PERIYAR UNIVERSITY

PERIYAR PALKALAI NAGAR

SALEM – 636011

B.Sc. COMPUTER SCIENCE

CHOICE BASED CREDIT SYSTEM

OBE REGULATIONS AND SYLLABUS

(SEMESTER PATTERN)

(**For Candidates admitted in the Colleges affiliated to Periyar**

University from 2021 - 2022 onwards)

Outcome Based Education (OBE) REGULATIONS AND SYLLABUS

(With effect from the academic year 2021-2022 onwards)

1. PREAMBLE

The programme prepares under Graduates in **Computer Science** with strong theoretical inputs and practical knowledge, who can be employed in industries. The programme develops requisite professional skills and problem solving abilities to pursue a successful career in software industry and for pursuing higher studies in Computer Science.

2. GRADUATE ATTRIBUTES

1. Computational Knowledge
2. Problem Analysis & Solving
3. Design & Development of Solutions
4. Modern Tool Usage
5. Communication skills
6. Innovation & Entrepreneurship
7. Societal & Environmental concern

3. PROGRAMME SPECIFIC QUALIFICATION ATTRIBUTES

The programme specific qualification attributes meant to be achieved through subjects in the programme in terms of

1. Knowledge and understanding level (K1 and K2)
2. Application level (K3)
3. Analytical level (K4)
4. Evaluation capability level (K5)
5. Scientific or Synthesis level (K6)

4. FOR ADMISSION

A candidate who has passed in Higher Secondary Examination with Mathematics or Business Mathematics or Computer Science or Statistics (Academic stream or Vocational stream) as one of the subject under Board of Higher Secondary Examination, Tamil Nadu as per the norms set by the Government of Tamil Nadu or an Examination accepted as equivalent thereto by the syndicate, subject to such other conditions as may be prescribed , are permitted to appear and qualify for the **Bachelor of Science in Computer Science** degree examination of this university, after a programme of study of three academic years.

5. PROGRAMME OBJECTIVES AND OUTCOMES

1. Programme Educational Objectives (PEOs)

PEO1: Graduates are prepared to be employed in IT industries by providing expected domain Knowledge.

PEO2: Graduates are provided with practical training, hands-on to meet the industrial needs.

PEO3: Graduates are motivated in career and entrepreneurial skill development to become global leaders.

PEO4: Graduates are trained to demonstrate creativity, develop innovative ideas and. to work in teams to accomplish a common goal.

PEO5: Graduates are trained to address social issues and guided to approach problems with solutions.

2. Programme Specific Outcomes(PSOs)

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

PSO1 : Apply domain knowledge and problem solving skills to solve real time problems.

PSO2: Acquire good employability skills which will ensure exceptional career opportunities in IT companies.

PSO3: Get a strong foundation to purse higher education in the field of Computer Science/Applications.

3. Programme Outcomes(POs)

After completion of the programme, the graduates will be able

PO1: To understand the fundamental concepts of computer system, including hardware and software.

PO2: To Design, and analyze precise specifications of algorithms, procedures, and interaction behavior.

PO3: To apply the appropriate technologies, skills and tools in various fields of Computer Science.

PO4: To analyze impacts of computing on individuals, organization and society.

6.   DURATION OF THE PROGRAMME

The programme shall extend over a period of three years comprising six semesters with two semesters in one academic year. There shall not be less than 90 working days for each semester. Examination shall be conducted at the end of every semester for the respective subjects.

7.   COURSE OF STUDY

The programme of study shall comprise instruction in the following subjects according to the syllabus and books prescribed from time to time. The syllabus for various subjects shall be clearly demarcated into five units in each subject. Part -I, Part-II, Part- III, Part -IV and Part-V subjects are prescribed in the scheme of examination. The Extension Activities are a must for each student to take part at least in any one of the activities such as NSS, YRC, SPORTS and RRC for the fulfillment of the degree.

8.   EXAMINATIONS

The theory examination shall be three hour duration for each paper at the end of every semester. The candidate failing in any subject(s) will be permitted to appear in the subsequent examination. The practical examinations for core subjects and SBEC should be conducted at the end of the every semester.

Submission of record note books for practical examinations

Candidates appearing for practical examinations should submit bonafide Record note books prescribed for practical examinations, Otherwise the candidates will not be permitted to appear for the practical examinations. However, in genuine cases of the students who could not submit the record note books, they may be permitted to appear for the practical examinations, provided the concerned Head of the Department certify that the candidate has performed the experiments prescribed for the course. For such candidates zero (0) marks will be awarded for record note books.

9.   Revision of Regulations and Curriculum

The University may revise/amend/ change the Regulations and Scheme of Examinations, as and when found necessary.

10 .   PASSING MINIMUM
     (a) Theory

The candidate shall be declared to have passed the examination if the candidate **secures not less than 40marks** put together out of 100 marks (**CIA+EA). Minimum 40% should be secured (30 out of 75) in EA** of each theory subject**.**

(b) Practical/Project viva voce

The candidate shall be declared to have passed the examination if the candidate **secures not less than 40marks** put together out of 100 marks (**CIA + EA). Minimum 40% should be secured (24 out of 60) in EA** of each Practical subject.

11.   Marks Distribution and Question Paper Pattern for B.Sc.,

11.1 Theory –Marks Distribution

Maximum Marks   : 100 Marks

External [EA]   : 75 Marks

Internal [CIA]   : 25 Marks

(a).   Theory - Question Paper Pattern [External]   (Total Marks: 75)

Section	Approaches	Mark Pattern
A	One word (Answer all questions &Three questions from each unit)	15X1 = 15 (Multiple Choice Questions)
B	100 to 200 words (Answer any Two out of five questions & One question from each unit)	2X5 = 10 (Analytical type questions)
C	500 to 1000 words(Answer ALL questions & One question from each unit with Internal Choice)	5X10 = 50 (Essay type questions)

(b). Theory - Internal Marks Distribution   (Total Marks: 25)

Attendance   :   5 Marks

Assignment   :   5 Marks

Test   :   15 Marks

11.2. Practical – Marks Distribution

Maximum Marks   :   100 Marks

External [EA]   :   60 Marks

Internal [CIA]   :   40 Marks

(a) practical-External marks distribution   (Total Marks :60)

For each practical question the marks should be awarded as follows **(External)**

i)   Algorithm/flowchart   - 20%
ii)   Writing the program in the main answer book   - 30%
iii)   Test and debug the program   - 30%
iv)   Printing the correct output   - 20%

 (Marks may be proportionately reduced for the errors committed in each of the above)

Practical Question Paper Pattern

Student should attend two questions (either / or pattern)

Note:

(i)   Practical I to Practical VII and SBEC Practical have the same pattern

(ii)   Core and SBEC Practical Examination must be conducted at the end of every Semester

(b). Practical - Internal Marks Distribution (Total Marks: 40)

- Record   : 15 Marks
- Internal Practical examinations   :   25 Marks

11.3 Project Evaluation:

Continuous Internal Assessment   : 40 Marks

Evaluation (External)   : 40 Marks

Viva-voce (jointly)   : 20 Marks

12.   COMMENCEMENT OF THIS REGULATION :

These regulations shall take effect from the academic year 2021-2022, i.e, for students who are to be admitted to the first year of the programme during the academic year 2021-2022 and thereafter.

Scheme of Examinations from the Academic Year 2021-2022

Credit Distribution as per the University Norms.

SEMESTER	I	II	III	IV	V	VI	Total Credits
PART – I	3	3	3	3	-	-	12
PART – II	3	3	3	3	-	-	12
ALLIED	4	6	4	6	-	-	20
CORE THEORY	5	10	9	4	12	5	45
CORE PRATICAL	2	2	2	2	4	8	20
ELECTIVE	-	-	-	-	4	8	12
SBEC	-	-	3	-	3	3	9
NMSDC	-	2	-	2	-	2	6
NMEC	-	-	2	2	-	-	4
EVS	-	-	-	-	-	-	-
VALUE EDUCATION	2	-	-	-	-	-	2
ADD-ON COURSE	-	-	-	-	-	-	-
EXTENSION ACTIVITY	-	-	-	-	-	1	1
PROFESSIONAL ENGLISH-PHYSICAL SCIENCE	4	4					8
Cumulative Total Credits	**23**	**30**	**26**	**22**	**23**	**27**	**151**

COURSE OF STUDY AND SCHEME OF EXAMINATION

SEM	PART	SUB CODE	TITLE OF THE SUBJECT	Hrs. Lect.	Hrs. Lab	CREDIT	MARKS CIA	MARKS EA	MARKS TOTAL
			SEMESTER – I						
I	I	21UFTA01	Tamil I	6	-	3	25	75	100
	II	21UFEN01	English I	6	-	3	25	75	100
	III	21UCS01	Core I: Problem Solving Through C	6	-	5	25	75	100
	III	21UCSP01	Practical I: C Programming	-	3	2	40	60	100
	III		Allied I	7	-	4	25	75	100
	IV	21UVE01	Value Education	2	-	2	25	75	100
	IV		Professional English- Physical Science I	4	-	4	25	75	100
			Total	**31**	**3**	**23**	**190**	**510**	**700**
			SEMESTER – II						
II	I	21UFTA02	Tamil II	6	-	3	25	75	100
	II	21UFEN02	English II	4	-	3	25	75	100
		NMSDC-I	Language Proficiency for Employability -Effective English	2	-	2	25	74	100
	III	21UCS02	Core II : Data Structure and Algorithms	3	-	5	25	75	100
	III	21UCSP02	Practical II : Data Structure Using C	-	3	2	40	60	100
	III	21UCS03	Core III: Computer Organization and Architecture	4	-	5	25	75	100
	III		Allied II	5	-	4	25	75	100
	III		Allied – Practical	-	2	2	40	60	100
	IV	21UES01	Environmental Studies	1	-	-	25	75	100
	IV		Professional English- Physical Science II	4	-	4	25	75	100
			Total	**29**	**5**	**30**	**280**	**720**	**1000**
			SEMESTER – III						
III	I	21UFTA03	Tamil – III	6	-	3	25	75	100
	II	21UFEN03	English – III	6	-	3	25	75	100
	III	21UCS04	Core IV: Relational Database Management Systems	3	-	5	25	75	100
	III	21UCSP03	Practical III: SQL and PL / SQL	-	2	2	40	60	100
	III	21UCS05	Core V: Computer Network	3	-	4	25	75	100
	III		Allied III	6	-	4	25	75	100
	III		Allied -Practical	-	-	-	-	-	-
	IV	21UCSSP01	SBEC-I : Office Automation Lab	-	2	3	40	60	100
	IV	NMEC-1	Non -Major Elective Course – I	2	-	2	25	75	100
			Total	**26**	**4**	**26**	**230**	**570**	**800**

SEM	PART	SUB CODE	TITLE OF THE SUBJECT	Hrs. Lect.	Hrs. Lab	CREDIT	CIA	EA	TOTAL
			SEMESTER – IV						
IV	I	21UFTA04	Tamil – IV	6	-	3	25	75	100
	II	21UFEN04	English – IV	6	-	3	25	75	100
	III	21UCS06	Core VI : Programming in Java	4	-	4	25	75	100
	III	21UCSP04	Practical IV: Java programming	-	3	2	40	60	100
	III		Allied IV	5	-	4	25	75	100
	III		Allied -Practical Lab	-	2	2	40	60	100
	IV	NMSDC-II	Digital Skills for Employability - Office Fundamentals	2	-	2	25	75	100
	IV	NMEC-2	Non -Major Elective – II	2	-	2	25	75	100
	IV	Add-on	Add-on Course Internship Programme	-	-	-	-	-	-
			Total	**25**	**5**	**22**	**230**	**570**	**800**
			SEMESTER – V						
V	III	21UCS07	Core VII: Operating Systems	5	-	4	25	75	100
	III	21UCS08	Core VIII: Web Technology	5	-	4	25	75	100
	III	21UCSP05	Practical V : Web Technology Lab	-	3	2	40	60	100
	III	21UCS09	Core IX: Linux and Shell Programming	5	-	4	25	75	100
	III	21UCSP06	Practical VI : Shell Programming	-	4	2	40	60	100
	III	21UCSE01 /02/03	Elective – I	5	-	4	25	75	100
	IV	21UCSSP03	SBEC III-Mobile Application Development Lab	-	3	3	40	60	100
			Total	**20**	**10**	**23**	**220**	**480**	**700**
			SEMESTER – VI						
VI	III	21UCS10	Core X: Programming in Python	6	-	5	25	75	100
	III	21UCSP07	Practical VII : Python Programming	-	4	3	40	60	100
	III	21UCSPR01	Mini Project	-	5	5	40	60	100
		NMSDC –III	Emerging Technology for Employability –II	2	-	2	25	75	100
	III	21UCSE04 /05/06	Elective-II	5	-	4	25	75	100
	III	21UCSE07 /08/09	Elective-III	5	-	4	25	75	100
	IV	21UCSS01	SBEC IV- Quantitative Aptitude	3	-	3	25	75	100
	V	21UEX01	Extension Activities	-	-	1	-	-	-
			Total	**21**	**9**	**27**	**205**	**475**	**700**

Practical Examination should be conducted in the same semester

ELECTIVE SUBJECTS

Elective – I

Sem	Part	Subject Code	Subject
V	III	21UCSE01	Data Mining and Warehousing
		21UCSE02	Software Project Management
		21UCSE03	Software Engineering

Elective – II

Sem	Part	Subject Code	Subject
VI	III	21UCSE04	Mobile Computing
		21UCSE05	Wireless Network
		21UCSE06	Computer Graphics

Elective – III

Sem	Part	Subject Code	Subject
VI	III	21UCSE07	Software Testing
		21UCSE08	Network Security
		21UCSE09	Internet of Things

Non Major Elective Course – (NMEC)

Extra Disciplinary Subjects offered by the Department of Computer Science

The department can offer any one of the subjects to the other major subject students in each semester.

PART	SEM	SUB CODE	TITLE OF THE SUBJECT	Lect. Hours	Credit	CIA	EA	TOTAL
						MARKS		
IV	III	21UCSN01	NMEC I: Basics of Computers	2	2	25	75	100
		21UCSN02	NMEC I: Computer Applications for Automation	2	2	25	75	100
	IV	21UCSN03	NMEC II: Basics of Internet	2	2	25	75	100
		21UCSN04	NMEC II: Image Editing Tool	2	2	25	75	100

SBEC – Skill Based Elective Courses

SEM	PART	SUB CODE	TITLE OF THE SUBJECT	Lect.	Lab	CRE DIT	CIA	EA	TOTAL
				Hrs.			MARKS		
III	IV	21UCSSP01	SBEC - I : Office Automation Lab	-	2	3	40	60	100
IV	IV								
V	IV	21UCSSP03	SBEC -III : Mobile Application Development	-	3	3	40	60	100
VI	IV	21UCSS01	SBEC-IV : Quantitative Aptitude	3	-	3	25	75	100

Allied Subjects for any Degree offered by the Department of Computer Science

SYLLABUS - CBCS PATTERN

EFFECTIVE FROM THE ACADEMIC YEAR 2021-2022

All subjects should be handled and valued by Department of Computer Science only. For University practical examinations both Internal and External examiners should be appointed from Department of Computer Science.

