SARASWATI Education Society's

SARASWATI College of Engineering

Learn Live Achieve and Contribute

Kharghar, Navi Mumbai - 410 210.

Information Technology Department
Academic Year 2019-20(ODD SEM)

Class/Sem: BE/ VII
Subject: Software Testing and Quality Assurance

Course Objective:
The students will be able to

1	Explore basic software debugging methods.
2	Examine distinctions between validation testing and defect testing
3	Compare and contrast White box and Black box testing methods.
4	Understand the essential characteristics of tool used for test automation.
5	Recognize strategies for generating system test cases.
6	Understand how to write testing plans.

Course outcome
At the end of this cource student will able to

1	Identify the reasons for bugs and analyze the principles in software testing to prevent and remove bugs
2	Analyze practical knowledge of a variety of ways to test software and an understanding of some of the trade-offs between testing techniques.
3	Apply the software testing methods in commercial environments.
4	Formulate adequacy assessment using: control flow, data flow, and program mutations.
5	Discuss methods of test case generation from requirements.
6	Evaluate various test processes for quality improvement.

SARASWATI Education Society's
SARASWATI College of Engineering
Learn Live Achieve and Contribute
Kharghar, Navi Mumbai - 410 210.

Information Technology Department
Academic Year 2019-20(ODD SEM)

Class/Sem: BE/ VII
Subject: Cyber Security & Laws **Subject Code**: ILO7016

Course Objective

1	To identify different types cybercrime and cyber law
2	To understand how criminal plan the attacks in system and mobile devices
3	To classify various security challenges in mobile device for different types of attack.
4	To select different tools and methods in Cyber Security.
5	To recognized Indian IT Act 2008 and its latest amendments.
6	To learn various types of security standards compliances.

Course outcome
At the end of this cource student will able to

1	Understand the concept of cybercrime and its effect on outside world.
2	Apply various security challenges in electronic device for different types of attack.
3	Use different tools and methods in Cyber Offenses.
4	Distinguish different aspects of cyber law.
5	Interpret and apply IT law in various legal issues
6	Employ Information Security Standards compliance during software design and development

SARASWATI Education Society's
SARASWATI College of Engineering
Learn Live Achieve and Contribute
Kharghar, Navi Mumbai - 410 210.

Information Technology Department
Academic Year 2019-20(OODSEM)

Class/Sem: BE/ VII
Subject: Management Information System

Course Objective:
The students will be able to

1	Compare the difference between of Management field and Technical field.
2	Discuss the roles played by information technology in today's business.
3	Justify how they meet the needs of the firm to deliver efficiency and competitive advantage.
4	Determine various technology architectures on which information systems are built.
5	Summarize the basic steps in systems development.
6	Define and analyze typical functional information systems.

Course outcome
At the end of this cource student will able to

1	Explain how information systems Transform Business.
2	Identify the impact information systems have on an organization.
3	Describe IT infrastructure and its components and its current trends.
4	Understand the principal tools and technologies for accessing information from databases to improve business performance and decision making.
5	Figure out the types of systems used for enterprise-wide knowledge management.
6	How Management Information Systems provide value for businesses.

SARASWATI Education Society's
SARASWATI College of Engineering
Learn Live Achieve and Contribute
Kharghar, Navi Mumbai - 410 210.

Information Technology Department
Academic Year 2019-20(OODSEM)

Class/Sem: BE/ VII
Subject: Artificial Intelligence & Intelligent Systems

Course Objective:
The students will be able to

1	Describe the different issues involved in trying to define and simulate intelligence.
2	Explain well known Artificial Intelligence methods.
3	Name different techniques which will help them build simple intelligent systems based on AI/IA concepts.
4	List some well known Artificial Intelligence algorithms.
5	Generalize some well known Artificial Intelligence knowledge representation schemes.
6	Make students understand the basic building blocks for developing AI Systems.

Course outcome
At the end of this cource student will able to

1	Develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents.
2	Choose an appropriate problem-solving method.
3	Analyze and formalize the problem (as a state space, graph, etc.) and select the appropriate search method.
4	Develop/demonstrate/ build simple intelligent systems
5	Choose an appropriate knowledge-representation scheme.
6	Classical toy problems using different AI techniques.

SARASWATI Education Society's

SARASWATI College of Engineering

Learn Live Achieve and Contribute

Kharghar, Navi Mumbai - 410 210.

