

**Shrimathi Devkunvar Nanalal Bhatt Vaishnav College for Women,
(Autonomous)**

Re-Accredited with 'A+' Grade By NAAC.

Chromepet, Chennai-44.

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 2023-24)

UNIVERSITY OF MADRAS
SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR
WOMEN (AUTONOMOUS)

B.SC. COMPUTER SCIENCE WITH COGNITIVE SYSTEMS
(Shift – II)

Under the faculty of Science
(w.e.f.2023 – 2024)

REGULATIONS
Choice based credit system
As per common Regulations framed by University of Madras

OBJECTIVES OF THE COURSE:

This program would ensure that the students graduating from this will gain knowledge in not only the core topics of Computer Science, but also develop an equal appreciation of current industry standards. It also enhances students computing skill, be successful in their professional lives through latest tools and technologies in the area of computer software.

UG REGULATIONS

1. ELIGIBILITY FOR ADMISSION:

Candidates for admission to the first year of the degree of Bachelor of Computer Science (With Cognitive Systems) have passed the Higher Secondary Examination(Mathematics and Computer Science) conducted by the government of Tamil Nadu of an examination accepted at equivalent thereof by the Syndicate of University of Madras

2. ELIGIBILITY FOR THE AWARD OF DEGREE:

A candidate shall be eligible for the award of the degree only if she has undergone the prescribed course of the study in a college affiliated to the university for a period of not less than three academic years, passed the examinations all the Six-Semesters prescribed earning 140 Credits (in parts-I,II,III,IV&V)

3. DURATION:

- 1) Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second semesters, the second academic year the third and fourth semesters and the third academic year the fifth and sixth semester respectively.

- 2) The odd semesters shall consist of the period from June to November of each year and the even semesters from December to April of each year. There shall be not less than 90 working days for each semester.

4. COURSE OF STUDY:

The main subject of study for Bachelor Degree Courses shall consists of the following

PART –I TAMIL / OTHER LANGUAGES

PART – II ENGLISH

PART – III CORE SUBJECTS, ALLIED SUBJECTS, PROJECT/ ELECTIVES

PART- IV

1)NON- MAJOR ELECTIVES

- a) Those who have not studied Tamil up to XII Std. and taken a Non- Tamil Language under Part-I shall take Tamil comprising of two course(level will be at 6th Standard).
- b) Those who have studied Tamil up to XII Std. and taken a Non-Tamil Language under Part-I shall take Advanced Tamil comprising of two courses.
- c) Others who do not come under a & b can choose Non-Major elective comprising of two courses.

2) Skill based subject (Four) – (2 SOFT SKILLS + 1 skill based elective related to the subject +1 Computing skill)

3) Environmental Studies

4) Value Education – Yoga and Health

PART–V EXTENSION ACTIVITIES (SPORTS/NCC/NSS/ROTARACT)

PART–VI EXTRA-CURRICULAR AND CO-CURRICULAR ACTIVITIES

(Introduced From 2018 onwards)

RECOMMEDED CREDIT DISTRIBUTION

The Minimum Credit Points for UG (Three Year Program)

Particulars	Credits
1. Part I, II,III – (Language/English/Core/Allied)	119
2. Part IV	20
a. Basic Tamil/Advanced Tamil/ Non-major (I & II Sem.)	4
b. Soft Skill (one paper per semester for 4 semesters)	12
c. EVS(III Semester)	2
d. Value Education (VI Sem.)	2

Total (Part I,II,III,IV)	139
Part V Extension Activities a. Sports credit for all, (or)Credits to international, national and state players b. NCC,NSS,EDP, Consumer club	1-5
	1-3
Total (PART I,II,III,IV,V)	140-144

11. PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

The Under graduates of various disciplines would be fully equipped

- To life-long learning in order to become effective collaborators and innovators, leading or participating in ventures that address social, technical and business challenges.
- To transform learners into holistic individuals acquiring higher levels of knowledge and competence.
- To approach life skills which are inclusive and value-based to appreciate human values and ethics.

12. 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 lifeskills 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.

