Department of Computer Engineering

Course Outcomes (CO)

COURSE PATTERN 2019 SE COMPUTER ENGINEERING			
SE SEM-III			
Course Code	**Course Name**	**COs**	**Course Outcomes**
210241	**Discrete Mathematics**	**1**	Design and analyze real world engineering problems by applying set theory, propositional logic and mathematical induction.
		2	Develop skill in expressing mathematical properties of relation and function.
		3	Identify number of logical possibilities of events to design professional engineering Solutions.
		4	Model and solve computing problem using tree and graph Analyze the properties of binary operations and evaluate the algebraic structure.
		5	Apply abstract algebra in combinatorics, coding theory and questions regarding geometric constructions.
210242	**Fundamentals of Data Structures**	**1**	To demonstrate a detailed understanding of behaviour of data structures like array, linked list, stack, and queue by developing programs.
		2	To use appropriate algorithmic strategy for better efficiency.
		3	To summarize data searching and sorting techniques.
		4	To discriminate the usage of various structures in approaching the problem solution.
		5	To analyze and use effective and efficient data structures in solving various Computer Engineering domain problems.
		6	To design the algorithms to solve the programming problems.
210243	**Object Oriented Programming**	**1**	Analyze the strengths of object oriented programming
		2	Design and apply OOP principles for effective programming.

		3	Develop the application using object-oriented programming language (C++).
		4	Apply object-oriented concepts for advanced programming.
210244	**Computer Graphics**	**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.
		2	Define the concept of windowing and clipping and apply various algorithms to fill and clip polygons.
		3	Explain the core concepts of computer graphics, including transformation in two and three dimensions, viewing and projection.
		4	Explain the concepts of color models, lighting, shading models and hidden surface elimination.
		5	Describe the fundamentals of curves, fractals, animation and gaming.
210245	**Digital Electronics and Logic Design**	**1**	Simplify Boolean Expressions using K Map.
		2	Design and implement combinational circuits.
		3	Design and implement sequential circuits.
		4	Develop simple real-world application using ASM and PLD.
		5	Choose appropriate logic families IC packages as per the given design specifications.
		6	Explain organization and architecture of computer system.
210246	**Humanity & Social Science**	**1**	Aware of the various issues concerning humans and society.

		2	Aware about their responsibilities towards society.
		3	Sensitized about broader issues regarding the social, cultural, economic and human aspects, involved in social changes.
		4	Able to understand the nature of the individual and the relationship between self and the community
		5	Able to understand major ideas, values, beliefs, and experiences that have shaped human history and cultures.
210251 (I)	**Audit Course III: Green Construction & Design**	**1**	To understand the importance of environment friendly society.
		2	To apply primary measures to reduce carbon emissions from their surroundings.
		3	To learn role of IT solutions in design of green buildings.
		4	To understand the use of software systems to complete statutory compliances involved in the design of a new home or office building through green construction.
210251 (II)	**Audit Course III: Social Awareness and Governance Program**	**1**	Understand social issues and responsibilities as member of society.
		2	Apply social values and ethics in decision making at social or organizational level.
		3	Promote obstacles in national integration and role of youth for National Integration.
		4	Demonstrate basic features of Indian Constitution.
210251 (III)	**Audit Course III:Environmental Studies**	**1**	Comprehend the importance of ecosystem and biodiversity.
		2	To correlate the human population growth and its trend to the environmental degradation and develop the awareness about his/her role towards environmental protection and

			Prevention.
		3	Identify different types of environmental pollution and control measures.
		4	To correlate the exploitation and utilization of conventional and non-conventional resources.
210251 (IV)	**Audit Course-III: Smart Cities**	**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
		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.
		3	Knowledge about data-informed approaches for the development of the future city, based on crowd sourcing and sensing.
		4	Knowledge about the latest research results in for the development and management of future cities.
		5	Understanding how citizens can benefit from data-informed design to develop smart and responsive cities.
210251 (V)	**Audit Course-III: Foreign Language- Japanese (Module 1)**	**1**	Will have ability of basic communication.
		2	Will have the knowledge of Japanese script.
		3	Will get introduced to reading, writing and listening skills.
		4	Will develop interest to pursue professional Japanese Language course.

