



SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited A++ Grade by NAAC | 12B Status by UGC | Approved by AICTE

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School of Computing

Department of Information Technology

1.1.3 Courses having focus on Employability / Entrepreneurship / Skill Development

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SCSA1702	ARTIFICIAL INTELLIGENCE	L	T	P	Credits	Total Marks
		3	*	0	3	100

COURSE OBJECTIVES

- To understand the various characteristics of intelligent agents.
- To learn the different search strategies in AI.
- To understand the knowledge in solving AI problems.
- To learn the concepts of learning and communication in AI.
- To know about the various applications of AI.

UNIT 1 INTRODUCTION AND PROBLEM SOLVING

9 Hrs.

Introduction – Foundations of AI – History of AI – Intelligent agent – Types of agents - Structure – Problem solving agents – Uninformed search strategies – Breadth first search – Uniform cost search – Depth first search – Depth limited search – Bidirectional search – Searching with partial Information.

UNIT 2 INFORMED SEARCH AND GAME PLAYING

9 Hrs.

Informed search – Strategies – A* Heuristic function – Hill Climbing – Simulated Annealing – Constraint Specification problem – Local Search in continuous space – Genetic algorithm – Optimal decisions in games - Pruning - Imperfect decisions –Alpha-Beta pruning – Games that include an element of chance.

UNIT 3 KNOWLEDGE AND REASONING

9 Hrs.

Knowledge based agent – The Wumpus world environment – Propositional logic – Inference rules – First-order logic – Syntax and semantics – Situation calculus – Building a knowledge base – Electronic circuit domain – Ontological Engineering – Forward and backward chaining – Resolution – Truth maintenance system-Mental Events and Mental Objects.

UNIT 4 ACTING LOGICALLY

9 Hrs.

Planning – Representation of planning – Partial order planning –Planning and acting in real world – Acting under uncertainty– Bayes's rules – Semantics of Belief networks – Inference in Belief networks – Making simple decisions – Making complex decisions.

UNIT 5 APPLICATIONS

9 Hrs.

AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing –Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

- CO1 - An ability to identify, analyze the search algorithm for the AI problems.
- CO2 - Represent a problem using first order logic.
- CO3 - Provide the knowledge based agent to solve the problem.
- CO4 -Understand the Informed search strategies.
- CO5 - Apply the baye's rule to solve the problem for societal concern.
- CO6 - Design user centric applications that use AI concepts.

TEXT / REFERENCE BOOKS

1. Stuart J.Russel, Peter Norvig, "Artificial Intelligence A Modern Approach ", 3rd Edition, Pearson Education, 2009.
2. Elaine Rich, Kevin Knight, "Artificial Intelligence", 3rd Edition, Tata McGraw Hill, 2009.
3. M. Tim Jones, "Artificial Intelligence: A Systems Approach (Computer Science)", Jones and Bartlett Publishers, Inc., 1st Edition, 2008.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100

Exam Duration:3 Hrs.

PART A: 10 Questions carrying 2 marks each – No choice

20 Marks

PART B: 2 Questions from each unit of internal choice, each carrying 16 marks **80 Marks**

- Employability

MOBILE APPLICATION DEVELOPMENT	L	T	P	Credits	Total Marks
	3	0	0	3	100

COURSE OBJECTIVES

- To understand basic concepts of mobile technologies, different operating systems and how to work with Android.
- To develop applications for current and emerging mobile computing devices, performing tasks at all stages of the software development life-cycle.
- To learn how to code with objective C programming.
- To design, implement and deploy mobile applications for iOS.
- To design, implement and deploy mobile applications for windows OS.

UNIT 1 INTRODUCTION

9 Hrs.

Introduction to mobile technologies, mobile operation systems - pros and cons, Introduction to Android, Features, Architecture, UI Widgets and Events handling, Layouts, Application structure, Android Manifest file, Creating Android applications.

UNIT 2 BUILDING BLOCKS AND DATABASES

9 Hrs.

Introduction to Activities and Intents - Understanding Activity life cycle, Linking Activities, Passing Data, Toast, Displaying a Dialog Window and Notifications. Content Provider, Services, Broadcast receivers, accessing databases, Location and sensors, Multimedia audio, video and camera, Deploying and publishing application.

UNIT 3 OBJECTIVE C PROGRAMMING

9 Hrs.

Objective C - Objects and Classes, Property, Messaging, Categories and Extensions, Fast Enumeration - NSArray, NS Dictionary, Methods and Selectors, Static & Dynamic objects, Exception handling, Memory management, Swift language essentials: Arrays, Dictionaries, functions.

UNIT 4 INTRODUCTION TO IOS

9 Hrs.

Introduction to iPhone, MVC Architecture, View Controller - Building the UI and Event handling, Application life cycle, Tab Bars, Story Boards and Navigation Controllers, Table View, Push Notification, Database handling, Introduction to icloud, Webkit framework in iOS8, Deploying and publishing application.

UNIT 5 WINDOWS MOBILE APP DEVELOPMENT

9 Hrs.

Introduction to [Windows Phone 8](#), [Application Life cycle](#), [UI Designing and events](#), [Building](#), [Files and Storage](#), [Network Communication](#), [Push Notification](#), [Background Agents](#), [Maps and Locations](#), [Data Access and storage](#), [Introduction to silver light and XAML](#), [Data Binding](#), [Deploying and Publishing](#).

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Understand the technologies and business trends impacting mobile applications.

CO2 - Understand and remember the components of android, iOS and Windows mobile applications.

CO3 - Learn the programming languages and techniques for developing mobile applications.

CO4 - Develop mobile applications with compelling user interface and database connectivity for real time applications for iOS.

CO5 - Deploy mobile applications with compelling user interface and database connectivity for real time applications for Windows OS.

CO6 - Develop and deploy mobile applications using silver light.

TEXT / REFERENCE BOOKS

1. Reto Meier, "Professional Android Application Development", Wrox, 2010.
2. <http://www.tutorialspoint.com/android/index.htm>
3. <http://developer.android.com/training/index.html>
4. Stephen G. Kochan, "Programming in Objective C", Dorling Kindersley India Pvt. Ltd, 2012.
5. David Mark, Jack Nutting and Jeff LaMarche, "Beginning iOS 6 Development Exploring the iOS SDK", Apress, 2013.
6. Henry Lee, Eugene Chuvyrov, "Beginning Windows Phone App Development", Apress 2012.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100

Exam Duration: 3 Hrs.

PART A: 10 Questions carrying 2 marks each – No choice

20 Marks

PART B: 2 Questions from each unit of internal choice, each carrying 16 marks

80 Marks

- Employability

SITA3005	SOCIAL NETWORK ANALYSIS	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- To understand the concept of semantic web and related applications.
- To learn knowledge representation using ontology.
- To understand human behavior in social web and related communities.
- To learn mining in social network communities.
- To learn visualization of social networks.

UNIT 1 INTRODUCTION

9 Hrs.

Introduction to Semantic Web: Limitations of current Web - Development of Semantic Web - Emergence of the Social Web Social Network Analysis: Social Networks Perspective - Analysis of Network Data –Key concepts and measurements in network analysis-Interpretation of Network Data - Social Network Analysis in the Social and Behavioral Sciences - Metrics in social network analysis.

UNIT 2 SOCIAL NETWORK ANALYSIS SOFTWARE, TOOLS AND LIBRARIES

9 Hrs.

Modelling and aggregating social network data: Ontological representation of social individuals - Ontological representation of social relationships - Aggregating and reasoning with social network data –(Advanced representations) Multi-Relational characterization of dynamic social network communities -Social network analysis software - Tools - Libraries.

UNIT 3 CLIQUES, CLUSTERS AND COMPONENTS

9 Hrs.

Components and Sub graphs: Sub graphs - Ego Networks, Triads, and Cliques, Hierarchical Clustering, Triads, Network Density and conflict. Density: Egocentric and Socio centric - Digression on Absolute Density - Community structure and Density, Centrality: Local and Global - Centralization and Graph Centres, Cliques and their intersections, Components and Citation Circles - Positions, Sets and Clusters.

UNIT 4 PREDICTING HUMAN BEHAVIOUR AND PRIVACY ISSUES

9 Hrs.

Development of Social Network Analysis - Understanding and predicting human behavior for social communities - User data management - policy, legal, and technical challenges. Inference and Distribution - Enabling new human experiences - Reality mining - Context - Awareness - Privacy in online social networks - Trust in online environment - Trust models based on subjective logic - Trust network analysis - Trust transitivity analysis - Combining trust and reputation - Trust derivation based on trust comparisons - Attack spectrum and countermeasures.

UNIT 5 VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS

9 Hrs.

Graph theory – Centrality – Clustering – Node-Edge Diagrams – Matrix representation – Visualizing online social networks, Visualizing social networks with matrix-based representations – Matrix and Node-Link Diagrams – Hybrid representations – Modeling and aggregating social network data -Applications – Cover networks – Community welfare – Collaboration networks – Co-Citation networks.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

- CO1 - An ability to identify metrics used in network analysis.
- CO2 - An ability to classify the network related data's.
- CO3 - Identify the aim of graph in computational models.
- CO4 - Apply the knowledge in predicting the user behaviors.
- CO5 - Visualization of a social network using tools.
- CO6 - Ability to analyze metrics in social network analysis.

TEXT / REFERENCE BOOKS

1. Jeffrey C Johnson, Martin G Everett, Stephen P Borgatti - Analyzing Social Networks –sage publication-2013.
2. Guandong Xu ,Yanchun Zhang and Lin Li,-Web Mining and Social Networking – Techniques and applications, 1st Edition, Springer, 2011.
3. Dion Goh and Schubert Foo,-Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively, IGI Global Snippet, 2008.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100

Exam Duration:3 Hrs.