FIRST OPTION (Allied Computer Science)
First Year / Second Year (Select any one of the Subject with Practical)

PART	SEMESTER	TITLE OF THE SUBJECT	Hrs. Lect.	Hrs. Lab	CREDIT	CIA	EA	TOTAL
III	I /III 21UCSA01	Allied Paper – I Fundamental of Computers	7	-	4	25	75	100
	II/IV 21UCSA02	Allied Paper – II Computer Applications in Office	5	-	4	25	75	100
	21UCSAP01	Allied Practical Office Automation	-	2	2	40	60	100

SECOND OPTION (Allied Computer Science)
First Year / Second Year (Select any one of the Subject with Practical)

PART	SEMESTER	TITLE OF THE SUBJECT	Hrs. Lect.	Hrs. Lab	CREDIT	CIA	EA	TOTAL
III	I /III 21UCSA03	Allied Paper – I Database Systems	7	-	4	25	75	100
	II/IV 21UCSA04	Allied Paper – II E-Commerce Techniques	5	-	4	25	75	100
	21UCSAP02	Allied Practical HTML Programming	-	2	2	40	60	100

Allied Subjects for Computer Science/Information Science /BCA

SYLLABUS - CBCS PATTERN
EFFECTIVE FROM THE ACADEMIC YEAR 2021-2022
FIRST OPTION
First Year / Second Year (Select any one of the Subject with Practical)

PART	SEMESTER	TITLE OF THE SUBJECT	Hrs. Lect.	Lab	CRE DIT	CIA	EA	TOTAL
III	I /III	Allied Paper – I Statistical Methods and their Applications I	7	-	4	25	75	100
	II/IV	Allied Paper – II Statistical Methods and their Applications II	5	-	4	25	75	100
		Allied Practical Statistical Practical	-	2	2	40	60	100

SECOND OPTION

First Year / Second Year (Select any one of the Subject with Practical)

PART	SEMESTER	TITLE OF THE SUBJECT	Hrs. Lect.	Lab	CRE DIT	CIA	EA	TOTAL
III	I /III	Allied Paper –I Principles of Accounting	7	-	4	25	75	100
	II/IV	Allied Paper II Cost and Management Accounting	5	-	4	25	75	100
		Allied Practical Commerce Practical	-	2	2	40	60	100

B.Sc-Computer Science Syllabus under CBCS Pattern with effect from 2021-2022 Onwards

THIRD OPTION
First Year / Second Year (Select any one of the Subject with Practical)

PART	SEMESTER	TITLE OF THE SUBJECT	Hrs. Lect.	Hrs. Lab	CRE DIT	CIA	EA	TOTAL
III	I /III	Allied Mathematics Paper – I	7	-	4	25	75	100
	II/IV	Allied Mathematics Paper – II	5	-	4	25	75	100
		Allied Mathematics Practical	-	2	2	40	60	100

FOURTH OPTION
First Year / Second Year (Select any one of the Subject with Practical)

PART	SEMESTER	TITLE OF THE SUBJECT	Hrs. Lect.	Hrs. Lab	CRE DIT	CIA	EA	TOTAL
III	I /III	Allied Physics Paper –I	7	-	4	25	75	100
	II/IV	Allied Physics Paper II	5	-	4	25	75	100
		Allied Physics Practical	-	2	2	40	60	100

FIFTH OPTION
First Year / Second Year (Select any one of the Subject with Practical)

PART	SEMESTER	TITLE OF THE SUBJECT	Hrs. Lect.	Hrs. Lab	CRE DIT	CIA	EA	TOTAL
III	I /III	Allied Electronics Paper –I	7	-	4	25	75	100
	II/IV	Allied Electronics Paper II	5	-	4	25	75	100
		Allied Electronics Practical	-	2	2	40	60	100

SEMESTER I

Subject Title	PROBLEM SOLVING THROUGH C	Semester	I
Subject Code	**21UCS01**	Specialization	NA
Type	**Core:** Theory	**L:T:P:C**	86:6:0:5

COURSE OBJECTIVE:

1. It aims to provide exposure to problem-solving through programming.

2. To apprehend the basic concepts of C- Programming language. This course introduces fundamental concepts such as arrays and structures.

3. It covers concepts such as arrays, pointers and file handling methods.

4. It provides technical skills to design and develop various applications.

CO Number	CO Statement	Knowledge Level
CO1	Recognize the Basic Terminologies of C Programming	K1
CO2	Understanding the statement structure and apply simple problems	K2,K3
CO3	Understand and apply the pre-defined functions and user defined functions and then apply in simple problems	K3
CO4	Demonstrate the operation of Structures and unions.	K3,K4
CO5	Recognize the operation of Files	K3,K4

Subject Title	PROBLEM SOLVING THROUGH C		Semester	I	
Subject Code	21UCS01		Specialization	NA	
Type	Core: Theory		L:T:P:C	86:6:0:5	
Unit	Contents			Levels	Sessions
I	Overview of Computers and Programming: Electronic Computers Then and Now , Computer Hardware, Computer Software , The Software Development Method, Applying the Software Development Method , Professional Ethics for Computer Programmers Fundamentals of C Languages: History of C, Character Set, Identifiers and Overview of C:– Introduction - character set - C tokens - keyword & identifiers – constants – variables - data types – Declarations of variables ,operators - expressions - Evaluation of expression - Mathematical functions - Formatted input and output			K1	17
II	Decision Statements: If, if else, switch, break, continue - the? Operator - The GOTO statement. – Loop Control Statements: Introduction – for, nested for loops – while, do-while statements – Arrays: One-dimensional - Two dimensional - Multidimensional arrays			K2,K3	17
III	Character string handling - Declaring and initializing string variables - Reading strings from terminal - Writing strings to screen - String handling functions - User-defined functions: Need for user defined functions – Types of functions - calling a function category of functions - no arguments and no return values - Arguments but no return values - Arguments with return values – Recursion - functions with arrays - The scope and lifetime of variables in functions			K2,K3	17
IV	Structure: Definition- Structure initialization - Comparison of structure variables - Arrays of structures - Arrays within structures - Structures within structures – unions. Pointers: understanding pointers - accessing the address of a variable - declaring and initializing pointers - accessing a variable through its pointers - pointer expressions - pointers and arrays - pointers and character strings - pointers and functions - pointers and structures			K3,K4	17
V	File Management in C: defining and opening a file - closing file - I/O operations on files - error handling during I/O operations - Random access to files - command line arguments. Preprocessors			K3,K4	18
	Learning Resources				

Text Books	1. Problem solving and program design in C / Jeri R. Hanly, Elliot B. Koffman. —7th ed.,PEARSON 2. E. Balagurusamy, Programming in ANSI C, fifth edition, Tata McGraw-Hill.
Reference Books	1. V. Rajaraman Computer Programming in C Prentice Hall of India Pvt Ltd, 1st Edition,2004 2 Yashwvant Kanetkar Let us C BPB Publications 13th Edition, 2014
Website / Link	http://www.learn-c.org/ http://crasseux.com/books/ctutorial/

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	S	S	-
CO2	S	M	M	S
CO3	S	L	L	M
CO4	M	S	M	S
CO5	S	L	S	S

S- Strong , M- Medium , L – Low

Subject Title	**PRACTICAL I : C-PROGRAMMING**	**Semester**	**I**
Subject Code	**21UCSP01**	**Specialization**	**NA**
Type	**Core: Practical**	**L:T:P:C**	**45:0:3:2**

COURSE OBJECTIVE:

1. To impart Practical Training in C Programming Language.
2. Familiarize the different control and decision making statements in ―C‖.
3. Build programs using arrays and strings.
4. Provide knowledge on working with files and functions.

LIST OF PROGRAMS

1. Develop a C program to print prime numbers within the range of integers given. .
2. Develop a C Program to find the sum and average of given N numbers.
3. Develop a C Program using all decision making and looping statements.
4. Develop a C Program to arrange the given numbers in ascending /descending order.
5. Develop a C Program to perform matrix multiplication.
6. Develop a C Program to manipulate string functions.
7. Develop a C Program to find the Fibonacci series for a give number using recursive function.
8. Develop a C Program to show Call by Value and Call by Reference.
9. Develop a C program to swap two numbers using pointers.
10. Develop a C Program to update the student's details using various file modes.
11. Develop a C Program to copy the content of one file to another file.

COURSE OUTCOME:

1. Study all the Basic Statements in C Programming.
2. Practice the usage of branching and looping statements.
3. Apply string functions and arrays usage.
4. Analysis the use of pointers and files.

Subject Title	DATA STRUCTURES AND ALGORITHMS	Semester	II
Subject Code	21UCS02	Specialization	NA
Type	Core: Theory	L:T:P:C	45:3:0:5

COURSE OBJECTIVE:

1. Understand the basic concept of algorithms.
2. To introduce the various data structures and their implementations.
3. Evaluate the performance of various sorting algorithms.

CO Number	CO Statement	Knowledge Level
CO1	Remember the concept of algorithms.	K1
CO2	Understanding the stack and queues.	K2
CO3	Apply linked list for other data structures.	K2, K3
CO4	Evaluate the trees and sorting methods.	K3,K4
CO5	Analyze the sorting and file organizations.	K5

Subject Title	DATA STRUCTURES AND ALGORITHMS		Semester	II
Subject Code	21UCS02		Specialization	NA
Type	Core: Theory		L:T:P:C	45:3:0:5
Unit	Contents		Levels	Sessions
I	Introduction of algorithms, analyzing algorithms, Arrays : Representation of Arrays, Implementation of Stacks and queues, Application of Stack: Evaluation of Expression - Infix to postfix Conversion - Multiple stacks and Queues, Sparse Matrices.		K1	8
II	Linked list : Singly Linked list - Linked stacks and queues - polynomial addition - More on linked Lists - Doubly linked List and Dynamic Storage Management - Garbage collection and compaction.		K2	8
III	Trees: Basic Terminology - Binary Trees - Binary Tree representations - Binary trees - Traversal - More on Binary Trees - Threaded Binary trees - counting Binary trees. Graphs: Terminology and Representations - Traversals, connected components and spanning Trees, Single Source Shortest path problem.		K2,K3	8
IV	Symbol Tables : Static Tree Tables - Dynamic Tree Tables - Hash Tables Hashing Functions - overflow Handling. External sorting : Storage Devices -sorting with Disks : K-way merging - sorting with tapes.		K3,K4	10
V	Internal sorting : Insertion sort - Quick sort - 2 way Merge sort - Heap sort - shell sort - sorting on keys. Files: Files, Queries and sequential organizations - Index Techniques - File organization		K5	11
	Learning Resources			
Text Books	1. Ellis Horowitz, Sartaj Shani, Fundamentals of Data Structures, Galgotia publication.			
Reference Books	1. Data structures Using C Aaron M. Tenenbaum, Yedidyah Langsam, Moshe J.Augenstein, Kindersley (India) Pvt. Ltd., 2. Data structure and Algorithms, Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, Pearson Education Pvt. Ltd.,			
Website/ Link	1. www.freetechbooks.com/a-practical-introduction-to-data-structures-and-algorithm-analysis-thirdedition-c-version-t804.html 2. http://www.nptel.ac.in/courses/106101060/ 3. http://www.nptel.ac.in/courses/106104019/			

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	S	S	-
CO2	S	M	M	S
CO3	S	L	L	M
CO4	M	S	M	S
CO5	S	L	S	S

S- Strong , M- Medium , L – Low

Subject Title	DATA STRUCTURES USING C	Semester	II
Subject Code	**21UCSP02**	Specialization	NA
Type	**Core: Practical**	**L:T:P:C**	**45:0:3:2**

COURSE OBJECTIVE:

1. To impart Practical Training in C Programming Language.
2. Understanding the data structures stack and queues.
3. Apply linked list for other data structures.
4. Analyze the sorting and file organizations.

LIST OF PROGRAMS:

1. Write a C program to create two array list of integers. Sort and store the elements of both of them in third list.
2. Write a C program to multiply two matrices A and B and store the resultant matrix in C using arrays.
3. Write a C program to experiment the operation of STACK using array.
4. Write a C program to create menu driven options to implement QUEUE to perform the following
    (i) Insertion (ii) Deletion (iii) Modification (iv) Listing of elements
5. Write a C program to create Linked list representations of employee records and do the following operations using pointers.
    (i)   To add a new record.
    (ii)   To delete an existing record.
    (iii)   To print the details about an employee.
    (iv)   To find the number of employees in the structure.
6. Write a C Program to count the total nodes of the linked list and to insert an element at the end of the linked list.
7. Write a C program to insert an element at the beginning of a doubly linked list.
8. Write a C program to display the hash table, using the mid square method.
9. Write a C program to traverse the given binary tree using all traversal methods.
10. Write a C program to insert an element in a binary tree.

COURSE OUTCOME:

1. Study all the Basic operation of matrices and stack.

2. Practice the usage of branching and looping statements in hash table.

3. Apply arrays for stack and queue.

4. Analysis the use of pointers for linked list, doubly linked list and tree traverse.

Subject Title	COMPUTER ORGANIZATION AND ARCHITECURE	Semester	II
Subject Code	21UCS03	Specialization	NA
Type	Core: Theory	L:T:P:C	56:4:0:5

COURSE OBJECTIVE:

1. To know Structure and functions of Computer architecture and organizations.

2. Observe the characteristics of various computer memory concepts.

3. To understand the computer arithmetic and machine instructions.

4. Understand the parallel processing concepts.

CO Number	CO Statement	Knowledge Level
CO1	Recognize the Basic Number system and logic gates.	K1
CO2	Understanding the flip flops and Karnaugh maps.	K2,K3
CO3	Understand and apply micro operation and data transfer.	K3
CO4	Demonstrate the computer arithmetic and addressing modes.	K3,K4
CO5	Analyze the memory and I/O organizations.	K3,K4

Subject Title	COMPUTER ORGANIZATION AND ARCHITECTURE	Semester	II	
Subject Code	21UCS03	Specialization	NA	
Type	Core: Theory	L:T:P:C	56:4:0:5	
Unit	Contents		Levels	Sessions
I	Digital Principles: Definition for digital signals – Digital waveforms – Digital logic – Moving and Storing Digital Information – Digital Operations – Digital computers – Digital Integrated Circuits. Digital Logic: The Basic Gates - NOT, OR, AND –Universal Logic Gates – NOR, NAND – AND-OR- Invert Gates – Positive and Negative Logic.		K1	12
II	Combinational Logic Circuits: Boolean Laws And Theorems – Sum-of-products Method – Truth Table to Karnaugh Map – Pairs, Quads, and Octets – Karnaugh Simplification – Don't-care Conditions – Product-of-sums Simplification. Data–Processing Circuits: 16-to-1 Multiplexer – 1-to-16 De- multiplexer – BCD-to-decimal Decoder – Decimal-to-BCD Encoder – Exclusive-or Gates – Parity Generation and Application.		K2,K3	12
III	Number Systems and Codes: Binary Number System – Binary-to-decimal Conversion – Decimal-to- binary Conversion – Octal Numbers – Hexadecimal Numbers – The ASCII Code – The Excess-3 Code – The Gray Code. Arithmetic Circuits: Binary Addition –Binary Subtraction –Unsigned Binary Numbers – Sign-magnitude Numbers - 2'S Complement Representation - 2'S Compliment Arithmetic.		K2,K3	12
IV	Arithmetic Circuits: Arithmetic Building Blocks – The Adder - Subtractor – Fast Adder – Arithmetic Logic Unit – Binary Multiplication and Division. Clocks and Timing Circuits: Clock Waveforms. Flip- Flops: RS Flip-flops – Edge-triggered D Flip-flops - Edge triggered JK Flip-flops – JK Master-slave Flip-flops.		K3,K4	10
V	Registers: Serial-In Serial-Out – Serial-In Parallel-Out – Parallel-In Serial-Out – Parallel-In Parallel-Out. Memory: Introduction - Magnetic Memory - Optical Memory - Memory Addressing - ROMs, PROMs, EPROMs and EEPROM – RAMs. A Simple Computer Design.		K3,K4	10

	Learning Resources
Text Books	Donald P Leach, Albert Paul Malvino and Goutam Saha, ‒Digital Principles and Applications,‖ 8th Edition, TMH, 2006.
Reference Books	1. Morris Mano, "Digital Logic and Computer Design," 4th Edition, Pearson, 2008 2. Thomas C Bartee, "Digital Computer Fundamentals," sixth edition, McGraw-Hill, 1985 3. **Pradeep K. Sinha, Priti Sinha ,** "Computer Fundamentals," Sixth Edition, BPB Publications, 2007
Website / Link	www.javatpoint.com/computer-organization-and-architecture-tutorial

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	S	S	-
CO2	S	M	M	S
CO3	S	L	L	M
CO4	M	S	M	S
CO5	S	L	S	S

S- Strong , M- Medium , L – Low

Subject Title	RELATIONAL DATABASE MANAGEMENT SYSTEMS	Semester	III
Subject Code	21UCS04	Specialization	NA
Type	Core: Theory	L:T:P:C	41:3:0:5

COURSE OBJECTIVE:

1. Understand the basic concept of Data Base and database management system.
2. Understand and apply the SQL fundamentals.
3. Evaluate the Relational database design.