COURSE PATTERN 2019 SE COMPUTER ENGINEERING

SE SEM-IV

Course Code	Course Name	COs	Course Outcomes
207003	Engineering Mathematics III	1	Solve Linear differential equations, essential in modelling and design of computer-based systems.
		2	Apply concept of Fourier transform and Z-transform and its applications to continuous and discrete systems and image processing.
		3	Apply Statistical methods like correlation and regression analysis and probability theory for data analysis and predictions in machine learning.
		4	Solve Algebraic and Transcendental equations and System of linear equations using numerical techniques.
		5	Obtain Interpolating polynomials, numerical differentiation and integration, numerical solutions of ordinary differential equations used in modern scientific computing.
210252	Data Structures and Algorithms	1	Identify and articulate the complexity goals and benefits of a good hashing scheme for real-world applications.
		2	Apply non-linear data structures for solving problems of various domain.
		3	Design and specify the operations of a nonlinear-based abstract data type and implement them in a high-level programming language.
		4	Analyze the algorithmic solutions for resource requirements and optimization.
		5	Use efficient indexing methods and multiway search techniques to store and maintain data.
		6	Use appropriate modern tools to understand and analyze the functionalities confined to the secondary storage.

210253	**Software Engineering**	**1**	Analyze software requirements and formulate design solution for a software.
		2	Design applicable solutions in one or more application domains using software engineering approaches that integrate ethical, social, legal and economic concerns.
		3	Apply new software models, techniques and technologies to bring out innovative and novelistic solutions for the growth of the society in all aspects and evolving into their continuous professional development.
		4	Model and design User interface and component-level.
		5	Identify and handle risk management and software configuration management.
		6	Utilize knowledge of software testing approaches, approaches to verification and validation.
		7	Construct software of high quality – software that is reliable, and that is reasonably easy to understand, modify and maintain efficient, reliable, robust and cost-effective software solutions.
210254	**Microprocessor**	**1**	Exhibit skill of assembly language programming for the application.
		2	Classify Processor architectures.
		3	Illustrate advanced features of 80386 Microprocessor.
		4	Compare and contrast different processor modes.
		5	Use interrupts mechanism in applications
		6	Differentiate between Microprocessors and Microcontrollers.
		7	Identify and analyze the tools and techniques used to design, implement, and debug microprocessor-based systems.
210255		**1**	Make use of basic principles of programming languages.

	Principles of Programming Languages	**2**	Develop a program with Data representation and Computations.
		3	Develop programs using Object Oriented Programming language: Java.
		4	Develop application using inheritance, encapsulation, and polymorphism.
		5	Demonstrate Multithreading for robust application development.
		6	Develop a simple program using basic concepts of Functional and Logical programming paradigm.
210258:	**Project Based Learning II**	**1**	Identify the real life problem from societal need point of view
		2	Choose and compare alternative approaches to select most feasible one.
		3	Analyze and synthesize the identified problem from technological perspective.
		4	Design the reliable and scalable solution to meet challenges.
		5	Evaluate the solution based on the criteria specified
		6	Inculcate long life learning attitude towards the societal problems.
210259	**Code of Conduct**	**1**	Understand the basic perception of profession, professional ethics, various moral and social issues, industrial standards, code of ethics and role of professional ethics in engineering field.
		2	Aware of professional rights and responsibilities of an engineer, responsibilities of an engineer for safety and risk benefit analysis.
		3	Understand the impact of the professional Engineering solutions in societal and Environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

		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.
210260 (I)	**Audit Course 4 Water Management**	**1**	Understand the global water cycle and its various processes.
		2	Understand climate change and their effects on water systems.
		3	Understand Drinking treatment and quality of groundwater and surface water.
		4	Understand the Physical, chemical, and biological processes involved in water treatment and distribution.
210260 (II)	**Audit Course 4 Intellectual Property Rights and Patents**	**1**	Understand the fundamental legal principles related to confidential information,copyright, patents, designs, trademarks and unfair competition
		2	Identify, apply and assess principles of law relating to each of these areas of intellectual property
		3	Apply the appropriate ownership rules to intellectual property you have been involved in creating
210260 (III)	**Audit Course 4 The Science of Happiness**	**1**	Understand what happiness is and why it matters to you.
		2	Learn how to increase your own happiness.
		3	Understand of the power of social connections and the science of empathy.
		4	Understand what is mindfulness and its real world applications.
210260 (IV)	**Audit Course 4 Yoga and Meditation**	**1**	Understand philosophy and religion as well as daily life issues will be challenged and enhanced.
		2	Enhances the immune system.
		3	Intellectual and philosophical understanding of the theory of yoga and basic related Hindu scriptures will be developed.