PART A: 10 Questions carrying 2 marks each – No choice

20 Marks

PART B: 2 Questions from each unit of internal choice, each carrying 16 marks

80 Marks

 - Employability

SITA1602	CYBER SECURITY	L	T	P	Credits	Total Marks
		3	*	0	3	100

COURSE OBJECTIVES

- To explore the aspects of classic and public key cryptography.
- To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
- To become aware of system security components.
- To know the technological aspects of security.
- To explore the vulnerabilities in any computing system.

UNIT 1 INTRODUCTION**9 Hrs.**

Basic Concepts – Security Architecture, Attacks, Services, Mechanisms, Model - Cryptography Basics - Symmetric Ciphers– Transposition, Substitution, Rotor Machines – Block Cipher – Data Encryption Standard – Confidentiality using Symmetric Encryption

UNIT 2 PUBLIC KEY CRYPTOGRAPHY**9 Hrs.**

Principles – RSA algorithm – Key Management – Diffie Hellman Key Exchange –Message Authentication – Requirements, Functions, Message Authentication – Hash Functions – Digital Signatures – Authentication Protocols

UNIT 3 SYSTEM SECURITY**9 Hrs.**

Intruders – Detection – Password Management – Malicious Software – Virus – Countermeasures – Distributed Denial of Service Attacks – Firewalls – Design Principles – Trusted Systems

UNIT 4 OPERATIONS AND PHYSICAL SECURITY**9 Hrs.**

Origin – Process – Laws –Physical Security – Controls – Protecting People – Protecting Data – Protecting Equipment

UNIT 5 APPLICATION SECURITY**9 Hrs.**

Software Development Vulnerabilities – Buffer Overflow – Race Condition – Web Security – Database Security - Tools

Max. 45 Hrs.**COURSE OUTCOMES**

On completion of the course, student will be able to CO1 -

Identify the basics of cryptography.

CO2 - Provide security of the data over the network.

CO3 - Explore the aspects of system security.

CO4 - Illustrate operations and physical security aspects.

CO5 - Analyse the vulnerabilities in any computing system and hence able to design a security solution.

CO6 - Design and implement secure applications.

TEXT / REFERENCE BOOKS

1. William Stallings, “Cryptography and Network Security”, 4th Edition, Pearson, 2009.
2. Jason Andress, Steven Winterfeld, “The Basics of Information Security”, 2nd Edition, Elsevier, 2014.
3. Harold F.Tipton, Micki Krause Nozaki, “Information Security Management Handbook”, 6th Edition, Vol.5, CRC Press, 2012.
4. Behrouz A. Forouzan, “Cryptography and Network Security”, Tata McGraw-Hill, 2008.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100

Exam Duration:3 Hrs.

PART A: 10 Questions carrying 2 marks each – No choice**20 Marks****PART B:** 2 Questions from each unit of internal choice, each carrying 16 marks**80 Marks**

- Employability

SITA2601	MOBILE APPLICATION DEVELOPMENT LAB	L	T	P	Credits	Total Marks
		0	0	4	2	100

COURSE OBJECTIVES

- To develop applications for current and emerging mobile computing devices, performing tasks at all stages of the software development life-cycle.
- To learn how to utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces.
- To understand the programming languages and platform for developing mobile applications.
- To design, implement and deploy mobile applications using an appropriate software development environment.
- To upload the developed application into the Android play store.

SUGGESTED LIST OF EXPERIMENTS

1. To implement mobile application life cycle methods.
2. To implement simple calculator application.
3. To implement simple SMS application.
4. To implement authentication verification application without and with database.
5. To implement navigation application with multiple pages / activities.
6. To implement student placement registration form with database.
7. To implement a simple notification application.
8. To implement simple intent with data passing application.
9. To implement simple profile changer application through SMS.
10. To create mobile web browser application.
11. To create mobile e-mail application to send a mail.
12. To add Google maps to an Android application.
13. To create photo show application.
14. To create app to upload a document.
15. Mini project.

NOTE

1. Above applications have to be created and deployed in Android OS.
2. Environment Required: Android SDK / Android Studio.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Understand how to set up Android Development Environment.

CO2 - Design various Android UI components.

CO3 - Develop Android applications using Java.

CO4 - Develop Android applications by using Eclipse with ADT / Android Studio.

CO5 - Create real time applications using Android database connectivity.

CO6 - Deploy the Android App into play store.

 - Employability

SCSA1501	OPERATING SYSTEMS	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- To have an overview of different types of operating systems.
- To understand the concept of process management.
- To understand the concept of storage management.
- To understand the concept of I/O and file systems.

UNIT 1 INTRODUCTION**9 Hrs.**

Introduction - Operating system structures - System components - OS services - System calls - System structure - Resources Processes - Threads - Objects - Device management - Different approaches - Buffering device drivers.

UNIT 2 PROCESS MANAGEMENT**9 Hrs.**

Processes - Process concepts - Process scheduling - Operations on processes - Cooperating processes - CPU scheduling - Basic concepts - Scheduling criteria - Scheduling algorithms - Preemptive strategies - Non-preemptive strategies.

UNIT 3 SYNCHRONIZATION AND DEADLOCKS**9 Hrs.**

The critical section problem - Semaphores - [Classic problems of synchronization](#) - [Critical regions](#) - [Monitors-Dead locks](#) - Deadlock characterization - Prevention - Avoidance - Detection - Recovery.

UNIT 4 MEMORY MANAGEMENT**9 Hrs.**

Storage Management Strategies - Contiguous Vs. Non-Contiguous Storage Allocation - Fixed & Variable Partition Multiprogramming - Paging - Segmentation - Paging/Segmentation Systems - Page Replacement Strategies - Demand & Anticipatory Paging - File Concepts - Access Methods - Directory Structure - File Sharing - Protection - File - System Structure - Implementation.

UNIT 5 I/O SYSTEM, LINUX & SHELL PROGRAMMING**9 Hrs.**

Mass Storage Structure - Disk Structure- Disk Scheduling - Disk Management - Swap Space Management – RAID Structure- Shell Operation Commands - File Management Operation - Internet Service - Telnet - FTP - Filters & Regular Expressions- Embedded Linux – Android VsiOS - Unix Internals - Shell Programming - Variable, Arithmetic Operations, Control Structures, Handling Date, Time & System Information.

Max. 45 Hrs.**COURSE OUTCOMES**

On completion of the course, student will be able to

- CO1 - Understand the fundamental components of a computer operating system and how computing resources are managed by the operating system.
- CO2 - Demonstrate and understand the different memory and I/O management techniques used in Operating Systems.
- CO3 - Apply the concepts of CPU scheduling, synchronization and deadlocks in real computing problems.
- CO4 - Have practical experience with software tools available in modern operating systems such as semaphores and monitors for process synchronization.
- CO5 -Create design and construct the following OS components: System calls, Schedulers, Memory management systems, Virtual Memory and Paging systems in the modern operating system.
- CO6 - Understand file system structure and implement a file system such as FAT.

TEXT / REFERENCE BOOKS

1. Abraham Silberschatz, Peter Galvin and Gagne, “Operating System Concepts”, 6th Edition, Addison Wesley, 2002.
2. Harvey M.Deitel, ”Operating System”, 2nd Edition, Addison Wesley, 2000.
3. Gary Nutt, ”Operating System, A modern perspective”, 2nd Edition, Addison Wesley, 2000.
4. Richard Peterson, “Linux : The Complete Reference”, 6th Edition, Tata McGraw Hills, 2007.
5. Andrew S. Tanenbaum, “Modern Operating Systems”

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100

Exam Duration:3 Hrs.

PART A: 10 Questions carrying 2 marks each – No choice**20 Marks****PART B:** 2 Questions from each unit of internal choice, each carrying 16 marks**80 Marks**

- Employability

SCSA1503	COMPUTER GRAPHICS AND MULTIMEDIA APPLICATIONS	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- To introduce two and three dimensional graphical structure.
- To design 2D and 3D methods and Models.
- To explore the visible surface detection with illumination and color models.
- To understand the concepts involved in multimedia and basis tools.
- To gain knowledge on Multimedia compression and animations.

UNIT 1 BASICS OF COMPUTER GRAPHICS**9 Hrs.**

Output primitives- Survey of Computer Graphics-Overview of Graphics System- Line drawing Algorithm (DDA Line Drawing Algorithm, Bresenham's Line Drawing Algorithm)-Circle drawing Algorithm- Curve Drawing Algorithm- Attributes of output Primitives- Antialiasing.

UNIT 2 2D TRANSFORMATION AND VIEWING**9 Hrs**

2D Transformation and other transformation – 2D and 3D Viewing- Line Clipping (Cohen Sutherland)– Polygon Clipping (Sutherland Hodgeman) – Logical Classification Input Function.

UNIT 3 3D CONCEPTS AND CURVES**9 Hrs.**

3D Object: Representation Method- B-Rep- Sweep Representation- 3D Transformation – curve generation – Splines –Beziers – Blending of curves other interpolation techniques- Display Curves and Surface – Shape Description Requirements– Parametric function – 3D Concept Introduction – Fractals and Self Similarity – Successive refinement of Curves – Koch Curves and Peano Curves.

UNIT 4 METHODS AND MODELS**9 Hrs.**

Visual Surface detection methods – Illumination models – Halftone Patterns – Dithering Techniques – Polygon Rendering Methods – Ray Tracing Methods – Color methods – Color Applications.

