UG-B.E (CS) 2018-Scheme COs

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	
COURSE CODE	18CPS13/23-C PROGRAMMING FOR PROBLEM SOLVING
CO1	Illustrate simple algorithms from the different domains such as mathematics, physics etc
CO2	construct programming solution to the given problem using C
CO3	Identify and correct the syntax and logical errors in C programs
CO4	Modularise the given problems using functions and structures.
COURSE CODE	18CPS17/27-C PROGRAMMING LABORATORY
CO1	Write Algorithms, flowchats, programs for simple problems
CO2	Correct Syntax and logical errors to execute a program
CO3	write irerative and wherever possible recursive programs
CO4	Demonstrate use of functions, arrays, strings, structures and pointers in problem solving
COURSE CODE	18CS32-DATA STRUCTURES AND APPLICATIONS
CO1	Use different types of data structures, operations and algorithms
CO2	Apply searching and sorting operations on files
CO3	Use stack, Queue, Lists, Trees and Graphs in problem solving
CO4	Implement all data structures in a high-level language for problem solving.
COURSE CODE	18CS33-ANALOG AND DIGITAL ELECTRONICS
CO1	Design and analyze application of analog circuits using photo devices, timer IC, power supply and regulator IC and op-amp.
CO2	Explain the basic principles of A/D and D/A conversion circuits and develop the same.
CO3	Simplify digital circuits using Karnaugh Map , and Quine-McClusky Methods
CO4	Explain Gates and flip flops and make us in designing different data processing circuits, registers and counters and compare the types.
CO5	Develop simple HDL programs
COURSE CODE	18CS34-COMPUTER ORGANIZATION
CO1	Explain the basic organization of a computer system.
CO2	Demonstrate functioning of different sub systems, such as processor, Input/output,and memory. Illustrate hardwired control and micro programmed control, pipelining, embedded and other computing systems.
CO3	Design and analyse simple arithmetic and logical units.
COURSE CODE	18CS35-SOFTWARE ENGINEERING
CO1	Design a software system, component, or process to meet desired needs within realistic constraints.
CO2	Assess professional and ethical responsibility
CO3	Function on multi-disciplinary teams
CO4	Use the techniques, skills, and modern engineering tools necessary for engineering practice
CO5	Analyze, design, implement, verify, validate, implement, apply, and maintain software systems or parts of software systems

COURSE CODE	18CS36-DISCRETE MATHEMATICAL STRUCTURES
CO1	Use propositional and predicate logic in knowledge representation and truth verification.
CO2	Demonstrate the application of discrete structures in different fields of computer science.
CO3	Solve problems using recurrence relations and generating functions.
CO4	Application of different mathematical proofs techniques in proving theorems in the courses.
CO5	Compare graphs, trees and their applications.
COURSE CODE	18CSL37-ANALOG AND DIGITAL ELECTRONICS LABORATORY
CO1	Use appropriate design equations / methods to design the given circuit.
CO2	Examine and verify the design of both analog and digital circuits using simulators.
CO3	Make us of electronic components, ICs, instruments and tools for design and testing of circuits for the given the appropriate inputs.
CO4	Compile a laboratory journal which includes; aim, tool/instruments/software/components used, design equations used and designs, schematics, program listing, procedure followed, relevant theory, results as graphs and tables, interpreting and concluding the findings.
COURSE CODE	18CSL38-DATA STRUCTURES LABORATORY
CO1	Analyze and Compare various linear and non-linear data structures
CO2	Code, debug and demonstrate the working nature of different types of data structures and their applications
CO3	Implement, analyze and evaluate the searching and sorting algorithms
CO4	Choose the appropriate data structure for solving real world problems
COURSE CODE	18CS42-DESIGN AND ANALYSIS OF ALGORITHMS
CO1	Describe computational solution to well-known problems like searching, sorting etc.
CO2	Estimate the computational complexity of different algorithms.
CO3	Devise an algorithm using appropriate design strategies for problem solving.
COURSE CODE	18CS43-OPERATING SYSTEMS
CO1	Demonstrate need for OS and different types of OS
CO2	Apply suitable techniques for management of different resources
CO3	Use processor, memory, storage and file system commands
CO4	Realize the different concepts of OS in platform of usage through case studies
COURSE CODE	18CS44-MICROCONTROLLER AND EMBEDDED SYSTEMS
CO1	Describe the architectural features and instructions of ARM microcontroller
CO2	Apply the knowledge gained for Programming ARM for different applications.
CO3	Interface external devices and I/O with ARM microcontroller.
CO4	Interpret the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.
CO5	Develop the hardware /software co-design and firmware design approaches.
CO6	Demonstrate the need of real time operating system for embedded system applications
COURSE CODE	18CS45-OBJECT ORIENTED CONCEPTS
CO1	Explain the object-oriented concepts and JAVA.
CO2	Develop computer programs to solve real world problems in Java.