		4	Powers of concentration, focus, and awareness will be heightened.
210260 (V)	**Audit Course 4 Foreign Language (Japanese) Module 2**	**1**	have ability of basic communication.
		2	have the knowledge of Japanese script.
		3	get introduced to reading, writing and listening skills.
		4	develop interest to pursue professional Japanese Language course.

Department of Computer Engineering

Course Outcomes (CO)

COURSE PATTERN 2019 TE COMPUTER ENGINEERING			
TE SEM-V			
Course Code	**Course Name**	**COs**	**Course Outcomes**
310241	**Database Management System**	**1**	Analyze and design Database Management System using ER model.
		2	Implement database queries using database languages
		3	Normalize the database design using normal forms
		4	Apply Transaction Management concepts in real-time situations
		5	Use NoSQL databases for processing unstructured data
		6	Differentiate between Complex Data Types and analyze the use of appropriate data types
310242	**Theory of Computation**	**1**	Understand formal language, translation logic, essentials of translation, alphabets, language representation and apply it to design Finite Automata and its variants
		2	Construct regular expression to present regular language and understand pumping lemma for RE
		3	Design Context Free Grammars and learn to simplify the grammar
		4	Construct Pushdown Automaton model for the Context Free Language
		5	Devise Turing Machine for the different requirements outlined by theoretical computer science
		6	Devise Turing Machine for the different requirements outlined by theoretical computerscience

310243	**Systems Programming and Operating System**	**1**	Analyze and synthesize basic System Software and its functionality.
		2	Identify suitable data structures and Design & Implement various System Software
		3	Compare different loading schemes and analyze the performance of linker and loader
		4	Implement and Analyze the performance of process scheduling algorithms
		5	Identify the mechanism to deal with deadlock and concurrency issues
		6	Demonstrate memory organization and memory management policies
310244	**Computer Networks and Security**	**1**	Summarize fundamental concepts of Computer Networks, architectures, protocols and technologies
		2	Illustrate the working and functions of data link layer
		3	Analyze the working of different routing protocols and mechanisms
		4	Implement client-server applications using sockets
		5	Implement client-server applications using sockets
		6	Comprehend the basics of Network Security
310245(A)	**Internet of Things and Embedded Systems**	**1**	Understand the fundamentals and need of Embedded Systems for the Internet of Things
		2	Apply IoT enabling technologies for developing IoT systems
		3	Apply design methodology for designing and implementing IoT applications
		4	Analyze IoT protocols for making IoT devices communication
		5	Design cloud based IoT systems
		6	Design and Develop secured IoT applications

310245(B)	**Human Computer Interface**	**1**	.Design effective Human-Computer-Interfaces for all kinds of users
		2	Apply and analyze the user-interface with respect to golden rules of interface
		3	Analyze and evaluate the effectiveness of a user-interface design
		4	Implement the interactive designs for feasible data search and retrieval
		5	Analyze the scope of HCI in various paradigms like ubiquitous computing, virtual reality ,multi-media, World wide web related environments
		6	Analyze and identify user models, user support, and stakeholder requirements of HCI systems
310245(C)	**Distributed Systems**	**1**	Analyze Distributed Systems types and architectural styles
		2	Implement communication mechanism in Distributed Systems
		3	Implement the synchronization algorithms in Distributed System applications
		4	Develop the components of Distributed File System
		5	Apply replication techniques and consistency model in Distributed Systems
		6	Build fault tolerant Distributed Systems
310245(D)	**Software Project Management**	**1**	Comprehend Project Management Concepts
		2	Use various tools of Software Project Management
		3	Schedule various activities in software projects
		4	Track a project and manage changes
		5	Apply Agile Project Management
		6	Analyse staffing process for team building and decision making in Software Projects and Management