CO Number	CO Statement	Knowledge Level
CO1	Remember the concept of database.	K1
CO2	Understanding the data models and ER Diagram.	K2
CO3	Apply SQL commands.	K2, K3
CO4	Evaluate the DBMS in SQL.	K3,K4
CO5	Analyze the Transaction management.	K5

B.Sc-Computer Science Syllabus under CBCS Pattern with effect from 2021-2022 Onwards

Subject Title	RELATIONAL DATABASE MANAGEMENT SYSTEMS	Semester	III
Subject Code	**21UCS04**	Specialization	NA
Type	Core: Theory	L:T:P:C	41:3:0:5
Unit	Contents	Levels	Sessions
I	Introduction: Database System Applications-Purpose of Database Systems-View of Data-Database Languages-Transaction Management-Database Architecture-Database users and Administrators. Relational Model: Structure of Relational Databases – Database Design – ER Model-Overview of the Design Process – The Entity – relationship Model – Constraints – Entity Relationship Diagrams.	K1	10
II	Relational Algebra Operations –Relational Languages: The Tuple Relational Calculus –The Domain Relational Calculus – SQL: Background – Data Definition – Basic Structure of SQL Queries – Set Operations – Aggregate Functions – Null Values – Nested Sub-Queries – Views – Modification of the Database.	K2	7
III	Data Normalization: Pitfalls in Relational Database Design – Decomposition – Functional Dependencies – Normalization – First Normal Form – Second Normal Form – Third Normal Form – Boyce-Codd Normal Form – Fourth Normal Form – Fifth Normal Form – Denormalization – Database Security: Data Security Requirements – Protecting the Data within the Database – Granting and Revoking Privileges – Data Encryption.	K2,K3	8
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 – SQ L 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.	K3,K4	8
V	PL/SQL Composite Data Types: Records – Tables – V arrays. Named Blocks: Procedures – Functions – Packages - Triggers – Data Dictionary Views.	K5	8
	Learning Resources		
Text Books	1. ‑Database System Concepts‖,Abraham Silberschatz, Henry F.Korth, S.Sudarshan, TMH 5th Edition (Units – I,II) 2. ‑Fundamentals of Database Management Systems‖, Alexis Leon, Mathews Leon, Vijay Nicole Imprints Private Limited. (Unit-III) 3. ‑Database Systems Using Oracle‖ Nilesh Shah,2nd edition,PHI.UNIT-IV: Chapters 10 & 11 UNIT-V:Chapters 12,13 & 14.		

Reference Books	1. Alexix Leon & Mathews Leon, "Essential of DBMS", 2nd reprint, Vijay Nicole Publications, 2009.
Website / Link	• https://www.w3schools.com/sql • https://www.tutorialspoint.com/sql • https://livesql.oracle.com

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	S	S	-
CO2	S	M	M	S
CO3	S	L	L	M
CO4	M	S	M	S
CO5	S	L	S	S

S- Strong , M- Medium , L – Low

Subject Title	PRACTICAL III – SQL and PL/SQL	Semester	III
Subject Code	21UCSP03	Specialization	NA
Type	Core: Practical	L:T:P:C	30:0:2:2

COURSE OBJECTIVE:

1. To impart Practical Training in DDL Commands.

2. Familiarize the different DML Commands.

3. Build queries with SQL Commands.

4. Provide knowledge on working with big tables.

LIST OF PROGRAMS:

NOTE : Demonstrate the following SQL commands and can take any back end RDBMS system

for implementation purpose.

1. Data Definition of Base Tables.

2. DDL with Primary key constraints.

3. DDL with constraints and verification by insert command.

4. Data Manipulation of Base Tables and Views.

5. Demonstrate the Query commands.

6. Write a PL/SQL code block that will accept an account number from the user and debit an amount of Rs. 2000 from the account if the account has a minimum balance of 500 after the amount is debited. The Process is to fired on the Accounts table.

7. Write a PL/SQL code block to calculate the area of the circle for a value of radius varying from 3 to 7. Store the radius and the corresponding values of calculated area in a table Areas. Areas – radius, area.

8. Write a PL/SQL block of code for reversing a number. (Example : 1234 as 4321).

9. Create a transparent audit system for a table Client_master (client_no, name, address, Bal_due). The system must keep track of the records that are being deleted or updated. The functionality being when a record is deleted or modified the original record details and the date of operation are stored in the audit client(client_no, name, bal_due, operation, user-id, opdate) table, then the delete or update is allowed to go through**.**

COURSE OUTCOME:

1. Study all the Basic DDL and DML Commands.

2. Practice the usage of SQL Statements.

3. Apply PL/SQL code usage.

4. Analysis the use of PL/SQL for complex problems.

Subject Title	**COMPUTER NETWORKS**	Semester	III
Subject Code	**21UCS05**	**Specialization**	**NA**
Type	**Core: Theory**	**L:T:P:C**	**41:3:0:4**

COURSE OBJECTIVE:

1. To understand the concept of Computer network.
2. To impart knowledge about networking and internet devices.

CO Number	CO Statement	Knowledge Level
CO1	Remember the concept of networks and its types.	K1
CO2	Understanding the wireless communications.	K2
CO3	Understand and Apply data link protocols.	K3
CO4	Evaluate the network design issues.	K3,K4
CO5	Analyze the connection issues.	K5

B.Sc-Computer Science Syllabus under CBCS Pattern with effect from 2021-2022 Onwards

Subject Title	COMPUTER NETWORKS		Semester	III
Subject Code	21UCS05		Specialization	NA
Type	Core: Theory		L:T:P:C	41:3:0:4
Unit	Contents		Levels	Sessions
I	Introduction – Network Hardware - Software - Reference Models - OSI and TCP/IP Models - Example Networks: Internet, ATM, Ethernet and Wireless LANs - Physical Layer - Theoretical Basis for Data Communication - Guided Transmission Media.		K1	8
II	Wireless Transmission - Communication Satellites - Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching. Data Link Layer: Design Issues - Error Detection and Correction.		K2	8
III	Elementary Data Link Protocols - Sliding Window Protocols - Data Link Layer in the Internet - Medium Access Layer - Channel Allocation Problem - Multiple Access Protocols - Bluetooth.		K3	8
IV	Network Layer - Design Issues - Routing Algorithms - Congestion Control Algorithms - IP Protocol - IP Addresses - Internet Control Protocols.		K3,K4	8
V	Transport Layer - Services - Connection Management - Addressing, Establishing and Releasing a Connection - Simple Transport Protocol - Internet Transport Protocols (ITP) - Network Security: Cryptography.		K5	9
	Learning Resources			
Text Books	1. A. S. Tanenbaum, ―Computer Networks‖, Prentice-Hall of India 2008, 4th Edition.			
Reference Books	1. Stallings, ―Data and Computer Communications‖, Pearson Education 2012, 7th Edition. 2. B. A. Forouzan, ―Data Communications and Networking‖, Tata McGraw Hill 2007, 4th Edition. 3. F. Halsall, ―Data Communications, Computer Networks and Open Systems‖, Pearson Education 2008.			
Website / Link	NPTEL & MOOC courses titled Computer Networks https://nptel.ac.in/courses/106106091/			

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	S	S	-
CO2	S	M	M	S
CO3	S	L	L	M
CO4	M	S	M	S
CO5	S	L	S	S

S- Strong , M- Medium , L – Low

B.Sc-Computer Science Syllabus under CBCS Pattern with effect from 2021-2022 Onwards

Subject Title	SBEC I - OFFICE AUTOMATION LAB	Semester	III
Subject Code	21UCSSP01	Specialization	NA
Type	SBEC: Practical	L:T:P:C	30:0:2:3

COURSE OBJECTIVE:

1. To acquire knowledge on editor, spread sheet and slide preparation.
2. To improve creative thinking in presentation software.

LIST OF PROGRAMS:

I. MS-WORD

1. Text Manipulation: Write a paragraph about your institution and Change the font size and type, Spell check, Aligning and justification of Text.

2. Bio data: Prepare a Bio-data.

3. Find and Replace: Write a paragraph about yourself and do the following. Find and Replace - Use Numbering Bullets, Footer and Headers.

4. Tables and manipulation: Creation, Insertion, Deletion (Columns and Rows). Create a mark sheet.

5. Mail Merge: Prepare an invitation to invite your friends to your birthday party. Prepare at least five letters.

II. MS-EXCEL

1. Data sorting-Ascending and Descending (both numbers and alphabets).
2. Mark list preparation for a student.
3. Individual Pay Bill preparation.
4. Invoice Report preparation.
5. Drawing Graphs. Take your own table.

III. MS-POWERPOINT

1. Create a slide show presentation for a seminar.

2. Preparation of Organization Charts.

3. Create a slide show presentation to display percentage of marks in each semester for all students

   (1) Use bar chart (X-axis: Semester, Y-axis: % marks).

   (2) Use different presentation template different transition effect for each slide.

CO Number	CO Statement	Knowledge Level
CO1	Remember the concept of word processing.	K1
CO2	Understanding the tools in Micro soft word.	K2
CO3	Understand and Apply Excel Features.	K3
CO4	Evaluate the EXCEL functions.	K3,K4
CO5	Analyze the different designs of MS Presentations.	K5

Subject Title	**PROGRAMMING IN JAVA**	Semester	IV
Subject Code	**21UCS06**	Specialization	NA
Type	**Core: Theory**	**L:T:P:C**	**60:4:0:4**

COURSE OBJECTIVE:

1. To understand the concepts of Object Oriented Programming.
2. To learn about the control structures, class with attributes and methods used in Java.

CO Number	CO Statement	Knowledge Level
CO1	Remember the concepts of OOPS.	K1
CO2	Understand the basic Terminologies of languages and statements.	K2
CO3	Demonstrate the use classes and objects.	K2,K3
CO4	Evaluate the packages and exception handling methods.	K3,K4
CO5	Analyze the I/O Streams and graphics classes.	K5

Subject Title	PROGRAMMING IN JAVA		Semester	IV	
Subject Code	**21UCS06**		**Specialization**	NA	
Type	Core: Theory		L:T:P:C	60:4:0:4	
Unit	Contents			Levels	Sessions
I	Introduction to OOPS: Paradigms of Programming Languages – Basic concepts of Object Oriented Programming – Differences between Procedure Oriented Programming and Object Oriented programming - Benefits of OOPs – Application of OOPs. Java: History – Java features – Java Environment – JDK – API. Introduction to Java: Types of java program – Creating and Executing a Java program – Java Tokens- Java Virtual Machine (JVM) – Command Line Arguments –Comments in Java program.			**K1**	**12**
II	Elements: Constants – Variables – Data types - Scope of variables – Type casting – Operators: Special operators – Expressions – Evaluation of Expressions. Decision making and branching statements- Decision making and Looping– break – labeled loop – continue Statement. Arrays: One Dimensional Array – Creating an array – Array processing – Multidimensional Array – Vectors – ArrayList – Advantages of Array List over Array Wrapper classes.			**K2**	**12**
III	Class and objects: Defining a class – Methods – Creating objects – Accessing class members – Constructors – Method overloading – Static members –Nesting of Methods – this keyword – Command line input. Inheritance: Defining inheritance –types of inheritance– Overriding methods – Final variables and methods – Final classes – Final methods - Abstract methods and classes – Visibility Control- Interfaces: Defining interface – Extending interface - Implementing Interface - Accessing interface variables. Strings: String Array – String Methods – String Buffer Class.			**K2,K3**	**12**
IV	Packages: Java API Packages – System Packages – Naming Conventions –Creating & Accessing a Package – Adding Class to a Package – Hiding Classes. Exception Handling: Limitations of Error handling – Advantages of Exception Handling - Types of Errors – Basics of Exception Handling – try blocks – throwing an exception – catching an exception – finally statement. Multithreading: Creating Threads – Life of a Thread – Defining & Running Thread – Thread Methods – Thread Priority – Synchronization –Implementing Runnable interface – Thread Scheduling.			**K3,K4**	**12**
V	I/O Streams: File – Streams – Advantages - The stream classes – Byte streams –Character streams. Applets: Introduction – Applet Life cycle – Creating & Executing an Applet –Applet tags in HTML – Parameter tag – Aligning the display - Graphics Class: Drawing and filling lines – Rectangles – Polygon – Circles –			**K5**	**12**

	Arcs – Line Graphs – Drawing Bar charts AWT Components and Even Handlers: Abstract window tool kit – Event Handlers – Event Listeners – AWT Controls and Event Handling: Labels – Text Component – Action Event – Buttons – Check Boxes – Item Event – Choice– Scrollbars – Layout Managers- Input Events – Menus.		
	Learning Resources		
Text books	1. E. Balagurusamy, ‒*Programming with Java*‖, TataMc-Graw Hill, 5th Edition. 2. Sagayaraj, Denis, Karthick and Gajalakshmi, ‒*Java Programming for Core and advanced learners*‖, Universities Press (INDIA) Private Limited 2018.		
Reference Books	Herbert Schildt, ‒*The complete reference Java*‖, TataMc-Graw Hill, 7th Edition.		
Website / Link	1. NPTEL & MOOC courses titled Java https://nptel.ac.in/courses/106105191/ 2. https://www.geeksforgeeks.org/ 3. https://www.tutorialspoint.com/java/		

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	S	S	-
CO2	S	M	M	S
CO3	M	S	L	M
CO4	M	S	M	S
CO5	S	S	-	-

S- Strong , M- Medium , L – Low

Subject Title	**PRACTICAL IV- JAVA PROGRAMMING**	Semester	IV
Subject Code	**21UCSP04**	Specialization	NA
Type	**Core: Practical**	L:T:P:C	45:0:3:2

COURSE OBJECTIVE:

1. To impart Practical Training in JAVA Programming Language.

2. Familiarize the different control and decision making statements in JAVA.

3. Build programs using Packages.

4. Provide knowledge on working with Exception handling functions.

LIST OF PROGRAMS:

1. Write a program to find the Area of Square, Rectangle and Circle using Method Overloading.

2. Write a program to sort the list of numbers using Command Line Arguments.

3. Write a program to multiply the given two matrices.

4. Write a program to design a class to represent a bank account. Include the following:

   Data Members: Name of the depositor, Account number, Type of account, and Balance amount in the account.

   Methods: To assign initial values, To deposit an amount, To withdraw an amount after checking balance, and To display the name and balance.

5. Write a program that import the user defined package and access the Member variable of classes that contained by Package.