CO3	Develop simple GUI interfaces for a computer program to interact with users, and to understand the event-based GUI handling principles using swings.
COURSE CODE	18CS46-DATA COMMUNICATION
CO1	Explain the various components of data communication.
CO2	Explain the fundamentals of digital communication and switching.
CO3	Compare and contrast data link layer protocols.
CO4	Summarize IEEE 802.xx standards
COURSE CODE	18CSL47-DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY
CO1	Design algorithms using appropriate design techniques (brute-force, greedy, dynamic programming, etc.)
CO2	Implement a variety of algorithms such assorting, graph related, combinatorial, etc., in a high level language.
CO3	Analyze and compare the performance of algorithms using language features.
CO4	Apply and implement learned algorithm design techniques and data structuresto solve real-world problems
COURSE CODE	18CSL48-MICROCONTROLLER AND EMBEDDED SYSTEMS LABORATORY
CO1	Develop and test program using ARM7TDMI/LPC2148
CO2	Conduct the following experiments on an ARM7TDMI/LPC2148 evaluation board using evaluation version of Embedded 'C' & Keil Uvision-4 tool/compiler.
COURSE CODE	18CS51-MANAGEMENT AND ENTREPRENEURSHIP FOR IT INDUSTRY
CO1	Define management, organization, entrepreneur, planning, staffing, ERP and outline their importance in entrepreneurship
CO2	Utilize the resources available effectively through ERP
CO3	Make use of IPRs and institutional support in entrepreneurship
COURSE CODE	18CS52-COMPUTER NETWORKS AND SECURITY
CO1	Explain principles of application layer protocols
CO2	Recognize transport layer services and infer UDP and TCP protocols
CO3	Classify routers, IP and Routing Algorithms in network layer
CO4	Understand the Wireless and Mobile Networks covering IEEE 802.11 Standard
CO5	Describe Multimedia Networking and Network Management
COURSE CODE	18CS53-DATABASE MANAGEMENT SYSTEM
CO1	Identify, analyze and define database objects, enforce integrity constraints on a database using RDBMS.
CO2	Use Structured Query Language (SQL) for database manipulation.
CO3	Design and build simple database systems
CO4	Develop application to interact with databases
COURSE CODE	18CS54-AUTOMATA THEORY AND COMPUTABILITY
CO1	Acquire fundamental understanding of the core concepts in automata theory and Theory of Computation
CO2	Learn how to translate between different models of Computation (e.g., Deterministic and Non-deterministic and Software models).
CO3	Design Grammars and Automata (recognizers) for different language classes and become knowledgeable about restricted models of Computation (Regular, Context Free) and their relative powers.
CO4	Develop skills in formal reasoning and reduction of a problem to a formal model, with an emphasis on semantic precision and conciseness.
CO5	Classify a problem with respect to different models of Computation.