13. 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 PROPOSED FRAMEWORK**w.e.f (2023-24)****SEMESTER I**

SEM	COURSE TITLE	TITLE OF THE PAPER	HRS	CREDITS	CIA	SE	TOTAL	
I	PART I	Tamil/Hindi/ Sanskrit/French	6	3	40	60	100	
	PART II	English	6	3	40	60	100	
	PART III	Core Major-I Operating Systems		5	3	40	60	100
		Core Practical-I Operating Systems - Lab		4	2	40	60	100
		Core Practical-II Introduction to Worksheets - Lab		3	2	40	60	100
		Allied Theory- I Discrete Mathematics		6	5	40	60	100
		TOTAL	30	18			600	

SEMESTER II

III	PART I	Tamil/Hindi/ Sanskrit/French	6	3	40	60	100	
	PART II	English	6	3	40	60	100	
	PART III	Core Major – II Java Programming		5	3	40	60	100
		Core Practical- III Java Programming - Lab		4	2	40	60	100
		Core Practical- IV WEB Technology - Lab		3	2	40	60	100
		Allied Theory – II Numerical Methods		6	5	40	60	100
			30	18			600	

SEMESTER III

III	PART I	Tamil/Hindi/ Sanskrit/French	5	3	40	60	100	
	PART II	English	5	3	40	60	100	
	PART III	Core Major- III Data Structures		4	3	40	60	100
		Core Major –IV Process Management		4	3	40	60	100
		Core Practical- V Data Structures using Java – Lab		4	3	40	60	100
		Core Practical – VI Robotic Process Automation using UIPATH - Lab		3	2	40	60	100
		Allied Theory – III Operational Research		5	5	40	60	100
		TOTAL	30	22			800	

SEMESTER IV							
SEM	COURSE TITLE	TITLE OF THE PAPER	HRS	CREDITS	CIA	SE	TOTAL
IV	PART I	Tamil/Hindi/ Sanskrit/French	5	3	40	60	100
	PART II	English	5	3	40	60	100
	PART III	Core Major- V RDBMS	4	3	40	60	100
		Core Practical- VII RDBMS- Lab	5	4	40	60	100
		Core Practical- VIII Mobile Application Development- Lab	4	3	40	60	100
		Allied Theory- IV Statistical Methods	5	3	40	60	100
		Allied Practical I: Statistical Methods	2	2	40	60	100
	TOTAL	30	21			700	
SEMESTER V							
V	PART III	Core Major- VI Software Engineering and Testing	4	3	40	60	100
		Core Theory- VII Client Relationship Management	4	3	40	60	100
		Core Major- VIII Computer Networks	4	3	40	60	100
	Elective Theory -I	IT cognition /Data Mining /Natural Language Processing	6	5	40	60	100
		Core Practical- IX Software Testing Using Selenium - Lab	4	2	40	60	100
		Core Practical- X Client Relation Management - Lab	4	2	40	60	100
		Core Practical- XI Computer Networks- Lab	4	2	40	60	100
	TOTAL	30	20			700	
SEMESTER VI							
VI	PART III	Core Major- IX Virtualization And Cloud Computing	4	2	40	60	100
		Core Major- X Machine Learning using Python	4	3	40	60	100
	Elective Theory -II	IoT /Human Computer Interaction / Ethics and Social Implications of AI	6	5	40	60	100
		Core Practical- XII Virtualization and Cloud Computing Lab	5	2	40	60	100
		Core Practical- XIII Data Analytics Lab	5	3	40	60	100
	Elective Project-III	Mini project	6	5	40	60	100
	TOTAL	30	20			600	

B.SC. COMPUTER SCIENCE WITH COGNITIVE SYSTEMS (Shift – II)

Under the faculty of Science (w.e.f. 2023 – 2024)

COURSE PROFILE

Core Major –I OPERATING SYTSEMS	
SEMESTER: I	INT MARKS: 40
CREDITS: 3	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	3	2	2	2	3
CO2	3	3	2	2	3
CO3	3	3	3	3	2
CO4	3	3	3	3	2
CO5	3	3	2	3	2

3- Strong; 2-Medium; 1-Low.