6. Write a program to handle the Exception using try and multiple catch blocks.

7. Write a program to illustrate the use of multi threads.

8. Write a program to create student registration form using applet with Name, Address, Sex,

   Class, Email-id.

9. Write a program to draw the line, rectangle, oval, text using the graphics method.

10. Write a program to create a sequential file that could store details about five products. Details include product code, cost, and number of items available and are provided through the keyboard. Compute and print the total value of all the five products

COURSE OUTCOME:

1. Study all the Basic Statements in java Programming.

2. Practice the usage of branching and looping statements.

3. Apply Packages and Interfaces.

4. Analysis the use of graphics tools in JAVA.

B.Sc.(Computer Science) / BCA / B.Sc.(Information Science)

Semester IV: Add-on Course
Internship Programme

OBJECTIVES:

- To make students acquire practical knowledge by going to a company and learn in a live environment
- To make students learn team work and work ethics
- To make students to know the recent trends in Web/Mobile Application Development, Networking or any other area relevant to their study
- To make students analyze their skills and interests
- To help students examine academic and career goals

OUTCOME:

At the end of this internship programme the students will be able to

- apply theory to real life
- work as a part of team
- learn from the company experts
- learn latest trending technologies
- come out with a high morale
- enrich CV

About the internship programme: The internship programme provides students with practical, real-world experience and a valuable complement to their academic training. It enhances the students' skills in problem solving by making him/her work in a live environment in which systematic problem solving methods are practised.

Duration: Internship requires students to spend a minimum of 15 days (during vacation) employed, full-time, as IT interns or trainees during vacation at the end of fourth semester. During this period, they are engaged in work of direct relevance to their programme of study.

Areas: Some of the fields that are open to students include:

- Online Publishing and Editing
- Online Advertising
- Web / Mobile Application Development
- E-Marketing / Online Marketing
- Any other field related to Computer Science / Applications / Information Science

Certificate: A certificate is to be obtained from the organization in which the student undergoes internship programme. This certificate is to be submitted to the college within fifteen days after the college reopens for the next semester.

Credits: The Internship programme does not carry any credit.

Subject Title	**OPERATING SYSTEM**	Semester	V
Subject Code	**21UCS07**	**Specialization**	**NA**
Type	**Core: Theory**	**L:T:P:C**	**71:5:0:4**

COURSE OBJECTIVE:

1. To understand the fundamental concepts and role of Operating System.
2. To learn the Process Management and Scheduling Algorithms
3. To understand the Memory Management policies
4. To gain insight on I/O and File management techniques

CO Number	CO Statement	Knowledge Level
CO1	Understand the structure and functions of Operating System	K1
CO2	Compare the performance of Scheduling Algorithms	K2
CO3	Understand and organize the memory	K1,K3
CO4	Evaluate the deadlock measures	K3,K4
CO5	Analyze the I/O hardware and software	K5

Subject Title	OPERATING SYSTEM		Semester	V
Subject Code	21UCS07		Specialization	NA
Type	Core: Theory		L:T:P:C	71:5:0:4
Unit	Contents		Levels	Sessions
I	Introduction – History of operating system- Different kinds of operating system – Operation system concepts - System calls- Operating system structure.		K1	11
II	Processes and Threads: Processes – threads – thread model and usage – inter process communication.		K2	15
III	Scheduling - Memory Management: Memory Abstraction – Virtual Memory - page replacement algorithms.		K1,K3	15
IV	Deadlocks: Resources- introduction to deadlocks – deadlock detection and recovery – deadlocks avoidance – deadlock prevention. Multiple processor system: multiprocessors – multi computers.		K3,K4	15
V	Input/Output: principles of I/O hardware - principles of I/O software. Files systems: Files – directories - files systems implementation – File System Management and Optimization.		K5	15
	Learning Resources			
Text Books	Andrew S. Tanenbaum, ‒Modern Operating Systems‖, 2ndEdition, PHI private Limited, New Delhi, 2008.			
Reference Books	1. William Stallings, ‒Operating Systems – Internals & Design Principles‖, 5th Edition, Prentice – Hall of India private Ltd, New Delhi, 2004. 2. Sridhar Vaidyanathan, ‒Operating System‖, 1st Edition,Vijay Nicole Publications, 2014.			
Website / Link	1. www.wikipedia.org/wiki/Operating_system 2. http://www.freetechbooks.com/introduction-to-operating-systems-t340.html			

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	S	S	-
CO2	S	M	M	S
CO3	S	L	L	M
CO4	M	S	M	S
CO5	S	L	S	S

S- Strong , M- Medium , L – Low

B.Sc-Computer Science Syllabus under CBCS Pattern with effect from 2021-2022 Onwards

Subject Title	**WEB TECHNOLOGY**	Semester	V
Subject Code	**21UCS08**	**Specialization**	**NA**
Type	**Core: Theory**	**L:T:P:C**	**71:5:0:4**

COURSE OBJECTIVE:

1. To understand the fundamental concepts and role of Web Technology.
2. To learn the Process of CSS.
3. To understand the web pages.
4. To gain insight on script objects.

CO Number	CO Statement	Knowledge Level
CO1	Understand the structure of the documents in Web.	K1
CO2	Remember and understand the table handling tags.	K2
CO3	Understand and organize CSS.	K1,k3
CO4	Implement scripts in web page.	K3,K4
CO5	Evaluate script objects.	K5

Subject Title	WEB TECHNOLOGY	Semester	V	
Subject Code	21UCS08	Specialization	NA	
Type	Core: Theory	L:T:P:C	71:5:0:4	
Unit	Contents		Levels	Sessions
I	Structuring Documents for the Web: Introducing HTML and XHTML, Basic Text Formatting, Presentational Elements, Phrase Elements, Lists, Editing Text, Core Elements and Attributes, Attribute Groups. Links and Navigation: Basic Links, Creating Links with the <a> Element, Advanced E- mail Links. Images, Audio, and Video: Adding Images Using the <img> Element, Using Images as Links Image Maps, Choosing the Right Image Format, Adding Flash, Video and Audio to your web pages.		K1	15
II	Tables: Introducing Tables, Grouping Section of a Table, Nested Tables, Accessing Tables. Forms: Introducing Forms, Form Controls, Sending Form Data to the Server. Frames: Introducing Frameset, <frame> Element, Creating Links Between Frames, Setting a Default Target Frame Using <base> Element, Nested Framesets, Inline or Floating Frames with <iframe>.		K2	15
III	Cascading Style Sheets: Introducing CSS, Where you can Add CSS Rules. CSS Properties: Controlling Text, Text Formatting, Text Pseudo Classes, Selectors, Lengths, Introducing the Box Model. More Cascading Style Sheets: Links, Lists, Tables, Outlines, The :focus and :activate Pseudo classes Generated Content, Miscellaneous Properties, Additional Rules, Positioning and Layout wit, Page Layout CSS , Design Issues.		K1,K3	15
IV	Java Script: How to Add Script to Your Pages, Variables and Data Types – Statements and Operators, Control Structures, Conditional Statements, Loop Statements – Functions - Message box, Dialog Boxes, Alert Boxes, Confirm Boxes, Prompt Boxes		K3,K4	15
V	Working with JavaScript: Practical Tips for Writing Scripts, JavaScript Objects: Window Object - Document object - Browser Object - Form Object - Navigator object Screen object - Events, Event Handlers, Forms – Validations, Form Enhancements, JavaScript Libraries**.**		K5	11
	Learning Resources			
Text Books	Jon Duckett, Beginning HTML, XHTML, CSS and Java script , Wiley Publishing			
Reference Books	1.Chris Bates, ‒Web Programming‖, Wiley Publishing 3d Edition. 2. M. Srinivasan, ‒Web Technology: Theory and Practice‖, Pearson Publication			
Website/ Link	www.tutorialspoint.com/internet_technologies/index.htm			

B.Sc-Computer Science Syllabus under CBCS Pattern with effect from 2021-2022 Onwards

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	S	S	-
CO2	S	M	M	S
CO3	S	L	L	M
CO4	M	S	M	S
CO5	S	L	S	S

S- Strong , M- Medium , L – Low

Subject Title	PRACTICAL V : WEB TECHNOLOGY LAB	Semester	V
Subject Code	21UCSP05	Specialization	NA
Type	Core: Practical	L:T:P:C	45:0:3:2

COURSE OBJECTIVE:

1. To impart Practical Training in Control panel tools.

2. Familiarize with HTML Tags.

3. Build programs using Java script.

4. Provide knowledge on working with events and methods.

LIST OF PROGRAMS:

1. Create a form having number of elements (Textboxes, Radio buttons, Checkboxes, and so on). Write JavaScript code to count the number of elements in a form.

2. Create a HTML form that has number of Textboxes. When the form runs in the Browser fill the Text boxes with data. Write JavaScript code that verifies that all textboxes has been filled. If a textboxes has been left empty, popup an alert indicating which textbox has been left empty.

3. Develop a HTML Form, which accepts any Mathematical expression. Write JavaScript code to Evaluates the expression and Displays the result.

4. Create a page with dynamic effects. Write the code to include layers and basic animation.

5. Write a JavaScript code to find the sum of N natural Numbers. (Use user-defined function).

6. Write a JavaScript code block using arrays and generate the current date in words, this should include the day, month and year.

7. Create a form for Student information. Write JavaScript code to find Total, Average, Result and Grade.

8. Create a form for Employee information. Write JavaScript code to find DA, HRA, PF, TAX, Gross pay, Deduction and Net pay.

9. Create a form consists of a two Multiple choice lists and one single choice list

   (a)The first multiple choice list, displays the Major dishes available.

   (b) The second multiple choice list, displays the Starters available.

   (c)The single choice list, displays the Soft drinks available.

B.Sc-Computer Science Syllabus under CBCS Pattern with effect from 2021-2022 Onwards

COURSE OUTCOME:

1. Study all the Basic tools.

2. Practice the usage of web page creation and useable objects.

3. Apply various effects on webpage.

4. Analysis the use of java script and html code.

B.Sc-Computer Science Syllabus under CBCS Pattern with effect from 2021-2022 Onwards

Subject Title	LINUX AND SHELL PROGRAMMING	Semester	V
Subject Code	21UCS09	Specialization	NA
Type	Core: Theory	L:T:P:C	71:5:0:4

COURSE OBJECTIVE:

1. To understand the Linux OS.
2. Study the shell programming and text formatting.

CO Number	CO Statement	Knowledge Level
CO1	Understand the structure and functions of Linux Operating System.	K1
CO2	Understand the basic commands of Shell.	K2
CO3	Implement text processing and arrays.	K3
CO4	Evaluate shell scripting.	K4
CO5	Analyze decision making and scripting in Linux.	K5

B.Sc-Computer Science Syllabus under CBCS Pattern with effect from 2021-2022 Onwards

Subject Title	**LINUX AND SHELL PROGRAMMING**	Semester	V
Subject Code	**21UCS09**	**Specialization**	**NA**
Type	**Core: Theory**	**L:T:P:C**	**71:5:0:4**
Unit	**Contents**	**Levels**	**Sessions**
I	Introduction to Linux : operating system and Linux - History of Linux and Unix - Linux overview - Linux Distributions - Vi editors..	**K1**	**15**
II	Shell - comparison of Shells - working in the shell - Learning Basic Commands - Compiler and interpreter differences - various directories - Drilling deep into process management, job control and Automation.	**K2**	**15**
III	Text processing - Text filtering Tools - working with commands. - Logical operators. - local variables and its scope - working with arrays.	**K3**	**15**
IV	Tricks with shell scripting - interactive shell scripts - The here document and << operator - sort command - WC command - file handling - Debugging -	**K4**	**15**
V	Automating Decision - Making in scripts - Automating repetitive tasks - working with Functions.	**K5**	**15**
	Learning Resources		
Text Books	1.1T.he Complete Reference LINUX - Richard L. Petersen, McGraw Hill, 2. LINUX shell scripting by Ganesh Naik, Packt Publishing Ltd.,		
Reference Books	Yashwanth Kanetkar, ─ Unix Shell Programming‖, B.P.B Publications 1st Edition Reprint 2012		
Website / Link	1.www.wikipedia.org/wiki/Operating_system 2.http://www.freetechbooks.com/introduction-to-operating-systems-t340.html		

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	S	S	---
CO2	S	M	M	S
CO3	S	L	L	M
CO4	M	S	M	S
CO5	S	L	S	S

S- Strong , M- Medium , L – Low

B.Sc-Computer Science Syllabus under CBCS Pattern with effect from 2021-2022 Onwards

Subject Title	PRACTICAL IV : SHELL PROGRAMMING	Semester	V
Subject Code	21UCSP06	Specialization	NA
Type	Core: Practical	L:T:P:C	60:0:4:2

COURSE OBJECTIVE:

1. To impart Practical Training in file commands.

2. Familiarize with shell script for system configuration.

3. Build programs using filter commands.

4. Provide knowledge on working with simple programs with shell script.

LIST OF PROGRAMS:

1. Write a shell script to stimulate the file commands: rm, cp, cat, mv, cmp, wc, split, diff.

2. Write a shell script to show the following system configuration:

   o Currently logged user and his log name.
   o Current shell, home directory, Operating System type, current Path setting, current working directory.
   o Show currently logged number of users, show all available shells
   o Show CPU information like processor type, speed
   o Show memory information.

3. Write a Shell Script to implement the following: pipes, Redirection and tee commands.

4. Write a Shell script for displaying current date, user name, file listing and directories by getting user choice.

5. Write a Shell script to implement the filter commands.

6. Write a Shell script to remove the files which has file size as zero bytes.

7. Write a Shell script to find the sum of the individual digits of a given number.

8. Write a Shell script to find the greatest among the given set of numbers using command line arguments.

9. Write a Shell script for palindrome checking.

10. Write a Shell script to print the multiplication table of the given argument using for-loop.

COURSE OUTCOME:

1. Study all the Basic commands.

2. Practice the usage of shell script for system configuration.

3. Apply various effects piping and redirection process.

4. Analysis the use of shell script for simple process.

Subject Title	SBEC III : MOBILE APPLICATION DEVELOPMENT LAB	Semester	V
Subject Code	21UCSSP03	Specialization	NA
Type	SBEC: Practical	L:T:P:C	45:0:3:3

COURSE OBJECTIVE:

1. To impart Practical Training in android developer tools.

2. Build programs using eclipse environment.

3. Provide knowledge on working with simple android apps.

LIST OF PROGRAMS:

1. Sample application about Layouts.

2. Sample application about Internets.

3. Sample application about User Interfaces.

4. Sample application about Animations.

5. Create calculator app in Android.

6. Create sample android Camera Application.

7. Create basic list view demo in Android.

8. Create Google map in Android.

COURSE OUTCOME:

1. Study all the Basic Tools.

2. Practice the usage of control panel objects.

3. Apply various commands for layouts and animations.

4. Analysis the use of SQLite I.

B.Sc-Computer Science Syllabus under CBCS Pattern with effect from 2021-2022 Onwards

Subject Title	PROGRAMMING IN PYTHON	Semester	VI
Subject Code	21UCS10	Specialization	NA
Type	Core: Theory	L:T:P:C	86:6:0:5

COURSE OBJECTIVE:

1. To understand the basic components of computer programming using the Python language.
2. To demonstrate significant experience with the Python program development environment.