Department of Information Technology

Academic Year 2019-20 (ODD SEM)

INFRASTRUCTURE SECURITY

CLASS: BE-/ SEM VII **SUBJECT I/C: Vrushali Thakur**

Course Objectives: Students will able to:

1.	Understand underlying principles of infrastructure security
2.	Explore software vulnerabilities, attacks and protection mechanisms and will learn security aspects of wireless network infrastructure and protocols
3.	Investigate web server vulnerabilities and their countermeasures
4.	Develop policies for security management and mitigate security related risks in the organization
5.	Learn the different attacks on Open Web Applications and Web services.
6.	Identify and Use the different security policies.

Course Outcomes: Students should be able to:

1.	Understand the concept of vulnerabilities, attacks and protection mechanisms
2.	Analyze and evaluate software vulnerabilities and attacks on databases and operating systems
3.	Explain the need for security protocols in the context of wireless communication
4.	Apply various security solutions for Web and Cloud infrastructure
5.	Evaluate different attacks on Open Web Applications and Web services
6.	Design appropriate security policies to protect infrastructure components

SARASWATI Education Society's

SARASWATI College of Engineering

Learn Live Achieve and Contribute

Kharghar, Navi Mumbai - 410 210.

Department of Information Technology

Academic Year 2019-20 (ODD SEM)

INFRASTRUCTURE SECURITY

CLASS: BE-/ SEM VII **SUBJECT I/C: Vaishali Jadhav**

Course Objectives

At the end of course, student should be able to:

1	be familiarized with the methodologies and approaches of the network design for an enterprise network.
2	Learn the network hierarchy and use modular approach to network design for an enterprise network
3	Understand CAmpus deisgn and data center design considerations for designing an enterprise campus.
4	Study enterprise edge WAN technologies and design a WAN using them.
5	Designing an IP addressing plan and selecting a Route protocol for an enterprise network.
6	Design enterprise network for given user requirements in an application.

Course Outcomes

At the end of course, students will attain an ability to:

1	Understand the customer requirement and Apply a Methodology to Network Design
2	Structure and Modularize the network
3	Design basic Campus and Data Center Network
4	Design Remote Connectivity
5	Designing IP Addressing and Select suitable routing protocols for the network.
6	Compare overflow controllers and switches with other enterprise network.

SARASWATI Education Society's

SARASWATI College of Engineering

Learn Live Achieve and Contribute

Kharghar, Navi Mumbai - 410 210.

Course Objectives and Course Outcomes

Odd Semester

Class: SE

Subject code: **ITC302**	Subject Name **: Logic Design**	Credits:04

Course Objective:

At the end of course, student should be able to:

1	Express concept of various components.
2	Associate the concepts that underpin the disciplines of Analog and digital electronic logic circuits.
3	Point Various Number system and Boolean algebra.
4	Construct and implement of combinational circuits.
5	Support Design and implementation of Sequential circuits.
6	Paraphrase Hardware description language.

Course Outcomes:

At the end of course, students will attain an ability to:

1	Point out the concepts of various components to design stable analog circuits.
2	Represent numbers and perform arithmetic operations.
3	Prepare the Minimized Boolean expression using Boolean algebra and design it, using logic gates.
4	Analyze and design combinational circuit.
5	Operate design and develop sequential circuits.
6	Translate real world problems into digital logic formulations using VHDL.DS

Subject code: **ITC303**	Subject Name **: Data Structures & Analysis**	Credits:04

Course Objective:

At the end of course, student should be able to:

1	Understand and remember algorithms and its analysis procedure.
2	Introduce the concept of data structures through ADT including List, Stack, Queues
3	Implement various data structure algorithms.
4	Summarize various techniques for representation of the data in the real world
5	Develop application using data structure algorithms.
6	Compute the complexity of various algorithms.

Course Outcomes:

At the end of course, students will attain an ability to:

1	Choose appropriate data structures as applied to specified problem definition.
2	Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.
3	Demonstrate implementation of Linear and Non-Linear data structures.
4	Select and Implement appropriate sorting/searching technique for given problem
5	Design advance data structure using Non-Linear data structure.
6	Determine and analyze the complexity of given Algorithms.

Subject code: **ITC304**	Subject Name **: Database Management System**	Credits:04

Course Objective:

At the end of course, student should be able to:

1	Describe a sound introduction to the discipline of database management systems.
2	Give a good formal foundation on the relational model of data and usage of Relational Algebra. Comprehend data modeling and analyze database requirement to identify entities and their relationship
3	Introduce the concepts of basic SQL as a universal Database language
4	Enhance knowledge to advanced SQL topics like embedded SQL, procedures connectivity through JDBC
5	Demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization
6	Provide an overview of physical design of a database system, by discussing Database Indexing techniques and storage techniques.

