

**SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)**

CHENNAI - 600044.

Re accredited with A+ Grade by NAAC

BACHELOR OF COMPUTER SCIENCE WITH COGNITIVE SYSTEMS

(Shift – II)

Under the faculty of Science

B.SC. COMPUTER SCIENCE WITH COGNITIVE SYSTEMS



CHOICE BASED CREDIT SYSTEM (CBCS)

OUTCOME BASED EDUCATION (OBE)

(Effective from the Academic Year 2021-22)

PROGRAMME OUTCOMES (POs)

After completion of the programme, the student will be able to

PO 1-Develop sharp cognisance of concepts, apply the domain knowledge with utmost confidence and be assertive at any given opportunity.

PO 2-Possess deeper understanding of life skills to appraise life and draw logical conclusions.

PO 3-Design and develop solutions for challenging problems of society.

PO 4-Acquire programme centric thought process facilitating further studies in the respective domain.

PO 5-Engage in life-long learning to easily adapt to the dynamic environment and obtain clarity and preparedness for field specialisation

PO 6-Self actualise and self regulate, focussing on ethical and moral values to become a compassionate human being.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1- Gives a good foundation in the discipline of Computer Science. It enables students to develop computerized solutions to the real time problems.

PSO2: Helps to acquire skills for doing intelligent data analysis. It is a necessary element for many real-world applications with appropriate algorithms of varying complexity.

PSO3: It enables students to get a productive career in industry, academia and research through logical thinking and problem solving and cognitive skills.

PSO4: Students will get training in recent technical tool which is mostly needed for IT companies / IT Enabled Services. The demands of IT company can be met through this.

PSO5: A continuous and gradual knowledge improvement is possible with this graduation programme, it gives a good basement for higher studies and even engage students in research.

**B.SC. COMPUTER SCIENCE WITH COGNITIVE SYSTEMS
UG DEGREE PROGRAMME
SYLLABUS
SEMESTER I**

Core Theory –I OPERATING SYTSEMS	
SEMESTER : 1	INT MARKS: 40
	EXT MARKS: 60

Course Objectives

This course provides the basic operating system structure, process management, synchronization and CPU scheduling. The course is designed to cover deadlock, memory management, virtual memory, file Concepts and user authentication.

Course Outcome

CO Number	CO Statement	Knowledge Level
CO1	Recognize the basic concepts of operating system.	K1
CO2	Understand the process and thread concepts	K2
CO3	Distinguish the concepts of deadlocks and memory management in operating system concepts.	K3
CO4	Discusses about virtual memory, paging and thrashing.	K3
CO5	Apply various file system concepts, allocation methods and authentication	K3

Mapping with Programme Outcomes

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	S
CO2	S	S	M	M	S
CO3	S	S	S	S	M
CO4	S	S	S	S	M

CO5	S	S	M	S	M
-----	---	---	---	---	---

S- Strong; M-Medium; L-Low.

UNIT I

Introduction: What Operating Systems Do - Operating System operations. Operating System Structures: Operating System Services - User and Operating System Interface - System Calls - System Programs - Operating System Design and Implementation - Operating System Debugging - Operating System Generation - Types of System Calls.

UNIT II

Process Management: Process Concept - Process Scheduling - Operations on Processes. Threads: Overview - Multicore Programming - Multithreading Models. Process Synchronization: Synchronization Hardware - Mutex Locks - Semaphores. CPU Scheduling: Basic Concepts - Scheduling Criteria - Scheduling Algorithms - Thread Scheduling.

UNIT III

Deadlock: System Model - Deadlock Characterization - Methods for Handling Deadlocks - Deadlock Prevention- Deadlock Avoidance- Deadlock Detection- Recovery from Deadlock. Memory Management: Address Binding –Dynamic Loading and Linking- Logical and Physical Address Space-swapping- Contiguous Allocation- Internal & External Fragmentation. Non-Contiguous Allocation: Paging-Implementation- Hardware-Protection-Sharing—structure of page table- Segmentation

UNIT IV

Virtual Memory: Demand Paging-Page Replacement-Page Replacement Algorithms-Thrashing.

UNIT V

File System: File Concepts-Access Methods -Directory Structures -Protection Consistency Semantics- File System Structures– Allocation Methods-Free Space Management. System, Security: Security Problems – Program Threats –System and Network Threats – User Authentication.

Text Book(s):

- A. Silberschatz, Galvin, Gagne; Operating System Concepts , John Wiley Private Limited, 9th Edition,2012
- B. Silberschatz, Galvin, Gagne; Operating System Concepts , John Wiley Private Limited, 10th Edition 2017

Core Practical-I OPERATING SYSTEMS Lab	
SEMESTER : 1	INT MARKS: 40
	EXT MARKS: 60

Course Objective

The objective of the lab course is to provide skills on installation of client / server windows in Virtual machine. It will equip the students to perform file, role, storage, partitioning management operations in the operating system.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the installation of client / server windows in virtual machine	K1
CO2	Illustrate adding roles and features in OS Server	K2
CO3	Apply disk partitioning and backup operations in OS Server	K3
CO4	Configuring, managing and installation of DNS	K3
CO5	Configuring Active Directory domain service	K2

Mapping with Programme Outcomes

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S
CO2	S	S	M	S	M
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	S	M	S	S	S

S- Strong; M-Medium; L-Low

Exercises

- Installation of client windows 10 in Virtual machine
- Installation of Windows server 2016 in Virtual machine
- Add roles and features
- Disk Partitioning in MBR and GPT
- Server Backup
- Configuring Active Directory domain service
- Configuring, managing and installation of DNS
- Configuring, managing and installation of DHCP
- IIS Configuration and Deployment
- Mapping network drive

Software Essentials: OS – Windows/Linux

Text Book(s):

1. William PanekTylor Wentworth, “Microsoft Windows 10 Administration”, Wiley Publishing, 2010
(check the latest version)
2. William PanekTylor Wentworth, “Microsoft Windows server 2012 R2 ”, Wiley Publishing, (check the latest version)

REFERENCE BOOKS:

1. Mitch Tulloch, “Windows 7 Essential Guidance”, 2009.
2. Charles Edge, Chris Barker EhrenSchwiebert, “Beginning MacOSX Snow Leopard Server”, 2010
3. Greg Tomsho, “Guide to Operating System”, 5th Edition, 2017.

**Core Practical –II PROBLEM SOLVING USING
WORKSHEETS**

SEMESTER : 1

INT MARKS: 40

EXT MARKS: 60

Course Objective

The objective of the lab course is to provide the necessary skills to work with worksheets to perform formula coding and to prepare accurate data reports. It will help the students to automate tasks using VBA code and reuse the code for other tasks.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic functions in worksheets	K1
CO2	Writing simple function to perform simple tasks	K2
CO3	Creating the user forms	K3
CO4	Applying function in generating reports	K3
CO5	Import and Export Data from different applications	K3

Mapping with Programme Outcomes

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S
CO2	S	M	S	S	S
CO3	S	S	M	S	S
CO4	S	M	M	S	S
CO5	S	S	S	S	S

S- Strong; M-Medium; L-Low

Excercise

- Simple Functions and Formulae
- Working with Sheets
- Working with Workbooks
- Data Analysis
- Data Visualization
- Import/ export data
- User forms
- Generating Reports

Software Essentials: Microsoft office 2007

Text Book:

- A. Gary B. Shelly, Misty E. Vermaat , Thomas J. Cashman; Microsoft Office2007: Introductory Concepts and Techniques, Windows Vista Edition.

REFERENCE BOOK:

1. John Walkenbach, Herb Tyson, Cary N.Pr, FaitheWempen;Office 2007 Bible,Wiley India Edition, Reprint 2009.

Core Theory – II COMPUTER NETWORKS	
SEMESTER : 2	INT MARKS: 40
	EXT MARKS: 60

Course Objective

This course is designed to provide in depth knowledge of the various network layers, network security and client server computing.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understanding of the fundamental concepts of computer networking.	K1
CO2	Provides a overview of the different design issues and functionality of data link layer	K2
CO3	Understand the terminology of Channel Allocation Problem and Ethernet	K2
CO4	Understand and Analyze about IP Addressing, behaviors and limitations of various routing algorithms and protocols	K2, K3
CO5	Learn about Transport Protocol, Email and Cryptography	K2

Mapping with Programme Outcomes

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	S	S	S
CO2	S	S	S	M	S
CO3	S	M	S	S	S
CO4	S	S	M	S	S
CO5	S	S	S	S	M

S- Strong; M-Medium; L-Low

UNIT I

Introduction - Network Hardware – Software – OSI Reference Models – Internet– ATM - Physical layer - Transmission media - wireless transmission – switching (circuit switching, packet switching, hybrid switching) methods – Communication Satellites.

UNIT II

Data link layer Design issues – error detection and correction – elementary data link protocols – Sliding window protocols – Data link Layer in the Internet.

UNIT III

Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols – Ethernet – Ethernet Cabling- Manchester Encoding-Ethernet MAC Sublayer Protocol - Wireless LANs.

UNIT IV

Network layer – design issues – Routing algorithms – Congestion control algorithms – Internet Working – IP protocol – IP Address – Internet Control Protocol.

UNIT V

Transport layer – Elements of Transport Protocols – Addressing, Establishing & Releasing A connection – Internet Transport Protocol (TCP) – The application layer-DNS-The domain name system- Electronic mail-the- Cryptography.

Text Books:

- A. Andrew.S.Tanenbaum , David J. Wetherall ; Computer Networks, Pearson, 5th Edition, (2014)
- B. Andrew.S.Tanenbaum ; Computer Networks, PHI, 4th Edition,(2009)

REFERENCE BOOKS:

1. Achyut Godbole; Data Communication and Networks, TMH; (2007)
2. Uyles Black; COMPUTER NETWORKS Protocols, Standards, and Interfaces, Second Edition, PHI.
3. Behrouz A. Forouzan; Data Communications and Networking,Tata McGraw-Hill, Second Edition, (2003).
4. Pete Loshin;TCP/IP For Everyone,Academic Press, (1995).