CO Number	CO Statement	Knowledge Level
CO1	Understand the Basic Programming Logic.	K1
CO2	Understand the basic Statements.	K2
CO3	Implement Files and SQL.	K3
CO4	Evaluate Graphics in python.	K4
CO5	Analyze Version control system.	K5

Subject Title	**PROGRAMMING IN PYTHON**	**Semester**	**VI**	
Subject Code	**21UCS10**	**Specialization**	**NA**	
Type	**Core: Theory**	**L:T:P:C**	**86:6:0:5**	
Unit	**Contents**		**Levels**	**Sessions**
I	Python – origins – features – variable and assignment - Python basics – statement and syntax – Identifiers – Basic style guidelines – Python objects – Standard types and other built-in types – Internal types – Standard type operators – Standard type built-in functions.		**K1**	**13**
II	Numbers – Introduction to Numbers – Integers – Double precision floating point numbers – Complex numbers – Operators – Numeric type functions – Sequences: Strings, Lists and Tuples – Sequences – Strings and strings operators – String built-in methods – Lists – List type Built in Methods – Tuples.		**K2**	**13**
III	Mapping type: Dictionaries – Mapping type operators – Mapping type Built-in and Factory Functions - Mapping type built in methods – Conditionals and loops – if statement – else Statement – elif statement – conditional expression – while statement – for statement – break statement – continue statement – pass statement – Iterators and the iter( ) function - Files and Input/Output – File objects – File built-in functions – File built-in methods – File built-in attributes – Standard files – command line arguments.		**K3**	**20**
IV	Functions and Functional Programming – Functions – calling functions – creating functions – passing functions – Built-in Functions: apply( ), filter( ), map( ) and reduce( ) - Modules – Modules and Files – Modules built-in functions - classes – class attributes – Instances.		**K4**	**20**
V	Database Programming – Introduction - Basic Database Operations and SQL - Example of using Database Adapters, Mysql - Regular Expression – Special Symbols and Characters – REs and Python.		**K5**	**20**
	Learning Resources			
Text Books	Title of Book Publisher Year of Publication 1 Wesley J. Chun Core Python Programming Pearson Education Publication 2012			
Reference Books	1.Wesley J. Chun Core Python Application Programming Pearson Education Publication 2015 2.Eric Matthes Python crash course William pollock 2016 3.Zed Shaw Learn Python the hard way Addition Wesley 2017 4.Mark Lutz Python pocket reference O'Reilly Media 2014 Pedagogy			
Website / Link	1.https://www.tutorialspoint.com/python/ 2.www.spoken-tutorial.org			

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Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	S	M	---
CO2	M	M	M	S
CO3	S	M	L	M
CO4	M	S	M	S
CO5	S	M	L	L

S- Strong , M- Medium , L – Low

Subject Title	**PYTHON PROGRAMMING**	**Semester**	**VI**
Subject Code	**21UCSP07**	**Specialization**	**NA**
Type	**Core: Practical**	**L:T:P:C**	**60:0:4:3**

COURSE OBJECTIVE:

1. To impart Practical Training in basic python statements.

2. Familiarize with control flow tools.

3. Build programs using data structure concepts.

4. Provide knowledge on working with exception and string handling.

LIST OF PROGRAMS:

1. Create a simple calculator to do all the arithmetic operations.

2. Write a program to use control flow tools like if.

3. Write a program to use for loop.

4. Data structures

   a. use list as stack.

   b. use list as queue.

   c. tuple, sequence.

5. Create new module for mathematical operations and use in your program.

6. Write a program to read and write files, create and delete directories.

7. Write a program with exception handling.

8. Write a program using classes.

9. Connect with MySQL and create address book.

10. Write a program using string handling and regular expressions.

COURSE OUTCOME:

1. Study all the Basic commands.

2. Practice the usage of control flow statements.

3. Apply various commands in files and directories.

4. Analysis the use of MYSQL to connect database.

Subject Title	QUANTITATIVE APTITUDE	Semester	VI
Subject Code	21UCSS01	Specialization	NA
Type	Theory	L:T:P:C	41:3:0:3

COURSE OBJECTIVE:

1. To improve the quantitative skills of the students.
2. To prepare the students for various competitive exams.

CO Number	CO Statement	Knowledge Level
CO1	Remember the basic mathematical functions.	K1
CO2	Understand the problems of ages , profits and loss.	K2
CO3	Demonstrate the relationship of time with work and distance.	K3
CO4	Implement permutation and combinations problem.	K4
CO5	Analyze data representation methods.	K5

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Subject Title	QUANTITATIVE APTITUDE		Semester	VI	
Subject Code	21UCSS01		Specialization	NA	
Type	SBEC: Theory		L:T:P:C	41:3:0:3	
Unit	Contents			Levels	Sessions
I	Numbers - HCF and LCM of numbers - Decimal fractions - Simplification - Square roots and cube roots - Average - problems on Numbers.			K1	8
II	Problems on Ages - Surds and Indices - percentage - profits and loss - ratio and proportion - partnership - Chain rule.			K2	8
III	Time and work - pipes and cisterns - Time and Distance - problems on trains -Boats and streams - simple interest - compound interest - Logarithms - Area - Volume and surface area - races and Games of skill.			K3	8
IV	Permutation and combination - probability - True Discount - Bankers Discount - Height and Distances - Odd man out & Series.			K4	8
V	Calendar - Clocks - stocks and shares - Data representation - Tabulation - Bar Graphs - Pie charts - Line graphs.			K5	9
	Learning Resources				
Text Books	‒Quantitative Aptitude‖, R.S. AGARWAL., S. Chand & Company Ltd.,				
Reference Books	‒Quantitative Aptitude for Competitive examinations‖ Abhijit Guha – 4th edition – Tata MH				
Website / Link	https://textbook.com/aptitude www.carrierbless.com/aptitude/qa/home.php				

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	S	M	---
CO2	M	M	M	S
CO3	S	M	L	M
CO4	M	S	M	S
CO5	S	M	L	L

S- Strong , M- Medium , L – Low

PRACTICAL – VIII MINI PROJECT   **III YEAR / VI SEM**

OBJECTIVES:
The aim of the mini project is that the student has to understand the real time software development environment. The student should gain a thorough knowledge in the problem and language / software which he/she has selected for their project work.

Project Planning:
B.Sc (Computer Science / Information Science)/BCA Mini Project is an involved exercise, which has to be planned well in advance. The topic should be chosen in the beginning of final year itself. Related reading training and discussions of project should be completed in the first term of final year.

I Selection of Team
To meet the stated objectives, it is imperative that mini project is done through a team effort. Though it would be ideal to select the team members at random and this should be strongly recommended, due to practical consideration students may also be given the choice of forming themselves into teams with Two members. A team leader shall be selected. Team shall maintain the minutes of meeting of the team members and ensure that tasks have been assigned to every team member in writing. Team meeting minutes shall form a part of the project report. Even if students are doing project as groups, each one must independently take different modules of the work and must submit the report.

II Selection of Tools
No restrictions shall be placed on the students in the choice of platform/tools/languages to be utilized for their project work, though open source is strongly recommended, wherever possible. No value shall be placed on the use of tools in the evaluation of the project.

III Project Evaluation:

Continuous Internal Assessment   :   40 Marks
Evaluation (External)   :   40 Marks
Viva-voce (jointly)   :   20 Marks

There shall be a common written examination conducted for all the candidates in each group together for a minimum of 10 minutes.
  (i)   Requirement Specification of Project
  (ii)   Design of Project
  (iii)   Testing and Implementation of Project

IV REGULATIONS OF PROJECT WORK

- Three copies of the project report must be submitted by each student..
- The final outer dimensions of the project report shall be 21cm X 30 cm.
- Only hard binding should be done. The text of the report should be set in 12 pt, Times New Roman, 1.5 spaced.
- Headings should be set as follows: CHAPTER HEADINGS 16 pt, Arial, Bold, All caps, Centered.

- Section Headings 14 pt Bookman old style, Bold, Left adjusted.
- Section Sub-heading 12 pt, Bookman old style.
- Title of figures tables etc are done in 12 point, Times New Roman, Italics, centered.
- Only 1.5 space need be left above a section or subsection heading and no space may be left after them.
- References shall be IEEE format (see any IEEE magazine for detail) While doing the project keep note of all books you refer, in the correct format and include them in alphabetical order in your reference list.
- The Candidate should submit the filled in format as given in Annexure-I to the department for approval during the First Week of December.
- Periodically the project should be reviewed.
- A Sample format is enclosed in Annexure-II.
- Format of the Title page and Certificate are enclosed in Annexure III.
- The students may use power point presentation during their viva voce examination.

ANNEXURE - I

PERIYAR UNIVERSITY

Name of the College   :

Programme   :

Name of the Student   :

Register Number   :

Title of the Project Work   :

Address of Organization / Institution :

Name of the Internal Guide   :

Qualification   :

Place :

Date :   Signature of Internal Guide

CONTENTS

A. Format of the title page

TITLE OF THE PROJECT WORK

A Project Work submitted in partial fulfillment of

the requirements for the degree of

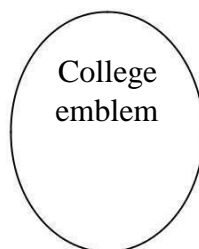**Bachelor of Science in Computer Science /
Information Science**

to the

Periyar University, Salem - 11

By

NAME OF THE STUDENT

REG. NO.

College
emblem

COLLEGE NAME

(AFFILIATED TO PERIYAR UNIVERSITY)

PLACE with Pin Code

MONTH – YEAR

B. Format of the Certificate

Name and Address of the Internal Guide

Date

CERTIFICATE

This is to certify that the Project Work entitled _____

submitted in partial fulfillment of the requirements of the degree of Bachelor of Science in

Computer Sciences to the Periyar University, Salem is a record of bonafide work carried out by

.......................………… Reg. No......................under my supervision and guidance.

Internal Guide

Head of the Department

Date of Viva-voice:

Internal Examiner   External Examiner

ELECTIVE I

Subject Title	SEMESTER – V PAPER - I DATA MINING AND WAREHOUSING	Semester	V
Subject Code	**21UCSE01**	Specialization	NA
Type	**Elective : Theory**	**L:T:P:C**	**71:5:0:4**

COURSE OBJECTIVE:

1. To introduce the basic concepts and techniques of Data Mining.
2. To study the basic concepts of cluster analysis.
3. To study a set of typical clustering methodologies, algorithms and applications.

CO Number	CO Statement	Knowledge Level
CO1	Remember the basic concepts of data mining and data preprocessing.	K1
CO2	Understanding the data mining primitives.	K2
CO3	Apply mining association rule.	K3
CO4	Evaluate classification and Prediction.	K4
CO5	Implement cluster analysis.	K5

Subject Title	SEMESTER – V PAPER - I DATA MINING AND WAREHOUSING		Semester	V	
Subject Code	21UCSE01		Specialization	NA	
Type	Elective : Theory		L:T:P:C	71:5:0:4	
Unit	Contents			Levels	Sessions
I	Introduction: Data mining application – data mining techniques – data mining case studies- the future of data mining – data mining software - Association rules mining: basics- task and a naïve algorithm- Apriori algorithm – improve the efficient of the Apriori algorithm – mining frequent pattern without candidate generation (FP-growth) – performance evaluation of algorithms.			K1	15
II	Classification : Introduction – decision tree – over fitting and pruning - DT rules- Naive bayes method- estimation predictive accuracy of classification methods - other evaluation criteria for classification method – classification software.			K2	15
III	Cluster analysis: cluster analysis – types of data – computing distances-types of cluster analysis methods- partitioned methods – hierarchical methods – density based methods – dealing with large databases – quality and validity of cluster analysis methods - cluster analysis software.			K3	15
IV	Web data mining: Introduction- web terminology and characteristics- locality and hierarchy in the web- web content mining-web usage mining- web structure mining – web mining software - Search engines: Search engines functionality- search engines architecture – ranking of web pages.			K4	15
V	Data warehousing: Introduction – Operational data sources- data warehousing - Data warehousing design – Guidelines for data warehousing implementation - Data warehousing metadata - Online analytical processing (OLAP): Introduction – OLAP characteristics of OLAP system – Multidimensional view and data cube - Data cube implementation - Data cube operations OLAP implementation guidelines.			K5	11
	Learning Resources				
Text Books	G.K. Gupta, ‒Introduction to Data mining with case studies‖, 2nd Edition, PHI Private limited, New Delhi, 2011				
Reference Books	Arun K Pujari, ―Data Mining Techniques‖, 10th impression, University Press, 2008.				
Website /Link	NPTEL & MOOC courses titled Data Mining 1. https://nptel.ac.in/courses/106105174/ 2. http://cecs.louisville.edu/datamining/PDF/0471228524.pdf				

B.Sc-Computer Science Syllabus under CBCS Pattern with effect from 2021-2022 Onwards

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	S	M	-
CO2	S	L	M	S
CO3	S	M	L	M
CO4	M	S	-	S
CO5	S	L	M	S

S- Strong , M- Medium , L – Low

Subject Title	SEMESTER – V PAPER – II SOFTWARE PROJECT MANAGEMENT	Semester	V
Subject Code	**21UCSE02**	Specialization	NA
Type	**Elective : Theory**	**L:T:P:C**	**71:5:0:4**

COURSE OBJECTIVE:

1. To define and highlight importance of software project management.
2. To formulate and define the software management.
3. To evaluate metrics & strategy in managing projects.

CO Number	CO Statement	Knowledge Level
CO1	Remember the basic concepts of software project management.	K1
CO2	Understanding domain processes in project management.	K1,K2
CO3	Apply task and activities.	K3
CO4	Evaluate issues in resource management.	K3,K4
CO5	Implement quality requirements.	K5

Subject Title	**SEMESTER – V PAPER - II SOFTWARE PROJECT MANAGEMENT**	Semester	V	
Subject Code	**21UCSE02**	Specialization	NA	
Type	**Elective : Theory**	L:T:P:C	**71:5:0:4**	
Unit	**Contents**		**Levels**	**Sessions**
I	Introduction to Competencies - Product Development Techniques - Management Skills - Product Development Life Cycle - Software Development Process and models - The SEI CMM - International Organization for Standardization.		**K1**	**15**
II	Managing Domain Processes - Project Selection Models - Project Portfolio Management - Financial Processes - Selecting a Project Team - Goal and Scope of the Software Project - Project Planning - Creating the Work Breakdown Structure - Approaches to Building a WBS - Project Milestones - Work Packages - Building a WBS for Software.		**K1,K2**	**15**
III	Tasks and Activities - Software Size and Reuse Estimating - The SEI CMM - Problems and Risks - Cost Estimation - Effort Measures - COCOMO: A Regression Model - COCOMO II - SLIM: A Mathematical Model - Organizational Planning - Project Roles and Skills Needed.		**K3**	**15**
IV	Project Management Resource Activities - Organizational Form and Structure - Software Development Dependencies - Brainstorming - Scheduling Fundamentals - PERT and CPM Leveling Resource Assignments - Map the Schedule to a Real Calendar - Critical Chain Scheduling.		**K3,K4**	**15**
V	Quality: Requirements – The SEI CMM - Guidelines - Challenges - Quality Function Deployment - Building the Software Quality Assurance - Plan - Software Configuration Management: Principles - Requirements - Planning and Organizing - Tools - Benefits - Legal Issues in Software - Case Study		**K5**	**11**
	Learning Resources			
Text Books	Robert T. Futrell, Donald F. Shafer, Linda I. Safer, ‒*Quality Software Project Management*‖, Pearson Education Asia 2002.			
Reference Books	1. Pankaj Jalote, ‒*Software Project Management in Practice*‖, Addison Wesley 2002. 2. Hughes, ‒*Software Project Management*‖, Tata McGraw Hill 2004, 3rd Edition.			
Website / Link	NPTEL & MOOC courses titled Software Project Management https://nptel.ac.in/courses/106/105/106105218/			

B.Sc-Computer Science Syllabus under CBCS Pattern with effect from 2021-2022 Onwards

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	M	L	L
CO2	S	M	L	L
CO3	S	M	L	M
CO4	M	S	L	S
CO5	S	M	M	L

S- Strong , M- Medium , L – Low

Subject Title	SEMESTER – V PAPER - III SOFTWARE ENGINEERING	Semester	V
Subject Code	**21UCSE03**	Specialization	NA
Type	**Elective : Theory**	**L:T:P:C**	**71:5:0:4**

COURSE OBJECTIVE:

1. To introduce the software development life cycles.
2. To introduce concepts related to structured and objected oriented analysis & design.
3. To provide an insight into UML and software testing techniques.