Course Outcomes:

At the end of course, students will attain an ability to:

1	Explicate and effectively apply underlying concepts of database management systems and

	Relational database.
2	Design conceptual models of a database using ER modeling for real life applications and also construct queries in Relational Algebra
3	Create and populate a RDBMS for a real life application, with constraints and keys, using SQL
4	Retrieve any type of information from a data base by formulating complex queries in SQL.
5	Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.
6	Build indexing mechanisms for efficient retrieval of information from a database.

Subject code: **ITC305**	Subject Name: **Principle of Communications**	Credits:04

Course Objective:

At the end of course, student should be able to:

1	Understand the basic principles and techniques used in analog and digital communications.
2	Explain the concept of noise and Fourier transform for designing and analyzing communication system.
3	Acquire the knowledge of different modulation techniques such as AM, FM and study the block diagrams of transmitter and receiver.
4	Define the Sampling theorem and Pulse Analog Modulation techniques.
5	Learn the concepts of Digital modulation techniques such as PCM, DM, ADM and multiplexing techniques.
6	Gain the core idea of Electromagnetic Radiation and propagation of waves.

Course Outcomes:

At the end of course, students will attain an ability to:

1	Differentiate analog and digital communication systems.
2	Identify different types of noise occurred, its minimization and able to apply Fourier analysis in frequency & time domain to quantify bandwidth requirement of variety of analog and digital communication systems.
3	Design generation & detection AM, DSB, SSB, FM transmitter and receiver.
4	Apply sampling theorem to quantify the fundamental relationship between channel bandwidth, digital symbol rate and bit rate.
5	Explain different types of line coding techniques for generation and detection of signals.
6	Describe Electromagnetic Radiation and propagation of waves.

SARASWATI Education Society's

SARASWATI College of Engineering

Learn Live Achieve and Contribute

Kharghar, Navi Mumbai - 410 210.

Class: TE

Subject code: **ITDLO5013**	Subject Name **: : E-commerce and e-business**	Credits:04

Course Objective:

At the end of course, student should be able to:

1	Understand concept of ecommerce and different type examples
2	Select with technologies for ecommerce
3	Identify different types of online payment sytem
4	Evalute emarketing strategies
5	Choose ebusiness models and select suitable revenue model
6	Design and development of ebusiness website and choose sutaible security system

Course Outcomes:

At the end of course, students will attain an ability to:

1	Understand the basic concepts of ecommerce and its choose suitable type.
2	Describe hardware and software technologies for ecommerce.
3	Choose suitable payment system.
4	Plan e-marketing strategies
5	Select e-business model
6	Aware about several factors while developing E-business website

Subject code: **ITC502**	Subject Name**: Internet Programming.**	Credits:04

Course Objective:

At the end of course, student should be able to:

1	Discuss the basics of the Internet Programming
2	Compare and discussthe knowledge and skills used for creation of web site considering both client and server side programming.
3	Design responsive web application by applying media query.

4	Differentiate web extensions and web services standards.
5	State characteristics of RIA – Web Mashup Eco System.
6	Explain Python web framework- Django.

Course Outcomes:

At the end of course, students will attain an ability to:

1	Illustrate interactive web pages using HTML,CSS and JavaScript. Implement.
2	Design responsive web site using HTML5 and CSS3
3	Describe Rich Internet Application.
4	Explain Dynamic web site using server side PHP Programming and Database connectivity.
5	Compare different Web Extensions and Web Services.
6	Develop web application using Python web Framework- Django.

Subject code: **ITC503**	Subject Name **: Advanced Database Management Technology**	Credits:04

Course Objective:

At the end of course, student should be able to:

1	Describe advanced concepts of transaction management and recovery techniques .
2	Apply knowledge related to query processing and query optimizer phases of a database management system.
3	Understand advanced database models like distributed databases.
4	Describe emerging data models like temporal, mobile and spatial databases.
5	Analyze concept of advanced access control techniques like role based and discretionary methods.
6	Analyze awareness of how enterprise can organize large amounts of data by creating a data warehouse.