Core Practical-III COMPUTER NETWORKS Lab	
SEMESTER : 2	INT MARKS: 40
	EXT MARKS: 60

Course Objective

This course imparts a detailed knowledge on various protocols used in communication, managing and configuring devices in designing the network.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Design and setup networking environment	K3
CO2	Understand and apply the concept of	K2
CO3	Apply socket configuration skills to design network a network	K3
CO4	Implement and evaluate routing protocols for network	K3
CO5	Gain awareness on configuring internetworking devices to design a network	K2

Mapping with Programme Outcomes

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S
CO2	S	S	M	S	S
CO3	S	M	S	S	S
CO4	S	S	S	M	S
CO5	S	S	S	M	S

S- Strong; M-Medium; L-Low

Requirements:

Cisco packet tracer software (Freeware)

Exercises

- Modes in Switches
- Switch Authentication
- Switching in Half-duplex mode
- Connecting PCs and assigning IP Address
- Telnet
- Port Security
- Virtual LAN (VLAN)
- VLAN Trunking Protocol (VTP)
- Spanning Tree Protocol (STP)
- Static /Dynamic Routing Protocols

Core Practical – IV WEB TECHNOLOGIES	
SEMESTER : 2	INT MARKS: 40
	EXT MARKS: 60

Course Objective

This course gives the fundamental concepts, techniques and methodologies of web application development. The Course is designed to create interactive web page using HTML, CSS, XML and JavaScript.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic HTML tags to create adaptive web pages	K2
CO2	Build dynamic web pages using JavaScript (client side programming).	K3
CO3	Apply CSS to implement a variety of presentation effects	K3
CO4	Illustrate scripting languages in XML document to add interactive web pages	K3
CO5	Demonstrate a sophisticated web application to link and publish web sites	K3

Mapping with Programme Outcomes

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S
CO2	S	S	S	M	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	M	S	S	S	S

S- Strong; M-Medium; L-Low

Exercises

I - HTML

- Create a Web Page for your Personal Information using text formatting tags.
- Create a web page to display railway train timings.
- Create a sample web page to promote a product using frames and links
- Working with lists

II - JAVASCRIPT

- Create a javascript program to sort the given numbers in ascending and descending order.
- Factorial of a number
- Fibonacci series
- Working with mouse events
- Manipulation of Strings
- Create a web page for getting personal details using form controls
- Write a program to design a calculator

III – CASCADING STYLE SHEET

- Box property in CSS
- Font property in CSS

IV - XML

- Creation of XML documents.
- Validation of XML using DTD
- Validation of XML using schemas
- Using CSS in XML
- Creating XSL style sheets.

Core Theory- III INFRASTRUCTURE MANAGEMENT	
SEMESTER : 3	INT MARKS: 40
	EXT MARKS: 60

Course Objectives

The objective of this course is to learn the installation and configuration process for System Center 2012 R2 Operations Manager standard and Data Center features. Acquire knowledge on monitor services, devices, and operations for many computers in a single console by showing state, health, and performance information, as well as alerts generated for availability, performance, configuration and security situations.

Course Outcomes (COs)

After successfully completing the course the students should be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the Installation of a new System Center 2012 Operations Manager Management Group	K1
CO2	Design and provision custom views to relevant support teams	K2
CO3	Understand how to deploy agents	K3
CO4	Work with management packs	K3
CO5	Create dashboards and custom visualizations	K3

Mapping with Programme Outcomes

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	S
CO2	S	S	S	S	M
CO3	S	M	S	S	S
CO4	S	M	S	S	S
CO5	S	S	S	S	S

S- Strong; M-Medium; L-Low

UNIT I: Introducing Windows 10

Overview of Deploying Windows 10- Configure Devices and Drivers- Perform Post installation Configuration Task- Managing Apps in Window.

UNIT II: SCCM Basics

Overview of System Center 2012 R2 Configuration Manager-Planning and Deploying a Stand-Alone Primary Site- Planning and Configuring Role-Based Administration- Planning and Deploying a Multiple-Site Hierarchy- Replicating Data and Managing Content in Configuration Manager 2012-Planning Resource Discovery and Client Deployment- Configuring Internet and Cloud-Based Client Management-Maintaining and Monitoring System Center 2012 Configuration Manager.

UNIT III: Overview of System Center 2012 R2 Operations Manager:

Operations Manager Introduction and Basic Concepts- Reason to use Operations Manager- What's New in 2012 R2 Operations Manager- System Requirements- Operations Manager Components. Planning & Installation: Deployment Scenarios-Order of Installation- Installation Process- SQL Server Configuration- Operations Console- Web Console.

UNIT IV: Administration

Agent Deployment- Security of manual agent- Agent and Agent less managed systems-Role Based Security- Reporting server- Object Discovery. Management Packs: Management Pack Overview- Pre-Installed Management Packs- Importing Management Packs- Overrides.

UNIT V: Monitoring Overview

Overriding of MPs- Creating Rules and Monitors- Agentless Monitoring- Demo on Role Based Security- Creating Groups- Configuring Notifications. Operations Manager Reporting: Installing SQL Reporting Services- Installing Operations Manager Reporting- Creating, Viewing and Customizing Reports-Dashboard- Considerations for High Availability and Disaster Recovery.

REFERENCE BOOKS:

- Kerrie Meyler, Gerry Hampson, "System Center Configuration Manager Current Branch Unleashed System" 1st Edition, 2018.
- SlawekLigus, "Effective Monitoring and Alerting: For Web Operations" 1st Edition, 2012.

Core Theory –IV VIRTUALIZATION AND CLOUD	
SEMESTER : 3	INT MARKS: 40
	EXT MARKS: 60

Course Objectives

The objective of this course is to understand basic concepts of distributed computing. Understand the basic principles of Cloud Computing, Virtualization and Data centers

Course Outcomes (COs)

After successfully completing the course the students should be able to

CO Number	CO Statement	Knowledge Level
CO1	Recognize the basic concepts of Distributed Systems	K1
CO2	Understand about Cloud Computing	K2
CO3	Understand about Virtualization	K2
CO4	Understand Cloud Types and Cloud Service Deployment Models (IaaS*, PaaS*, SaaS*).	K2
CO5	Learn to Create Virtual Machines (VM) using vSphere and Data centers	K3

Mapping with Programme Outcomes

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	S
CO2	M	S	S	M	S
CO3	S	M	S	M	S
CO4	S	S	M	S	S
CO5	M	S	S	M	M

S- Strong; M-Medium; L-Low

UNIT I: Distributed Systems

Distribute a system - Distributed algorithm - Distributed Data Stores - Distributed Computing - File Systems - Distributed Messaging - Distributed Applications – Distributed Transaction - Parallel and distributed computing - Applications.

UNIT II: Cloud Concepts

Introduction Cloud Computing - Advantages of Cloud - Public Cloud - five essential characteristics - three service models - Four deployment models - Benefits of Cloud Computing - Cloud Vendors - Traditional Infrastructure setup and Challenges – AWS.

UNIT III: Virtualization

Introduction to vsphere and the Software - Defined Data Center Creating Virtual Machines - vcenter Server - Configuring and Managing - Virtual Networks Configuring and Managing Virtual Storage - Virtual Machine Management - Resource Management and Monitoring.

UNIT IV: Virtual Machines

Vsphere HA - vsphere Fault Tolerance - Protecting Data vsphere DRS - Network Scalability - vsphere Update Manager and Host Maintenance - Storage Scalability - Securing Virtual Machines.

UNIT V: Datacenter

Data center overview -Components - Provisions - Need of Data Center - Data Center Architecture - Different Racks - Data center architecture for cloud computing - role of data center in cloud computing.

SUGGESTED READINGS

- A. Jean Dollimore formerly of Queen Mary, Tim Kindberg, “Distributed Systems Concepts and Design”, 5th Edition Cambridge University, University of London
- B. VenkataJosyula , Malcolm Orr , Greg Page, “Cloud Computing: Automating the Virtualized Data Center”, 1st Edition.
- C. Brian J.S. Chee, Curtis Franklin Jr., “Cloud Computing: Technologies and Strategies of the Ubiquitous Data Center”, 1st Edition.

Core Practical-V VIRTUALIZATION AND CLOUD Lab	
SEMESTER : 3	INT MARKS: 40
	EXT MARKS: 60

Course Objectives

The objective of this course is to understand Cloud Computing, Virtualization and Data centers using AWS

Course Outcomes (COs): After successfully completing the course the

CO Number	CO Statement	Knowledge Level
CO1	Understand about Cloud Computing	K1
CO2	Understand about Virtualization	K2
CO3	Using hypervisors	K3
CO4	Creating account in AWS	K3
CO5	To work with AWS services	K3

Mapping with Programme Outcomes

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	M
CO2	S	M	S	M	M
CO3	S	M	M	S	S
CO4	M	S	M	S	S
CO5	S	S	S	S	S

S- Strong; M-Medium; L-Low

Exercises

- Working with hypervisors
- Creating account in AWS
- Exploring AWS services like storage, machine image, pricing models, data bases

Core Practical-VI INFRASTRUCTURE MANAGEMENT Lab	
SEMESTER : 3	INT MARKS: 40
	EXT MARKS: 60

Course Objectives

The objective of this course is to learn the installation and configuration process for System Center 2012 R2 Operations Manager standard and Data Center features. Acquire knowledge on monitor services, devices, and operations for many computers in a single console by showing state, health, and performance information, as well as alerts generated for availability, performance, configuration and security situations.