UNIT V MULTIMEDIA BASIS AND TOOLS**9**

Hrs.Multimedia Basics and Tools – Introduction to Multimedia – Compression and Decompression – Data and File Format Standards – Digital voice and audio video image animation- Introduction to photoshop- workshop tools- Navigating window – Importing and Exporting Images – Operations on Images – resize, Crop, rotate. Introduction to Flash – Elements of Flash Documents – Flash Environment- Drawing Tools – Flash Animation Importing and Exporting – Adding Sounds – Publishing Flash Movies.

Max. 45 Hrs.**COURSE OUTCOMES**

On completion of the course, student will be able to

- CO1 - Identify the various line & circle drawing algorithm.
- CO2 - Study the various transformations in 2D and 3D objects
- CO3 - Understand the concepts of curves and surface.
- CO4 - Apply transformation and clipping algorithm in 2D and 3D objects.
- CO5 - Design Illumination and color models.
- CO6 - Implement 2D and 3D Transformation concepts in Real world Applications.

TEXT /REFERENCE BOOKS

1. Donald Hearn and M. Pauline Baker, Computer Graphics C Version, Second Edition, Prentice Hall, 2006.
2. Fabio Ganovelli, Massimiliano Corsini, Sumanta Pattanaik, Marco Di Benedetto "Introduction to Computer Graphics: A Practical Learning Approach" Taylor and Francis Group. 2015.
3. TayVaughan,"Multimedia", 5th Edition, Tata McGraw Hill, 2001.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100

Exam Duration:3 Hrs.

PART A: 10 Questions carrying 2 marks each – No choice**20 Marks****PART B:** 2 Questions from each unit of internal choice, each carrying 16 marks**80 Marks**

- Employability

SCSA1402	COMPUTER ARCHITECTURE AND ORGANIZATION	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- To impart knowledge on various types of Registers and Microinstructions.
- To discuss about the Data path design and Processor design in detail.
- To understand the types of memory organizations.
- To discuss about the registers, interface and communication in I/O devices.
- To analyze about the characteristics, structure, communication and synchronization of multiprocessors.

UNIT 1 CENTRAL PROCESSING UNIT**9 Hrs.**

Introduction - General Register Organization - Stack organization - Basic computer Organization - Instruction codes - Computer Registers - Computer Instructions - Instruction Cycle - Arithmetic – Logic - Shift Micro operations - Arithmetic Logic Shift unit - Example [Architectures: MIPS – Power – PC – RISC – CISC](#).

UNIT 2 COMPUTER ARITHMETIC**9 Hrs.**

Addition - Subtraction - Multiplication and Division algorithms - Floating Point Arithmetic [operations](#) [Micro programmed Control](#) - [Control memory](#) - [address sequencing](#) – [Micro program Example](#) - Design of Control unit - Example Processor design.

UNIT 3 MEMORY ORGANIZATION**9 Hrs.**

Memory Hierarchy - Main memory - auxiliary Memory - Associative Memory - Cache Memory - Virtual memory.

UNIT 4 INPUT - OUTPUT ORGANIZATION**9 Hrs.**

Peripheral Devices - I/O Interface - Modes of transfer - Priority Interrupt - DMA - IOP - Serial Communication.

UNIT 5 CHARACTERISTICS OF MULTIPROCESSORS**9 Hrs.**

Interconnection Structures – Inter processor Arbitration – [Inter processor Communication and Synchronization](#) - Cache coherence.

Max. 45 Hrs.**COURSE OUTCOMES**

On completion of the course, student will be able to

- CO1 - Classify the various types of registers, microinstructions and addressing modes. CO2 - Design the data path for processor.
 CO3 - Demonstrate the usage of Memory Organization.
 CO4 - Describe about the I/O devices.
 CO5 - Explain the characteristics, structure, communication and synchronization of multiprocessor.
 CO6 - State the inter processor communication and synchronization.

TEXT / REFERENCE BOOKS

1. M.Morris Mano, “Computer system Architecture”, 3rd Edition, Prentice-Hall Publishers, 2007.
2. Mark Burrell, “Fundamentals of Computer Architecture”, Mcmillan Higher Education, 2003.
3. John D. Carpinelli, “Computer Systems Organization & Architecture”, Pearson Education, 2001.
4. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, “Computer Organization”, Fifth Edition, McGraw-Hill, 2002.
5. William Stallings, “Computer Organization and Architecture - Designing for Performance”, Ninth Edition, Prentice Hall, 2012.
6. John P Hayes, Computer Architecture Organization, McGraw Hill Edition 4, 2003.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100

Exam Duration:3 Hrs.

PART A: 10 Questions carrying 2 marks each – No choice**20 Marks****PART B:** 2 Questions from each unit of internal choice, each carrying 16 marks**80 Marks**

- Employability

SCSA1303	SOFTWARE ENGINEERING	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- Software process models and compare their applicability.
- Identify the key activities in managing a software project.
- Concepts of requirements engineering and Analysis Modelling.
- Apply systematic procedure for software design and deployment.
- Compare and contrast the various testing and maintenance.

UNIT 1 SOFTWARE PROCESS AND PROJECT MANAGEMENT 9 Hrs.

The evolving role of software – the changing nature of software- Life cycle models - Water fall - Incremental - Spiral - Evolutionary - Prototyping – Concurrent development – Specialised process models - Verification - Validation - Life cycle process - Development process - System engineering hierarchy - Introduction to CMM - Levels of CMM.

UNIT 2 REQUIREMENT ANALYSIS AND SPECIFICATIONS 9 Hrs.

Functional And Non-Functional - User - System - Requirement Engineering Process - Feasibility Studies –communication practices- Requirements - Elicitation - Validation and management - Fundamental of requirement analysis – Analysis principles – Structured System Analysis - Software prototyping - Prototyping in the Software Process - Data - Functional and Behavioral Models - Structured Analysis and Data Dictionary.

UNIT 3 SOFTWARE DESIGN 9 Hrs.

Design process - Modular design - Design heuristic - Design model and document - Architectural design - Software architecture - Data design - Architecture data - Transform and transaction mapping - User interface design - User interface design principles.

UNIT 4 TESTING AND IMPLEMENTATION 9 Hrs.

Levels - Software Testing Fundamentals - Types of s/w test - White box testing- Basis path testing - Black box testing - Control Structure testing- Regression testing strategies - Strategic approach and issues - UNIT testing - Integration testing - Validation testing - System testing and debugging. Case studies - Writing black box and white box testing-Coding Practices- Refactoring.

UNIT 5 PROJECT MANAGEMENT AND ESTIMATION 9 Hrs.

Software cost estimation - COCOMO model - Quality management - Quality concepts- SQA - Software reviews - Formal technical reviews - Formal approaches of SQA and software reliability - Software maintenance - SCM - Need for SCM - Version control - Introduction to SCM process - Software configuration items. Re-Engineering - Software reengineering - Reverse engineering - Restructuring - Forward engineering.

Max. 45 Hrs**COURSE OUTCOMES**

On completion of the course, student will be able to:

CO1 - Identify and apply software lifecycle model for a given problem and will know the criteria for each level of CMM.

CO2 - Comprehend types of requirements and summarize Requirement Engineering Process.

CO3 - Design data, functional and behavioral model for any given software requirement.

CO4 - Identify and analyze levels of testing and perform white box testing and black box testing for a given problem.

CO5 - Describe concepts of software quality assurance and software configuration management.

CO6 - Compare and contrast forward engineering, reverse engineering and reengineering.

TEXT / REFERENCE BOOKS

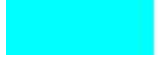
1. Pressman, "Software Engineering and Application", 7th Edition, McGraw International Edition, 2009.
2. Ian Sommerville, "Software Engineering", 8th Edition, Pearson Education, 2008.
3. Stephan Schach, "Software Engineering", Tata McGraw Hill, 2007.
4. Pfleeger and Lawrance, "Software Engineering: Theory and Practice" Pearson Education, Second Edition, 2001.
5. Rajib Mall, "Fundamentals of Software Engineering", Third Edition, PHI Learning Private Limited, 2009.

6. Pankaj Jalote, “Software Engineering, A Precise Approach”, Wiley India, 2010.
7. Kelkar S.A., “Software Engineering”, Prentice Hall of India Pvt Ltd, 2007.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100

Exam Duration:3 Hrs.

PART A: 10 Questions carrying 2 marks each – No choice**20 Marks****PART B:** 2 Questions from each unit of internal choice, each carrying 16 marks**80 Marks** - Employability

SITA1401	DATA COMMUNICATION AND COMPUTER NETWORKS	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- To understand the network architecture and protocols supported for connecting devices in a network.
- To gain the knowledge of framing in data link layer.
- To learn the functions of network layer and the routing strategies with their associated protocols.
- To introduce the protocols used for end to end packet delivery in transport layer.
- To understand the application layer protocols.

UNIT 1 DATA COMMUNICATION**9 Hrs.**

Introduction to data communication - Network protocols & standards - Line configuration - Topology - Transmission mode - Categories of networks - [OSI model](#) - [Layers of OSI model](#) - [TCP/IP Model](#) - [Transmission media](#) - [Guided media](#) - Unguided media- Switching-Circuit Switching - Packet Switching.

UNIT 2 DATALINK LAYER**9 Hrs.**

Error detection and correction- Line Discipline - Flow Control - Error control- Medium Access Control - [Ethernet](#) - [CSMA/CD](#) - [Wireless LAN](#) - [CSMA/CA](#) - IEEE 802.11, Bluetooth.