Course Outcomes:

At the end of course, students will attain an ability to:

1	Explain and understand the concept of a transaction and how ACID properties are maintained when concurrent transaction occurs in DB
2	Measure query cost and design alternate efficient paths for query execution.
3	Apply sophisticated access protocols to control access to the database.
4	Implement alternate models like distributed database and design applications using

	advanced models like mobile, spatial databases.
5	Organize strategic data in an enterprise and build a data warehouse.
6	Analyze data using OLAP operations to take strategic decisions.

Subject code: **IT504**	Subject Name **: Cryptography And Network Security**	Credits:04

Course Objective:

At the end of course, student should be able to:

1.	Learn concept of classical encryption techniques and concepts of finite fields and number theory.
2.	Explore the working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key algorithms.
3.	Understand the design issues and working principles of various authentication protocols, PKI standards.
4.	Define various secure communication standards including Kerberos, IPsec, and SSL/TLS and email.
5.	Use existing cryptographic utilities to build programs for secure communication.
6.	Explain concepts of cryptographic utilities and authentication mechanisms to design secure applications.

Course Outcomes:

At the end of course, students will attain an ability to:

1	Identify information security goals, classical encryption techniques and acquire fundamental knowledge on the concepts of finite fields and number theory.
2.	Understand, compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication
3.	Apply the knowledge of cryptographic checksums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes
4.	Explain different digital signature algorithms to achieve authentication and create secure applications
5.	Apply network security basics, analyze different attacks on networks and evaluate the performance of firewalls and security protocols like SSL, IPSec, and PGP.
6.	Illustrate the knowledge of cryptographic utilities and authentication mechanisms to design secure applications

Subject code: **IT C501**	Subject Name **: Microcontroller and Embedded Programming**	Credits:04

Course Objective:

At the end of course, student should be able to:

1	Understand the concepts and architecture of embedded systems.
2	Use basic of microcontroller 8051.
3	Learn concepts of microcontroller interface.
4	Explain the concepts of ARM architecture.
5	Interpret the concepts of real-time operating system.
6	List different design platforms used for an embedded systems application

Course Outcomes:

At the end of course, students will attain an ability to:

1	Explain the embedded system concepts and architecture of embedded systems.
2	Describe the architecture of 8051 microcontroller and write embedded program for 8051 microcontroller.
3	Design the interfacing for 8051 microcontroller.
4	Understand the concepts of ARM architecture.
5	Demonstrate the open source RTOS and solve the design issues for the same.
6	Select elements for an embedded systems tool.

SARASWATI Education Society's
SARASWATI College of Engineering
Learn Live Achieve and Contribute
Kharghar, Navi Mumbai - 410 210.

Class: BE

Subject code: **IT**	Subject Name**: Cloud Computing.**	Credits:04

Course Objective:

At the end of course, student should be able to:

1	Understand fundamentals and essentials of cloud computing.
2	Demonstrate implementation of key concepts of virtualization.
3	Differentiate various Cloud Computing services and deployment models.
4	Design applications by using cloud computing driven systems such as Google Apps, Microsoft Azure and Amazon Web Services.
5	Build various cloud computing environments by using various open source tools
6	Identify various security threats in cloud computing environment.

Course Outcomes:

At the end of course, students will attain an ability to:

1	Explain fundamentals and essentials of cloud computing.
2	Implement virtualization tools.
3	Differentiate cloud computing services and deployment models.
4	Design and develop applications by using cloud computing services.
5	Establish cloud computing environments by using open source tools.
6	Classify various security threats in cloud computing environment.

Subject code: **ITC703**	Subject Name **: Intelligent Systems**	Credits:04

Course Objective:

At the end of course, student should be able to:

1	Describe the different issues involved in trying to define and simulate intelligence.

2	Explain well known Artificial Intelligence methods.
3	Name different techniques which will help them build simple intelligent systems based on AI/IA concepts.
4	List some well known Artificial Intelligence algorithms.
5	Compose some well known Artificial Intelligence knowledge representation schemes.
6	Classify the basic building blocks for developing AL Systems.

Course Outcomes:

At the end of course, students will attain an ability to:

1	Develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents.
2	Choose an appropriate problem-solving method.
3	Analyze and formalize the problem (as a state space, graph, etc.) and select the appropriate search method.
4	Develop/demonstrate/ build simple intelligent systems
5	Choose an appropriate knowledge-representation scheme.
6	Classical toy problems using different AI techniques.