Course Outcomes (COs)

After successfully completing the course the students should be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the Installation of a new System Center 2012 Operations Manager Management Group	K1
CO2	Design and provision custom views to relevant support teams	K2
CO3	Understand how to deploy agents	K3
CO4	Work with management packs	K3
CO5	Create dashboards and custom visualizations	K3

Mapping with Programme Outcomes

Cos	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	S
CO2	S	S	S	S	M
CO3	S	M	S	S	S
CO4	S	M	S	S	S
CO5	S	S	S	S	S

S- Strong; M-Medium; L-Low

Exercises

- Working with SCCM
- Working with SCOM

Core Theory-V RDBMS USING ORACLE	
SEMESTER : 4	INT MARKS: 40
	EXT MARKS: 60

Course Objectives

To understand the role and nature of relational database management systems (RDBMS) in today's IT environment, understand need for normalization. To convert conceptual data models into relational database schemas using the SQL Data Definition Language (DDL). Query and manipulate databases using the SQL Data Manipulation Language (DML). To acquire Programming and Software Engineering skills and techniques using SQL and PL/SQL.

Course Outcomes (COs)

CO Number	CO Statement	Knowledge Level
CO1	Define the fundamental elements of database management system. Understanding of normalization theory and extends such knowledge to the normalization of a database.	K1
CO2	Explains the knowledge about oracle 9i	K2
CO3	Usage SQL Commands	K2
CO4	Use the PL/SQL code constructs of IF-THEN-ELSE and LOOP types as well as syntax and command functions	K3
CO5	Learn Database problems using Oracle SQL and PL/SQL. This will include the use of Procedures, Functions, Packages, and Triggers.	K3

Mapping with Programme Outcomes

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	M
CO2	S	M	S	S	M
CO3	M	S	S	M	S
CO4	S	M	M	S	M
CO5	M	S	S	M	S

S- Strong; M-Medium; L-Low

UNIT I: Database Concepts

A Relational approach: Database – Relationships – DBMS – Relational Data Model – Integrity Rules – Theoretical Relational Languages. Database Design: Data Modeling and Normalization: Data Modeling – Dependency – Database Design – Normal forms – Dependency Diagrams – De normalization – Examples of Normalization.

UNIT II: Oracle9i

Overview: Personal Databases – Client/Server Databases – Oracle9i an introduction – SQL *Plus Environment – SQL – Logging into SQL *Plus - SQL *Plus Commands – Errors & Help – Alternate Text Editors - SQL *Plus Worksheet - SQL *Plus. Oracle Tables: DDL: Naming Rules and conventions – Data Types – Constraints – Creating Oracle Table – Displaying Table Information – Altering an Existing Table – Dropping, Renaming, Truncating Table – Table Types – Spooling – Error codes.

UNIT III: Working with Table

Data Management and Retrieval: DML – adding a new Row / Record – Customized Prompts – Updating and Deleting an Existing Rows / Records – retrieving Data from Table – Arithmetic Operations – restricting Data with WHERE clause – Sorting – Revisiting Substitution Variables – DEFINE command – CASE structure. Functions and Grouping: Built-in functions – Grouping Data. Multiple Tables: Join – Set operations

UNIT IV: PL / SQL

A Programming Language: History – Fundamentals – Block Structure – Comments – Data Types – Other Data Types – Declaration – Assignment operation – Bind variables – Substitution Variables – Printing – Arithmetic Operators. Control Structures and Embedded SQL: Control Structures – Nested Blocks – SQL in PL/SQL – Data Manipulation – Transaction Control statements. PL/SQL Cursors and Exceptions: Cursors – Implicit & Explicit Cursors and Attributes – Cursor FOR loops – SELECT...FOR UPDATE – WHERE CURRENT OF clause – Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions.

UNIT V: PL / SQL Composite Data Types

Records – Tables – Varrays, Named Blocks: Procedures – Functions – Packages – Triggers – Data Dictionary Views.

Text Book:

- A. Nilesh Shah, “Database Systems Using ORACLE”, PHI, 2nd Edition, 2015

REFERENCE BOOKS:

1. Database Management Systems – Arun Majumdar & Pritimoy, Bhattacharya, 2007, TMH.
2. Database Management Systems – Gerald V. Post, 3rd edition, TMH.

Core Theory- VI PROCESS MANAGEMENT	
SEMESTER : 4	INT MARKS: 40
	EXT MARKS: 60

Course Objectives

To provide theoretical and practical practise in software development and process models. To understand Agile development and testing in Scrum. To acquire knowledge about Devops principles. To learn and use Lean UX, Sprint and to understand Design Thinking principles.

Course Outcomes (COs)

After successfully completing the course the students should be able to

CO Number	CO Statement	Knowledge Level
CO1	Gives basic understanding of software development practices and process models	K1
CO2	Understand Agile development and testing in Scrum.	K2
CO3	Differentiate Devops and Agile principles	K2
CO4	Usage of Lean UX, Sprint and Scrum	K3
CO5	Usage of design thinking principles for software development	K3

Mapping with Programme Outcomes

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	S	S
CO2	S	S	S	S	M
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S- Strong; M-Medium; L-Low

Unit I: Software And Software Engineering

The Nature of Software –The Unique Nature of WebApps-Software Engineering- Software Process-Software Engineering Practice-Software Myths. Software Process Model: A Generic Process Model-Process Assessment and Improvement –Perspective Process Models-Specialized Process Model-The Unified Process.

Unit II: Agile

Agile Methodology-Manifesto-Principles of Agile-Agile Methodologies-Challenges with Agile. Scrum: Overview of Scrum-Scrum Roles-Scrum Ceremonies-Scrum Artifacts-Extreme programming vs Scrum.

Unit III: Devops

Introduction to Devops-Principles-Automation-Performance Measurement through KPIS and Metrics-Agile and Devops-Agile Infrastructure-Velocity-Lean Startup UPS.

Unit IV: Lean Ux and Agile Anti-Patterns

Sprint -Staggered sprints -Sprint zero and design sprints- Dual-track Agile- Listening to Scrum's rhythms- Listening to Scrum's rhythms- Participation- Design is a team sport- Coordinating multiple Lean UX teams- Managing up and out – Agile anti-patterns.

Unit V: Design Thinking

Introduction to Design Thinking – Lean thinking - Actionable Strategy- The Problem with Complexity - Vision and Strategy - Defining Actionable Strategy Act to Learn - Leading Teams to Win.

SUGGESTED READINGS

- A. Roger S Pressman, “Software Engineering A Practioners Approach”, 7th Edition 2010
- B. KalloriVikraman, “Introduction to Devops”, 1st Edition, 2016.
- C. Stephen Haunts, “Essential of Scrum” Addison-Wesley Professional; 1st Edition, 2012
- D. Jeff Gothelf, Josh Seiden, “Lean UX”, 2nd Edition, 2016.
- E. Jonny Schneider, “Understanding Design Thinking, Lean, and Agile” O’Reilly Media 2017.
- F. Jeff Gothelf , "Lean vs. Agile vs. Design Thinking", Sense and Respond Press,2017.

WEBSITES

1. https://www.tutorialspoint.com/sdlc/sdlc_overview.htm
2. <https://existek.com/blog/sdlc-models/>
3. <https://www.agilealliance.org/agile101/>
4. <https://devops.com/>
5. <http://theleanstartup.com/principles>

Core Practical-VII RDBMS with Oracle Lab	
SEMESTER : 4	INT MARKS: 40
	EXT MARKS: 60

Course Objectives

To use SQL Data Definition Language (DDL), query and manipulate databases using the SQL Data Manipulation Language (DML). To acquire programming and software engineering skills and techniques using SQL and PL/SQL. To create Procedures, Functions, Packages, and Triggers with PL/SQL.

Course Outcomes (COs): After successfully completing the course the students should be able to

CO Number	CO Statement	Knowledge Level
CO1	Creation of Table	K1
CO2	Creation of Queries	K2
CO3	Using DDL , DML	K2
CO4	Use the PL/SQL Block	K3
CO5	Solve Database problems using Oracle SQL and PL/SQL. This will include the use of Procedures, Functions, Packages, and Triggers.	K3

Mapping with Programme Outcomes

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	S	S	S
CO2	S	M	S	M	S
CO3	S	M	M	S	S
CO4	M	M	S	S	M
CO5	S	M	S	S	S

S- Strong; M-Medium; L-Low.

Exercises

- a) Write queries to create the following tables
 - a.i) EMPLOYEE(employee-name, street, city)
 - a.ii) WORKS (employee-name, company-name,salary)
 - a.iii) COMPANY(company-name,city)
 - a.iv) MANAGERS (employee-name, manager-name) Use insert command to add data according to the need of queries.