UNIT 3 NETWORK LAYER**9 Hrs.**

Routing - Distance Vector Routing - Link State Routing - Addressing-Subnetting - IPV4- IPV6- ARP - RARP - ICMP - IGMP - DHCP.- Networking Devices - Repeaters - Switches - Bridges - Routers - Gateways.

UNIT 4 TRANSPORT LAYER**9 Hrs.**

[TCP](#)- [UDP](#) - [Connection Management](#) - Flow Control - Retransmission - Congestion Control - Leaky bucket algorithm - Detection and Avoidance.

UNIT 5 APPLICATION LAYER**9 Hrs.**

Message Handling System(MHS) - [FTAM](#) - [Virtual Terminal \(VT\)](#) - Domain Name System - FTP - WWW and HTTP - SNMP - SMTP - POP3 - IMAP - MIME -TELNET

Max. 45 Hrs.**COURSE OUTCOMES**

On completion of the course, student will be able to

- CO1 - Describe the architecture of a computer network and explain how each device in a network communicates with each other.
- CO2 - Explain packet collision in the link layer and how they are corrected.
- CO3 - Design a routing protocol in a network and demonstrate how data packet will reach to the intended destination. CO4 - Implementation of flow control mechanism to regulate the traffic in a network.
- CO5 - Describe IP addressing and explain its functions.
- CO6 - Recognize various application layer protocols and its functions.

TEXT / REFERENCE BOOKS

- Behrouz A. Fourouzan, "Data Communication and Networking", Fifth Edition, McGraw-Hill Education India Pvt. Ltd - New Delhi., 2013.
- William Stallings, Data and Computer Communications (8th ed.), Pearson Education, 2007.
- P.C. Gupta, Data Communications and Computer Networks, Prentice-Hall of India, 2006.
- Andrew S. Tanenbaum, "Computer Networks", Fifth Edition, Pearson, 2011.
- L. L. Peterson and B. S. Davie, Computer Networks: A Systems Approach (3rd ed.), Morgan Kaufmann, 2003.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100

Exam Duration:3 Hrs.

PART A: 10 Questions carrying 2 marks each – No choice**20Marks****PART B:** 2 Questions from each unit of internal choice, each carrying 16 marks**80 Marks**
 - Employability

SCSA4003	BUSINESS ANALYTICS	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- To gain an understanding of how managers use business analytics to formulate and solve business problems and to support manager in decision making.
- To understand the different basic concept/ fundamentals of business statistics.
- To become familiar with the processes needed to develop, report, and analyze business data.

UNIT 1 OVER VIEW OF BUSINESS ANALYTICS 9Hrs.

Definitions and Examples in Business Intelligence - Need, Features and Use of Business Intelligence (BI) -BI Components- Data Warehouse- Business Performance Management. User Interface Business Analytics: Introduction to Business Analytics (BA) – Need-Components (Business Context, Technology, Data Science)-Types (Descriptive, Predictive and Prescriptive)-Business Intelligence versus Business Analytics.

UNIT 2 TYPES OF DIGITAL DATA 9Hrs.

Definition, Sources, Storage and Characteristics of data - Structured, Unstructured and Semi Structured Data - Importance of data quality Dealing with missing or incomplete data-Data Classification Data Ware house: Definition, characteristics, framework- Data lake - Business Reporting, Visual Analytics: Definition, concepts - Different types of charts and graphs- Emergence of data visualization and visual analytics

UNIT 3 INTRODUCTION TO DATA MINING 9Hrs.

Data Mining: Concepts and applications - Data mining process - Text & Web Analytics: Text analytics and text mining overview- Text mining applications- Web mining overview- Social media analytics- Sentiment analysis overview- Big Data Analytics: Definition and characteristics of big data-Fundamentals of big data analytics

UNIT 4 TRANSACTION PROCESSING 9Hrs.

Data Mining Tasks, OLAP and Multidimensional data analysis, Basic concept of Association Analysis and Cluster Analysis-Transaction processing v/s Analytic Processing-OLTP v/s OLAP-OLAP Operations-Data models for OLTP(ER model) and OLAP(Star & Snow flake Schema)

UNIT 5 BUSINESS PERFORMANCE MANAGEMENT 9Hrs.

Business performance management cycle - KPI, Dashboard - Analytics in Business Support Functions: Sales & Marketing Analytics - HR Analytics - Financial Analytics - Production and operations analytics- Analytics in Industries: Telecom, Retail, Health care, Financial Services- Decision Making under Uncertainty. Case study: prepare a detailed report on applications of analytics in different industries.

Max.45Hrs.**COURSE OUTCOMES**

- CO1 : Comprehend Knowledge of basic concept/fundamentals of business statistics, business intelligence
- CO2 : Evaluating basic concepts of digital data and data warehouse
- CO3 : To apply analytics methodologies on various real time data
- CO4 : To create data schema and transaction processing Methodology for a given real time dataset.
- CO5 : Analyze various types of analytics on data from various domains.
- CO6: To perform practical application by taking managerial decision and evaluating the Concept of Business Analytics.

TEXT/REFERENCE BOOKS

- Shmueli, Patel, and Bruce: Wiley, Data Mining for Business Intelligence, Concepts, Techniques and Applications, Wiley, 2010
- Fisher and Raman, The New Science of Retailing, : Harvard Business Press, 2012

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks: 100****Exam Duration: 3 Hrs.****PART A:** 10 Questions carrying 2 marks each – No choice**20 Marks****PART B:** 2 Questions from each unit of internal choice, each carrying 16 marks**80 Marks**

SITA3008	INTERNET OF THINGS	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- To understand the concepts of Internet of Things
- To identify the various elements of an IoT System.
- To understand the various means of communication from Node / Gateway to Cloud Platforms.
- To identify types of data analytics and data visualization tools.
- To make students aware of security concerns and challenges while implementing IoT solutions.

UNIT 1 INTRODUCTION TO IOT**9 Hrs.**

Introduction to IoT, Current technological trends and future prospects, - Evolution of IoT , Business Scope, Relation with embedded system, - Basic Architecture of an IoT, From M2M to IoT, M2M towards IoT, IoT Value Chains, An emerging industrial structure for IoT.

UNIT 2 ELEMENTS OF IOT**9 Hrs.**

Application Sensors & Actuators - Edge Networking (WSN) – Gateways - IoT Communication Model – WPAN & LPWA, Overview of IoT supported Hardware platforms such as: Raspberry pi, ARM Cortex Processors, Arduino and Intel Galileo boards, Wearable Development Boards.

UNIT 3 COMMUNICATION AND CONNECTIVE TECHNOLOGIES**9 Hrs.**

IoT Communication Model, Cloud computing in IoT, IoT in cloud architecture, Logging on to cloud, Selecting and Creating cloud service , cloud based IoT platforms - IBM Watson, Google cloud.

UNIT 4 DATA ANALYTICS AND IOT PLATFORM**9 Hrs.**

Big Data Analytics , Apache Hadoop, Using Hadoop MapReduce for Batch Data Analysis, Apache Storm, Data Visualization, Visualization tools for IoT.

UNIT 5 HANDS-ON PROJECTS**9 Hrs.**

Industry 4.0 concepts. Sensors and sensor Node and interfacing using any Embedded target boards (Raspberry Pi / Intel Galileo/ARM Cortex/ Arduino), DIY Kits – Soil moisture monitoring, Weather monitoring, Air quality Monitoring, Movement Detection.

Max. 45 Hrs.**COURSE OUTCOMES**

On Completion of the course, student will be able to

- CO1 - To learn and understand the technology and current trends in Internet of things.
- CO2 - To understand the various elements of IoT system and hardware devices.
- CO3 - To learn the programming languages and platforms for building IoT applications.
- CO4 - To understand the cloud computing and its relevance for developing IoT applications.
- CO5 - To design and implement IoT applications that manages big data with data analytics and visualization tools.
- CO6 - To implement hands-on projects using an appropriate software and hardware devices in various applications.

TEXT / REFERENCE BOOKS

1. The Internet of Things: Applications and Protocols, Wiley publications. Author(s): Oliver Hersent, David Boswarthick, Omar Elloumi.
2. Architecting the Internet of Things, Springer publications. Author(s):Dieter Uckelmann, Mark Harrison, Florian Michahelles.
3. Internet of Things with Arduino Cookbook, Packt Publications. Author(s): Marco Schwatz.
4. Internet of Things and Data Analytics, Wiley Publications.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100

Exam Duration:3 Hrs.

PART A: 10 Questions carrying 2 marks each – No choice**20 Marks****PART B:** 2 Questions from each unit of internal choice, each carrying 16 marks**80 Marks**

VENTURE CREATION

Overview

This course is designed to enable students to build an entrepreneurial mindset, explore the concept of entrepreneurship, Design thinking, understand the startup journey from opportunity identification to a validated MVP, build sustainable business model, Business planning & financial feasibility and creation of pitch deck.