UNIT I :	LECTURE HOURS:15
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:	LECTURE HOURS:15
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:	LECTURE HOURS:15
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:	LECTURE HOURS:10
Virtual Memory: Demand Paging-Page Replacement-Page Replacement Algorithms-Thrashing.	
UNIT V:	LECTURE HOURS:15
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, 9 th Edition,2012 B. Silberschatz, Galvin, Gagne; Operating System Concepts , John Wiley Private Limited, 10 th Edition 2017	

Core Practical-I OPERATING SYSTEMS Lab	
SEMESTER : I	INT MARKS: 40
CREDITS: 2	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	3	2	3	3	3
CO2	3	3	2	3	2
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	1	3	3	3

3- Strong; 2-Medium; 1-Low

OPERATING SYSTEMS Lab EXERCISES

1. Install and Configure windows 10 operating systems using oracle virtual box
2. Do the disk partitioning to create a new drive and name the new volume.
3. Install and Configure Windows Server 2022 operating system
4. Add roles and features using Windows server 2022
5. Change the windows 10 operating system Password
6. Change the Windows Server 2022 operating system Password
7. Install and Configure IIS using Windows server 2022
8. Install and Configure DHCP using Windows server 2022
9. Install and Configure Active Directory domain service
10. Remove roles and features in windows server 2022.

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 INTRODUCTION TO WORKSHEETS	
SEMESTER: I	INT MARKS: 40
CREDITS: 2	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	3	3	3	3	3
CO2	3	2	3	3	3
CO3	3	3	2	3	3
CO4	3	2	2	3	3
CO5	3	3	3	3	3

3- Strong; 2-Medium; 1-Low

Exercise

1. Construct a worksheet with Simple Functions and Formulae calculate TOTAL, AVERAGE, COUNT, MAX, MIN, SUM of a column for the data given.
2. Working with Sheets to perform the following functions
 - a) Insert a Worksheet
 - b) Rename a Worksheet
 - c) Move a Worksheet
 - d) Delete a Worksheet
 - e) Copy a Worksheet
3. Construct a worksheet with various shortcuts which does the following function
 - a) Opens format cell dialogue box
 - b) Convert data to table instantly opens create table dialogue box
 - c) To repeat the content of a particular cell for vertical filling
 - d) To repeat the content of a particular cell for horizontal filling
 - e) Make us to move to next sheets (next sheet)
 - f) Used to draw an instant chart for a table (displayed in same sheet)
 - g) To display chart in different/ new sheet
 - h) To update a cell
 - i) To increase the row width to accommodate additional values
 - j) For looping (repeatedly doing same operation) (previously done action)
4. Perform Data Analysis in worksheet with given data. Do the SORTING AND DATA VALIDATION function for the data given.
5. Perform data analysis for ANALYSIS TOOL PACK AND DATA VALIDATION
6. Perform Data Visualization with the given data draws BARCHART AND LINE CHARTWITH SINGLE AND MULTIPLE COLORS.
7. Generate a SALES REPORT in worksheet with minimum 50 records
8. Prepare a monthly budget for a family. Output should be in the below format, use multiple worksheet for the same

Description	Budgeted amount	Actual amount	Variance
Income head			
Salary/wages income			
House rent			
Dividend income			
Miscellaneous income			
DAILY HOUSE EXPENSES			
Rent on property			
Grocery			
Dry cleaning			
Personal supplies			
TRANSPORTATION EXPENSES			
Car repair charges			
Fuel expenses			
Car servicing expenses			
PAYMENT OBLIGATIONS			
Debt 1			
Debt 2			
Taxes			
UTILITY EXPENSES			
Electricity bill			
Water bill			
Telephone bill			
Internet bill			
Tv bill			

9. Do the import operation from TEXT AND WEB SOURCE and Export excel data to PDF AND TEXT FORMAT?
10. Create a user form in Excel which receives Employee id, Employee name, Login, Password, In Time and Out Time, display form data in a table. The table should contain at least 10 valid data
11. Construct a simple MACRO to for assigning String and Integer values
12. Construct a simple MACRO to for assigning String, Integer, Decimal and Boolean values
13. Construct a simple MACRO to display a GREETING MESSAGE by clicking command button

Core Major –II JAVA PROGRAMMING	
SEMESTER: II	INT MARKS: 40
CREDITS: 3	EXT MARKS: 60

Course Objectives

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

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	3	2	2	2	3
CO2	3	3	2	2	3
CO3	3	3	3	3	2
CO4	3	3	3	3	2
CO5	3	3	2	3	2

3- Strong; 2-Medium; 1-Low.

