**C424.1**	Identify the research papers/applied knowledge resources on latest trends in area of interest and formulate objectives of the study.
		C424.2	Acquaint literatures review methods and identify the significant technical information relevant to selected topic.
		C424.3	Interpret the observations with hypothesis and summarize the conclusions.
		C424.4	Adopting logical though process and sift the findings efficiently to produce well-structured and tailored report.
		C424.5	Prepare and present the outcomes of the observations and suggestions to improve the future scope.