- b) Find the names of all employees who work for a particular company from the following tables.
 - b.i) EMPLOYEE(employee-name, street, city)
 - b.ii) COMPANY(company-name,city)

- c) Find the names and city of residence of all employee who work for a particular company from the following tables.
 c.i) EMPLOYEE(employee-name, street, city)
 c.ii) COMPANY(company-name,city)
- d) Find the names, street address and city of residence of all employees who work for a particular company and earn more than Rs. 2,00,000 per annum. (Nested subquery) from the following tables.
 d.i) EMPLOYEE(employee-name, street, city)
 d.ii) WORKS (employee-name, company-name,salary)
 d.iii) COMPANY(company-name,city)
- e) Find the names of employees who are living in a particular city for a particular company (use group by)
 e.i) EMPLOYEE(employee-name, street, city)
 e.ii) WORKS (employee-name, company-name,salary)
 e.iii) COMPANY(company-name,city)
- f) Find the names of the employees whose salary is greater than the average salary of the particular company (subquery)
 f.i) EMPLOYEE(employee-name, street, city)
 f.ii)WORKS (employee-name, company-name,salary)
- g) Find the total and average salary of each company employees
 g.i) EMPLOYEE(employee-name, street, city)
 g.ii) WORKS (employee-name, company-name,salary)
- h) Find the names of all the employees whose pay is greater than the average pay of their respective company
 h.i) EMPLOYEE(employee-name, street, city)
 h.ii) WORKS (employee-name, company-name,salary)
- i) Find the names of the employee and the city they work under a particular manager.
 i.i) EMPLOYEE(employee-name, street, city)
 i.ii)WORKS (employee-name, company-name,salary)
 i.iii) MANAGERS (employee-name, manager-name)
- j) Update the name of an employee who has changed his company. Make proper changes in the following tables.
 j.i) EMPLOYEE(employee-name, street, city)
 j.ii)WORKS (employee-name, company-name,salary)
 j.iii) COMPANY(company-name,city)
 j.iv) MANAGERS (employee-name, manager-name)

PL/SQL Block

- Write a PL/SQL program to insert ten values in a table, check each value is odd or even and insert the output into the table
- Use a cursor to select the five highest paid employees from the emp table.
- Create a master and a transaction table. Write a PL/SQL code to update the master using transaction table.

- Create a package, which consists of two procedures named hire_employee which will insert new employee details into emp table and another procedure named fire_employee which will delete an employee details from the database.
- Write a PL/SQL block that will select all rows from a employee table. The block displays empno, empname, doj, dept, and experience column. Experience column should be calculated using current date and doj column.
- Write a PL/SQL block to select only those rows where the ordered is 2000 from the item table and update the price to be three times the quantity and set the actual price column of the table to the value in price.

Procedures

- Create a procedure to calculate simple interest. Principal, rate of interest and no. of years are given as input.
- Create a procedure to satisfy the following conditions accepting the route id as user input. Create suitable table(s).
 - If the distance is less than 500 then update the fare to be 190.98
 - If the distance is between 501-1000 then update fare to be 876.98
 - If the distance is greater than 1000 then update fare to be 1200.98

Functions

- Create a function that returns the empno of employees working in admin dept.
- Create a function that finds out the result of a given student rollno.

Triggers

- Write a database trigger before insert/update/delete for each row and allowing any of the transactions on Mondays, Wednesdays and Fridays. Create suitable table(s)
- The price of a product changes constantly. It is important to maintain the history of the prices of the products. Create a trigger to update the "Product_price_history" table when the price of the product is updated in the "Product" table. Create the "Product" table and "Product_price_history" table with the following fields respectively
 - a. Product_price_history (product_id number(5), product_name varchar2(32), supplier_name varchar2(32), unit_price number(7,2))
 - b. Product (product_id number(5), product_name varchar2(32), supplier_name varchar2(32), unit_price number(7,2))
- Create the Price_history_trigger and execute it.
- Update the price of a product. Once the update query is executed, the trigger fires and should update the 'Product_price_history' table.

Generate a report for railway seat reservations. Check the validity of each field and generate reports for reservation and cancellation details.

Core Theory – VII SOFTWARE ENGINEERING & TESTING	
SEMESTER : 5	INT MARKS: 40
	EXT MARKS: 60

Course Objective

This course provides the basic concepts of software engineering to design a new software project and develops skills to construct software of high quality. This Course also covers the fundamental techniques for modeling software requirements, analysis and design.

Course Outcomes (COs)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand about introduction to Software Engineering	K1
CO2	Understand about Requirements Engineering	K2
CO3	To Know to build and analyze model	K2
CO4	Apply Component level design	K3
CO5	Study and Apply various Software Testing Strategies	K3

Mapping with Programme Outcomes

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S
CO2	S	S	M	S	S
CO3	S	S	S	S	S
CO4	S	M	S	S	S
CO5	S	S	S	S	S

S- Strong; M-Medium; L-Low

UNIT I

Introduction to Software Engineering: The Software process: A generic view of process-Software Engineering –Layered technology, Process framework, CMMI ,Process patterns , Process assessment , Personal and Team process models ,Process technology and Product & Process. Process models: Waterfall model, Incremental process models, Evolutionary models, Specialized Process models, Unified process.-UML.

UNIT II

Software Engineering: System engineering –computer based systems, System Engineering hierarchy, business process engineering, Product engineering, system modeling. Requirements Engineering- Bridge to design and construction, Requirements Engineering tasks, Initiating the requirements engineering process, Eliciting Requirements, Developing Use cases, Building the analysis model, Negotiating Requirements and Validating Requirements.

UNIT III

Software Engineering: Building the analysis model – Requirement analysis ,Analysis modeling approaches, Data Modeling concepts, Object oriented analysis, Scenario based modeling , Flow oriented modeling, class based modeling ,Creating Behavioral model. Design Engineering: Design within the context of software Engineering, Design process and design quality, Design concepts , Design model , Pattern Based Software design.

UNIT IV

Modeling component level design: What is a component, Defining class based components, conducting component level design, object constraint language, Designing Conventional components. Performing user interface design: Golden rules, user interface analysis and design, interface analysis, interface design steps and design evaluation.

UNIT V

Testing strategies: A strategic approach to software testing, strategic issues Test strategy for conventional software, testing strategies for object oriented software, validation testing, system testing and art of debugging. Testing tactics: software testing fundamentals, black box testing , White box testing ,Basis path testing , Control structure testing.

Text Books:

- A. Roger S Pressman ; Software Engineering , Tata McGraw-Hill, 7th Edition
- B. Roger S Pressman ; Software Engineering , Tata McGraw-Hill, 4th Edition

BOOKS RECOMMENDED:

1. Roger S.Pressman, Software engineering- A practitioner's Approach, McGraw-Hill
2. Ian Sommerville, Software engineering, Pearson education Asia, 6th edition, 2000.
3. Pankaj Jalote- An Integrated Approach to Software Engineering, Springer Verlag, 1997.
4. James F Peters and Witold Pedryez, "Software Engineering – An Engineering Approach", John Wiley and Sons, New Delhi, 2000.
5. Ali Behforooz and Frederick J Hudson, "Software Engineering Fundamentals", Oxford University Press, New Delhi, 1996.
6. Pfleeger, "Software Engineering", Pearson Education India, New Delhi, 1999.

Core Theory- VIII CLIENT RELATIONSHIP MANAGEMENT	
SEMESTER : 5	INT MARKS: 40
	EXT MARKS: 60

Course Objectives

Acquire knowledge about Service Now platform. To get comprehensive knowledge in ITSM principles and architecture. To acquire various features of Service Now platform and tool.

Course Outcomes (COs) : On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To understand about Service Now Intermediate Level	K1
CO2	To understand System Properties	K2
CO3	To practice Client Scripts & Client Glide Apis	K3
CO4	Using Flows and Workflows for process automation	K3
CO5	Various script types used throughout the platform	K3

Mapping with Programme Outcomes

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S
CO2	S	S	M	M	M
CO3	S	S	M	M	M
CO4	S	S	M	S	S
CO5	S	S	M	S	M

S- Strong; M-Medium; L-Low.

UNIT I: Service Now Intermediate Level

Administrator-Service Now Introduction-Service Now Platform UI Service Now ITSM overview- Managing Users, Groups and Roles, departments, companies and Assignment Rules-Tables, Columns, Attributes, Dictionary Entries, Schema Map-Managing Forms, Layouts and Lists - Dictionary Overrides and Simple Reference Qualifiers.

UNIT II: System Properties

Incident management - - Problem management- - Change management- Overview of other ITSM Modules - Overview of other ITSM Modules- SLA Basics-Introduction to Client and Server Side Scripting-server-side scripting - Server Side Glide API -server-side scripting - Server Side Glide API -Server Side script Debugging-Server Side Scripting Best Practices-Business Rules-Client Side APIs-UI Policies and Data Policies-Client Scripts -Client Side script Debugging.

UNIT III: Client Scripts & Client Glide Apis-Best Practices

Client-side scripting & policies (UI and Data)-Modularize programming using UI Actions (both Server and Client Side)-Script Include-Glide AJAX-UI Pages and UI Macros-Managing Update Sets-Custom Applications Automated Test Framework –Events-Inbound/Out Bound notifications-Mail Templates and Scripts.

UNIT IV: Manage Workflows

Managing Stage Sets -Manage Workflows -Manage Workflows -Flow Designer (Over view)-Service Catalogs, Categories, Items and variables-Manage Execution Plans and workflows-Cart Layouts-Client scripts and UI policies-Record Producers-Order Guides & Scriptable Order Guides-Scheduled Jobs. VTB Agent Intelligence (Over View)-Restrict access to applications and application modules-Automatically create application Access Controls -Manually create, test, and debug Access Controls-Managing ServiceNow imports and exports-Managing Import Sets and Transform Map-Configure and run Reports and Dashboards Security Controls-Database Views.

UNIT V: Service now Service Portals Overview

Service Now Service portals core components -Scripting in Service Portal-ITSM Virtual Agent – Overview-Performance Analytics Overview-Service Now on Mobile-Service Now Integration Overview.

REFERENCE BOOKS

- Tim Woodruff, “Learning ServiceNow: Administration and development on the Now platform, for powerful IT automation”, 2nd Edition, Packt Publishing Ltd., 2018.
- AshishRudraSrivastava “ServiceNow Cook Book” Packt Publishing Ltd, 2017.
- Andrew Kindred , “Mastering ServiceNow Scripting” Packt Publishing2018.