310249	**Seminar and Technical Communication**	**1**	.Analyze a latest topic of professional interest
		2	Enhance technical writing skills
		3	Identify an engineering problem, analyze it and propose a work plan to solve it
		4	Communicate with professional technical presentation skills
310250 (A)	**Audit course 5: Cyber Security**	**1**	Understand and classify various cybercrimes
		2	Understand how criminals plan for the cybercrimes
		3	Apply tools and methods used in cybercrime
		4	Analyze the examples of few case studies of cybercrimes
310250 (B)	**Audit course 5: Professional Ethics and Etiquettes**	**1**	Summarize the principles of proper courtesy as they are practiced in the workplace.
		2	Apply proper courtesy in different professional situations.
		3	Practice and apply appropriate etiquettes in the working environment and day to day life.
		4	Build proper practices personal and business communications of Ethics and Etiquettes.
310250 (C)	**Audit course 5: Learn New Skills-full Stack Developer**	**1**	Design and develop web application using frontend and backend technologies.
		2	Design and develop dynamic and scalable web applications
		3	Develop server side scripts
		4	Design and develop projects applying various database techniques
310250 (D)	**Audit course 5: Engineering Economics**	**1**	Understand economics, the cost money and management in engineering
		2	Analyze business economics and engineering assets evaluation
		3	Evaluate project cost and its elements for business
		4	Develop financial statements and make business decisions

310250(E)	**Audit Course 5: Foreign Language (Japanese)- Module 3**	**1**	Apply language to communicate confidently and clearly in the Japanese language
		2	Understand and use Japanese script to read and write
		3	Apply knowledge for next advance level reading, writing and listening skills
		4	Develop interest to pursue further study, work and leisure

COURSE PATTERN 2019 TE COMPUTER ENGINEERING

TE SEM-VI

Course Code	Course Name	COs	Course Outcomes
310251	**Data Science and Big Data Analytics**	**1**	Analyze needs and challenges for Data Science Big Data Analytics
		2	Apply statistics for Big Data Analytics
		3	Apply the lifecycle of Big Data analytics to real world problems
		4	Implement Big Data Analytics using Python programming
		5	Implement data visualization using visualization tools in Python programming
		6	Design and implement Big Databases using the Hadoop ecosystem
310252	**Web Technology**	**1**	Implement and analyze behavior of web pages using HTML and CSS
		2	Apply the client side technologies for web development
		3	Analyze the concepts of Servlet and JSP
		4	Analyze the Web services and frameworks
		5	Apply the server side technologies for web development
		6	Create the effective web applications for business functionalities using latest web development platforms

310253	**Artificial Intelligence**	**1**	Identify and apply suitable Intelligent agents for various AI applications
		2	Build smart system using different informed search / uninformed search or heuristic approaches
		3	Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem.
		4	Apply the suitable algorithms to solve AI problems
		5	Implement ideas underlying modern logical inference systems.
		6	Represent complex problems with expressive yet carefully constrained language of representation
310254(A)	**Elective II: Information Security**	**1**	Model the cyber security threats and apply formal procedures to defend the attacks
		2	Apply appropriate cryptographic techniques by learning symmetric and asymmetric keycryptography
		3	Design and analyze web security solutions by deploying various cryptographic techniquesalong with data integrity algorithms
		4	Identify and Evaluate Information Security threats and vulnerabilities in Informationsystems and apply security measures to real time scenarios
		5	Demonstrate the use of standards and cyber laws to enhance Information Security in the development process and infrastructure protection
310254(B)	**Elective II: Augmented and Virtual Reality**	**1**	Understand the basics of Augmented and Virtual reality systems and list theirapplications
		2	Describe interface to the Virtual World with the help of input and output devices
		3	Explain representation and rendering system in the context of Virtual Reality
		4	Analyze manipulation, navigation and interaction of elements in the virtual world
		5	Summarize the basic concepts and hardware of Augmented Reality system
		6	Create Mobile Augmented Reality using Augmented Reality