COURSE CODE	18CS55-APPLICATION DEVELOPMENT USING PYTHON
CO1	Demonstrate proficiency in handling of loops and creation of functions.
CO2	Identify the methods to create and manipulate lists, tuples and dictionaries.
CO3	Discover the commonly used operations involving regular expressions and file system.
CO4	Interpret the concepts of Object-Oriented Programming as used in Python.
CO5	Determine the need for scraping websites and working with CSV, JSON and other file formats.
COURSE CODE	18CS56-UNIX PROGRAMMING
CO1	Explain Unix Architecture, File system and use of Basic Commands
CO2	Illustrate Shell Programming and to write Shell Scripts
CO3	Categorize, compare and make use of Unix System Calls
CO4	Build an application/service over a Unix system.
COURSE CODE	18CSL57-COMPUTER NETWORK LABORATORY
CO1	Analyze and Compare various networking protocols.
CO2	Demonstrate the working of different concepts of networking.
CO3	Implement, analyze and evaluate networking protocols in NS2 / NS3 and JAVA programming language
COURSE CODE	18CSL58-DBMS LABORATORY WITH MINI PROJECT
CO1	Create, Update and query on the database.
CO2	Demonstrate the working of different concepts of DBMS
CO3	Implement, analyze and evaluate the project developed for an application.
COURSE CODE	18CIV59-ENVIRONMENTAL STUDIES
CO1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale,
CO2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
CO3	Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components.
CO4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.
COURSE CODE	18CS61-SYSTEM SOFTWARE AND COMPILERS
CO1	Explain system software
CO2	Design and develop lexical analyzers, parsers and code generators
CO3	Utilize lex and yacc tools for implementing different concepts of system software
COURSE CODE	18CS62-COMUTER GRAPHICS AND VISUALIZATION
CO1	Design and implement algorithms for 2D graphics primitives and attributes.
CO2	Illustrate Geometric transformations on both 2D and 3D objects.
CO3	Apply concepts of clipping and visible surface detection in 2D and 3D viewing, and Illumination Models.
CO4	Decide suitable hardware and software for developing graphics packages using OpenGL.
COURSE CODE	18CS63-WEB TECHNOLOGY AND ITS APPLICATIONS
CO1	Adapt HTML and CSS syntax and semantics to build web pages.
CO2	Construct and visually format tables and forms using HTML and CSS

CO3	Develop Client-Side Scripts using JavaScript and Server-Side Scripts using PHP to generate and display the contents dynamically.
CO4	Appraise the principles of object oriented development using PHP
CO5	Inspect JavaScript frameworks like jQuery and Backbone which facilitates developer to focus on core features.
COURSE CODE	18CS642-OBJECT ORIENTED MODELING AND DESIGN
CO1	Describe the concepts of object-oriented and basic class modelling.
CO2	Draw class diagrams, sequence diagrams and interaction diagrams to solve problems.
CO3	Choose and apply a befitting design pattern for the given problem
COURSE CODE	18EE653-RENEWABLE ENERGY RESOURCES
CO1	Discuss causes of energy scarcity and its solution, energy resources and availability of renewable energy.
CO2	Outline energy from sun, energy reaching the Earth's surface and solar thermal energy applications.
CO3	Discuss types of solar collectors, their configurations, solar cell system, its characteristics and their applications.
CO4	Explain generation of energy from hydrogen, wind, geothermal system, solid waste and agriculture refuse.
CO5	Discuss production of energy from biomass, biogas.
CO6	Summarize tidal energy resources, sea wave energy and ocean thermal energy.
COURSE CODE	18CSL66-SYSTEM SOFTWARE LABORATORY
CO1	Implement and demonstrate Lexer‟s and Parser‟s
CO2	Evaluate different algorithms required for management, scheduling, allocation and communication used in operating system.
COURSE CODE	18CSL67-COMPUTER GRAPHICS LABORATORY WITH MINI PROJECT
CO1	Apply the concepts of computer graphics
CO2	Implement computer graphics applications using OpenGL
CO3	Animate real world problems using OpenGL
COURSE CODE	18CSMP68-MOBILE APPLICATION DEVELOPMENT
CO1	Create, test and debug Android application by setting up Android development environment.
CO2	Implement adaptive, responsive user interfaces that work across a wide range of devices.
CO3	Infer long running tasks and background work in Android applications.
CO4	Demonstrate methods in storing, sharing and retrieving data in Android applications.
COURSE CODE	18CS71-ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
CO1	Appaise the theory of Artificial intelligence and Machine Learning.
CO2	Illustrate the working of AI and ML Algorithms.
CO3	Demonstrate the applications of AI and ML.
COURSE CODE	18CS72-BIG DATA AND ANALYTICS
CO1	Understand fundamentals of Big Data analytics.
CO2	Investigate Hadoop framework and Hadoop Distributed File system.
CO3	Illustrate the concepts of NoSQL using MongoDB and Cassandra for Big Data.
CO4	Demonstrate the MapReduce programming model to process the big data along with Hadoop tools.