WEBSITES

1. <https://www.servicenow.com/products/it-service-management.html>
2. <https://www.servicenow.com/content/dam/servicenow-assets/public/en-us/doc-type/resource-center/data-sheet/ds-itsm.pdf>
3. <https://www.guru99.com/servicenow-tutorial.html>

Core Theory- IX INTRODUCTION TO DIGITAL TECHNOLOGY	
SEMESTER : 5	INT MARKS: 40
	EXT MARKS: 60

Course Objectives

To know the concepts of cloud, big data and digital marketing. To identify the principles of Artificial Intelligence, Block chain technology. To recognize the use of Digital technology in various Industries and to understand the principles of Automatrix, Automation Anywhere and Bots

Course Outcomes (COs)

A student who successfully completes this course should be able to

CO Number	CO Statement	Knowledge Level
CO1	To understand about cloud , big data, digital marketing	K2
CO2	To apply digital technology for industries	K3
CO3	Understand the principles of Automatrix,	K2
CO4	To know about Automation Anywhere	K2
CO5	To understand about Bots	K2

Mapping with Programme Outcomes

COs	PSO 1	PSO2	PSO 3	PSO4	PSO5
CO 1	S	S	S	M	S
CO 2	S	S	S	M	S
CO 3	M	M	S	M	S
CO 4	S	S	S	M	S
CO 5	S	S	S	M	S

S- Strong; M-Medium; L-Low.

UNIT I: Digital Primer

Why is Digital Different?- Digital Metaphors On Cloud 9-A Small Intro to Big Data-Social Media & Digital Marketing-Artificial Intelligence- Unchain the Block chain-Internet of Everything-Immersive Technology.

UNIT II: Digital for Industries

Manufacturing and Hi-tech-Banking and Financial Services-Insurance and Healthcare-Retail-Travel & Hospitality-Communications, Media & Information Services-Government.

UNIT III: Automatix

Art of RPA-Introduction – Setting the Context-RPA Prelude-RPA Demystified-RPA vs BPM RPA Implementations-RPA in Industries-RPA Tools-Automatix – Art of RPA

UNIT IV: Automation Anywhere

Getting Started with AA Enterprise - Exploring AA Enterprise-AA Enterprise – Architecture.

UNIT V: Knowing Bots

More about Task Bots-AA Enterprise – All about Recorders-Designers-MetaBots-Cognitive RPA.

REFERENCE BOOKS:

- Richard Murdoch, “Robotic Process Automation: Guide To Building Software Robots, Automate Repetitive Tasks & Become an RPA Consultant”
- Kelly Wibbenmeyer, “The Simple Implementation Guide to Robotic Process Automation (RPA): How to Best Implement RPA in an Organization”

WEBSITES

1. https://en.wikipedia.org/wiki/Robotic_process_automation
2. [https://en.wikipedia.org/wiki/Automatix_\(software\)](https://en.wikipedia.org/wiki/Automatix_(software))
3. <https://www.automationanywhereuniversity.com/>
4. <https://www.automationanywhere.com/in/products/iq-bot>

Core Theory-X PYTHON PROGRAMMING AND DATA STRUCTURES	
SEMESTER : 5	INT MARKS: 40
	EXT MARKS: 60

Course Objectives

Students can acquire problem solving and programming capability using Python. To Master the principles of object-oriented programming and the interplay of algorithms and data structures in well-written modular code.

Course Outcomes (COs)

Students will be able to:

CO Number	CO Statement	Knowledge Level
CO1	Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python	K1
CO2	Express different Decision Making statements and Functions	K2
CO3	Interpret Object oriented programming in Python	K2
CO4	Understand and summarize different File handling operations	K2
CO5	Give students a comprehensive introduction of common data structures, and algorithm design and analysis.	K2
CO6	Data structures and algorithms for solving real problems that arise frequently in computer applications, and to teach principles and techniques of computational complexity.	K3

Mapping with Programme Outcomes

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	S
CO2	S	S	S	M	S
CO3	M	M	S	M	S
CO4	S	S	S	M	S
CO5	S	S	S	M	S
CO6	S	S	S	M	S

S- Strong; M-Medium; L-Low.

UNIT I

Python interpreter and interactive mode, Values and types: int, float, Boolean, string, and list, variables, expressions, statements, Tuple assignment, precedence of operators, comments, modules and functions, function definition and use, flow of execution, parameters and arguments.

UNIT II

Boolean values and operators, conditional statements, Iteration, functions Recursion, Strings: string slices, immutability, string functions and methods,

UNIT III

Lists: list operations, list parameters; Lists as arrays, Tuples: Tuple assignment, tuple as return value, Dictionaries: operations and methods: Advanced list processing. Files, Exception, Modules and Packages.

UNIT IV

Introduction to algorithms, Analysis of Algorithms using Notations, Arrays, Lists, Stack, Queue, recursion.

UNIT V

Linked List- Divide and Conquer-Merge Sort and Quick Sort- Searching- Linear and Binary Search- Introduction to Trees and Graphs.

SUGGESTED READINGS

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist'', 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016.
2. Guido van Rossum and Fred L. Drake Jr, ``An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
3. Charles Dierbach, ``Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.
4. John V Guttag, ``Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press, 2013.
5. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, Data Structures and Algorithms in Python
Wiley, July 2013.

WEBSITES

1. <http://docs.python.org/3/tutorial/index.html>.
2. <http://interactivepython.org/courselib/static/pythonds>.
3. <http://www.ibiblio.org/g2swap/byteofpython/read/>.
4. Data Structures and Algorithms in Python, the complete beginners guide, 2019 edition by DS Publishing, ebook Kindle Edition

List of Programs Tentatively Designed For Assignment During The Class

- Finding Factorial using Looping
- Fibonacci series using recursion
- Find the minimum and maximum of a list of numbers
- Insertion sort and merge sort
- First n prime numbers
- Insert a number in a list of sorted numbers
- Program to find GCD of two numbers using recursion.
- Program to sum an array of numbers.
- Program to find linear search and binary search in an array
- Program for list operations such as ; list slices, list methods, list loop, mutability, aliasing, cloning lists
- Program for drawing histogram.
- Program to find word count in a file
- Program to copy the content of one file to another file.

Core Practical-IX SOFTWARE TESTING Lab	
SEMESTER : 5	INT MARKS: 40
	EXT MARKS: 60

Course Objective

To study the basics of java programming and to test the coding using testing tool - Selenium.

Course Outcomes (COs): On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand about the basics of Java	K1
CO2	Simple Programs using Java	K2
CO3	To cover basic Web based Controls using selenium	K2
CO4	To work with advanced web based controls using selenium	K3
CO5	To Automate testing with scripts using TestNG	K3

Mapping with Programme Outcomes

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S
CO2	S	S	M	S	S
CO3	S	S	S	S	S
CO4	S	M	S	S	S
CO5	S	S	S	S	S

S- Strong; M-Medium; L-Low

Exercises

- **To start with simple programs in java to understand basics.**
- Write a test case based on controls like
Label, Text Box, Button, Option Button, Check Box
- Write and test a program for
 - a. Login a specific web page.

b. Test using email-id.

- Write and test a program to get the number of list items in a list
- Write and test a program to get the number of list items combo box.
- Program for handling pop-up windows.
- Test a program with thread functions
- Test a program for handling mouse.
- Test a program for moving between frames
- Test a program to handle multiple windows
- Program for TestNG

Core Practical–X CLIENT RELATIONSHIP MANAGEMENT Lab	
SEMESTER : 5	INT MARKS: 40
	EXT MARKS: 60

Course Objectives

To acquire knowledge about Service Now platform, to get comprehensive knowledge of ITSM principles and architecture. Get acquainted with various features of Service Now platform and tool.

Course Outcomes (COs)

Students can able to

CO Number	CO Statement	Knowledge Level
CO1	Application navigation and user interfaces like lists and forms	K1
CO2	Create users, groups, and roles	K1
CO3	Task management using assignment rules, presence, and work notes	K2
CO4	To create the database structure: tables, records, and fields	K2
CO5	Protecting Service Now instance data using Access Control rules	K2
CO6	Using Flows and Workflows for process automation	K2
CO7	Various script types used throughout the platform	K3
CO8	Capturing and moving configurations between instances, using update sets	K3

Mapping with Programme Outcomes

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S
CO2	S	S	M	M	S
CO3	S	S	M	M	M
CO4	S	S	M	M	M
CO5	S	S	M	S	S
CO5.	S	S	M	S	M
CO6	S	M	M	M	S
CO7	S	M	M	S	M
CO8	S	M	S	M	M

S- Strong; M-Medium; L-Low

Exercises

- Creating tickets for servicing requests from clients
- Creating reports of status of client service

Core Practical– XI DIGITAL TECHNOLOGY Lab	
SEMESTER : 5	INT MARKS: 40
	EXT MARKS: 60

Course Objectives

To know the concepts of cloud, big data and digital marketing. To identify the principles of Artificial Intelligence, Block chain technology. To recognize the use of Digital technology in various Industries and to understand the principles of Automatrix, Automation Anywhere and Bots

Course Outcomes (COs)

CO Number	CO Statement	Knowledge Level
CO1	To create bots for automatic software installation	K2
CO2	To create bots for automatic software patch installation	K2
CO3	Create bots for file transfer	K2
CO4	Create bots for automatic file backup	K3

Mapping with Programme Outcomes

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	S
CO2	S	S	S	M	S
CO3	M	M	S	M	S
CO4	S	S	S	M	S

S- Strong; M-Medium; L-Low

Exercises

- Creating bots for automatic software installation
- Creating bots for automatic software patch installation
- Creating bots for file transfer
- Creating bots for automatic file backup

Core Theory-XI JAVA PROGRAMMING	
SEMESTER : 6	INT MARKS: 40
	EXT MARKS: 60

Course Objective

The course is an expository of the object-oriented programming methodology with emphasis on software design and code reuse as its core objectives. Language elements include loops, arrays, input/output structures, events, exceptions, and threads. It aims to develop the student's logical, critical thinking and problem solving skills on programming basics

Course Outcome (COs)

Students can able to

CO Number	CO Statement	Knowledge Level
CO1	Define the basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods	K1
CO2	Describe the fundamentals of object-oriented programming including defining classes, objects, invoking methods	K2
CO3	Apply the principles of inheritance, packages and interfaces	K3
CO4	Use exceptions, applets, graphics programming for real world problems	K3
CO5	Demonstrate the working features of files	K3

Mapping

with Programme Outcomes

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S
CO2	S	S	S	M	S
CO3	M	M	S	M	S
CO4	S	S	S	M	S
CO5	S	S	S	S	M

S- Strong; M-Medium; L-Low

UNIT I

JAVA Evolution: History - Features - Java differs from C and C++ -Java and Internet - Java and WWW - Web Browsers. Overview of Java Language: Introduction - Simple Java program - Structure - Java tokens- Statements - Java virtual Machine.