UNIT I :	LECTURE HOURS:10
Introduction to Java – Features of Java- Object Oriented Concepts- Lexical Issues- dataTypes- Variables- Arrays-Operators-control Statements.	
UNIT II:	LECTURE HOURS:15
Classes–Objects – Constructors – Overloading method-Access Control- Static and final methods-Inner Classes – String Class-Inheritance- Overriding methods- using super Abstract class.	
UNIT III:	LECTURE HOURS:20
Packages – Access Protection – Importing Packages – Interfaces – Exception Handling Throw and Throws – Java Collections - Collections Class - ArrayList - Vector Class - Stack Class - Thread – Synchronization -Messaging- Runnable Interface-Interthread Communication- Multithreading.	
UNIT IV:	LECTURE HOURS:10
I/OStreams –File Streams – Applets – String Objects –StringBuffer –CharArray - Java Utilities–Code Documentation.	
UNIT V:	LECTURE HOURS:15
Working with windows using AWT Classes-AWT Controls –Labels –Button – CheckBox –RadioButton-Choice-List- Scrollbars- Layout Managers –Flow Layout - Border Layout-Grid Layout -Card Layout - Grid bag Layout –panels –Frames - Menus-Dialogs -Mouse Events and their Listeners.	
Text Book(s):	
<ol style="list-style-type: none"> 1. E.Baluguruswamy , “<i>Programming With Java, A Primer</i>”, TMH 2. Cay S.Horstmann, Gary Cornell, “<i>Java2 Volume I -Fundamentals</i>”, 5thEdition,PHI,2000. 3. P.Naughtonand H.Schildt , “<i>Java2 (The Complete Reference)</i>”,ThirdEdition TMH 1999. 4. K.Arnoldand J.Gosling, “<i>The Java Programming Language</i>”, Second Edition Addison Wesley,1996. 5. C.Muthu , “<i>Programming in Java</i>“ , Vijay Nicolepublication 6. Sachin Malhotra & Saurabh Choudhary, “<i>Programming in JAVA</i>”, 2nd Ed, Oxford Press 	

Core Practical –III JAVA PROGRAMMING LAB	
SEMESTER: II	INT MARKS: 40
CREDITS: 2	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, collections and threads. It aims to develop the student's logical, critical thinking and problem solving skills on programming basics

Course Outcomes

On the successful completion of the course, students will be 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, interfaces and collections	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	3	3	3	3	3
CO2	3	2	3	3	3
CO3	3	3	2	3	3
CO4	3	2	2	3	3
CO5	3	3	3	3	3

3- Strong; 2-Medium; 1-Low

Exercises

Applications

1. Area and perimeter of the circle
2. Substring removal
3. Program for overloading functions in java
4. Hierarchical inheritance in java
5. Program for overriding
6. Program for abstract class
7. Program for interface.
8. Program for pre-defined exception handling
9. Program for user-defined exception handling
10. Thread and exceptional handling
11. Thread synchronization
12. Program using ArrayList
13. Program using Vector Class
14. Program for java utility (calendar class)
15. Program for string manipulation.
16. File streams

Applets

17. Program for applet with mouse listener
18. Frames and controls
19. Menus and dialog box
20. Panel and layout
21. Incorporating graphics

Core Practical – IV WEB TECHNOLOGY LAB	
SEMESTER: II	INT MARKS: 40
CREDITS: 2	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 java script 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.

SEMESTER III

Core Major –III DATA STRUCTURES	
SEMESTER: III	INT MARKS: 40
CREDITS: 3	EXT MARKS: 60

Course Objectives

1. To understand the different methods of data organization like linear and non-linear structure.
2. To learn the various operations are performed in linear and non-linear structure.
3. To study various algorithms of Sorting, Searching methods in Data structures.

Course Outcome: on completion of the course the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understanding the concepts of data structures and complexity of algorithms.	K1
CO2	Implement operations like searching, insertion, and deletion, traversing mechanism of Stack and Queue.	K2
CO3	Discuss about linked list, operations and its applications.	K2
CO4	Identify the nonlinear data structure and indexing techniques.	K3
CO5	Demonstrating the various algorithms of Sorting, Searching methods in Data structures.	K3

Mapping with Programme Outcomes

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	3
CO2	3	3	2	2	3
CO3	3	3	3	3	2
CO4	3	3	3	3	2
CO5	3	3	2	3	2

3- Strong; 2-Medium; 1-Low.