Course Credits: 3

Credit Structure: L-3; T-0; P-0; EI -0 C-3

Course Learning Objectives:

1. To develop an entrepreneurial mindset, understand the concept of entrepreneurship and identify personal strengths and weaknesses
2. To understand the design thinking process and apply design thinking to real-world problems
3. To identify problems and opportunities and develop ideas for new ventures by assessing market potential
4. To develop a value proposition, business model canvas, build MVP to create sustainable differentiation for the venture with a well-structured business plan, unit economics, go- to-market strategies and funding plan for managing business growth
5. To build an idea pitch and deliver it with confidence to potential stakeholders

Course Learning Outcome:

Upon completion of the course, students will be able

1. To define entrepreneurship and explain emerging trends in entrepreneurship
2. To identify and evaluate business opportunities and assess market potential
3. To conduct customer discovery, market research, build a lean canvas, develop a business plan and marketing strategies
4. To identify sources of funding and develop a funding strategy, understand basic legal requirement for starting and running a business
5. To build an idea pitch and deliver it with confidence to various stakeholders

Course Contents

Unit	Unit title	Descriptors
Unit 1	Introduction to Entrepreneurship	Defining Entrepreneurship, evolution the concept & Emerging Trends in Entrepreneurship (Domain specific), Understanding the unique opportunities; Why be an Entrepreneur? Entrepreneurship in Indian Scenario &
		Its role in economic development; Success stories of Entrepreneur (Domain specific); Entrepreneurial style assessment tool; Developing the Entrepreneurial mindset- Attributes & skills, recognizing your sweet spot for starting up; Principles of Effectuation; Myths about Entrepreneurship; Types of Entrepreneurs; Entrepreneur vs Intrapreneur; Role of Entrepreneurial Teams
Unit 2	Design Thinking & Opportunity Discovery	Introduction to Design Thinking for startups; Design Thinking principles & process; Define the problem using Design thinking principles and validate Problem; Generation of ideas, Idea generation techniques and evaluating creative ideas; Identify problem worth solving; Sharpen your Problem Pitch
Unit 3	Customer, Markets and creating a sustainable differentiation	Differentiate between a customer and a consumer; Who is your customer and what is your segment ; Customer Job, Pains, and Gains using Value proposition Canvas; Build solution using Value Proposition Canvas; Market Estimation-TAM,SAM,SOM; Competitive analysis; Minimum viable product – what is MVP: Build - Measure - Learn, differentiate between solution Demo & MVP; How to validate MVP- Achieve a Product – Market fit

Unit 4	Business Model, Business Planning and Go to Market strategies	Introduction to Business model, Business plan ; Lean approach 9 block lean canvas model; Financial feasibility: Costs, revenue streams, Pricing, Financial Projections, Key Financial Metrics using financial template, Managing growth & targeting scale, Unit economics; Selecting the Right Channel; Introduction to Digital Marketing and tools; Branding strategy
Unit 5	Funding strategy	Sources of funds: Debt & Equity ; Map the Start-up Lifecycle to Funding Options; Build an Investor ready pitch deck

Assessment

Assessment	Internal evaluation	External examination
Weightages	50%	50%

Internal Assessment

Component 1	Component 2	
Milestone 1 & 2	Milestone 3&4	Pitch presentation
20 marks	20 marks	10 marks

Note :

- Internal evaluation will be based on Milestone deck submission in the LMS NextGen Platform provided by Wadhvani Foundation and presentation.
- The students form venture teams and work with their venture idea. This practice venture will converge to a Milestone, a pitch deck presentation created by students in the templates provided as part of the Ignite program.

External Examination

- Written examination for 50 marks on the Ignite program content.

Teaching Learning Process (Pedagogy)

The program is driven by facilitator with top-notch curated material, real life examples and case studies, access to experts and mentors, masterclasses and expert webinars. The Ignite program is hosted in the LMS NextGen Platform provided by Wadhvani Foundation. The program helps students to build practice ventures with the help of milestone deck to gain global jury certification. Students successfully completing the course will get an opportunity to get their milestone deck evaluated by team of global jury. On qualifying the global jury based on rubric assessment the student venture team gains a global jury certification from Wadhvani Foundation.

References

1. Hisrich, R. D., Peters, M. P., & Shepherd, D. A. (2017). Entrepreneurship (10th ed.). McGraw-Hill Education.
2. Ries, E. (2011). The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses. Crown Business.
3. Blank, S. G., & Dorf, B. (2012). The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company. K&S Ranch.
4. Roy, R. (2017). Indian Entrepreneurship: Theory and Practice. New Delhi: Oxford University Press.
5. Chandan, J. S., & Rana, S. S. (2019). Entrepreneurship Development and Management. New Delhi: McGraw Hill Education.
6. Sinek, S. (2011). Start with Why: How Great Leaders Inspire Everyone to Take Action. Portfolio.
7. Choudhary, R., & Mehta, N. (2019). From Zero to One: How to Build a Successful Startup in India. Notion Press.

SCSA3016	DATASCIENCE	L	T	P	Credits	Total Marks
		3	0	0		

COURSE OBJECTIVES

- To understand the mathematical foundations required for data science.
- To describe a flow process for data science problems.
- To introduce basic data science algorithms and data visualization.
- To learn machine tools and techniques.
- To learn the ideas and tools for data visualization.

UNIT1 LINEAR ALGEBRA**9Hrs.**

Algebraic view–vectors 2D, 3D and D, matrices, product of matrix & vector, rank, null space, solution of over determined set of equations and pseudo-inverse. Geometric view-vectors, distance, projections, eigenvalue decomposition, Equations of line, plane, hyperplane, circle, sphere, Hypersphere.

UNIT2 PROBABILITY AND STATISTICS**9Hrs.**

Introduction to probability and statistics, Population and sample, Normal and Gaussian distributions, Probability Density Function, Descriptive statistics, notion of probability, distributions, mean, variance, covariance, covariance matrix, understanding univariate and multivariate normal distributions, introduction to hypothesis testing, confidence interval for estimates.

UNIT3 EXPLORATORY DATA ANALYSIS AND THE DATA SCIENCE PROCESS**9Hrs.**

Exploratory Data Analysis and the Data Science Process - Basic tools (plots, graphs and summary statistics) of EDA - Philosophy of EDA-The Data Science Process-Data Visualization-Basic principles, ideas and tools for data visualization

-Examples of exciting projects-Data Visualization using Tableau.

UNIT4 MACHINE LEARNING TOOLS, TECHNIQUES AND APPLICATIONS**9Hrs.**

Supervised Learning, Unsupervised Learning, Reinforcement Learning, Dimensionality Reduction, Principal Component Analysis, Classification and Regression models, Tree and Bayesian network models, Neural Networks, Testing, Evaluation and Validation of Models.

UNIT5 INTRODUCTION TO PYTHON**9Hrs.**

Data structures- Functions- Numpy- Matplotlib- Pandas- problems based on computational complexity-Simple cases studies based on python (Binary search, common elements in list), Hash tables, Dictionary.

Max.45Hrs.**COURSE OUTCOMES**

On completion of the course, student will be able to

CO1 - Explain the basic terms of Linear Algebra and Statistical Inference.

CO2 - Describe the Data Science process and its components interaction.

CO3-Apply EDA and the Data Science process in a case study.

CO4-Classify Data Science problems.

CO5-Analyse and correlate the results to the solutions.

CO6- Simulate Data visualization in exciting project.

TEXT / REFERENCE BOOKS

1. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O'Reilly. 2014.
2. Introduction To Linear Algebra-By Gilbert Strang, Wellesley-Cambridge Press, 5th Edition. 2016.
3. Applied Statistics And Probability For Engineers-By Douglas Montgomery. 2016.
4. Jure Leskovec, Anand Rajaraman and Jeffrey Ullman. Mining of Massive Datasets. v2.1, Cambridge University Press. 2014. (free online)
5. Avrim Blum, John Hopcroft and Ravindran Kannan. Foundations of Data Science.
6. Jiawei Han, Micheline Kamber and Jian Pei. Data Mining: Concepts and Techniques, 3rd Edition.

END SEMESTER EXAM QUESTION PAPER PATTERN**Max.Marks:100****Exam Duration:3Hrs.****PART A:** 10 Questions of 2 marks each–No choice**20 Marks****PART B:** 2 Questions from each unit of internal choice, each carrying 16 marks **80 Marks**

SITA2701	AI AND MACHINE LEARNING LAB	L	T	P	Credits	Total Marks
		0	0	4	2	100

COURSE OBJECTIVES

- To implement various machine learning algorithms.
- To learn how to build Artificial Neural Network.
- To understand how to learn Data sets with the help of machine learning algorithms.
- To Apply EM algorithm to cluster a set of data stored in a .CSV file.
- To be familiar with PROLOG tool.

SUGGESTED LIST OF PROGRAMS

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
4. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.
5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.
7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.
9. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
10. Study of PROLOG. Write the following programs using PROLOG.
11. Write a program to solve 8 queens problem.
12. Solve any problem using depth first search.
13. Solve any problem using best first search.
14. Solve 8-puzzle problem using best first search.
15. Solve travelling salesman problem.

COURSE OUTCOMES

On completion of the course, student will be able to

- CO1 - Apply various machine learning algorithms.
 CO2 - Design Java/Python programs for various Learning algorithms.
 CO3 - Apply appropriate data sets to the Machine Learning algorithms.
 CO4 - Identify and apply Machine Learning algorithms to solve real world problems.
 CO5 - Apply EM algorithm to cluster a set of data stored in a .CSV file.
 CO6 - Implement programs with PROLOG.

SITA3003	ADVANCED JAVA PROGRAMMING	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- To know about Enterprise architecture models.
- To introduce the basics of session tracking.
- To understand JSP and to write Custom Tags.
- To know about the development of Enterprise Java Beans.
- To have knowledge in advanced Java programming concepts.

UNIT 1 INTRODUCTION & DATABASE PROGRAMMING**9 Hrs.**

J2EE Platform – Enterprise architecture styles – J2EE run times – J2EE API – J2EE architecture – Containers – Introduction to J2EE technologies – Naming and directory services. Database programming with JDBC – JDBC/ODBC bridge – Establishing a connection – Creating and executing SQL statements – Querying – Report statements – Scrollable and updatable result sets – Java.sql packages – JDBC data sources – Connection pooling.