Subject code: **ITDLO5012**	Subject Name**: Image Processing.**	Credits:04

Course Objective:

At the end of course, student should be able to:

1	Describe the basic theory and algorithms those are widely used in digital image Processing.
2	Paraphrase students to current technologies and issues specific to image processing systems.
3	Distinguish between various image enhancement techniques.
4	Apply image compression procedures as per requirement.
5	Appraise image morphological operations.
6	Develop applications of image processing.

Course Outcomes:

At the end of course, students will attain an ability to:

1	Describe fundamental concepts of a digital image processing system.
2	Represent images in spatial domain.
3	Evaluate the techniques for image enhancement, image restoration and histogram

	equalization.
4	Analyze images in frequency domain using various transforms and segmentations.
5	Categorize various compression techniques.
6	Compute image morphological operations, representation techniques and applications of image processing.

Subject code**: ITC7053**	Subject Name: **E-commerce and e-business**	Credits:04

Course Objective:

At the end of course, student should be able to:

1	Understand concept of ecommerce and different type examples.
2	Select with technologies for ecommerce.
3	Identify different types of online payment sytem
4	Evalute emarketing strategies
5	Choose ebusiness models
6	Design and development of ebusiness website and choose sutaible security system

Course Outcomes:

At the end of course, students will attain an ability to:

1	Understand the basic concepts of ecommerce and its choose suitable type.
2	Describe hardware and software technologies for ecommerce
3	Understand importance of payment system and choose suitable payment system
4	Plan e marketing strategies
5	Select E-business model
6	Aware about several factors while developing E-business website

Subject code: **ITC701**	Subject Name: **Software Project Management**	Credits:04

Course Objective:

At the end of course, student should be able to:

1	Distinguish between SDLC and PLC.
2	Differentiate between typical project management and Extreme Project Management.
3	Identify key areas of concern over project life cycle (i.e Project charter, Business Case, MOV, WBS).
4	Use the project management principles through project life cycle.
5	Summarize the resources (Time, Cost, Human being etc) necessary for Project plan.
6	Demonstrate the importance of team and how to work as a team member.

Course Outcomes:

At the end of course, students will attain an ability to:

1	Illustrate the use of project life cycle by distinguishing it with SDLC.
2	Articulate similarities and differences between IT Projects and other type of projects.
3	Develop key areas such as project charter, Work Breakdown Structure, MOV for IT Projects.
4	Estimate the resources (Time, Cost, Human being etc).
5	Ensure the quality of project using various standards.
6	Identify IT project risk and develop the risk mitigation strategies.

Subject code: **ITC702**	Subject Name: **Wireless Technology.**	Credits:04

Course Objective:

At the end of course, student should be able to:

1	Acquire knowledge of modern wireless communication technologies.
2	Learn/Analyze evolution of cellular networks.
3	Explain Wirless in local loop.
4	Understand and evaluate emerging wireless technologies and standards.
5	Learn/Analyze security threats and related security standards.
6	Know econimical aspects of wireless technology.

Course Outcomes:

At the end of course, students will attain an ability to:

1	Understand the basic concepts such as frequency spectrum, modulation, and multiple radio access technology involved in wireless communication.
2	Apply cell based network architecture and frequency reuse concepts to solve cellular network design problem.
3	Explain role of WLL Wirless in local loop in providing broadband services.
4	Describe and judge the emerging wireless technologies standards such as WLAN,WPAN,WMAN
5	Demonstrate security mechanism to avoid attacks in wireless network.
6	Express factors of change in economics of wireless technology.

SARASWATI Education Society's

SARASWATI College of Engineering

Learn Live Achieve and Contribute

Kharghar, Navi Mumbai - 410 210.

Course Objectives and Course Outcomes

Even Semester

Class: SE

Subject code: **ITC402**	Subject Name **: Computer Networks**	Credits:04

Course Objective:

At the end of course, student should be able to:

1	Use design considerations knowledge for deploying the wireless network infrastructure.
2	Acquire knowledge of Application layer and presentation layer paradigm and protocols.
3	Learn session layer design issues, transport layer services and protocols.
4	Gain core knowledge of Network layer routing protocols and IP addressing.
5	Describe data link layer concepts, design issues and protocols.
6	Learn the fundamentals and basics of Physical layer , and will apply them in real time applications.

Course Outcomes:

At the end of course, students will attain an ability to:

1	Illustrate the functions of each layer in OSI and TCP/IP model.
2	Express the functions of Application Layer and Presentation layer paradigms and Protocols.
3	Describe the session layer design issues and Transport layer services.
4	Classify the routing protocols and analyze how to assign the IP addresses for the given network.
5	Describe the functions of the data link layer and the protocols.
6	Explain and Classify the types of transmission media with real time application.