CO Number	CO Statement	Knowledge Level
CO1	Remember the basic concepts of software Engineering.	K1
CO2	Understanding requirement analysis.	K1,K2
CO3	Apply software design.	K3
CO4	Evaluate with UML.	K4
CO5	Implement coding and testing.	K5

Subject Title	SEMESTER – V PAPER - III SOFTWARE ENGINEERING	Semester	V	
Subject Code	21UCSE03	Specialization	NA	
Type	Elective : Theory	L:T:P:C	71:5:0:4	
Unit	Contents	Levels	Sessions	
I	Introduction – Evolution – Software Development projects – Emergence of Software Engineering. Software Life cycle models – Waterfall model – Rapid Application Development – Agile Model – Spiral Model	K1	15	
II	Requirement Analysis and Specification – Gathering and Analysis – SRS – Formal System Specification	K1,K2	15	
III	Software Design – Overview – Characteristics – Cohesion & Coupling – Layered design – Approaches Function Oriented Design – Structured Analysis – DFD – Structured Design – Detailed design	K3	15	
IV	Object Modeling using UML – OO concepts – UML – Diagrams – Use case, Class, Interaction, Activity, State Chart – Postscript	K4	15	
V	Coding & Testing – coding – Review – Documentation – Testing – Black-box, White-box, Integration, OO Testing, Smoke testing.	K5	11	
	Learning Resources			
Text Books	Rajib Mall, ‒*Fundamentals of Software Engineering*‖, PHI 2018, 5th Edition.			
Reference Books	1. Roger S. Pressman, ‒*Software Engineering - A Practitioner's Approach*‖, McGraw Hill 2010, 7th Edition. 2. Pankaj Jalote, ‒*An Integrated Approach to Software Engineering*‖, Narosa Publishing House 2011, 3rd Edition.			
Website / Link	NPTEL online course – Software Engineering - https://nptel.ac.in/courses/106105182/			

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	M	M	L
CO2	S	M	L	L
CO3	S	M	M	L
CO4	M	S	L	L
CO5	S	M	M	L

S- Strong , M- Medium , L – Low

Subject Title	SEMESTER – VI PAPER – I MOBILE COMPUTING	Semester	VI
Subject Code	21UCSE04	Specialization	NA
Type	Elective : Theory	L:T:P:C	86:6:0:4

COURSE OBJECTIVE:

1. To make the student to understand the concepts of mobile computing.

2. To familiar with the network protocol stack.

3. To be exposed to Ad-Hoc networks.

4. Gain knowledge about different mobile platforms and application development.

CO Number	CO Statement	Knowledge Level
CO1	Remember the basic concepts of mobile computing.	K1
CO2	Understanding mobile IP.	K1,K2
CO3	Apply Mobile Telecommunication system.	K3
CO4	Evaluate mobile ad hoc system.	K4
CO5	Implement mobile operating system.	K5

B.Sc-Computer Science Syllabus under CBCS Pattern with effect from 2021-2022 Onwards

Subject Title	SEMESTER – VI PAPER – I MOBILE COMPUTING		Semester	VI	
Subject Code	**21UCSE04**		Specialization	NA	
Type	Elective : Theory		L:T:P:C	86:6:0:4	
Unit	Contents			Levels	Sessions
I	Introduction-Mobile Computing – Mobile Computing Vs wireless Networking – Mobile Computing Applications – Characteristics of Mobile computing – Structure of Mobile Computing Application. MAC Protocols – Wireless MAC Issues. Fixed Assignment Schemes – Random Assignment Schemes – Reservation Based Schemes			K1	14
II	Mobile Internet Protocol and Transport Layer-Overview of Mobile IP – Features of Mobile IP – Key Mechanism in Mobile IP – route Optimization. Overview of TCP/IP – Architecture of TCP/IP- Adaptation of TCP Window – Improvement in TCP Performance.			K1,K2	18
III	Mobile Telecommunication System-Global System for Mobile Communication (GSM) – General Packet Radio Service (GPRS) – Universal Mobile Tele communication System (UMTS).			K3	18
IV	Mobile Ad-Hoc Networks-Ad-Hoc Basic Concepts – Characteristics – Applications – Design Issues – Routing – Essential of Traditional Routing Protocols –Popular Routing Protocols – Vehicular Ad Hoc networks (VANET) – MANET Vs VANET –Security.			K4	18
V	Mobile Platforms and Applications-Mobile Device Operating Systems – Special Constrains & Requirements – Commercial Mobile Operating Systems – Software Development Kit: iOS, Android, BlackBerry, Windows Phone – M-Commerce – Structure– Pros & Cons – Mobile Payment System – Security Issues.			K5	18
	Learning Resources				
Text Books	Prasant Kumar Pattnaik, Rajib Mall, ‒*Fundamentals of Mobile Computing‖*, PHI Learning Pvt. Ltd, New Delhi 2012.				
Reference Books	1. Jochen H. Schller, ‒*Mobile Communications‖*, Pearson Education, New Delhi, 2007, 2nd Edition. 2. Dharma Prakash Agarval, Qing and An Zeng, "*Introduction to Wireless and Mobile systems*", Thomson Asia Pvt Ltd. 2005. 3. Uwe Hansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, ‒*Principles of Mobile Computing‖*, Springer 2003.				
Website / Link	NPTEL & MOOC courses titled Mobile Computing 1. https://nptel.ac.in/courses/106/106/106106147/ 2. https://www.smartzworld.com/notes/mobile-computing-pdf-notes-mc-notes-pdf/				

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	M	S	M	L
CO2	S	M	M	L
CO3	S	M	M	L
CO4	M	S	M	L
CO5	S	M	L	L

S- Strong , M- Medium , L – Low

Subject Title	SEMESTER – VI PAPER – II WIRELESS NETWORK	Semester	VI
Subject Code	**21UCSE05**	Specialization	NA
Type	**Elective : Theory**	**L:T:P:C**	**86:6:0:4**

COURSE OBJECTIVE:

1. To understand about Wireless Networks,

2. To familiar with Protocol Stack and Standards.

3. To be exposed to 3G/4G Services.

4. Gain knowledge about Its Protocols and Applications.

CO Number	CO Statement	Knowledge Level
CO1	Remember the basic concepts of WLAN technologies.	K1
CO2	Understanding mobile IP.	K2
CO3	Apply TCP enhancements.	K3
CO4	Evaluate UTMS.	K4
CO5	Implement 4G.	K5

Subject Title	SEMESTER – VI PAPER – II WIRELESS NETWORK	Semester	VI
Subject Code	**21UCSE05**	Specialization	NA
Type	**Elective : Theory**	L:T:P:C	86:6:0:4

Unit	Contents	Levels	Sessions
I	Introduction-WLAN Technologies: Infrared, UHF Narrowband, Spread Spectrum -IEEE802.11: System Architecture, Protocol Architecture, Physical Layer, MAC Layer, 802.11b, 802.11a – Hiper LAN: WATM, BRAN, HiperLAN2 – Bluetooth: Architecture, Radio Layer, Baseband Layer, Link Manager Protocol, Security – IEEE802.16-WIMAX: Physical Layer, MAC, Spectrum Allocation For WIMAX.	K1	14
II	Introduction – Mobile IP: IP Packet Delivery, Agent Discovery, Tunneling And Encapsulation, IPV6-Network Layer In The Internet- Mobile IP Session Initiation Protocol – Mobile Ad-Hoc Network: Routing, Destination Sequence Distance Vector, Dynamic Source Routing.	K2	18
III	TCP Enhancements For Wireless Protocols – Traditional TCP: Congestion Control, Fast Retransmit/Fast Recovery, Implications Of Mobility – Classical TCP Improvements: Indirect TCP, Snooping TCP, Mobile TCP, Time Out Freezing, Selective Retransmission, Transaction Oriented TCP – TCP Over 3G Wireless Networks.	K3	18
IV	Overview Of UTMS Terrestrial Radio Access Network-UMTS Core Network Architecture: 3G-MSC, 3G-SGSN, 3G-GGSN, SMS-GMSC/SMS-IWMSC, Firewall, DNS/DHCP-High Speed Downlink Packet Access (HSDPA) - LTE Network Architecture And Protocol.	K4	18
V	4G Introduction – 4G Vision – 4G Features And Challenges – Applications Of 4G – 4G Technologies: Multicarrier Modulation, Smart Antenna Techniques, OFDM-MIMO Systems, Adaptive Modulation And Coding With Time Slot Scheduler, Cognitive Radio.	K5	18
	Learning Resources		
Text Books	1. Jochen Schiller, ‖Mobile Communications‖, Second Edition, Pearson Education 2012.(Unit I,II,III) 2. Vijay Garg , ‒Wireless Communications And Networking‖, First Edition, Elsevier 2007.(Unit IV,V)		
Reference Books	1. Erik Dahlman, Stefan Parkvall, Johan Skold And Per Beming, ‒3G Evolution HSPA And LTE For Mobile Broadband‖, Second Edition, Academic Press, 2008. 2. Anurag Kumar, D.Manjunath, Joy Kuri, ‒Wireless Networking‖, First Edition, Elsevier 2011. 3. Simon Haykin , Michael Moher, David Koilpillai, ‒Modern Wireless Communications‖, First Edition, Pearson Education 2013		
Website / Link	www.tutorialspoint.com/wireless-network www.iqytechnicalcollege.com www.rejinPaul.com		

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	M	S	S	L
CO2	S	S	M	L
CO3	S	M	L	L
CO4	M	S	L	L
CO5	S	M	M	L

S- Strong , M- Medium , L – Low

Subject Title	SEMESTER – VI PAPER – III COMPUTER GRAPHICS	Semester	VI
Subject Code	**21UCSE06**	Specialization	NA
Type	**Elective : Theory**	**L:T:P:C**	**86:6:0:4**

COURSE OBJECTIVE:

1. To understand about Computer Graphics,

2. To familiar with scan and I/O devices.

3. To be exposed to 2D Transformations and clipping.

CO Number	CO Statement	Knowledge Level
CO1	Remember the basic concepts of Graphics system.	K1
CO2	Understanding scans system and I/O Devices.	K2
CO3	Apply 2D Transformations.	K3
CO4	Evaluate 3D Transformations.	K4
CO5	Implement visual surface techniques.	K5

Subject Title	SEMESTER – VI PAPER – III COMPUTER GRAPHICS		Semester	VI	
Subject Code	**21UCSE06**		Specialization	NA	
Type	**Elective : Theory**		L:T:P:C	86:6:0:4	
Unit	**Contents**			Levels	Sessions
I	Overview of graphics Systems: Video Display Device – Refresh Cathode-Ray tubes Raster – Scan Displays Random – Scan Displays – Color CRT Monitors –Direct view Storage tubes Flat – Panel Displays Three – Dimensional Viewing Devices. Stereoscopic and Virtual – Reality Systems.			**K1**	**14**
II	Raster – Scan Systems Video Controller – Random – Scan Systems Video Controller – Random-Scan Systems – Input device – Keyboard Mouse – Trackball and Space ball . Joysticks – Data Glove – Digitizers- Image Scanners – Touch Panels – Light pens. Voice Systems – Hard-Copy Devices – Line Drawing Algorithms DDA Algorithms – Circle generating Algorithm Properties of Ellipses			**K2**	**18**
III	Two Dimensional Geometric Transformation: Basic Transformations - Translation – Rotation – Scaling – Matrix Representations and Homogeneous Coordinates – Other Transformations Reflections Two Dimensional Viewing : Windows to view point coordinate Transformations – Clipping Operations – Point Clipping – Line Clipping – Curve Clipping – Text Clipping – Exterior Clipping.			**K3**	**18**
IV	Three Dimensional Concepts: Three Dimensional Display method – Parallel projection – Depth cueing - visible line and surface – Three Dimensional Geometric and modeling Transformations: Translation – Rotation - Scaling – Composite Transformations. Three Dimensional Viewing: Viewing pipeline – Viewing Coordinates – Projections – Parallel Projections – Perspective Projections.			**K4**	**18**
V	Visible Surface Detection Methods : Classification Visible Surface Detection Algorithms – Back Face Detection – Depth – Buffer Method – A-Buffer Method – Scan line method – Depth sorting method – BSP tree method – Area Subdivision Method.			**K5**	**18**
	Learning Resources				
Text Books	Donald Hearn & M.Pauline Baker , –Computer Graphics‖,2ⁿᵈ Edition, 1996				
Reference Books	John f. Hughes, Andries Van Dam, Morgan Mcguire, David F. Sklar, James D. Foley, Steven K. Feiner, Kurt Akeley, –*Computer Graphics* Principles and Practice‖ 3rd*Edition,* Pearson Education,2014.				
Website / Link	www.javatpoint.com/computer-graphics www.taylorfrancis.com				

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	M	S	M	L
CO2	S	M	M	M
CO3	S	M	L	L
CO4	M	S	L	M
CO5	S	S	M	L

S- Strong , M- Medium , L – Low

ELECTIVE III

Subject Title	SEMESTER – VI PAPER – I SOFTWARE TESTING	Semester	VI
Subject Code	21UCSE07	Specialization	NA
Type	Elective : Theory	L:T:P:C	86:6:0:4

COURSE OBJECTIVE:

1. To study various Software techniques
2. To study fundamental concepts in software testing

CO Number	CO Statement	Knowledge Level
CO1	Remember the basic concepts of SDLC	K1
CO2	Understanding Block box testing	K2
CO3	Apply system testing	K3
CO4	Evaluate performance testing	K4
CO5	Implement test planning.	K5

Subject Title	SEMESTER – VI PAPER – I SOFTWARE TESTING		Semester	VI
Subject Code	21UCSE07		Specialization	NA
Type	Elective : Theory		L:T:P:C	86:6:0:4
Unit	Contents		Levels	Sessions
I	SOFTWARE DEVELOPMENT LIFE CYCLE MODELS: Phases of Software project –Quality, Quality Assurance, Quality control – Testing, Verification and Validation – Process Model to represent Different Phases - Life Cycle models. White-Box Testing: Static Testing – Structural Testing – Challenges in White-Box Testing		K1	14
II	BLACK-BOX TESTING: What is Black-Box Testing? - Why Black-Box Testing? – When to do Black-Box Testing? – How to do Black-Box Testing? Integration Testing: Integration Testing as Type of Testing – Integration Testing as a Phase of Testing – Scenario Testing - Defect Bash		K2	18
III	SYSTEM AND ACCEPTANCE TESTING: System Testing Overview – Why is System testing done? – Functional versus Non-functional Testing - Functional System Testing - Non-Functional Testing-Acceptance Testing - Summary of Testing Phases		K3	18
IV	PERFORMANCE TESTING: Factors Governing Performance Testing – Methodology for Performance Testing - Tools for Performance Testing - Process for Performance Testing - Challenges. Regression Testing: What is Regression Testing? – Types of Regression Testing – When to do Regression Testing? – How to do Regression Testing? – Best Practices in Regression Testing		K4	18
V	TEST PLANNING, MANAGEMENT, EXECUTION AND REPORTING:Test Planning – Test Management-Test Process – Test Reporting. Quick Test Professional (QTP): Overview of QTP – Testing an Application using QTP – Creating Check Points – Testing Database Application – Testing a Web Application		K5	18
	Learning Resources			
Text Books	Srinivasan Desikan, Gopalaswamy Ramesh Software Testing Principles and Practices, Pearson Education 2012			
Reference Books	1. Dr.K.V.K.K.Prasad ,Software Testing Tools ,Dreamtech Press2012 2. RenuRajani, Testing Practitioner ,Handbook Packt Publishing Limited2017 3. NareshChauhan ,Software Testing, Oxford University Press2nd edition, 2016			
Website / Link	https://s3_ap_southeast-1,amazonaws.com/tv-prod/documents%2F7619-2.software+system+principles+and+practices_srinivasan+desikan_gopalaswamy+ramesh.pdf			

B.Sc-Computer Science Syllabus under CBCS Pattern with effect from 2021-2022 Onwards
Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	M	L	L
CO2	S	M	L	M
CO3	S	M	L	L
CO4	L	S	M	M
CO5	S	M	M	L

S- Strong , M- Medium , L – Low

B.Sc-Computer Science Syllabus under CBCS Pattern with effect from 2021-2022 Onwards

Subject Title	SEMESTER – VI PAPER – II NETWORK SECURITY	Semester	VI
Subject Code	21UCSE08	Specialization	NA
Type	Elective : Theory	L:T:P:C	86:6:0:4

COURSE OBJECTIVE:

1. To Understand OSI security architecture.
2. To acquire fundamental knowledge of finite fields and number theory.
3. To Understand various block cipher and stream cipher models.
4. Study the principles of symmetric & public key crypto systems.
5. To learn the system security practices.