UNIT 2 SERVLET PROGRAMMING**9 Hrs.**

Introduction to Servlet Programming - Servlet Implementations - Servlet configuration - Servlet exceptions - Servlet Life Cycle - Servlet Programming - Servlet Security- Servlet communication - Advanced Servlets : Approach to Session Tracking- Demonstrating Session - Lifecycle with Cookies - A simple shopping cart using Sessions - Servlet Context Interface - Servlet Collaboration.

UNIT 3 JSP AND JAVA MAIL**9 Hrs.**

Java Server Pages : Intro to JSP - JSP Directives - Scripting elements - Standard Auctions - Implicit objects - Scope - JSP pages as XML documents - JSP Sample Program - Design Strategies - JSP tag Extensions-A simple TAG - Writing TAG Extensions. Java Mail API: Introduction to Java Mail - Mail Protocols- Java Mail Overview- Quick, Send me a Email: An example program

UNIT 4 ENTERPRISE JAVA BEANS**9 Hrs.**

Overview of EJB-EJB Middleware Architecture - EJB Architecture- EJB Containers and its services - Design of EJB Tier - Session java Beans- Stateless and Stateful Beans, Entity Beans and Persistence - Container Vs Bean Managed Persistence, Message Driven Bean - Relationships, EJB Container Services.

UNIT 5 STRUTS**9 Hrs.**

Struts: Development Models-Basic Components of Struts – Struts2 Architecture-Interceptors-Validation- Building simple struts Application.

Max. 45 Hrs.**COURSE OUTCOMES**

On completion of the course, student will be able to

CO1 - Implement JDBC connectivity.

CO2 - Implement advanced Servlets.

CO3 - Implement JSP and Java Mail.

CO4 - Implement EJB.

CO5 - Implement Struts.

CO6 - To develop enterprise java applications thereby meeting the industrial requirements.

TEXT / REFERENCE BOOKS

1. Subrahmanyam Allamaraju and Cedric Buest ,”Professional Java Server Programming”, A press,J2EE 1.3, 2007.
2. Jim Keogh ,”Completer Reference, J2EE”,Tata McGraw Hill, 2007.
3. James Holmes-Struts,”The complete Reference”, 2nd Edition, Tata McGraw Hill, 2007.
4. <http://www.java.sun.com/tutorial>.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100

Exam Duration:3 Hrs.

PART A: 10 Questions carrying 2 marks each – No choice**20 Marks****PART B:** 2 Questions from each unit of internal choice, each carrying 16 marks**80 Marks**

- Skill Development

SITA2602	BIG DATA ANALYTICS LAB	L	T	P	Credits	Total Marks
		0	0	4	2	100

COURSE OBJECTIVES

- To configure Big Data Ecosystem.
- To work with No SQL Databases.
- To process job scheduling.
- To Analyse and Interpret Data.
- To visualize the data insights.

TO LEARN, DEPLOY AND EXECUTE PROGRAMS ON THE FOLLOWING TECHNOLOGIES.

1. No SQL (using Cassandra/MongoDB/Spark).
2. Hadoop – Map Reduce Programs / Commands / Job Scheduling.
3. HDFS.
4. YARN.
5. Working with Pig and Hive.
6. Visualization (using Tableau Cloud).

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Able to setup Hadoop in a Cloud / Cluster environment.

CO2 - Process and schedule the tasks in the Hadoop platform.

CO3 - To configure nosql databases in the big data ecosystem.

CO4 - Selection of right visualization method based on the intended audience.

CO5 - Creates a dashboard and story based on the data analysis.

CO6 - Test and evaluate the data models.

 Skill Development

SITA1502	CUSTOMER INTERFACE DESIGN AND DEVELOPMENT	L	T	P	Credits	Total Marks
		3	*	0	3	100

COURSE OBJECTIVES

- To effectively design with a range of technologies.
- To develop static websites & dynamic web applications.
- To learn new emerging web technologies.
- To gain knowledge and skills required for web development careers.
- To develop skills in the use and application of specific methods in user experience design.

UNIT 1 HTML, XML, CSS& RWD**9 Hrs.**

Introduction To HTML- DHTML , XML – Structuring XML document using DTD – Schemas – XML parsers – DOM – SAX presentation technologies – XSL – XFORMS – XHTML – Transformations – XSLT – XLINK – XPATH – XQuery. Responsive Web Design-Intro-Fluid Grid-Viewport-Media Queries-Images. Introduction To CSS-Syntax, Selectors-Types of style sheets.

UNIT 2 CLIENT SIDE SCRIPTING**9 Hrs.**

Java Script – Advantages – **Data types – Variables – Operators – Control statements – Functions – Objects and arrays – Windows and frames – Forms. AJAX – XML Http Request (XHR) – Create Object – Request – Response – Ready state.**

UNIT 3 SERVER SIDE SCRIPTING**9 Hrs.**

Introduction To PHP – Data Types – Control Structures – **Arrays - Function – Html Form with PHP – Form Handling & Validation - File Handling – Cookies – Sessions – Filters – Exception Handling - Database Connectivity With MySQL.**

UNIT4 ANGULAR JS & JQUERY**9 Hrs.**

Angular JS Expression – Modules – Directives – Data Binding – Controllers – Scopes – Filters – Services – Tables – Events– Form – Validation. Query Syntax – Selects – Events – jQuery Effects – jQuery – jQuery HTML – jQuery Traversing.

UNIT 5 UX & UI**9 Hrs.**

UX Introduction -Elements of UX Design- UX Design Process- Research Methods and Tools- Understanding User Needs and Goals. UX Design Process: Visual Design Principles-Information Design and Visualization-Interaction Design- Prototyping Tools-Usability Test.UI Introduction-User Interface Components -Tools and Processes.

Max. 45 Hrs.**COURSE OUTCOMES**

On completion of the course, student will be able to

- CO1 - Able to work with XML technologies.
- CO2 - Design web page to perform form validation using client-side scripting language.
- CO3 - Implement new technologies such as Angular JS and JQuery.
- CO4 - Develop web applications using server-side scripting language.
- CO5 - Understand the differences between usability and user experience.
- CO6 - Effectively select and utilize design thinking processes and UX/UI tools.

TEXT / REFERENCE BOOKS

1. Jeffrey C. Jackson, Web Technologies: A Computer Science Perspective, Pearson Education, 2009.
2. Kogent Learning Solutions Inc., Web Technologies Black Book, Dreamtech Press, 2009.
3. Ken Williamson, Learning AngularJS: A Guide to AngularJS Development, O'Reilly, 2015.
4. Jon Duckett, JavaScript and JQuery: Interactive Front-End Web Development, John Wiley and Sons Inc., 2014.
5. CallumMacrae, Learning from JQuery, O'Reilly, 2013.
6. Steve Krug,Dont Make Me Think,2nd Edition, New Riders Publishing,USA,2006.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100

Exam Duration:3 Hrs.

PART A: 10 Questions carrying 2 marks each – No choice**20 Marks****PART B:** 2 Questions from each unit of internal choice, each carrying 16 marks**80 Marks**

- Skill Development

SITA2501	CUSTOMER INTERFACE DESIGN AND DEVELOPMENT LAB	L	T	P	Credits	Total Marks
		0	0	4	2	100

COURSE OBJECTIVES

- To be familiar with mark-up languages and style sheets.
- To learn XML technologies and AJAX.
- To develop static websites and dynamic web applications.
- To gain knowledge and skills required for web development careers.
- To create web page using PHP.

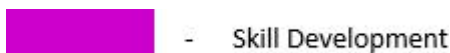
SUGGESTED LIST OF EXPERIMENTS

1. Design a web page for your university using HTML.
2. Create an Internal and External Style sheet.
3. Working with XML and CSS.
4. Write a JavaScript code to perform form validation.
5. Working with AJAX.
6. Working with Angular JS Directives.
7. Working with Angular JS Expressions.
8. Working with jQuery Selectors.
9. Working with jQuery Events and Effects.
10. Program to perform PHP Form Validation.
11. Program to demonstrate PHP Form Handling.
12. Program to create PHP Database Application using MySQL.

COURSE OUTCOMES

On completion of the course, student will be able to

- CO1 - Implement static web pages using mark-up languages and style sheets.
- CO2 - Implement form validation using client-side scripting language.
- CO3 - Implementation of new technologies: Angular JS and JQuery.
- CO4 - Develop web applications using server-side scripting language.
- CO5 - Develop web applications with database connectivity.
- CO6 - Create web page using PHP concepts.



SCSA2502	OPERATING SYSTEMS LAB	L	T	P	Credits	Total Marks
		0	0	4	2	100

COURSE OBJECTIVES

- To write programs Linux environment using system calls.
- To implement the scheduling algorithms.
- To implement page replacement algorithms.
- To implement file allocation methods.
- To develop solutions for synchronization problems using semaphores.

SUGGESD LIST OF EXPERIMENTS

1. Study of basic LINUX and VI Editor command.
2. String and Numerical Handling Functions.
3. Loop and Selection Constructs.
4. File Handling Functions.
5. Manipulate Date/Time/Calendar.
6. Retrieve System information.
7. Implementation of process scheduling mechanism – FCFS, SJF, Priority Queue.
8. Producer Consumer Problem using Semaphores.
9. Reader – Writer Problem.
10. Diner's Philosopher Problem.
11. First Fit, Worst Fit, Best Fit allocation strategy.
12. Bankers Algorithm.
13. Simulate Paging Technique of Memory Management.
14. Simulate Page Replacement Algorithms.
15. Implement memory management Scheme.