Subject code: **ITC403**	Subject Name **Operating System**	Credits:04

Course Objective:

At the end of course, student should be able to:

1	Identify the main components of an OS & extend their functions.
2	Describe the process management and scheduling.
3	Summarize various issues in Inter Process Communication (IPC) and the role of OS in IPC.
4	Outline the concepts and use Memory management policies and virtual memory.
5	Defend the working of an OS as a resource manager, file system manager, process manager, memory manager and I/O manager and methods used to restate the different parts of OS.
6	Interpret the need for special purpose operating system with the advent of new emerging Technologies.

Course Outcomes:

At the end of course, students will attain an ability to:

1	Describe the important computer system resources and the role of operating system in their management policies and algorithms.
2	Illustrate the process management policies and scheduling of processes by CPU.
3	Paraphrase the requirement for process synchronization and coordination handled by Operating system.
4	Associate and analyze the memory management and its allocation policies.
5	Identify use and evaluate the storage management policies with respect to different Storage management technologies.
6	Show the need to create the special purpose operating system.

Subject code: **IT C404**	Subject Name **: Computer Organization and Architecture**	Credits:04

Course Objective:

At the end of course, student should be able to:

1	Conceptualize the basics of organizational and architectural issues of a digital computer.
2	Analyze processor performance improvement using instruction level parallelism.
3	Learn the function of each element of a memory hierarchy.
4	List various data transfer techniques in digital computer.
5	Articulate design issues in the development of processor or other components that satisfy

	design requirements and objectives.
6	Learn microprocessor architecture and study assembly language programming.

Course Outcomes:

At the end of course, students will attain an ability to:

1	Describe basic organization of computer and the architecture of 8086 microprocessor.
2	Implement assembly language program for given task for 8086 microprocessor.
3	Demonstrate control unit operations and conceptualize instruction level parallelism.
4	Express and perform computer arithmetic operations on integer and real numbers.
5	Categorize memory organization and explain the function of each element of a memory hierarchy.
6	Identify and compare different methods for computer I/O mechanisms

Subject code: **ITC405**	Subject Name: **Automata Theory**	Credits:04

Course Objective:

At the end of course, student should be able to:

1	Learn fundamentals of Regular and Context Free Grammars and Languages
2	Summarize the relation between Regular Language and Finite Automata and machines.
3	Design Automata's and machines as Acceptors, Verifiers and Translators.
4	Represent the relation between Contexts free Languages, PDA and TM.
5	Design PDA as acceptor and TM as Calculators.
6	Convert Automata to Programs and Functions.

Course Outcomes:

At the end of course, students will attain an ability to:

1	Analyze, Understand, design, construct and interpret Regular languages, Expression and Grammars.
2	Design different types of Finite Automata and Machines as Acceptor, Verifier and Translator.
3	Interpret, Understand, design, and analyze Context Free languages, Expression and Grammars.
4	Construct different types of Push down Automata as Simple Parser.
5	Design different types of Turing Machines as Acceptor, Verifier, Translator and Basic computing machine.
6	Compare, understand and analyze different languages, grammars, Automata and Machines and appreciate their power and convert Automata to Programs and Functions

SARASWATI Education Society's

SARASWATI College of Engineering

Learn Live Achieve and Contribute

Kharghar, Navi Mumbai - 410 210.

Class: TE

Subject code: **ITC601**	Subject Name **: Software Engineering with Project Management**	Credits:04

Course Objective:

At the end of course, student should be able to:

1	Select suitable process models for software development process.
2	Estimate project based on Loc and FP and prepare software requirements specification.
3	Sketch UML diagrams and design user interfaces.
4	Choose testing methods and understanding concept of software quality assurance and software configuration management process.
5	Play role in project management life cycle.
6	Develop RMMM plan.

Course Outcomes:

At the end of course, students will attain an ability to:

1	Define various software application domains and remember different process model used in software development.
2	Explain needs for software specifications also they can classify different types of software requirements and their gathering techniques.
3	Convert the requirements model into the design model and demonstrate use of software and user-interface design principles.
4	Distinguish among SCM and SQA and can classify different testing strategies and tactics and compare them.
5	Justify role of SDLC in Software Project Development and they can evaluate importance of Software Engineering in PLC.
6	Generate project schedule and can construct, design and develop network diagram for different type of Projects. They can also organize different activities of project as per Risk impact factor.