CO5	Use Machine Learning algorithms for real world big data.
CO6	Analyze web contents and Social Networks to provide analytics with relevant visualization tools.
COURSE CODE	18CS733-ADVANCED COMPUTER ARCHITECTURES
CO1	Explain the concepts of parallel computing and hardware technologies
CO2	Compare and contrast the parallel architectures
CO3	Illustrate parallel programming concepts
COURSE CODE	18CS742-NETWORK MANAGEMENT
CO1	Analyze the issues and challenges pertaining to management of emerging network technologies such as wired/wireless networks and high-speed internets.
CO2	Apply network management standards to manage practical networks
CO3	Formulate possible approaches for managing OSI network model.
CO4	Use on SNMP for managing the network
CO5	Use RMON for monitoring the behavior of the network
CO6	Identify the various components of network and formulate the scheme for the managing them
COURSE CODE	18EE753-DISASTER MANAGEMENT
CO1	Discuss disaster management plan, cyclones and their hazard potential
CO2	Understand the role of IMD and cyclone prediction and cyclone warning system in India
CO3	Understand the role of different institutions defence and other services in natural disaster management.
CO4	Understand the role of Central Water Commission in river water sharing, Draught, its assessment and draught management plan
COURSE CODE	18CSL76-ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING LABORATORY
CO1	Implement and demonstrate AI and ML algorithms.
CO2	Evaluate different algorithms.
COURSE CODE	18CS81-INTERNET OF THINGS
CO1	Interpret the impact and challenges posed by IoT networks leading to new architectural models.
CO2	Compare and contrast the deployment of smart objects and the technologies to connect them to network.
CO3	Appraise the role of IoT protocols for efficient network communication.
CO4	Elaborate the need for Data Analytics and Security in IoT.
CO5	Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry
COURSE CODE	18CS823-NOSQL DATABASE
CO1	Define, compare and use the four types of NoSQL Databases (Document-oriented, KeyValue Pairs, Column-oriented and Graph).
CO2	Demonstrate an understanding of the detailed architecture, define objects, load data, query data and performance tune Column-oriented NoSQL databases.
CO3	Explain the detailed architecture, define objects, load data, query data and performance tune Document-oriented NoSQL databases.

PG-B.E (CS) 2018-Scheme COs	
COURSE CODE	18SCS11-MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE
CO1	Understand the numerical methods to solve and find the roots of the equations.
CO2	Utilize the statistical tools in multi variable distributions.
CO3	Use probability formulations for new predictions with discrete and continuous RV's.
CO4	To understand various graphs in different geometries related to edges.
CO5	Understand vector spaces and related topics arising in magnification and rotation of images.
COURSE CODE	18SCS12-ADVANCES IN OPERATING SYSTEMS
CO1	Demonstrate the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system
CO2	Learn the various resource management techniques for distributed systems
CO3	Identify the different features of real time and mobile operating system
CO4	Modify existing open source kernels in terms of functionality or features used
COURSE CODE	18SCS13-ADVANCES IN DATA BASE MANAGEMENT SYSTEMS
CO1	Select the appropriate high performance database like parallel and distributed database
CO2	Infer and represent the real world data using object oriented database
CO3	Interpret rule set in the database to implement data warehousing of mining
CO4	Discover and design database for recent applications database for better interoperability
COURSE CODE	18SCS14-INTERNET OF THINGS
CO1	Develop schemes for the applications of IOT in real time scenarios
CO2	Manage the Internet resources
CO3	Model the Internet of things to business
CO4	Understand the practical knowledge through different case studies
CO5	Understand data sets received through IoT devices and tools used for analysis
COURSE CODE	18SCS151-ADVANCES IN COMPUTER NETWORKS
CO1	List and classify network services, protocols and architectures, explain why they are layered.
CO2	Choose key Internet applications and their protocols, and apply to develop their own applications (e.g. Client Server applications, Web Services) using the sockets API.
CO3	Explain develop effective communication mechanisms using techniques like connection establishment, queuing theory, recovery Etc.
CO4	Explain various congestion control techniques.
COURSE CODE	18SCSL16-ADBMS AND IOT LABORATORY
CO1	Work on the concepts of Software Testing and ADBMS at the practical level
CO2	Compare and pick out the right type of software testing process for any given real world problem
CO3	Carry out the software testing process in efficient way
CO4	Establish a quality environment as specified in standards for developing quality software
CO5	Model and represent the real world data using object oriented database
CO6	Embed the rules set in the database to implement various features of ADBMS