COURSE OUTCOMES

On completion of the course, student will be able to

- CO1 - Learn the basic services and functionalities of the operating system using System Calls in Linux.
- CO2 - Model CPU Scheduling such as FCFS, SJF, Priority and Round Robin.
- CO3 - Describe and solve Synchronization Problem.
- CO4 - Simulate Memory Management Technique.
- CO5 - Explain how to perform Paging Techniques.
- CO6 - Demonstrate Page Replacement Algorithms.

- Skill Development

SITA2401	NETWORKING LAB	L	T	P	Credits	Total Marks
		0	0	4	2	100

COURSE OBJECTIVES

- To understand how to implement socket programming.
- To be familiar with simulation tools.
- To understand how to create applications using TCP and UDP.
- To gain Knowledge on various networking protocols.

SUGGESTED LIST OF EXPERIMENTS

1. Study of Socket Programming and Client – Server model.
2. Creation of Date Server, and also print the client's address on the Server.
3. Applications using TCP Sockets like.
 - a. Echo client and echo server b. Chat c. File Transfer
4. Applications using TCP and UDP Sockets like.
 - a. DNS b. SNMP c. File Transfer
5. Calculation of Checksum for packet data and file.
6. Program to implement HTTP Protocol.
7. Implementation of Stop and Wait Protocol and Sliding Window Protocol.
8. Simulating PING and TRACEROUTE commands.
9. Study of Network simulator (NS) and Simulation of Congestion Control Algorithms using NS.
10. Perform a case study about the different routing algorithms to select the network path with its optimum and economical during data transfer.
 - i. Link State routing ii. Flooding iii. Distance vector
11. WiFi Simulation.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Analyze the performance of the protocols in different layers.

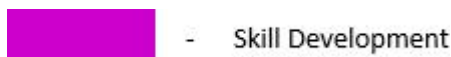
CO2 - Implement various protocols.

CO3 - Design with simulation tools.

CO4 - Analyze various routing algorithms.

CO5 - Construct Wi-Fi model.

CO6 - Understand socket programming.



SITA3004	USER INTERFACE DESIGN AND IMPLEMENTATION	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- To explain hypertext and style sheet languages.
- To apply Responsive Web Design Framework and features.
- To illustrate the basics of JavaScript, jQuery and allied scripting languages for Web design.
- To build Server side JS frameworks.
- To design client side JS frameworks.

UNIT 1 UI DESIGN**9 Hrs.**

HTML5: What is HTML5 - Features of HTML5 – Semantic Tags – New Input Elements and tags - Media tags (audio and video tags) – Designing Graphics using Canvas API - Drag and Drop features – Geolocation API - Web storage (Session and local storage). CSS3: What is CSS3 – Features of CSS3 – Implementation of border radius, box shadow, image border, custom web font, backgrounds - Advanced text effects (shadow) - 2D and 3D Transformations - Transitions to elements - Animations to text and elements.

UNIT 2 RESPONSIVE WEB DESIGN (RWD)**9 Hrs.**

Responsive Design: What is RWD – Introduction to RWD Techniques – Fluid Layout, Fluid Images and Media queries - Introduction to RWD Framework. Twitter Bootstrap – Bootstrap Background and Features - Getting Started with Bootstrap - Demystifying Grids – Off Canvas - Bootstrap Components - JS Plugins – Customization.

UNIT 3 INTRODUCTION TO JAVASCRIPT AND JQUERY**9 Hrs.**

Introduction - Core features - Data types and Variables - Operators, Expressions and Statements - Functions & Scope - Objects - Array, Date and Math related Objects - Document Object Model - Event Handling – Browser Object Model - Windows and Documents - Form handling and validations. Object-Oriented Techniques in JavaScript - Classes – Constructors and Prototyping (Sub classes and Super classes) – **JSON – Introduction to AJAX. Introduction – jQuery Selectors – jQuery HTML - Animations – Effects – Event Handling – DOM – jQuery DOM Traversing, DOM Manipulation – jQuery AJAX.**

UNIT 4 INTRODUCTION TO SERVER-SIDE JS FRAMEWORK – NODE.JS**9 Hrs.**

Introduction - What is Node JS – Architecture – **Feature of Node JS - Installation and Setup - Creating web servers with HTTP (Request & Response) – Event Handling - GET & POST implementation - Connect to SQL Database using Node JS – Implementation of CRUD operations.**

UNIT 5 INTRODUCTION TO CLIENT-SIDE JS FRAMEWORK**9 Hrs.**

Introduction to Angular 4.0 - Needs & Evolution – Features – Setup and Configuration – Components and Modules – Templates – Change Detection – Directives – Data Binding - Pipes – Nested Components. Template - Model Driven Forms or Reactive Forms - Custom Valuator. Introduction to ReactJS - React Components- Build a simple React component- React internals -Component inter communication- Component composition- Component styling.

Max. 45 Hrs.**COURSE OUTCOMES**

On Completion of the course, student will be able to

- CO1 - Develop web pages and style sheets using HTML and CSS3 respectively.
- CO2 - Design responsive websites with RWD techniques.
- CO3 - Apply JavaScript and allied scripting languages for implementing object models and functions.
- CO4 - Demonstrate Server Side JS Framework for application development.
- CO5 - Use Client Side JS Framework for redefining the application development.
- CO6 - Develop User Interface Designs using the frameworks

TEXT / REFERENCE BOOKS

- Harvey and Paul Deitel & Associates, Harvey Deitel and Abbey Deitel, “Internet and World Wide Web - How to Program”, 5th Edition, Pearson Education, 2011.
- Achyut S Godbole and Atul Kahate, “Web Technologies”, 2nd Edition, Tata McGraw Hill, 2012.
- Thomas A Powell, Fritz Schneider, “JavaScript: The Complete Reference”, 3rd Edition, Tata McGraw Hill, 2013.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100

Exam Duration: 3 Hrs.

PART A: 10 Questions carrying 2 marks each – No choice**20 Marks****PART B:** 2 Questions from each unit of internal choice, each carrying 16 marks**80 Marks**

- Skill Development

SITA1301	PROGRAMMING IN JAVA	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- To introduce object oriented concepts in Java.
- To understand Packages, Interfaces and Multithreading Concepts.
- To understand lang, io packages.
- To understand the concepts involved in internet application development.
- To understand the internet application design using swing controls.

UNIT 1 INTRODUCTION TO JAVA**9 Hrs.**

Classes and Objects – Class Fundamentals – Declaring Objects – Methods – Constructors – Garbage Collection. Inheritance – Basics – Using Super – Method Overriding – Abstract Classes – Using final with inheritance. String Handling – String class – String buffer class.

UNIT 2 PACKAGES, INTERFACES AND THREADS**9 Hrs.**

Introduction to Packages – User Defined Packages - Importing packages – Access protection – Interfaces – Exception Handling - Exception Types – Using try, catch, throw, throws and finally – Multithreading – JavaThreadModel – Main thread – Creating multiple thread – Thread priorities – Synchronization.

UNIT 3 LANG AND IO PACKAGES**9 Hrs.**

Java. lang package - Wrapper Classes– Simple type wrappers – Using clone() and the Cloneable Interface -IO Package - Introduction – Input Stream and Output Stream classes - Data Output Stream and Data Input Stream classes –FileInput Stream – File Output Stream. - Reader and Writer Classes – File Reader and File Writer

UNIT 4 APPLLET PROGRAMMING AND EVENT HANDLING**9 Hrs.**

Applet Class – **Applet basics – HTML APPLLET tag – Passing parameters to applets -Delegation Event Model** – Handling Mouse and Keyboard Events – Adapter Classes.

UNIT 5 SWINGS AND DATABASE CONNECTIVITY**9 Hrs.**

Introduction-**J Applet Class-J Label Control - J Text Field Control –J Button Control –J Checkbox Control-J Radio Button Control – J Combo Box Control – J tapped Pane Control-J ScrollPane Control – J Table**. Introduction –Establishing Connection – Creation of Data Tables – Entering Data into the Tables- Table Updating .

Max. 45 Hrs.**COURSE OUTCOMES**

On completion of the course, student will be able to

CO1 - Develop application programs using java object oriented concepts.

CO2 - Implement the interface, package and multithread concepts.

CO3 - Implement various built in packages and its applications.

CO4 - Develop web based applications using applet programming.

CO5 - Implement Swing concepts in real time applications.

CO6 - Design the net applications frontend and connect with backend using database connectivity.

TEXT / REFERENCE BOOKS

1. Herbert Schildt, "The Complete Reference JAVA2", Fifth Edition, Tata Mcgraw Hill, 2017.
2. Bruce Eckel, "Thinking in Java", Pearson Education, Fourth Edition 2006.
3. Core Java Volume-I Fundamentals, 9th Edition, Cay Horstman and Grazy Cornell, Prentice Hall, 2013.
4. <https://docs.oracle.com/javase/tutorial/>.
5. <https://www.tutorialspoint.com/java/>.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100

Exam Duration:3 Hrs.

PART A: 10 Questions carrying 2 marks each – No choice**20 Marks****PART B:** 2 Questions from each unit of internal choice, each carrying 16 marks**80 Marks**
 - Skill Development

SITA2302	PROGRAMMING IN JAVA LAB	L	T	P	Credits	Total Marks
		0	0	4	2	100

COURSE OBJECTIVES

- To implement Object Oriented concepts in Java
- To implement Packages, Interfaces and Multithreading Concepts.
- To develop applications using lang and io packages.
- To design web based application.
- To design GUI application design using swing controls.