UNIT II

Constants -Variables- Data types - Operators and expressions -Decision making and Branching: Simple If Statement, the IF...Else statement, The Else... If ladder, The Switch Statement, The? : Operator, Decision making and looping: The While statement, the do Statement - The for Statement - Jumps in loops - labeled loops - Classes, Objects and Methods.

UNIT III

Arrays, Strings and Vectors – Interfaces- Multiple Inheritance – Packages: Putting classes together Multi-Threaded Programming.

UNIT IV

Managing Errors and Exceptions – Applet Programming – Graphics programming: The Graphics class-Lines and rectangles-Circles and ellipses-Drawing arcs-Drawing polygons-Line graphs- Using Control loops in applets-Drawing Bar charts.

UNIT V

Files: Introduction – concept of streams – Stream classes – Using stream – I/O classes – File class – I/O Exceptions – creation of files – Reading / Writing characters/ Bytes – Handling primitive data types – Random Access Files

Text Books

1. E. Balaguruswamy, Programming with JAVA - A Primer, McGraw Hill Professional, 2015

Core Practical – XII JAVA PROGRAMMING Lab	
SEMESTER : 6	INT MARKS: 40
	EXT MARKS: 60

Course Objective

The course is an expository of the object-oriented programming methodology with emphasis on software design and code reuse as its core objectives. Language elements include loops, arrays, input/output structures, events, exceptions, and threads. It aims to develop the student's logical, critical thinking and problem solving skills on programming basics

Course Outcome (COs)

CO Number	CO Statement	Knowledge Level
CO1	Define the basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods	K1
CO2	Describe the fundamentals of object-oriented programming including defining classes, objects, invoking methods	K2
CO3	Apply the principles of inheritance, packages and interfaces	K3
CO4	Use exceptions, applets, graphics programming for real world problems	K3
CO5	Demonstrate the working features of files	K3
CO6	Work with Applets	K3

Mapping with Programme Outcomes

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S
CO2	S	S	S	M	S
CO3	M	M	S	M	S
CO4	S	S	S	M	S
CO5	S	S	S	S	M
CO6	S	S	M	S	M

S- Strong; M-Medium; L-Low

Exercises

Applications

- Substring Removal from a String. Use String Buffer class.
- Finding area and Perimeter of a circle. Use Buffered Reader class
- Determining the order of numbers generated randomly using Random class.
- Implementation of Point Class for Image manipulation.
- String Manipulation using Char Array.
- Usage of Vector Classes.
- Implementing Thread based applications & Exception Handling.
- Application using synchronization such as Thread based, Class based and synchronized statements.

Applets

- Working with Frames and various controls.
- Working with Dialogs and Menus.
- Working with Panel and Layout.
- Working with Colors and Fonts.

ELECTIVE -I

(ANY ONE FROM THE BELOW LIST)

- 1. IT COGNITION AND PROBLEM SOLVING**
- 2. DATA MINING**
- 3. COMPUTER GRAPHICS**

SEMESTER : 6

INT MARKS: 40

EXT MARKS: 60

ELECTIVE –I

IT COGNITION AND PROBLEM SOLVING

Course Objectives

To defining Critical Thinking and its interaction with knowledge and to define problem solving and how it uses Critical thinking to develop solutions to problems. Can explore project based learning as a specific method of problem solving.

Course Outcomes (COs)

Students can able to understand

CO Number	CO Statement	Knowledge Level
CO1	Student can acquire basic knowledge of cognitive psychology.	K1
CO2	Student will acquire knowledge of how human cognition works from attention, sensation, perception, action, language processes, problem solving and thinking to learning and memory.	K2
CO3	Student can develop a scientific attitude comprising the ability of reflection and logic reasoning.	K3
CO4	Student can develop an ability of critical thinking including respect for scientific data and ethical values.	K3

Mapping with Programme Outcomes

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S
CO2	S	S	S	M	S
CO3	M	M	S	M	S
CO4	S	S	S	M	S

S- Strong; M-Medium; L-Low

UNIT I

Introduction to Cognition: Meaning cognitive processes, Development of cognitive psychology: Structuralism, Functionalism, Behaviorism, Memory Research, Gestalt psychology, Emergence of cognitive psychology, Information Processing, Connectionism, Alternate approaches to cognitive psychology, Research Methods in Cognitive Psychology.

UNIT II

Perceptual Processes: Object Recognition- theories of object recognition, Bottom-Up and Top-Down Processing, Face Perception, Change Blindness. Attention: Divided attention, Selective Attention, Visual attention and Auditory attention. Consciousness: Varieties, Subliminal Perception. Visual Perception
"Perceptual Organizational Processes, Multisensory interaction and Integration – Synthesis, Comparing the senses, Perception and Action.

UNIT III

Memory- Working Memory: Research on Working Memory, Factors affecting the capacity of working Memory, Baddeley's Working Memory Approach. Long Term Memory: Encoding and Retrieval in Long Term Memory, Autobiographical Memory. Memory Strategies: Practice, Mnemonics using Imagery, Mnemonics using organization, The Multimodal Approach, Improving Prospective Memory. Meta cognition: Meta memory, TOT, Meta comprehension.

UNIT IV

Problem Solving, Reasoning and Decision Making: VUCA World Problem Solving – Types of problem, Understanding the problem, Problem-Solving Approaches, Factors that influence Problem Solving, creativity, Reasoning – Inductive and Deductive Reasoning Decision Making – Heuristics in decision making – representativeness, availability and Anchoring and adjustment. The framing effect, Overconfidence in decisions, The Hindsight Bias.

UNIT V

Future Skills: Critical thinking, Adaptive thinking, Cognitive Load Management, Design thinking, Virtual Collaboration and Cultural Sensitivity

SUGGESTED READINGS

1. Matlin M.W. (2003) 'Cognition' 5th Edition, Wiley Publication.
2. Riegler, B.R., Reigler, G.L. (2008), Cognitive Psychology – Applying the Science of Mind. 2nd Edition, Pearson Education.
3. Benjafield J G (2007). 'Cognition' 3rd Edition. Oxford University Press.
4. Goldstein B.E.(2008) 'Cognitive Psychology' 2nd Edition, Wadsworth.

ELECTIVE –I

DATA MINING

Course Objectives

This course introduce students to the basic concepts and techniques of Data Mining, develop skills of using recent data mining software for solving practical problems, gain experience of doing independent study and research.

Course Outcomes (COs)

Students can able to understand

CO Number	CO Statement	Knowledge Level
CO1	To introduce students to the basic concepts and techniques of Data Mining	K1
CO2	To develop skills of using recent data mining software for solving practical problems.	K2
CO3	To gain experience of doing independent study and research	K3
CO4	To possess some knowledge of the concepts and terminology associated with database systems, statistics, and machine learning	K3

Mapping with Programme Outcomes

COs	PSO 1	PSO 2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S
CO2	S	S	S	M	S
CO3	M	M	S	M	S
CO4	S	S	S	M	S

S- Strong; M-Medium; L-Low

UNIT I

Introduction: Data mining tasks – Data Mining versus Knowledge Discovery in Data bases - Mining Issues – Metrics – Social implications of Data mining. Data Mining Techniques – Introduction – A statistical perspective on Data Mining – similarity measures – Decision Trees – Neural Networks – Genetic Algorithms

UNIT II

Data Preprocessing: Why Preprocess the data – Data cleaning – Data Integration – Data Transformation – Data Reduction – Data Discretization .

UNIT III

Data Mining Techniques: Association Rule Mining – The Apriori Algorithm – Multilevel

Association Rules – Multidimensional Association Rules – Constraint Based Association Mining

UNIT IV

Classification and Prediction: Issues regarding Classification and Prediction – Decision Tree induction – Bayesian Classification – Back Propagation – Classification Methods – Prediction – Classifiers accuracy

UNIT V

Clustering Techniques: cluster Analysis – Clustering Methods – Similarity and Distance Measures – Hierarchical Methods - Partitional Methods – Outlier Analysis

SUGGESTED READINGS

1. Han and M. Kamber , 2001, “Data Mining: Concepts and Techniques”, Morgan Kaufmann, New Delhi.
2. M. H.Dunham, 2003, “Data Mining : Introductory and Advanced Topics” , Pearson Education, Delhi
3. PaulrajPonnaiah, 2001, ”Data Warehousing Fundamentals“, Wiley Publishers.S.N. Sivananda and S. Sumathi, 2006, Data Mining, Thomsan Learning, Chennai

WEB SITES

<http://nptel.iitm.ac.in/video.php?subjectId=106106093>

<http://cecs.louisville.edu/datamining/PDF/0471228524.pdf>

ELECTIVE –I

COMPUTER GRAPHICS

Course Objectives

It gives basic concepts used in computer graphics. It discusses various algorithms for fundamentals graphics techniques. Describe the importance of viewing and projections

Course Outcomes (COs)

Students can able to understand

CO Number	CO Statement	Knowledge Level
CO1	To obtain the knowledge about characteristics and functioning of common graphics input/output devices	K1
CO2	To understand the basic principles of 3-dimensional computer graphics	K2
CO3	To understand of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition	K2
CO4	To analyze the mapping from a world coordinates to device coordinates, clipping, and projections	K3

Mapping with Programme Outcomes

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S
CO2	S	S	S	M	S
CO3	M	M	S	M	S
CO4	S	S	S	M	S

S- Strong; M-Medium; L-Low

UNIT I

Introduction to computer graphics: Brief Survey of Computer Graphics – Graphics Systems: Video Display Devices – Types – Raster-Scan Systems and Random-Scan Systems – Input Devices – Hard-Copy Devices – Graphics Software.