			techniques and software
310254(C)	**Elective II: Cloud Computing**	**1**	Understand the different Cloud Computing environment
		2	Use appropriate data storage technique on Cloud, based on Cloud application
		3	Analyze virtualization technology and install virtualization software
		4	Develop and deploy applications on Cloud
		5	Apply security in cloud applications
		6	Use advance techniques in Cloud Computing
310254(D)	**Elective II: Software Modeling and Architecture**	**1**	Analyze the problem statement (SRS) and choose proper design technique for designingweb-based/ desktop application
		2	Design and analyze an application using UML modeling as fundamental tool
		3	Evaluate software architectures
		4	Use appropriate architectural styles and software design patterns
		5	Apply appropriate modern tool for designing and modeling
310255	**Internship**	**1**	To demonstrate professional competence through industry internship.
		2	To apply knowledge gained through internships to complete academic activities in aprofessional manner.
		3	To choose appropriate technology and tools to solve given problem.
		4	To demonstrate abilities of a responsible professional and use ethical practices in day today life.
		5	Creating network and social circle, and developing relationships with industry people.
		6	To analyze various career opportunities and decide carrier goals.
310259(A)	**Audit Course 6: Digital and Social Media Marketing**	**1**	Understand the fundamentals and importance of digital marketing
		2	Use the power of social media for business marketing
		3	Analyze the effectiveness of digital marketing and social media over traditionalprocess

310259(B)	**Audit Course 6: Sustainable Energy Systems**	**1**	.Comprehend the importance of Sustainable Energy Systems
		2	Correlate the human population growth and its trend to the natural resource degradation and develop the awareness about his/her role towards Sustainable Energy Systems protection
		3	Identify different types of natural resource pollution and control measures
		4	Correlate the exploitation and utilization of conventional and non-conventional resources
310259(C)	**Audit Course 6: Leadership and Personality Development**	**1**	Express effectively through communication and improve listening skills
		2	Develop **e**ffective team leadership abilities.
		3	Explore self-motivation and practicing creative/new age thinking.
		4	Operate effectively in heterogeneous teams through the knowledge of team work,people skills and leadership qualities.
310259(D)	**Audit Course 6: Foreign Language (Japanese) Module 4**	**1**	Have the ability to communicate confidently and clearly in the Japanese language
		2	Understand the nature of Japanese script
		3	Get introduced to reading, writing and listening skills
		4	Develop interest to pursue further study, work and leisure
310259(E)	**Audit Course 6: Learn New Skill – 'Software' Development Using Agility Approach'**	**1**	Illustrate the agility and principles
		2	Understand the software development using agile methodology
		3	Apply Dev Ops for the software product development
		4	Develop software products for early delivery through continual feedback and learning

Department of Computer Engineering
Course Outcomes (CO)

COURSE PATTERN 2019 BE COMPUTER ENGINEERING			
BE SEM-VII			
Course Code	**Course Name**	**COs**	**Course Outcomes**
410241	**Design and Analysis of Algorithms**	**1**	Formulate the problem.
		2	Analyze the asymptotic performance of algorithms.
		3	Decide and apply algorithmic strategies to solve given problem.
		4	Find optimal solution by applying various methods.
		5	Analyze and Apply Scheduling and Sorting Algorithms.
410242	**Machine Learning**	**1**	Identify the needs and challenges of machine learning for real time applications.
		2	Apply various data pre-processing techniques to simplify and speed up machine learning algorithms.
		3	Select and apply appropriately supervised machine learning algorithms for real time applications.
		4	Implement variants of multi-class classifier and measure its performance
		5	Compare and contrast different clustering algorithms.
		6	Design a neural network for solving engineering problems.
410243	**Blockchain Technology**	**1**	Interpret the fundamentals and basic concepts in Blockchain.
		2	Compare the working of different blockchain platforms.