UNIT I :	LECTURE HOURS:15
Definition of Data Structure-Primitive and Composite Data Types, Asymptotic notations, Arrays, Operations on Arrays, Order lists.	
UNIT II:	LECTURE HOURS:15
Stacks- Operations on Stacks, Application of Stack-Infix to Postfix Conversion, Recursion, Maze Problems-Queues-Operations on Queues, Queue Application, Circular Queue.	
UNIT III:	LECTURE HOURS:15
Singly Linked List-Operations, Application-Representation of a Polynomial - Polynomial addition; Doubly Linked List - Operations, Applications-Ordering of Books in Library (Alphabetical Ordering).	
UNIT IV:	LECTURE HOURS:15
Trees and Graphs: Binary Trees-Conversion of Forest to Binary Tree, Operations - Tree Traversals; Graph-Definition, Types of Graphs, Hashing Table and Hashing Functions, Traversal-Shortest Path; Dijkstra's Algorithm.	
UNIT V:	LECTURE HOURS:15
Algorithm-Definition - Examples-Complexity-Divide and Conquer-Binary Search - Maximum and Minimum-Merge Sort.	
Text Book(s):	
<ol style="list-style-type: none"> 1. E.Horowitz and S.Shani ,(1999),Fundamentals of Data Structures in C++, Galgotia Pub. 2. P.Sudharsan and J.JohnManoj Kumar ,C++ & Data Structures, RBA Publications, First Edition 3. Yashavant Kanetkar, Data Structure Through C++, BPB Publication 4. Ashok N Kamthane,(2004),“Programming and Data Structures”, First Edition,Pearson Education. 5. Alfred V.Aho,John E.Hopcroft,Jeffrey D.Ullman,(2006) – “Data Structures and algorithms”,Pearson Education,. 	
BOOKS FOR REFERENCE:	
<ol style="list-style-type: none"> 1. Horowitz, S.Sahni,and S.Rajasekaran, Computer Algorithms, Galgotia Pub. Pvt. Ltd., 1998. 2. R.F.Gilberg, B.A.Forouzan, Data Structures, Thomson India Edition, 2005. 3. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++,”, Pearson Education, Second Edition 4. Narasimha Karumanchi,(2019),Data Structures and Algorithms Made Easy: Data Structures and Algorithmic Puzzles 	

Core Theory- IV PROCESS MANAGEMENT	
SEMESTER: III	INT MARKS: 40
CREDITS: 3	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 :	LECTURE HOURS:15
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:	LECTURE HOURS:15
Stacks- Operations on Stacks, Application of Stack-Infix to Postfix Conversion, Recursion, Maze Problems-Queues-Operations on Queues, Queue Application, Circular Queue.	
UNIT III:	LECTURE HOURS:15
Devops - Introduction to Devops-Principles-Automation-Performance Measurement through KPIS and Metrics-Agile and Devops-Agile Infrastructure-Velocity-Lean Startup UPS.	
UNIT IV:	LECTURE HOURS:15
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:	LECTURE HOURS:15
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.	
Text Book(s):	
<ol style="list-style-type: none"> a. Roger S Pressman, “Software Engineering A Practioners Approach”, 7th Edition 2010 b. Kallori Vikraman, “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	
<ol style="list-style-type: none"> 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 –V DATA STRUCTURES USING JAVA LAB	
SEMESTER: III	INT MARKS: 40
CREDITS: 2	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, collections and threads. It aims to develop the student's logical, critical thinking and problem solving skills on programming basics

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Implement the basic operations of Stack, Queue data structures	K2,k3
CO2	Implement different types of linked structures, Hash table structures	K2, k3
CO3	Implement binary search tree and its operations	K3
CO4	Implement the searching and sorting techniques in their programs and write efficient programs	K3

Mapping with Programme Outcomes

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

3- Strong; 2-Medium; 1-Low

Lab Exercises in Data Structures using Java Lab

1. Implement PUSH, POP operations of stack using Arrays.
2. Implement PUSH, POP operations of stack using Pointers.
3. Implement add, delete operations of a queue using Arrays.
4. Implement add, delete operations of a queue using Pointers.
5. Conversions of infix to postfix using stack operations.
6. Postfix Expression Evaluation.
7. Addition of two polynomials using Arrays
8. Addition of two polynomials using Pointers.
9. Creation, Insertion, and Deletion in doubly linked list.
10. Binary tree traversals (in-order,pre-order,and post-order) using recursion.