CYCLE -1

1. Write a Java program using Classes and Objects.
2. Write a java Program using various types of Constructors.
3. Implement the concept of following kinds of Inheritance for Employee Application
 - 3.1. Single Inheritance.
 - 3.2. Multilevel Inheritance.
 - 3.3. Hierarchical Inheritance.
4. Write a Java Program to access various members of super class using Super Keyword
5. Write a java program that illustrates the example for abstract class.
7. Write a java program to find area of various shapes using interface.
8. Write a java Program to create custom package to implement calculator operations.
9. Write a java program that describes the exception handling mechanism.
10. Write a java program that describes the user defined exception.
11. Write a program to create thread by extending Thread Class or by implementing Runnable Interface.
12. Write a java program to create copy of a given object using ICloneable interface.

CYCLE -2

13. Write a Java Program to implement Wrapper classes and their methods.
14. Write a java program for handling input and output operations using,
 - a. Input Stream and Output Stream classes
 - b. Reader and Writer Classes
 - c. Data Output Stream and Data Input Stream classes.
15. Write a java program that describes the life cycle of an applet.
16. Write a java program to pass parameters to Applet and display the output.
17. Write a java program for event handling using awt controls
18. Write a Java program to handle Mouse and Key events
19. Create a Java Application Programming Interface by using swing controls
20. Write a java program for database connectivity using JDBC.

COURSE OUTCOMES

On completion of the course the student will be able to

- CO1: Ability to implement application programs using java object oriented concepts
- CO2: Able to implement interface, package and multithread concepts
- CO3: Understand various built in packages and its applications
- CO4: Knowledge on designing web based applications using applet programming
- CO5: Create applications using Swing controls in real time applications.

S11BLH11	PROGRAMMING IN C	L	T	P	EL	Credits	Total Marks
		2	0	4	0	4	100

COURSE OBJECTIVES

- To understand the concepts of variables, operators, control structures and arrays.
- To gain knowledge on functions, structures and union in C.
- To explore the concepts of pointers and files to create real world applications using C.

UNIT 1 BITS AND BYTES IN COMPUTING**12 Hrs.**

Computers: Hardware – Software – Processor – Memory – I/O devices – Interface – Programming Languages – Evolution from COBOL, FORTRAN to C, Python – Need

Algorithms: Role in problem solving – Analysis – Design – Flowcharts: Role in problem solving – Symbols – Design – Pseudo code: Role in problem solving – Design – Program: Role in problem solving – Design. Practical: Describe a simple real world problem in your domain of interest and describe it in the form of problem statement, input, output and provide its solution in terms of algorithm, flowchart, pseudo code and program.

UNIT 2 C: MATH BEHIND CODING**12 Hrs.**

C: Structure of program – Character set – Tokens – Keywords – Identifiers – Constants – Variables – Data types – Strings – Operators and its types – Functions – Header Files

Algorithmic Strategies: Iteration and Recursion – Efficiency – Role of time and space consumption while building an algorithm – Complexities Practical:

- Describe a simple real world problem in your domain of interest and provide a computing and non-computing solution for the same. Calculate the time and space consumed in both solutions. Compare and contrast the pros and cons in both solutions.
- Write an algorithm, flowchart, pseudo code followed by a simple C code to do find the Factorial and Fibonacci series using both iteration and recursion.
- Input the number of days taken to cultivate both rice and wheat in turns in an agricultural land from the user. Write a C program to display the days as years, months and days using simple operators.
- You have a circular plot for building playground and a rectangular plot for building an apartment. Get the input from the user for both plots and write a C program to calculate the area and perimeter of both plots.

UNIT 3 C: MAGIC BEHIND INSTANT OUTPUTS**12 Hrs.**

Advanced coding concepts: Decision Making using branching statements and its types – Decision making using looping statements and its types – Switch statements – Break – Continue – Goto – Jump statements. Case Study: Fun with Code -- Printing Alphabets / Flags of Countries / Flying Alphabet Screensaver. Practical: Describe a problem statement in your domain of interest whose solution involves repetition of same steps and provide code as solution involving for, while and do while loops.

- Describe a problem statement in your domain of interest whose solution involves decision making and provide code as solution involving if-else, nested if-else and ladder if-else.
- Develop a simple scientific calculator using Switch case statement.
- A Cartesian co-ordinate system has four quadrants. Write a C program to find the quadrant of the co-ordinate points given by the user using both if-else and nested if-else control structure.
- Given a rose flower to you, dismantle the petals of the flower from inside, if you notice - it follows the sequence of Fibonacci. Now, try to arrange the word "PIZZA" in several ways without repeating and calculate number of ways it can be done using factorial concept. Write a C program to find both Fibonacci and factorial by getting the mentioned input.
 1. Product of two large prime numbers is used as encryption key in encryption algorithms. Write a C program to display all the prime numbers between 1 and 100 and give the first two largest numbers as the output.

UNIT 4 STORING GROUP OF HOMOGENOUS ELEMENTS: ARRAYS**12 Hrs.**

Diving into Arrays: Definition – Syntax – Types – Representation: Row and Column Order – Dynamic Arrays. Idea behind functions: Declaration – Definition – Types – Calling – Arguments – Prototypes – Call by Value – Call by Reference – Pointers – Amalgamation of Pointers with Arrays and Strings. Case Study: Fun with Code – Simple Game development using Arrays and Functions. Practical:

- Describe a problem statement in your domain of interest where you need to work with group of same type of data. Provide a solution in terms of C program to store and manage the data effectively.
- You're playing UNO cards, suddenly a person is getting rev card. Write a C program to reverse the round by storing the number of players in array.
- Write a C program for Vehicle Regulation System where odd number ending vehicles can use the road on odd days and even number ending vehicles can use the road on even days using two separate arrays to store and display the odd and even numbers.
 - Write a C program to do the following applications in array:
 - (i). Get set of positive and negative integers from the user; replace positive integers by 0 in the array.
 - (ii). Reverse the floating point numbers stored in the array.
 - (iii). Return the smallest value and largest value position in the array.
 - (iv). Search the number '5' in array and replace it with '10'
- Write C program to do the following string handling applications.
 - (i). Get favourite actor and actress name, concatenate it and display
 - (ii). Display your name in uppercase, lowercase and as fname and lname.
 - (iii). Count the frequency of "the" in any sentence and delete it from sentence.
 - (iv). Check whether the given string is a palindrome or not.
- Write a C program for counting the total number of duplicate elements in an array; print all the unique elements in the same array as two different functions.
- Write a C program to sort the elements in an array in both ascending and descending order using two different functions.
- Write a C program to find the largest and smallest number in an array using recursion and to convert the output into a binary number.
- Write a C program to swap two numbers using two functions, one using pointers and the other one without using pointers.

UNIT 5 STORING GROUP OF HETEROGENOUS ELEMENTS: STRUCTURE 12 Hrs.

Outset of Structure and Union: Structure definition and declaration – Structures fusion with Arrays – Pointers – Functions – Union initiation, Definition and declaration – Memory allocation- Static and dynamic. Working with Files: File handling functions – Read – Write – Other operations – Different file types Case Study: Report on using file functions to create score board for any game, importing it to program Practical:

- Describe a problem statement in your domain of interest where you need to work with group of different type of data. Provide a solution in terms of C program to store and manage the data effectively.
- Write a C program to get the details of the student (roll no, name, date of birth, state, 10th percentage and 12th percentage) using structure. Calculate the age of the student and display the eligibility status for his admission.
 - Eligibility criteria: more than 60 percent in 10th and 12th, age $\geq$ 17, state==TN.
 - Write a menu driven C program for library management system with ten entries:
 - Add Book
 - Add Author
 - Add Category
 - Book Cos
 - Display - Book by Author, Book by Category, Book under cost
- Write a C program to create an employee Union with employee details (id, name, salary) Accept the details of 'n' employees, rearrange the data in ascending order of employee name, id and salary as three different functions and display it.

Complex Practice Problems

- Design a C program by creating your own header file for any function of your choice and display the output by calling the header file.
 - Create TIC-TAC-TOE game using C Language.
- Given a situation, you are going to ATM to withdraw money. Write a C program, get the money requested from the user as input and display the number of possible bank notes for the requested money. Note: Give input as number ending in 0's or 5's.
- Develop a C program for managing Car Rental process with various modules for registration as new user, login, get id proof, keep track of cars available and cars given for rental.

- Create SUDOKU game using C Language.

Max. 60 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

- CO1** - Interpret the difference between components of problem solving such as algorithm, flowchart, pseudo code and source code.
- CO2** - Build simple solutions for any given problem statement using various components of problem solving techniques and measure its efficiency in terms of time and space.
- CO3** - Examine the roots and foundation of C programming's key concepts like Data types, Operators.
- CO4** - Design applications using different core concepts such as Arrays and Functions in C language.
- CO5** - Formulate real time solutions through programs using Structure and Union in C language.
- CO6** - Develop various applications for solving real time societal problems.

TEXT / REFERENCE BOOKS

1. Yashwant kanetkar let us c bpb publication 2019 3rd edition
2. R.G. Dromey how to solve it by computer 2013 14th edition
3. Balaguruswamy programming in ansi c tata mcgraw-hill publication ,8th Edition
4. Reg Perry Dean Miller c Programming Absolute Beginners Guide Pearson Education 2008.3rd Edition



- Skill Development



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