Subject code: **ITC602**	Subject Name**: Data Mining and Business Intelligence**	Credits:04

Course Objective:

At the end of course, student should be able to:

1	Apply the concept of data mining as an important tool for enterprise data management and as a cutting-edge technology for building competitive advantage.
2	Describe students to effectively identify sources of data and process it for data mining.
3	Formulate all data mining algorithms, methods of evaluation.
4	Apply knowledge of tools used for data mining.
5	Analyze large sets of data to gain useful business understanding.
6	Describe skills that can enable students to approach business problems analytically identifying opportunities to derive business value for data.

Course Outcomes:

At the end of course, students will attain an ability to:

1	Analyze an understand of the importance of data mining and the principles of BI.
2	Organize and prepare the data needed for data mining using preprocessing techniques.
3	Perform exploratory analysis of data to be used for mining.
4	Implement the appropriate data mining method like classification, clustering or frequent mining on large data sets.
5	Define and apply metrics to measure the performance of various data mining algorithms.
6	Apply BI to solve practical problems: analyze the problem domain, use the data collected from enterprise apply the appropriate data mining technique, interpret and visualize the results, provide decision support.

Subject code: **ITC603**	Subject Name **: Cloud Computing and services**	Credits:04

Course Objective:

At the end of course, student should be able to:

1	Understand fundamentals and essentials of cloud computing.
2	Demonstrate implementation of key concepts of virtualization.
3	Differentiate various Cloud Computing services and deployment models.

4	Design applications by using cloud computing driven systems such as Google Apps, Microsoft Azure and Amazon Web Services.
5	Build various cloud computing environments by using various open source tools
6	Identify various security threats in cloud computing environment.

Course Outcomes:

At the end of course, students will attain an ability to:

1	Explain fundamentals and essentials of cloud computing.
2	Implement virtualization tools.
3	Differentiate cloud computing services and deployment models.
4	Design and develop applications by using cloud computing services.
5	Establish cloud computing environments by using open source tools.
6	Classify various security threats in cloud computing environment.

Subject code: **ITC604**	Subject Name **Wireless Networks**	Credits:04

Course Objective:

At the end of course, student should be able to:

1	Understand the fundamentals of wireless network.
2	Learn/Analyze the different wireless technologies.
3	Evaluate Adhoc networks and wireless sensor networks.
4	Understand and evaluate emerging wireless technologies and standards
5	Discuss design considerations for wireless networks
6	Learn/Analyze and evaluate the security threats and related security standards

Course Outcomes:

At the end of course, students will attain an ability to:

1	Explain the basic concepts of wireless network and wireless generation .
2	Analyze the different wireless technologies such as CDMA, GSM,GPRs etc.
3	Appraise the importance of Adhoc networks such as MANET, VANET and wireless sensor networks.
4	Describe and judge the emerging wireless technologies standards such as WLL,WPAN,WMAN.
5	Use design considerations knowledge for deploying the wireless network infrastructure
6	Differentiate and support the security measures, standards, services and layer wise security consideration.

Subject code: **ITDLO6023**	Subject Name **: Digital Forensics**	Credits:04

Course Objective:

At the end of course, student should be able to:

1	Study underlying principles and categorize many of the techniques associated with the digital forensic practices and cyber crime.
2	Draw practical knowledge about ethical hacking Methodology.
3	Learn the importance of evidence handling and storage for various devices
4	Develop an excellent understanding of current cyber security issues (Computer Security Incident) and analyzed the ways that exploits in securities
5	Critique attacks, IDS .technical exploits and router attacks and “Trap and Trace” computer networks.
6	Apply digital forensic knowledge to use computer forensic tools and investigation report writing.

Course Outcomes:

At the end of course, students will attain an ability to:

1	Illustrate the concept of ethical hacking and its associated applications in Information Communication Technology (ICT) world.
2	Assess the need of digital forensic and role of digital evidences.
3	Explain the methodology of incident response and various security issues in ICT world, and identify digital forensic tools for data collection .
4	Recognize the importance of digital forensic duplication and various tools for analysis to achieve adequate perspectives of digital forensic investigation in various applications /devices like Windows/Unix system
5	Apply the knowledge of IDS to secure network and performing router and network analysis
6	Propose the method to generate legal evidence and supporting investigation reports and will also be able to use various digital forensic tools .