CO Number	CO Statement	Knowledge Level
CO1	Remember the OSI Security Architecture.	K1
CO2	Understanding Number theory and finite fields.	K2
CO3	Apply Block Ciphers and Data Encryption Std.	K3
CO4	Evaluate Public Key Cryptography and RSA.	K4
CO5	Implement Hash functions.	K5

Subject Title	SEMESTER – VI PAPER – II NETWORK SECURITY	Semester	VI
Subject Code	**21UCSE08**	Specialization	NA
Type	**Elective : Theory**	L:T:P:C	86:6:0:4
Unit	Contents	Levels	Sessions
I	OSI Security Architecture – Security attacks, services and mechanisms – Network security Model – Classical encryption techniques: Symmetric cipher model, Substitution techniques – Transposition techniques – Rotor machines – Steganography	**K1**	**14**
II	Number theory and finite fields: The Euclidean algorithm – Modular arithmetic - Groups, Rings and Fields – Finite fields of the Form GF (p) – Polynomial arithmetic – prime numbers – Fermat's and eulers theorems	**K2**	**18**
III	Block Ciphers and Data Encryption Standard: Traditional block cipher structure – Data Encryption – Strengths of DES – Block Cipher Design Principles – Advanced Encryption Standard – AES structure – AES transformation functions – AES Key expansion – implementation	**K3**	**18**
IV	Public Key Cryptography and RSA – Principles of Public-key Crypto systems – RSA algorithm - Diffie – Hellman Key exchange - Elgamal Cryptographic System	**K4**	**18**
V	Hash functions – Applications – two simple hash functions – Hash functions based on Cipher block chaining - Secure Hash Algorithm (SHA)	**K5**	**18**
	Learning Resources		
Text Books	William Stallings, ‖*Cryptography and Network Security: Principles and Practice*‖, Pearson Education 2013,6th Edition.		
Reference Books	1. Behrouz A. F-erouzan, ‖*Cryptography & Network Security*‖, Tata McGraw Hill 2007. 2. Man Young Rhee, ‖*Internet Security: Cryptographic Principles, Algorithms and Protocols*‖, Wiley Publications 2003. 3. Charles Pfleeger, ‖*Security in Computing*‖, Prentice Hall of India 2006, 4th Edition. 4. Ulysess Black, ‖*Internet Security Protocols"*, Pearson Education Asia 2000. 5. Charlie Kaufman and Radia Perlman, Mike Speciner, ‖*Network Security, Private Communication in Public World*‖, PHI 2002, 2nd Edition.		
Website /Link	1.NPTEL & MOOC courses titled Network Security 2.https://nptel.ac.in/courses/106/105/106105031/		

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	M	M	L
CO2	S	M	L	L
CO3	S	M	L	L
CO4	M	L	S	M
CO5	S	M	M	L

S- Strong , M- Medium , L – Low

Subject Title	SEMESTER – VI PAPER – III INTERNET OF THINGS	Semester	VI
Subject Code	21UCSE09	Specialization	NA
Type	Elective : Theory	L:T:P:C	86:6:0:4

COURSE OBJECTIVE:

1. Use of Devices, Gateways and Data Management in IoT.
2. Design IoT applications in different domain and be able to analyze their performance.
3. Implement basic IoT applications on embedded platform**.**

CO Number	CO Statement	Knowledge Level
CO1	Remember IoT and Web technology.	K1
CO2	Understanding M2M to IoT.	K2
CO3	Apply IoT Architecture.	K3
CO4	Evaluate IoT Applications.	K4
CO5	Implement IoT Privacy, Security and Governance.	K5

Subject Title	**SEMESTER – VI PAPER – III** **INTERNET OF THINGS**	**Semester**	**VI**
Subject Code	**21UCSE09**	**Specialization**	**NA**
Type	**Elective : Theory**	**L:T:P:C**	**86:6:0:4**
Unit	**Contents**	**Levels**	**Sessions**
I	IoT & Web Technology, The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on Research Topics.	**K1**	**14**
II	M2M to IoT – A Basic Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.	**K2**	**18**
III	IoT Architecture -State of the Art – Introduction, State of the art, Architecture. Reference Model- Introduction, Reference Model and architecture, IoT reference Model, IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views	**K3**	**18**
IV	IoT Architecture Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT For Oil and GasIndustry, Opinions on IoT Application and Value for Industry, Home Management, eHealth.	**K4**	**18**
V	Internet of Things Privacy, Security and Governance Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy andTrust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security	**K5**	**18**
	Learning Resources		
Text Books	Vijay Madisetti and ArshdeepBahga, ‒*Internet of Things: (A Hands-on Approach)*‖, Universities Press (INDIA) Private Limited 2014, 1st Edition.		
Reference Books	1. Michael Miller, ‒*The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the World*‖, Pearson Education 2015. 2. Francis da Costa, ‒*Rethinking the Internet of Things: A Scalable Approach to Connecting Everything*‖, Apress Publications 2013, 1st Edition.		

	3. Waltenegus Dargie, Christian Poellabauer, "*Fundamentals of Wireless Sensor Networks: Theory and Practice*‖, Wiley 2014**.** **4.** CunoPfister, ‒*Getting Started with the Internet of Things*‖, O‟Reilly Media 2011.
Website /Link	1. https://github.com/connectIOT/iottoolkit 2. https://www.arduino.cc/ 3. http://www.zettajs.org/

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	M	M	L
CO2	S	M	M	L
CO3	S	M	M	M
CO4	M	L	S	M
CO5	S	L	M	L

S- Strong , M- Medium , L – Low

NON MAJOR ELECTIVE COURSE (NMEC) - I

Subject Title	SEMESTER – III PAPER – I BASICS OF COMPUTERS	Semester	III
Subject Code	**21UCSN01**	Specialization	NA
Type	**NMEC: Theory**	**L:T:P:C**	**26:2:0:2**

COURSE OBJECTIVE:

1. To understand the basics of computers.
2. To prepare the students for analyze data processing.

CO Number	CO Statement	Knowledge Level
CO1	Remember the basics of computers.	K1
CO2	Understand number system.	K2
CO3	Demonstrate the functions of computer system.	K3
CO4	Study the input and output system.	K4
CO5	Analyze data processing.	K5

B.Sc-Computer Science Syllabus under CBCS Pattern with effect from 2021-2022 Onwards

Subject Title	SEMESTER – III PAPER – I BASICS OF COMPUTERS		Semester	III
Subject Code	**21UCSN01**		Specialization	NA
Type	NMEC: Theory		L:T:P:C	26:2:0:2
Unit	Contents		Levels	Sessions
I	Introduction to Computer: Introduction – Types of computers – Characteristics of Computers. Generations of Computers: First Generation – Second Generation – Third Generation – Fourth Generation – Fifth Generation. Classification of Digital Computers: Introduction – Microcomputers – Personal Computer – Portable Computers – Mini Computers – Super Computers – Main Frames.		**K1**	**5**
II	Number System: Introduction – Decimal Number System – Binary Number System – Binary-Decimal Conversion – Decimal Binary Conversion – Binary Addition – Binary Subtraction – Complements – 9's Complement – 10's Complement – 1's Complements – 2's Complements – BCD - Bits, Bytes, Words – Octal – Hexadecimal Number System.		**K2**	**5**
III	Anatomy of Digital Computer : Functions and Components of Computer – Central Processing Unit – Control Unit – Arithmetic – Logic Unit – Memory – Registers – Addresses. Memory Units: RAM, ROM, PROM, EPROM, EEPROM, and Flash Memory		**K3**	**5**
IV	Input Devices: Introduction – Keyboard – Mouse – Types of Mice – Connections – Mouse pad – Trackball – joystick – Digitizing Tablet – Scanners – Digital Camera – MICR – OCR – OMR – Bar Code Reader – Speech Input Device- Touch Screen – Touch Pad – Light Pen. Output Devices: Introduction – Monitor – Classification of Monitors – Monochrome – Gray Scale – Color – Digital Monitor – Analog Monitor – Characteristics of monitor – Printers.		**K4**	**5**
V	Computer Software: Introduction – Operating System – Utilities – Compiler and Interpreters – Word Processor – Spreadsheets – Presentation Graphics – DBMS – Programming Languages: Machine Language – Assembly Language – High level language – Types of High Level Language. Data Processing: Data VS Information – File Processing – Sequential File Processing – Direct Access File Processing.		**K5**	**6**
	Learning Resources			
Text Books	Alexis Leon and Mathews Leon, ‒Fundamentals of Computer Science and Communication Engineering‖, Leon Techworld, 1998.			
Reference Books	1. B. Ram and Sanjay Kumar, ‒Computer Fundamentals‖, 5th Edition, New Age International Publishers, 2014. 2. Pradeep K Sinha, Priti Sinha, ‒Computer Fundamentals‖, BPB Publications, 2004. 3. Anita Goel, ‒Computer Fundamentals‖, 1st Edition, Pearson Education India, 2010.			

Website/ Link	https://www.gopeaople.edu/blog/the_basics_of_computer_science_how_to_get_started/ www.tutorialspoint.com>basics_of_computer

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	M	M	---
CO2	M	M	-	S
CO3	S	M	L	M
CO4	M	S	M	-
CO5	S	M	-	L

S- Strong , M- Medium , L – Low

NON MAJOR ELECTIVE COURSE (NMEC) - I

Subject Title	SEMESTER – III PAPER – II COMPUTER APPLICATIONS FOR AUTOMATION	Semester	III
Subject Code	21UCSN02	Specialization	NA
Type	NMEC: Theory	L:T:P:C	26:2:0:2

COURSE OBJECTIVE:

1. To acquire knowledge on editor, spread sheet, slide preparation.
2. To improve creative thinking in presentation software.

CO Number	CO Statement	Knowledge Level
CO1	Remember the basics of computers.	K1
CO2	Understand MS word.	K2
CO3	Demonstrate the functions of MS excel.	K3
CO4	Study the basics of MS power point.	K4
CO5	Analyze data processing with MS Access.	K5

B.Sc-Computer Science Syllabus under CBCS Pattern with effect from 2021-2022 Onwards

Subject Title	SEMESTER – III PAPER – II COMPUTER APPLICATIONS FOR AUTOMATION		Semester	III	
Subject Code	21UCSN02		Specialization	NA	
Type	NMEC: Theory		L:T:P:C	26:2:0:2	
Unit	Contents			Levels	Sessions
I	Introduction to Computers: Introduction- Importance- History- Anatomy			K1	5
II	MS-Word: Basics –Do's and Don'ts – Menus – Commands – Tool Bars – Icons – Word Formatting Tool Bar			K2	5
III	MS-Excel: Basics – Do's and Don'ts – Menus – Commands – Tool Bars – Icons			K3	5
IV	MS-PowerPoint: Basics – Menus – Tool Bars – Navigation			K4	5
V	MS-Access: Introduction – Parts of an Window: - Creating a New Data Base – Table Wizard – Renaming – Saving the Database – Relationships – Query – Form – Reports – Exiting MS-Access			K5	6
	Learning Resources				
Text Books	Sanjay Saxena, ―MS-Office 2000 for everyone‖, Vikas Publishing House Pvt. Ltd, Reprint 2006				
Reference Books	1. Nellai Kannan, ―MS-Office‖, Nels Publications, 3rd Edition, 2004. 2. John Walkenbach, Herb Tyson, Michael R.Groh, Faithe Wempen and Lisa A.Bucki , ‒ Microsoft Office 2010 Bible ‒, Wiley India Pvt. Ltd , Reprint 2010				
Website/ Link	1. https://ptgmedia.pearsoncmg.com/images/9780735623026/samplepages/9780735623026.pdf 2. https://www.dit.ie/media/ittraining/msoffice/MOAC_Excel_2016_Core. pdf 3. https://ptgmedia.pearsoncmg.com/images/9780735697799/samplepages/9780735697799.pdf 2010				

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	M	M	---
CO2	S	M	-	-
CO3	S	S	L	M
CO4	M	S	M	-
CO5	S	M	M-	L

S- Strong , M- Medium , L – Low

NON MAJOR ELECTIVE COURSE (NMEC) – II

Subject Title	SEMESTER – IV PAPER – I BASICS OF INTERNET	Semester	IV
Subject Code	21UCSN03	Specialization	NA
Type	NMEC: Theory	L:T:P:C	26:2:0:2

COURSE OBJECTIVE:

1. To improve the skills of surfing internet.
2. To prepare the students for developing webpage using HTML.

CO Number	CO Statement	Knowledge Level
CO1	Remember the basics of Internet.	K1
CO2	Understand internet technologies.	K2
CO3	Demonstrate tags in HTML.	K3
CO4	Study the basics of create list and tables.	K4
CO5	Analyze frames and forms.	K5

B.Sc-Computer Science Syllabus under CBCS Pattern with effect from 2021-2022 Onwards

Subject Title	SEMESTER – IV PAPER – I BASICS OF INTERNET	Semester	IV	
Subject Code	21UCSN03	Specialization	NA	
Type	NMEC: Theory	L:T:P:C	26:2:0:2	
Unit	Contents		Levels	Sessions
I	Introduction To The Internet: Computer in Business – Networking – Internet -E-mail – Resource Sharing – Gopher – World Wide Web – Telnet – Bulletin Board Service – Wide Area Information Service.		K1	5
II	Internet Technologies: Modem - Internet addressing – Physical connections – Telephone Lines – Internet browsers – Internet Explorer – Netscape Navigator.		K2	5
III	Introduction to HTML: Designing a home page – HTML documents – Anchor tag – Hyper Links. Traditional text and formatting		K3	5
IV	Types of lists: Ordered, Unordered – Nesting Lists – Other tags: Marquee, HR, BR- Using Images – Creating Hyperlinks ,Tables: Creating basic Table, Table elements, Caption – Table and cell alignment – Rowspan, Colspan – Cell padding		K4	5
V	Frames: Frameset – Targeted Links – No frame – Forms : Input, Text area, Select, Option.		K5	6
	Learning Resources			
Text Books	1. C Xavier, ‒World Wide Web with HTML‖, Tata McGraw Hill Education, 2000. 2. H.M.Deital, P.J. Deital,―Internet and World Wide Web – How to Program‖, 4th Edition ‒PHI Learning			
Reference Books	Laura Lemay, ‒*HTML Complete Reference, Teach Yourself Web Publishing with HTML”*.			
Website/ Link	https://www.codecademy.com/learn/learn-html/			

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	S	M	---
CO2	S	M	-	-
CO3	S	S	M	L
CO4	M	S	L	-
CO5	S	L	M-	L

S- Strong , M- Medium , L – Low

NON MAJOR ELECTIVE COURSE (NMEC) – II

Subject Title	SEMESTER – IV PAPER – II IMAGE EDITING TOOL	Semester	IV
Subject Code	**21UCSN04**	Specialization	NA
Type	NMEC: Theory	L:T:P:C	26:2:0:2

COURSE OBJECTIVE:

1. To impart Practical Training in PHOTOSHOP image editing Tool.
2. Familiarize the different text and filter effects.
3. Build programs using stamp tools.
4. Provide knowledge on working with several layouts.