		3	Use Crypto wallet for cryptocurrency based transactions.
		4	Analyze the importance of blockchain in finding the solution to the real-world problems.
		5	Illustrate the Ethereum public block chain platform.
		6	Identify relative application where block chain technology can be effectively used and implemented.
410244(A)	**Pervasive Computing**	**1**	Demonstrate fundamental concepts in pervasive computing.
		2	Explain pervasive devices and decide appropriate one as per the need of real time applications.
		3	Classify and analyze context aware systems for their efficiency in different ICT systems
		4	Illustrate intelligent systems and generic intelligent interactive applications.
		5	Design HCI systems in pervasive computing environment.
		6	Explore the security challenges and know the role of ethics in the context of pervasive computing.
410244(B)	**Multimedia Techniques**	**1**	Describe the media and supporting devices commonly associated with multimedia information and systems.
		2	Demonstrate the use of content-based information analysis in a multimedia information system.
		3	Critique multimedia presentations in terms of their appropriate use of audio, video,graphics, color,and other information presentation concepts.
		4	Implement a multimedia application using an authoring system.
		5	Understanding of technologies for tracking, navigation and gestural control.
		6	Implement Multimedia Internet of Things Architectures.
410244(C)	**Cyber Security and Digital Forensics**	**1**	Analyze threats in order to protect or defend it in cyberspace from cyber-attacks.
		2	Build appropriate security solutions against cyberattacks.

		3	Underline the need of digital forensic and role of digital evidences.
		4	Explain rules and types of evidence collection
		5	Analyze, validate and process crime scenes
		6	Identify the methods to generate legal evidence and supporting investigation reports.
410244(D)		**1**	Describe the concepts of object-oriented and basic class modelling.
	Object oriented Modeling and Design	**2**	Draw class diagrams, sequence diagrams and interaction diagrams to solve problems.
		3	Choose and apply a befitting design pattern for the given problem.
		4	To Analyze applications, architectural Styles & software control strategies
		5	To develop Class design Models & choose Legacy Systems.
		6	To Understand Design Patterns.
410244(E)	**Digital Signal Processing**	**1**	Understand the mathematical models and representations of DT Signals and Systems.
		2	Apply different transforms like Fourier and Ztransform from applications point of view.
		3	Understand the design and implementation of DT systems as DT filters with filter structures and different transforms.
		4	Demonstrate the knowledge of signals and systems for design and analysis of systems.
		5	Apply knowledge and use the signal transforms for digital processing applications.
		6	To understand Filtering and Different Filter Structures.
410245(A)	**Information Retrieval**	**1**	Implement the concept of Information Retrieval
		2	Generate quality information out of retrieved information
		3	Apply techniques such as classification, clustering, and filtering over multimedia to analyze the information
		4	Evaluate and analyze retrieved information.

		5	Understand the data in various Application and Extensions of information retrieval.
		6	Understand Parallel information retrieving and web structure.
410245(B)	**GPU Programming and Architecture**	**1**	Describe GPU architecture.
		2	Write programs using CUDA, identify issues and debug them.
		3	Implement efficient algorithms in GPUs for common application kernels, such as matrix Multiplication.
		4	Write simple programs using OpenCL.
		5	Identify efficient parallel programming patterns to solve problems.
		6	Explore the modern GPUs architecture and it's Applications.
410245(C)	**Mobile Computing**	**1**	Develop a strong grounding in the fundamentals of mobile Networks
		2	Apply knowledge in MAC, Network, and Transport Layer protocols of Wireless Network.
		3	Illustrate Global System for Mobile Communications.
		4	Use the 3G/4G technology based network with bandwidth capacity planning, VLR and HLR identification algorithms.
		5	Classify network and transport layer of mobile communication.
		6	Design & development of various wireless network protocols using simulation tools.
410245(D)	**Software Testing and Quality Assurance**	**1**	Describe fundamental concepts in software testing such as manual testing, automation testing and software quality assurance.
		2	Design and Develop project test plan, design test cases, test data, and conduct test operations.
		3	Apply recent automation tool for various software testing for testing software.
		4	Apply different approaches of quality management, assurance, and quality standard to software system.

		5	Apply and analyze effectiveness Software Quality Tools.
		6	Apply tools necessary for efficient testing framework.
410245(E)	**Compilers**	**1**	Design and implement a lexical analyzer using LEX tools.
		2	Design and implement a syntax analyzer using YACC tools.
		3	Understand syntax-directed translation and run-time environment.
		4	Generate intermediate codes for high-level statements.
		5	Construct algorithms to produce computer code
		6	Analyze and transform programs to improve their time and memory efficiency.