SARASWATI Education Society's
SARASWATI College of Engineering
Learn Live Achieve and Contribute
Kharghar, Navi Mumbai - 410 210.

Class: BE

Subject code: **ITC801**	Subject Name**: Computer Simulation And Modeling**	Credits:04

Course Objective:

At the end of course, student should be able to:

1.	Understand and analyze the concept of simulation with real life examples.
2.	Emphasis of the course will be on modeling and use of simulation languages/software to solve real world problems.
3.	Generate random numbers, random variety, how to test with hypothesis to accept it.
4.	Enhance necessary skills to formulate and build valid models, implement the models, perform simulation analysis of the system and analyze results properly.
5.	Appreciate the advantages of using simulation and modeling for taking decision in engineering problems.
6.	Understand the need to incorporate simulation and modeling considerations throughout the design and execution of a project aiming at understanding its limitations and ways of improvement.

Course Outcomes:

At the end of course, students will attain an ability to:

1.	Recognize simulation and its real life application and its importance in business, science, engineering, industries and services and able to solve simulation problems manually.
2.	Analyze events and inter arrival time, arrival process, queuing strategies, resources and disposal of entities.
3.	Difference between random number and random variety, as well as they will be able to apply and test the hypotheses by solving the problems.
4.	Differentiate validation and verification of system. Also able to check different output against different input of system to check the performance of system.
5.	Estimate and validate a model based upon input and output data
6.	Select natural, physical and engineering sciences, mathematics, statistics, computer and information sciences to engineering applications.

Subject code: **ITC802**	Subject Name**: Big Data Analytics**	Credits:04

Course Objective:

At the end of course, student should be able to:

1	Present an over view of an exciting growing field of big data analytics
2	Introduce the tools required to manage and analyze big data like Hadoop and map reduce
3	Illustrate the concept of no SQL databases and the tools of no SQL databases
4	Enable students have skills that will help them to solve complex real world problems.
5	Explain the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.
6	Demonstrate recommendation model

Course Outcomes:

At the end of course, students will attain an ability to:

1	Recognize the key issues in big data management and its associated applications in intelligent business and scientific computing.
2	Acquire fundamental enabling techniques and scalable algorithms like Hadoop and Map Reduce in big data analytics.
3	Develop NOSQL databases using different tools.
4	Interpret business models and scientific computing paradigm, and apply software tools for big data analytics.
5	Achieve adequate perspectives of big data analytics in various applications like clustering, social media applications etc.
6	Propose a recommendation system using different algorithms.

Subject code:**ITC803**	Subject Name**: Storage Network Management and Retrival.**	Credits:04

Course Objective:

At the end of course, student should be able to:

1	Understand the basic concept of RAID and choose suitable RAID level
2	Draw current storage network architecture such as SCSI, SAN: FC SAN FC Protocol Stack, IP Storage
3	Understand and select current storage networking technologies such as FC-SAN, NAS, IP-SAN storage etc., this will bridge the gap between the emerging trends in industry and academics
4	Identify different storage virtualization technologies and their benefits
5	Prepare and articulate business continuity solutions including, backup and recovery

	technologies, and local and remote replication solutions.
6	Develop information retrieval system as per different application in storage networks.

Course Outcomes:

At the end of course, students will attain an ability to:

1	Understand current RAID levels technologies with common applications
2	Evaluate storage architectures, including storage subsystems, SAN, NAS.
3	Examine emerging technologies including IP-SAN
4	Identify different storage virtualization technologies.
5	Articulate business continuity solutions backup and recovery techniques.
6	Define and explain information retrieval in storage network

Subject code:**ITC8046**	Subject Name: **Software Testing and Quality Assurance**	Credits:04

Course Objective:

At the end of course, student should be able to:

1	Prescribe basic software debugging methods.
2	Discuss the distinctions between validation testing and defect testing.
3	Distinguished and Implement White box and Black box testing methods.
4	Pointout the essential characteristics of tool used for test automation.
5	Describe strategies for generating system test cases.
6	Learn How to write testing plans.

Course Outcomes:

At the end of course, students will attain an ability to:

1	Identify the reasons for bugs and analyze the principles in software testing to prevent and remove bugs.
2	Provides practical knowledge of a variety of ways to test software and an understanding of some of the trade-offs between testing techniques.
3	Apply the software testing methods in commercial environments.
4	Test adequacy assessment using: control flow, data flow, and program mutations.
5	Methods of test case generation from requirements.
6	Implement various test processes for quality improvement.