Core Practical– VI ROBOTIC PROCESS AUTOMATION Lab USING UIPATH	
SEMESTER : III	INT MARKS: 40
CREDITS : 2	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	3	3	3	2	3
CO2	3	3	3	2	3
CO3	2	2	3	2	3
CO4	3	3	3	2	3

3- Strong; 2-Medium; 1-Low

Exercises

1. Create a bot for the following processes:
2. · Check whether the number given by the user is even or odd
3. · Basic and Desktop Recording

4. · Notepad Automation
5. · Word Automation
6. · Web scrapping
7. · Google form filling automation
8. · E-mail Automation
9. · Attendance Automation
10. · Files Automation
11. · ExcelAutomation

SEMESTER IV

Core Major-V RDBMS	
SEMESTER : IV	INT MARKS: 40
CREDITS : 3	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	2	3	2	3	2
CO2	3	2	3	3	2
CO3	2	3	3	2	3
CO4	3	2	2	3	2
CO5	2	3	3	2	3

3- Strong; 2-Medium; 1-Low

UNIT I: Database Concepts		LECTURE HOURS:15
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		LECTURE HOURS:15
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		LECTURE HOURS:15
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		LECTURE HOURS:20
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		LECTURE HOURS:10
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 – ArunMajumdar&Pritimoy, Bhattacharya, 2007, TMH.
2. Database Management Systems – Gerald V. Post, 3rd edition, TMH.

Core Practical-VII RDBMS - Lab	
SEMESTER : IV	INT MARKS: 40
CREDITS : 4	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	2	2	3	3	3
CO2	3	2	3	2	3
CO3	3	2	2	3	3
CO4	2	2	3	3	2
CO5	3	2	3	3	3

3- Strong; 2-Medium; 1-Low.

Excercises

- 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 Practical-VIII	
MOBILE APPLICATION DEVELOPMENT LAB	
SEMESTER : IV	INT MARKS: 40
CREDITS : 3	EXT MARKS: 60

COURSE OBJECTIVES:

The student should be made to:

- Know the components and structure of mobile application development frameworks for
- Android and windows OS based mobiles.
- Understand how to work with various mobile application development frameworks.
- Learn the basic and important design concepts and issues of development of mobile applications.
- Understand the capabilities and limitations of mobile devices.

LIST OF EXPERIMENTS:

- 1 .Develop an application that uses GUI components, Font and Colours
2. Develop an application that uses Layout Managers and event listeners.
3. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that makes use of database.
6. Develop an application that makes use of RSS Feed.
7. Implement an application that implements Multithreading
8. Develop a native application that uses GPS location information.
9. Implement an application that writes data to the SD card.
10. Implement an application that creates an alert upon receiving a message.
11. Write a mobile application that creates alarm clock

SEMESTER V

Core Major – VI SOFTWARE ENGINEERING & TESTING	
SEMESTER : V	INT MARKS: 40
CREDITS : 3	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	3	3	3	3	3
CO2	3	3	2	3	3
CO3	3	3	3	3	3
CO4	3	2	3	3	3
CO5	3	3	3	3	3

3- Strong; 2-Medium; 1-Low

UNIT I:	LECTURE HOURS:15
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:	LECTURE HOURS:15
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:	LECTURE HOURS:15
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:	LECTURE HOURS:15
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:	LECTURE HOURS:15
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 Pedrycz, "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 Major- VII CLIENT RELATIONSHIP MANAGEMENT	
SEMESTER : V	INT MARKS: 40
CREDITS : 3	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	3	3	2	2	3
CO2	3	3	2	2	2
CO3	3	3	2	2	2
CO4	3	3	2	3	3
CO5	3	3	2	3	2

3- Strong; 2-Medium; 1-Low.