UNIT II

Output primitives and their attributes Line-Drawing (DDA and Bresenham's) Algorithms – Circle-Generating (Midpoint) Algorithm – Ellipse-Generating (Midpoint) Algorithms- Area-Filling (Boundary-Fill and Flood-Fill) Algorithms - Line Attributes - Color and Grayscale Levels – Character Attributes.

UNIT III

Two-dimensional transformations and viewing : Basic Transformations - Matrix Representations and Homogeneous Coordinates – Composite Transformations - Other Transformations – Window-to- Viewport Coordinate Transformation.

UNIT IV

Three-dimensional concepts: Three-Dimensional Display Methods: Parallel and Perspective Projections – Depth Cueing - Visible Line and Surface Identification –Three-Dimensional Transformations: Translation- Rotation- Scaling - Other Transformations.

UNIT V

Three-dimensional viewing: Viewing Pipeline and Coordinates – Transformation from World to Viewing Coordinates – Projections – Parallel Projection- Perspective Projection.

SUGGESTED READINGS

1. Hearn and M.P. Baker, 2005, Computer Graphics, 2nd Edition, Pearson Education, Prentice Hall, 19th Reprint.
2. S. Harrington, 1987, Computer Graphics , 2nd Edition , Tata McGraw-Hill Book Co.
3. W.M. Newman and R.F. Sproull, 1997, Principles of Interactive Computer Graphics, 2nd Edition, Tata McGraw-Hill Publishing Co. Ltd.
4. D.P. Mukherjee, 1999, Fundamentals of Computer Graphics and Multimedia, 1st Edition, Prentice-Hall of India Pvt. Ltd.

ELECTIVE - II

(ANY ONE FROM THE BELOW LIST)

- 1. MACHINE LEARNING**
- 2. INTRODUCTION TO DATA SCIENCE**
- 3. MULTIMEDIA AND ITS APPLICATION**

SEMESTER : 6	INT MARKS: 40
	EXT MARKS: 60

ELECTIVE - II

MACHINE LEARNING

Course Objectives

The course aims to provide an introduction to the basic principles, techniques, and applications of Machine Learning. To become familiar with regression methods, classification methods, clustering methods. To become familiar with Dimensionality reduction techniques.

Course Outcome (COs)

Students can able to understand

CO Number	CO Statement	Knowledge Level
CO1	Gain knowledge about basic concepts of Machine Learning	K1
CO2	Identify machine learning techniques suitable for a given problem	K2
CO3	Solve the problems using various machine learning techniques	K3
CO4	Apply Dimensionality reduction techniques.	K3
CO5	Design application using machine learning techniques.	K6

Mapping with Programme Outcomes

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S
CO2	S	S	S	M	S
CO3	M	M	S	M	S
CO4	S	S	S	M	S
CO5	M	M	S	M	S

S- Strong; M-Medium; L-Low

UNIT I

Concept of Machine Learning, Applications of Machine Learning, Key elements of Machine Learning, Supervised vs. Unsupervised Learning, Statistical Learning: Bayesian Method, The Naive Bayes Classifier

UNIT II

Plotting of Data, Vectorization, Matrices and Vectors: Addition, Multiplication, Transpose and Inverse using available tool such as R (or) PYTHON.

UNIT III

Prediction using Linear Regression, Gradient Descent, Linear Regression with one variable, Linear Regression with multiple variables, Polynomial Regression, Feature Scaling/Selection. Logistic Regression: Classification using Logistic Regression, Logistic Regression vs. Linear Regression, Logistic Regression with one variable and with multiple variables.

UNIT IV

Regularization and its utility: The problem of Overfitting, Application of Regularization in Linear and Logistic Regression, Regularization and Bias/Variance.

UNIT V

Introduction, Model Representation, Gradient Descent vs. Perceptron Training, Stochastic Gradient Descent, Multilayer Perceptrons, Multiclass Representation, Backpropagation Algorithm.

SUGGESTED READINGS

1. Santanu Chatto padhyaya. (2011). Systems Programming. New Delhi: PHI.
2. Alfred, V. Aho., Monica, S. Lam., RaviSethi., & Jeffrey, D. Ullman. (2006). Compilers: Principles, Techniques, and Tools (2nd ed.). New Delhi: Prentice Hall.
3. Dhamdhere, D. M. (2011). Systems Programming. New Delhi: Tata McGraw Hill.
4. Leland Beck., & Manjula, D. (2008). System Software: An Introduction to System Programming (3rd ed.). New Delhi: Pearson Education.

ELECTIVE - II

INTRODUCTION TO DATA SCIENCE

Course Objectives

To Build a comprehensive working knowledge and expertise around various analytical and database tools which is a key step to excel in Big Data and Data Science fields. To enhance comprehensive understanding of applications of R programming and its applications

Course Outcomes (COs):

Students can able to understand

CO Number	CO Statement	Knowledge Level
CO1	Describe about Data Science and the skill sets needed to be a data scientist.	K1
CO2	Use R to carry out basic statistical modeling and analysis	K2
CO3	Identify probability distributions commonly used as foundations for statistical modeling. Fit a model to data.	K2
CO4	Explain the significance of exploratory data analysis (EDA) in data science. Apply basic tools (plots, graphs, summary statistics) to carry out EDA.	K3
CO5	Performs Data Analysis by writing document using R	K3

Mapping with Programme Outcomes

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S
CO2	S	S	M	S	S
CO3	S	S	S	S	S
CO4	S	M	S	S	S
CO5	S	S	S	S	S

S- Strong; M-Medium; L-Low

UNIT I

Data Scientist's Tool Box: Turning data into actionable knowledge, introduction to the tools that will be used in building data analysis software: version control, markdown, git, GitHub, R, and RStudio.

UNIT II

R Programming Basics: Overview of R, R data types and objects, reading and writing data, Control structures, functions, scoping rules, dates and times, Loop functions, debugging tools, Simulation, code profiling

UNIT III

Getting and Cleaning Data: Obtaining data from the web, from APIs, from databases and from colleagues in various formats. Basics of data cleaning and making data —tidy.

UNIT IV

Exploratory Data Analysis: Essential exploratory techniques for summarizing data, applied before formal modeling commences, eliminating or sharpening potential hypotheses about the world that can be addressed by the data, common multivariate statistical techniques used to visualize high-dimensional data.

UNIT V

Reproducible Research: Concepts and tools behind reporting modern data analyses in a reproducible manner, To write a document using R markdown, integrate live R code into a literate statistical program, compile R markdown documents using knitr and related tools, and organize a data analysis so that it is reproducible and accessible to others.

SUGGESTED READINGS

1. Rachel Schutt., &Cathy O'Neil.(2013). Doing Data Science: Straight Talk from the Frontline. Schroff/O'Reilly.
2. Foster Provost.,&Tom Fawcett.(2013). Data Science for Business What You Need to Know About Data Mining and Data-Analytic Thinking. O'Reilly.
3. John, W. Foreman. (2013). Data Smart: Using data Science to Transform Information into Insight. John Wiley & Sons.
4. Ian Ayres. (2007). Super Crunchers: Why Thinking-by-Numbers Is the New Way to Be Smart (1st ed.). Bantam.
5. EricSeigel. (2013).PredictiveAnalytics:ThePowertoPredictwhoWillClick,BuyLie,or Die (1sted.). Wiley.
6. Matthew, A. Russel. (2013). Mining the Social Web: Data mining Facebook, Twitter, LinkedIn, Goole+,GitHub, and More (2nd ed.). O'Reilly Media.

**ELECTIVE - II
MULTIMEDIA AND ITS APPLICATIONS**

Course Objectives

To enable the students to understand the concept of Multimedia. To encourage the students to create multimedia projects.

Course Outcome (COs)

Students can able to learn

CO Number	CO Statement	Knowledge Level
CO1	To obtain the knowledge about the multimedia basics, kinds.	K1
CO2	To analyze the components of multimedia, animation and different file formats	K2
CO3	To understand audio and video file structure and formats	K2
CO4	To train the students to obtain the capability of creating multimedia projects	K3

Mapping with Programme Outcomes

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S
CO2	S	S	S	M	S
CO3	M	M	S	M	S
CO4	S	S	S	M	S

S- Strong; M-Medium; L-Low

UNIT I

Multimedia Overview: Introduction to Multimedia: What is multimedia- a concise history of multimedia- Linear vs. interactive multimedia – The purposes and applications of multimedia: Why and how multimedia is used – Planning stages and development process – Tools for creating and preparing media.

UNIT II

Kinds of Media: Graphics and Images: The role of graphics and images in multimedia – Designing vector graphics – Creating raster images – Color theory – Text and Typography: Text defined – Typing , Texting and E-mailing – Typography.

UNIT III

2D and 3D animation: Animation in multimedia – Kinds of animation – Traditional animation overview-Principles of animation-Difference between 2D and 3D animation – Animation files and formats.

UNIT IV

Audio: Audio fundamentals – recording vs importing sound - MIDI and Digital Music – Editing and manipulating Audio Tracks – Audio File formats- Audio file Types.