410248	**Project Work Stage I**	**1**	Solve real life problems by applying knowledge.
		2	Analyze alternative approaches, apply and use most appropriate one for feasible solution.
		3	Write precise reports and technical documents in a nutshell.
		4	Participate effectively in multi-disciplinary and heterogeneous teams exhibiting team work.
		5	Inter-personal relationships, conflict management and leadership quality.
410249	**AC 7 – I : MOOClearn New Skill**	**1**	To acquire additional knowledge and skill.
	AC 7 – II : Entrepreneurship Development	**1**	Understand the legalities in product development.
		2	Undertake the process of IPR, Trademarks, Copyright and patenting.
		3	Understand and apply functional plans.
		4	Manage Entrepreneurial Finance.
		5	Inculcate managerial skill as an entrepreneur.
	AC7 – III: Botnet of Things	**1**	Implement security as a culture and show mistakes that make applications vulnerable to attacks.

		2	Understand various attacks like DoS, buffer overflow, web specific, database specific, web -spoofing attacks.
		3	Demonstrate skills needed to deal with common programming errors that lead to most security problems and to learn how to develop secure applications.
	AC7 – IV: 3D Printing	**1**	Understand the basic knowledge of Shop Floor Safety rules and regulations basics of Machine tools and 3D printing machines.
		2	Understand the concept of concept of technical sketching, multi-view drawings, Lettering, tolerance, and metric construction.
		3	Identify and Distinguish drafting terminologies and construction of geometrical figures using drawing instruments, procedure to prepare a drawing sheet as per SP-46:2003.
		4	Describe and Explain practical aspects to generate detailed and assembly views with dimensions, annotations, in 3D Modeling software.
		5	Apply concepts and Fabricate the simple mechanical parts, prototype/ end use product for 3D Printing.
	AC7 – V: Industrial Safety and Environment Consciousness	**1**	Develop the plan for Safety performance.
		2	Demonstrate the action plan for accidents and hazards.
		3	Apply the safety and security norms in the industry.
		4	Evaluate the environmental issues of Industrialization.

COURSE PATTERN 2019 BE COMPUTER ENGINEERING

BE SEM-VIII

Course Code	Course Name	COs	Course Outcomes
410250	High Performance Computing	1	Understand various Parallel Paradigm.
		2	Design and Develop an efficient parallel algorithm to solve given problem.
		3	Illustrate data communication operations on various parallel architecture.
		4	Analyze and measure performance of modern parallel computing systems.
		5	Apply CUDA architecture for parallel programming.
		6	Analyze the performance of HPC applications
410251	Deep Learning	1	Understand the basics of Deep Learning and apply the tools to implement deep learning applications.
		2	Evaluate the performance of deep learning models (e.g., with respect to the bias-variance tradeoff, overfitting and underfitting, estimation of test error).
		3	To apply the technique of Convolution (CNN) and Recurrent Neural Network (RNN) for implementing Deep Learning models.
		4	To implement and apply deep generative models.

		5	Construct and apply on-policy reinforcement learning algorithms.
		6	To Understand Reinforcement Learning Process.

410252(A)	**Natural Language Processing**	**1**	Describe the fundamental concepts of NLP, challenges and issues in NLP.
		2	Analyze Natural languages morphologically, syntactical and semantically OR Describe the concepts of morphology, syntax, semantics of natural language.
		3	Illustrate various language modelling techniques.
		4	Integrate the NLP techniques for the information retrieval task.
		5	Demonstrate the use of NLP tools and techniques for text-based processing of natural languages.
		6	Develop real world NLP applications.
410253(B)	**Image Processing**	**1**	Apply Relevant Mathematics Required for Digital Image Processing.
		2	Apply Special and Frequency Domain Method for Image Enhancement.
		3	Apply algorithmic approaches for Image segmentation.
		4	Summarize the Concept of Image Compression and Object Recognition.
		5	Explore the Image Restoration Techniques.