UNIT I: Service Now Intermediate Level LECTURE HOURS:11	
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	LECTURE HOURS:12

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
HOURS:11

LECTURE

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

LECTURE HOURS:11

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
HOURS:11

LECTURE

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 Major - VIII COMPUTER NETWORKS	
SEMESTER : V	INT MARKS: 40
CREDITS : 3	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	2	3	3	3	3
CO2	3	3	3	2	3
CO3	3	1	3	3	3
CO4	3	3	2	3	3
CO5	3	3	3	3	1

3- Strong; 2-Medium; 1-Low

UNIT I :	LECTURE HOURS:15
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 :	LECTURE HOURS:15
Data link layer Design issues – error detection and correction – elementary data link protocols – Sliding window protocols – Data link Layer in the Internet.	
UNIT III :	LECTURE HOURS:15
Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols – Ethernet – Ethernet Cabling- Manchester Encoding-Ethernet MACSublayer Protocol - Wireless LANs.	
UNIT IV :	LECTURE HOURS:14
Network layer – design issues – Routing algorithms – Congestion control algorithms – Internet Working – IP protocol – IP Address – Internet Control Protocol.	
UNIT V :	LECTURE HOURS:16
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. AchyutGodbole; 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).

ELECTIVE THEORY-I

(ANY ONE FROM THE BELOW LIST)

1. IT COGNITION AND PROBLEM SOLVING

2. DATA MINING

3. NATURAL LANGUAGE PROCESSING

SEMESTER : V	INT MARKS: 40
CREDITS : 5	EXT MARKS: 60

ELECTIVE THEORY –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	PSO 1	PSO2	PSO3	PSO4	PSO5
CO 1	3	2	3	3	3
CO 2	3	3	3	2	3
CO 3	2	2	3	2	3
CO 4	3	3	3	2	3

3- Strong; 2-Medium; 1-Low

UNIT I:	LECTURE HOURS:15
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:	LECTURE HOURS:15
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:	LECTURE HOURS:15
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:	LECTURE HOURS:15
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:	LECTURE HOURS:10
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 THEORY –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	3	2	3	3	3
CO2	3	3	3	2	3
CO3	2	2	3	2	3
CO4	3	3	3	2	3

3- Strong; 2-Medium; 1-Low

UNIT I HOURS:12	LECTURE
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 HOURS:10	LECTURE
Data Preprocessing: Why Preprocess the data – Data cleaning – Data Integration –Data Transformation – Data Reduction – Data Discretization	
UNIT III HOURS:10	LECTURE
Data Mining Techniques: Association Rule Mining – The Apriori Algorithm – Multilevel Association Rules – Multidimensional Association Rules – Constraint Based Association Mining	
UNIT HOURS:10	LECTURE
Classification and Prediction: Issues regarding Classification and Prediction – Decision Tree induction – Bayesian Classification – Back Propagation – Classification Methods – Prediction – Classifiers accuracy	
UNIT V HOURS:10	LECTURE
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 THEORY –I

NATURAL LANGUAGE PROCESSING

COURSE OBJECTIVES:

- To grasp the significance of natural language processing in solving real-world problems.
- To map the appropriate processing technique to a problem and implement the technique.
- To demonstrate required design skills for large collection sets.
- To appreciate the theoretical formulation of the natural language processing techniques.

COURSE OUTCOMES:

CO Number	CO Statement	Knowledge Level
CO1	Describe the fundamental concepts and techniques of natural language processing	K1
CO2	Distinguish among the various techniques, taking into account the assumptions, strengths, and weaknesses of each.	K2
CO3	Use appropriate descriptions, visualizations, and statistics to communicate the problems and their solutions.	K4
CO4	Analyze large volume text data generated from a range of real-world applications	K4

Mapping with Programme Outcomes

COs	PSO 1	PSO2	PSO 3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	2	3	3
CO3	3	3	3	3	3
CO4	3	2	3	3	3