UNIT V

Video: Video mechanics – Video in Multimedia – Analog and Digital Video – Shooting and obtaining video – video compression schemes and file formats – Authoring for multimedia functionality: Tools for authoring – Web authoring with HTML.

TEXT BOOK: Jennifer Coleman Dowling, “Multimedia Demystified”, Tata McGraw Hill, Edition 1, 2011.

REFERENCE BOOKS

1. Robert Reinhardt, Snow Dowd, “Macromedia Flash8 Bible”, Wiley Publishing Inc., Edition I, 2006.
2. Tay Vaughan , “Multimedia Making it work”– Sixth Edition –Tata Mc-GrawHill-2004.

Web References

1. nptel.ac.in/courses/Webcourseontents/.../Multimedia%20Processing/New_index1.html

ELECTIVE- III

PROJECT: - MINIPROJECT	
Semester 6	INT MARKS: 40
	EXT MARKS: 60
Group Projects	
<u>Project Evaluation:</u>	
Power point presentation of the project and individual viva	

Rules and Regulations

1. The combined project shall be undertaken by the students as a team minimum of four maximum of five.
2. The Title must be confirmed countersigned by the guide need to be submitted for approval on or before second week of the commencement of the semester.
3. The Student should maintain an observation for their project work and give report about this to project guide on every week.
4. The Students should meet the guide before every project lab days.
5. The Students must attend all the reviews without fail and come with the corresponding needs.

ALLIED MATHEMATICS – I	INT MARKS :40
SEMESTER :1	EXT MARKS:60

Course Objectives

This course enables the students to learn to develop and analyze algorithms, to express ideas using mathematical notation ,to solve problems with the help of tools of mathematical analysis.

Course Outcomes

On successful completion of the course, students will be able to

1. To acquire the knowledge of logic and its properties.
2. To understand the fundamentals in growth of sets and functions.
- 3 To learn about the familiar concepts of elementary algebraic set theory.
- 4.To understand the basic knowledge of special types of graphs and its properties and also concepts of trees.
5. To learn about the different colouring parameter and to develop the special graphs and apply to describe the specific algorithms.

Syllabus

UNIT I

Logic : Introduction, Propositions, Connectives, truth table tautology and contradiction, Logical Equivalences.

UNIT II

Sets and functions: Introduction, Composition of functions, relations, Characteristic functions.

UNIT III

Algebraic Systems: Introduction , semigroups, monoids, Groups, Subgroups

UNIT IV

Graphs and Trees :Introduction, Graphs, sub graphs ,isomorphism, Some Special classes of graphs,connectedness,Euler graphs Hamiltonian graphsand circuits , trees.

UNIT V

Graphs and trees (cont.) :Planar graphs, Colouring,Graphs $K_5, K_{3,3}$, Directed graphs, shortest path problem,Dijkstra's Algorithm for shortest path, Algorithm for minimum Spanningtrees (Kruskal's Algorithm),spanning trees.

BOOK FOR STUDY

Discrete Mathematics, K.Chandrasekhara Rao,Narosa publishing house pvt.ltd, New Delhi.

BOOK FOR REFERENCES

1. Discrete Mathematics, Dr. S. P. Rajagopalan, Dr. R. Sattanathan, Margham publications, Chennai-17
2. Discrete Mathematics, B. Praba, vijay Nicole imprints pvt.ltd.

ALLIED MATHEMATICS - II	INT MARKS:40
SEMESTER:2	EXT MARKS:60

Course Objectives

This course enables the students to learn to develop and analyze to solve problems with the help of tools of mathematical analysis.

Course Outcomes

On successful completion of the course ,students will be able to

CO1: To study about the basic concepts of algebraic equations and compute the errors, followed by the steps to apply it in numerical methods.

CO2:To acquire the knowledge of relation among the operators and derive the interpolation formula for solving the problems numerically.

CO3:To learn about the concepts of unequal intervals and its properties.

CO4:To analyze and describe the properties of integration and differentiation and formulate the problems.

CO5:To construct the numerical solutions and derive the different types of ordinary differential equations.

Syllabus

UNIT-I

Solving algebraic and transcendental equation by Bisection method, Iteration method, Regula-Falsi method and Newton-Raphson method.

UNIT-II

Forward differences, backward differences, shift operator, relation between operators, Interpolation with equal intervals: Newton's forward and backward interpolation formulae.

UNIT-III

Interpolation with unequal intervals:Divided differences and their properties,Newton's divided difference formula,Lagrange's formula for interpolation. Inverse interpolation: Lagrange's method.

UNIT-IV

Numerical Differentiation:Numerical differentiation upto second order solution using Newton's forward and backward formula.

Numerical integration:Trapezoidal rule,Simpson's one-third rule,Simpson's three-eighth rule.

UNIT-V

Numerical solution of ordinary differential equations: Taylor's series, Euler method and Runge-Kutta method of fourth order.

Books for Study

Calculus of Finite Differences and Numerical Analysis by P.Kandasamy and K. Thilagavathy, S.Chand Publishers

Books for Reference Numerical Analysis by B.D.Gupta, Konark Publishers Pvt Ltd.

ALLIED-III OPERATIONAL RESEARCH	
SEMESTER : 3	INT MARKS: 40
	EXT MARKS: 60

Course Objectives

This course enables the students to learn to develop and analyze algorithms ,to express ideas using mathematical notation ,to solve problems with the help of tools of mathematical analysis.

Course Outcomes

On successful completion of the course ,students will be able to

1. To acquire the knowledge Basic of Operations Research
2. To understand the fundamentals Transportation model
- 3 To learn about the familiar concepts of Sequencing problem
- 4.To understand the basic knowledge of Game Theory
5. To learn about Pert-CPM Techniques

UNIT-I

Basic of Operations Research (OR): Characteristics of OR-Necessity of OR in industry-OR and Decision making-Role of computers in OR. Linear programming: Formulation and Graphical solution (of 2 variables) canonical and standard terms of Linear programming problem. Algebraic solution and Graphical solution: Simplex method.

UNIT-II

Transportation model: Definition-formulation and solution of transportation models – the row-minima, column-minima, matrix minima and vogel’s approximation methods. Assignment model: Definition of assignment model-comparison with transportation model-formulation and solution of Assignment model-variation of Assignment problem.

UNIT-III

Sequencing problem: Processing each of n jobs through m machines-processing n jobs through 2 machines-processing n jobs through 3 machines – processing 2 jobs through m machinesprocessing n jobs through m machines – traveling salesman problem.

UNIT-IV

Game Theory: Characteristic of games – maximin, minimax criteria of optimality – Dominance property – algebraic and graphical method of solution of solving 2*2 games.

UNIT-V

Pert-CPM: Networks-PERT computation-CPM computation – resource scheduling.

Text Books

- A. Operations Research -Resource Management Technique, P.R.Vittal,V.Malini ,Margham Publication
- B. HamdyA.Taha: Operation Research – An Introduction, 5thed. Prentice Hall of India, Private Limited.,New Delhi,1996.

BOOKS FOR REFERENCE

1. Srinath L.S.: PERT and CPM principles and applications, Affiliated East Press Pvt. Ltd., New York, 1973.

ALLIED-IV STATISTICAL METHODS AND ITS APPLICATON	
SEMESTER : 4	INT MARKS: 40
	EXT MARKS: 60

Course Objectives

This course enables the students to learn to develop and analyze algorithms ,to express ideas using mathematical notation ,to solve problems with the help of tools of mathematical analysis.

Course Outcomes

On successful completion of the course ,students will be able to

1. To know about Nature and scope of statistical methods
2. To understand the fundamentals Measures of Location
- 3 To learn about the Measures of dispersion

- 4.To understand the basic of Correlation
5. To learn about Sampling Techniques

UNIT – I

Nature and scope of statistical methods and their limitations- Classification, tabulation and diagrammatic representation of various type of statistical data-Frequency curves and Ogives-graphical determination of median and mode

UNIT-II

Measures of Location- arithmetic mean, median and mode- merits and demerits- simple problem.

UNIT –III

Measures of dispersion- Range,mean deviation,standard deviation,coefficient of variation, skewness and kurtosis-simple problems.

UNIT-IV

Correlation – Scatter diagram-Rank correlation coefficient-Regression lines-linear prediction-simple problem

UNIT-V

Concepts of Sampling Distribution-standard error-type I and type II errors – level of significance-critical region.

Text Books

- A. Gupta, S.P.(2005):Statistical methods, Sultan Chand and Sons.
- B. Pillai, R.S.N. and Baghavathi,V.(2003):Statistics, S. Chand and Company Ltd., New Delhi.

Shrimathi DevkunvarNanalal Bhatt Vaishnav College for Women (Autonomous)

Re-accredited with “A+” Grade by NAAC

Amendments in the regulations from 2020 – 2021 onwards

UG - Changes in Part-IV

Semester – I

Title	Internal Marks	External Marks	Credits
Soft Skills – Essentials of Communication Skills	50	-	3
Environmental Studies – For Day Students	50	-	2

Semester – II

Title	Internal Marks	External Marks	Credits
Soft Skills – Essentials of Spoken and Presentation Skills	50	-	3
Environmental Studies – For Self-Supporting Students	50	-	2
Yoga and wellness	50	-	2

Semester – III

Title	Internal Marks	External Marks	Credits
NME – Offered to other department students	50	-	3

Semester – IV

Title	Internal Marks	External Marks	Credits
NME – Offered to other department students	50	-	3

Semester – V

Title	Internal Marks	External Marks	Credits
Skill Enhancement course	50	-	3

Semester – VI

Title	Internal Marks	External Marks	Credits
Skill based Elective – Offered to students of same department SWAYAM – MOOC or other (For Non-Commerce Students) ArthaVidhya (For Commerce Students)	50	-	3