		6	Explore the Medical and Satellite Image Processing Applications.
410253(C)	**Software Defined Networks**	**1**	Interpret the need of Software Defined networking solutions.
		2	Analyze different methodologies for sustainable Software Defined Networking solutions.
		3	Select best practices for design, deploy and troubleshoot of next generation networks.
		4	Develop programmability of network elements.
		5	Demonstrate virtualization and SDN Controllers using Open Flow protocol.
		6	Design and develop various applications of SDN.
410252(D)	**Advanced Digital Signal Processing**	**1**	Understand and apply different transforms for the design of DT/Digital systems.
		2	Explore the knowledge of adaptive filtering and Multi-rate DSP.
		3	Design DT systems in the field/area of adaptive filtering, spectral estimation and multi-rate DSP.
		4	Explore use of DCT and WT in speech and image processing.
		5	Develop algorithms in the field of speech , image processing and other DSP applications.

		6	Identify Image Processing Techniques.
410252(E)	**Open Elective**	**-**	-
410253(A)	**Pattern Recognition**	**1**	Analyze various type of pattern recognition techniques.
		2	Identify and apply various pattern recognition and classification approaches to solve the problems.
		3	Evaluate statistical and structural pattern recognition.
		4	Percept recent advances in pattern recognition confined to various applications
		5	Implement Bellman's optimality principle and dynamic programming.
		6	Analyze Patterns using Genetic Algorithms & Pattern recognition applications.
410253(B)	**Soft Computing**	**1**	Understand requirement of soft computing and be aware of various soft computing techniques.
		2	Understand Artificial Neural Network and its characteristics and implement ANN algorithms.
		3	Understand and Implement Evolutionary Computing Techniques.
		4	Understand the Fuzzy logic and Implement fuzzy algorithms for solving real life problems.

		5	Apply knowledge of Genetic algorithms for problem solving.
		6	Develop hybrid systems for problem solving.
410253(C)	**Business Intelligence**	**1**	Differentiate the concepts of Decision Support System & Business Intelligence.
		2	Use Data Warehouse & Business Architecture to design a BI system.
		3	Build graphical reports.
		4	Apply different data preprocessing techniques on dataset.
		5	Implement machine learning algorithms as per business needs.
		6	Identify role of BI in marketing, logistics, and finance and telecommunication sector.
410253(D)	**Quantum Computing**	**1**	To understand the concepts of Quantum Computing.
		2	To understand and get exposure to mathematical foundation and quantum mechanics.
		3	To understand and implement buiding blocks of Quantum circuits.
		4	To understand quantum information, its processing and Simulation tools.
		5	To understand basic signal processing algorithms FT, DFT and FFT.

		6	To study and solve examples of Quantum Fourier Transforms and their applications.
410253(E)	**Open Elective**	**-**	-
410256	**Project Work Stage II**	**1**	Show evidence of independent investigation.
		2	Critically analyze the results and their interpretation.
		3	Report and present the original results in an orderly way and placing the open questions in the right perspective.
		4	Link techniques and results from literature as well as actual research and future research lines with the research.
		5	Appreciate practical implications and constraints of the specialist subject.
410257	**Audit Course 8**		
	AC8 – I: Usability Engineering	**1**	Describe the human centered design process and usability engineering process and their roles in system design and development.
		2	Discuss usability design guidelines, their foundations, assumptions, advantages, and weaknesses.
		3	Design a user interface based on analysis of human needs and prepare a prototype system.
		4	Assess user interfaces using different usability engineering techniques.
		5	Present the design decisions
	AC8 – II:	**1**	Develop an effective interface for conversation.

	Conversational Interfaces	**2**	Explore advanced concepts in user interface.
	AC8–III: Social Media And Analytics	**1**	Develop a far deeper understanding of the changing digital land scape.
		2	Identify some of the latest digital marketing trends and skill sets needed for today's marketer.
		3	Successful planning, prediction, and management of digital marketing campaigns.
		4	Assess user interfaces using different usability engineering techniques.
		5	Implement smart management of different digital assets for marketing needs.
		6	Assess digital marketing as a long term career opportunity.
	AC8 – IV: MOOC-learn New Skill	**1**	To acquire additional knowledge and skill.