3- Strong; 2-Medium; 1-Low

Unit – I: INTRODUCTION	LECTURE HOURS:10
Overview: Origins and challenges of NLP- Theory of Language -Features of Indian Languages – Issues in Font –Models and Algorithms- NLP Applications.	
UNIT II - MORPHOLOGY AND PARTS-OF-SPEECH	LECTURE HOURS:15
Phonology – Computational Phonology - Words and Morphemes – Segmentation – Categorization and Lemmatisation – Word Form Recognition – Valency - Agreement - Regular Expressions – Finite State Automata – Morphology- Morphological issues of Indian Languages – Transliteration.	
UNIT III - PROBABILISTIC MODELS	LECTURE HOURS:15
Probabilistic Models of Pronunciation and Spelling – Weighted Automata – N- Grams – Corpus Analysis –Smoothing – Entropy - Parts-of-Speech – Taggers – Rule based – Hidden Markov Models – Speech Recognition.	
UNIT IV – SYNTAX	LECTURE HOURS:15
Basic Concepts of Syntax – Parsing Techniques – General Grammar rules for Indian Languages – Context Free Grammar – Parsing with Context Free Grammars – Top Down Parser – Earley Algorithm – Features and Unification - Lexicalised and Probabilistic Parsing	
UNIT V - SEMANTICS AND PRAGMATICS	LECTURE HOURS:10
Representing Meaning – Computational Representation – Meaning Structure of Language – Semantic Analysis – Lexical Semantics – WordNet –Pragmatics – Discourse – Reference Resolution – Text Coherence – Dialogue Conversational Agents.	

TEXT BOOK:

1. Ronald Hausser, “Foundations of Computational Linguistics”, Springer-Verleg, 1999.

REFERENCES:

2. Daniel Jurafsky and James H. Martin “Speech and Language Processing”, Prentice Hall, 2009.
3. Christopher D.Manning and HinrichSchutze, “Foundation of Statistical Natural Language Processing”, MIT Press, 1999.

4. James Allen, "Natural Language Understanding", Benjamin/Cummings Publishing Co. 1995.

5. Applied Natural Language Processing with Python: Implementing Machine Learning

and Deep Learning Algorithms for Natural Language Processing, By Taweh Beysolow

II, September 2018

WEB REFERENCES:

1. <https://blog.algorithmia.com/introduction-natural-language-processingnlp/>

2. <https://www.udacity.com/course/natural-language-processingnanodegree--nd892>.

<https://www.coursera.org/learn/language-processing>

3. <https://towardsdatascience.com/a-practitioners-guide-to-naturallanguage-processing-part-i-processing-understanding-text-9f4abfd13e72>

5. <https://www.edx.org/course/natural-language-processing>

Core Practical-IX SOFTWARE TESTING LAB USING SELENIUM	
SEMESTER : V	INT MARKS: 40
CREDITS : 2	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	PSO 1	PSO2	PSO 3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	2	3	3
CO3	3	3	3	3	3
CO4	3	2	3	3	3
CO5	3	3	3	3	3

3- Strong; 2-Medium; 1-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 RELATIONSHIPMANAGEMENT Lab	
SEMESTER : V	INT MARKS: 40
CREDITS : 2	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	3	3	2	2	3
CO2	3	3	2	2	3
CO3	3	3	2	2	2
CO4	3	3	2	2	2
CO5	3	3	2	3	3
CO5.	3	3	2	3	2
CO6	3	2	2	2	3

CO7	3	2	2	3	2
CO8	3	2	3	2	2

3- Strong; 2-Medium; 1-Low

Exercises

1. Creating user, group and roles
2. Assignment rule
3. Creation of table
4. Service level agreement
5. Applying business rule
6. Client scripting
7. Mail template and outbound mail
8. Inbound mail action
9. Create workflow
10. Create a service catalog
11. Create an order guide
12. Create a record producer
13. Create application and table using ACL
14. Create scheduled reports
15. Import sets to add users to group table.

Core Practical-XI COMPUTER NETWORKS LAB	
SEMESTER : V	INT MARKS: 40
CREDITS : 2	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	3	3	3	3	3
CO2	3	3	2	3	3
CO3	3	2	3	3	3
CO4	3	3	3	2	3
CO5	3	3	3	2	3

3- Strong; 2-Medium; 1-Low

Requirements:**Cisco packet tracer software (Freeware)****Exercises:**

1. Connecting PCs and assigning IP address (Simulation)
2. Working with hub (Simulation)
3. Working with switch (Simulation)
4. Configuration of switch (CLI)
5. Assigning IP address to switch (CLI)
6. Changing speed and mode of switch (CLI)
7. Working with router (Simulation)
8. Configuration of Telnet (CLI)
9. Configuration of port security in switch (CLI)
10. Configuring VLAN in a switch (CLI)
11. Configuration of VLAN trunking (CLI)
12. Routing protocols(CLI)
 - a. Static protocol
 - b. Dynamic protocol
13. Configuration of web server and DNS server
14. Configuration of FTP server
15. Spanning tree protocol