CO7	Choose, design and implement recent applications database for better interoperability
COURSE CODE	18SCS21-MANAGING BIG DATA
CO1	Describe big data and use cases from selected business domains
CO2	Explain NoSQL big data management
CO3	Install, configure, and run Hadoop and HDFS
CO4	Perform map-reduce analytics using Hadoop
CO5	Use Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data Analytics
COURSE CODE	18SCS22-ADVANCED ALGORITHMS
CO1	Design and apply iterative and recursive algorithms.
CO2	Design and implement optimization algorithms in specific applications.
CO3	Design appropriate shared objects and concurrent objects for applications
COURSE CODE	18SCS23-CLOUD COMPUTING
CO1	Compare the strengths and limitations of cloud computing
CO2	Identify the architecture, infrastructure and delivery models of cloud computing
CO3	Apply suitable virtualization concept.
CO4	Choose the appropriate cloud player
CO5	Address the core issues of cloud computing such as security, privacy and interoperability
CO6	Design Cloud Services
CO7	Set a private cloud
COURSE CODE	18SCS241-ADVANCES IN STORAGE AREA NETWORKS
CO1	Identify the need for performance evaluation and the metrics used for it
CO2	Apply the techniques used for data maintenance.
CO3	Realize strong virtualization concepts
CO4	Develop techniques for evaluating policies for LUN masking, file systems
COURSE CODE	18SCS253-OBJECT ORIENTED SOFTWARE ENGINEERING
CO1	Apply Object Oriented Software Engineering approach in every aspect of software project
CO2	Analyze the requirements from various domains
CO3	Adapt appropriate object oriented design aspects in the development process
CO4	Implement and test the software projects using object oriented approach
CO5	Learn the issues and concepts relating to maintenance of software projects
CO6	Adapt the concepts and tools related to software configuration management
COURSE CODE	18SCS31-MACHINE LEARNING TECHNIQUES
CO1	Choose the learning techniques with this basic knowledge.
CO2	Apply effectively neural networks and genetic algorithms for appropriate applications.
CO3	Apply bayesian techniques and derive effectively learning rules.
CO4	Choose and differentiate reinforcement and analytical learning techniques
COURSE CODE	18SCS323-WIRELESS NETWORKS AND MOBILE COMPUTING
CO1	Explain state of art techniques in wireless communication.
CO2	Discover CDMA, GSM. Mobile IP, WImax
CO3	Demonstrate program for CLDC, MIDP let model and security concerns

COURSE CODE	18SCS332-SOFTWARE PROJECT PLANNING AND MANAGEMENT
CO1	Evaluate a project to develop the scope of work, provide accurate cost estimates and to plan the various activities
CO2	Apply risk management analysis techniques that identify the factors that put a project at risk and to quantify the likely effect of risk on project timescales
CO3	Identify the resources required for a project and to produce a work plan and resource schedule
CO4	Monitor the progress of a project and to assess the risk of slippage, revising targets counteract drift
CO5	Use appropriate metrics to management the software development outcome
CO6	Develop research methods and techniques appropriate to defining, planning and carrying out a research project within your chosen specialist area within the management of software projects.