CO Number	CO Statement	Knowledge Level
CO1	Remember the basics of Photoshop.	K1
CO2	Understand the working with images.	K2
CO3	Demonstrate the layering in Photoshop.	k3
CO4	Implement the layer style.	K4
CO5	Analyze the action concept.	K5

Subject Title	SEMESTER – IV PAPER – II IMAGE EDITING TOOL		Semester	IV	
Subject Code	**21UCSN04**		Specialization	NA	
Type	**NMEC: Theory**		L:T:P:C	26:2:0:2	
Unit	Contents			Levels	Sessions
I	Getting Started with Photoshop CS5: Launching Photoshop CS5 - Exploring the Interface - Using Screen Modes - Opening an Existing Image - Opening an Image Using Adobe Bridge - Exploring Commonly Used Tools in the Tools Panel - Creating a New Document - Saving a Document - Reverting a Document - Selecting a Workspace - Creating a New Workspace - Deleting a Workspace - Working with Panels in Photoshop CS5 - Keyboard Shortcuts and Menu Settings - Customizing Preferences.			K1	5
II	Working with Images: Differences between Bitmap and Vector Images - Understanding Image Resolution Editing Images - Different Color Modes in Photoshop CS5 - Making Color Adjustments - File Formats in Photoshop CS5 -Creating a PDF File in Photoshop CS5 - Importing a PDF File into Photoshop CS5 - Making a Selection with Selections Tools - Modifying a Selection-Transforming a Selection - Transforming Pixels.			K2	5
III	Mastering Layers in Photoshop CS5:Exploring LAYERS Panel - Working with Layers -Organizing Layers Working with Opacity and Blend Modes - Working with Adjustment Layers - Masking in Photoshop CS5 - Setting the Current Foreground and Background Colors - Filling a Selection with the Current Foreground Color - Using the Content-Aware Feature - Exploring Drawing Tools - Exploring Painting Tools - Exploring Retouching Tools.			K3	5
IV	Working with Layer Styles and Filter Effects: Understanding Layer Styles - Working with Smart Objects - Understanding Filters.			K4	5
V	Animation, 3D, and Printing in Photoshop CS5:Working with Actions - Working with Automate Commands - Exploring 3D in Photoshop - Working with Animation in Photoshop CS5 - Printing in Photoshop CS5.			K5	6
	Learning Resources				
Text Books	C Kogent Learning Solutions Inc,‒Photoshop CS5 in Simple Steps‖, Dreamtech Press, New Delhi, 2012.				
Reference Books	1. Brie Gyncild, ‒Ado be Photoshop CS6 Classroom in a Book‖, Adobe Press/Peachpit, 2012 2. Lisa Danae Dayley, Brad Dayley, ‒Adobe Photoshop Cs6 Bible‖, Wiley India Pvt Ltd. 3. Edward Bailey, ‒Photoshop: 7 Ways to Use Adobe Photoshop Like a Pro‖, Create space Independent Publishing Platform				
Website/ Link	1.www.online_image_editor.com 2.www.cs5_on_demand_sampler.pdf				

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	M	L	---
CO2	S	M	-	L
CO3	S	M	L	L
CO4	M	S	L	L
CO5	S	L	-	M

S- Strong , M- Medium , L – Low

ALLIED OPTION I

Subject Title	**SEMESTER I/III PAPER – I FUNDAMENTALS OF COMPUTERS**	**Semester**	**I/III**
Subject Code	**21UCSA01**	**Specialization**	**NA**
Type	**Allied: Theory**	**L:T:P:C**	**86:6:0:4**

COURSE OBJECTIVE:

1. To Understand the basics of computers.
2. To prepare the students for the analyze of data processing.

CO Number	CO Statement	Knowledge Level
CO1	Remember the basics of computers.	K1
CO2	Understand the number system.	K2
CO3	Demonstrate the functions of computer system.	K3
CO4	Study the input and output system .	K4
CO5	Analyze of data processing.	K5

B.Sc-Computer Science Syllabus under CBCS Pattern with effect from 2021-2022 Onwards

Subject Title	SEMESTER I/III PAPER – I FUNDAMENTALS OF COMPUTERS		Semester	I/III	
Subject Code	21UCSA01		Specialization	NA	
Type	Allied: Theory		L:T:P:C	86:6:0:4	
Unit	Contents			Levels	Sessions
I	Introduction to Computer: Introduction – Types of computers – Characteristics of Computers. Generations of Computers: First Generation – Second Generation – Third Generation – Fourth Generation – Fifth Generation. Classification of Digital Computers: Introduction – Microcomputers – Personal Computer – Portable Computers – Mini Computers – Super Computers – Main Frames.			K1	17
II	Number System: Introduction – Decimal Number System – Binary Number System – Binary-Decimal Conversion – Decimal Binary Conversion – Binary Addition – Binary Subtraction – Complements – 9's Complement – 10's Complement – 1's Complements – 2's Complements – BCD - Bits, Bytes, Words – Octal – Hexadecimal Number System.			K2	17
III	Anatomy of Digital Computer : Functions and Components of Computer – Central Processing Unit – Control Unit – Arithmetic – Logic Unit – Memory – Registers – Addresses. Memory Units: RAM, ROM, PROM, EPROM, EEPROM, and Flash Memory.			K3	17
IV	Input Devices: Introduction – Keyboard – Mouse – Types of Mice – Connections – Mouse pad – Trackball – joystick – Digitizing Tablet – Scanners – Digital Camera – MICR – OCR – OMR – Bar Code Reader – Speech Input Device- Touch Screen – Touch Pad – Light Pen. Output Devices: Introduction – Monitor – Classification of Monitors – Monochrome – Gray Scale – Color – Digital Monitor – Analog Monitor – Characteristics of monitor – Printers.			K4	17
V	Computer Software:Introduction – Operating System – Utilities – Compiler and Interpreters – Word Processor – Spreadsheets – Presentation Graphics – DBMS – Programming Languages: Machine Language – Assembly Language – High level language – Types of High Level Language. Data Processing: Data VS Information – File Processing – Sequential File Processing – Direct Access file Processing.			K5	18
	Learning Resources				
Text Books	Alexis Leon and Mathews Leon, ―Fundamentals of Computer Science and Communication Engineering‖, Leon Techworld, 1998.				
Reference Books	1. B Ram and Sanjay Kumar, ―Computer Fundamentals‖, 5th Edition, New Age International Publishers, 2014. 2. Pradeep K Sinha, Priti Sinha, ―Computer Fundamentals‖, BPB Publications, 2004. Anita Goel, ―Computer Fundamentals‖, 1st Edition, Pearson Education India, 2010.				
Website/ Link	https://www.gopeople.edu/blog/the_basics_of_computer_science_how_to_get_started/ www.tutorialspoint.com>basics_of_computer				

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	M	M	---
CO2	M	M	-	S
CO3	S	M	L	M
CO4	M	S	M	-
CO5	S	M	-	L

S- Strong , M- Medium , L – Low

B.Sc-Computer Science Syllabus under CBCS Pattern with effect from 2021-2022 Onwards

Subject Title	COMPUTER APPLICATIONS IN OFFICE	Semester	II/IV
Subject Code	**21UCSA02**	Specialization	NA
Type	**Allied: Theory**	**L:T:P:C**	**56:4:0:4**

COURSE OBJECTIVE:

1. To improve the quality of students in office automation process.
2. To prepare the students for various ability to prepare reports and presentations.

CO Number	CO Statement	Knowledge Level
CO1	Remember the basics of MS word.	K1
CO2	Understand MS word.	K2
CO3	Demonstrate the functions of MS excel.	K3
CO4	Study the basics of MS excel workbooks.	K4
CO5	Analyze of data processing with MS power point.	K5

Subject Title	COMPUTER APPLICATIONS IN OFFICE		Semester	II/IV	
Subject Code	**21UCSA02**		Specialization	NA	
Type	**Allied: Theory**		L:T:P:C	**56:4:0:4**	
Unit	Contents			Levels	Sessions
I	MS Word Exploring Word 2007: Working in the Word Environment – Opening, Moving Around in, and closing Document – Creating and Saving A Document – Previewing and Printing Document – Editing and Proofreading Documents: Making Changes to document – Inserting Saved Text – Finding the Most Appropriate Word – Reorganizing a Document Outline – Finding and Replacing Text – Correcting spelling and Grammatical errors – Finalizing Document			**K1**	**12**
II	MS Word Changing the Look of Text: Quickly Formatting Text and Paragraphs – Manually changing the look of characters – Manually changing the look of paragraphs – Creating and modifying Lists-Presenting Information in Columns and Tables : Presenting Information in Columns – Creating Tabular List – Presenting Information in a Table – Formatting Table Information – Performing Calculations in a Table- Using a Table to control Page Layout.			**K2**	**12**
III	MS Excel Setting Up a Workbook : Creating Workbooks – Modifying Workbooks - Modifying Worksheets – Working with Data and Data Tables : Entering and Revising Data – Moving Data within a Workbook- Finding and Replacing Data – Correcting and Expanding Upon Worksheet Data – Defining a Table – Performing Calculations on Data : Naming Groups of Data – Creating Formulas to Calculate Values – Summarizing Data that meets Specific Conditions –Finding and Correcting Errors in Calculations- Changing Document Appearance.			**K3**	**12**
IV	MS-Access: Introduction – Parts of an Window: - Creating a New Data Base – Table Wizard – Renaming – Saving the Database – Relationships – Query – Form – Reports – Exiting MS-Access			**K4**	**10**
V	MS PowerPoint Starting a New Presentation – Working with Slide Text : Entering Text – Editing Text – Adding and Manipulating Text Boxes –Correcting and Sizing text – Checking Spelling – Finding and replacing text and fonts – Changing the size, Alignment, Spacing – Adjusting the Slide Layout, Order and Look : Changing the Layout of a slide – Rearranging Slides in a Presentation – Applying a theme -Switching to a Different Color Scheme – Adding Shading and texture to the background of a slide – Delivering a Presentation Electronically.			**K5**	**10**
	Learning Resources				
Text Books	1. Step by Step 2007 Microsoft Office System -Joyce Cox and Team ,PHI learning Private ltd, New delhi 2009 2. Sanjay Saxena, ‒MS-Office 2000 for everyone‖, Vikas Publishing House Pvt. Ltd, Reprint 2006				

Reference Books	1. Nellai Kannan, ‒MS-Office‖, Nels Publications, 3rd Edition, 2004. 2. John Walkenbach, Herb Tyson, Michael R.Groh, Faithe Wempen and Lisa A.Bucki , ‒ Microsoft Office 2010 Bible ‒, Wiley India Pvt. Ltd , Reprint 2010
Website/ Link	1. https://ptgmedia.pearsoncmg.com/images/9780735623026/samplepag es/9780735623026.pdf 2.https://www.dit.ie/media/ittraining/msoffice/MOAC_Excel_2016_Core. pdf 3.https://ptgmedia.pearsoncmg.com/images/9780735697799/samplepag es/9780735697799.pdf 2010

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	M	M	M
CO2	S	M	L	M
CO3	S	S	L	M
CO4	M	S	L	M
CO5	S	M	M-	L

S- Strong , M- Medium , L – Low

Subject Title	**OFFICE AUTOMATION LAB**	**Semester**	**II/IV**
Subject Code	**21UCSAP01**	**Specialization**	**NA**
Type	**Allied: Practical**	**L:T:P:C**	**30:0:2:2**

COURSE OBJECTIVE:

1. To enable the students to design and develop the Office applications.
2. To qualify the students working in editor, spread sheet and slide preparation.
3. To improve creative thinking in presentation software.

LIST OF PROGRAMS

I. MS-WORD

1. Text Manipulation: Write a paragraph about your institution and Change the font size and type, Spell check, Aligning and justification of Text.
2. Bio data: Prepare a Bio-data.
3. Find and Replace: Write a paragraph about yourself and do the following. Find and Replace - Use Numbering Bullets, Footer and Headers.
4. Tables and manipulation: Creation, Insertion, Deletion (Columns and Rows). Create a mark sheet.
5. Mail Merge: Prepare an invitation to invite your friends to your birthday party. Prepare at least five letters.

II. MS-EXCEL

1. Data sorting-Ascending and Descending (both numbers and alphabets).
2. Mark list preparation for a student.
3. Individual Pay Bill preparation.
4. Invoice Report preparation.
5. Drawing Graphs. Take your own table.

III. MS-POWERPOINT

1. Create a slide show presentation for a seminar.
2. Preparation of Organization Charts.
3. Create a slide show presentation to display percentage of marks in each semester for all students.
4. Use bar chart (X-axis: Semester, Y-axis: % marks).
5. Use different presentation template different transition effect for each slide.

COURSE OUTCOME:

On successful completion of the course, the students will
1. Understand the features in MS Word.
2. Select and apply worksheet and functions in MS EXCEL.
3. Combine multiple features in MS POWER POINT to prepare presentations.

ALLIED OPTION II

Subject Title	**DATABASE SYSTEMS**	Semester	I/III
Subject Code	**21UCSA03**	**Specialization**	**NA**
Type	**Allied: Theory**	**L:T:P:C**	**86:6:0:4**

COURSE OBJECTIVE:

1. To improve the understanding of database theory and practices.
2. To prepare the students implement database manipulation in SQL.

CO Number	CO Statement	Knowledge Level
CO1	Remember the basics of Database.	K1
CO2	Understand Database Systems Concept and Architecture.	K2
CO3	Demonstrate the functions of the Relational Data Model and SQL.	K3
CO4	Study the basics of Basics SQL.	K4
CO5	Analyze advanced SQL commands and statements.	K5

Subject Title	DATABASE SYSTEMS		Semester	I/III	
Subject Code	**21UCSA03**		Specialization	NA	
Type	**Allied: Theory**		L:T:P:C	86:6:0:4	
Unit	Contents			Levels	Sessions
I	Introduction to Databases – Introduction - Characteristics of the Database Approach -Advantages of Using the DBMS Approach -A Brief History of Database Applications.			**K1**	**14**
II	Database Systems Concept and Architecture : Data Models, Schemas, and Instances - Three Schema Architecture and Data Independence - Database Languages and Interfaces- - The Database System Environment - Centralized and Client/Server Architectures for DBMSs- Classification of Database Management Systems.			**K2**	**18**
III	The Relational Data Model and SQL - Database Constraints - Relational Model Concepts- Key concepts - Relational Model Constraints and Relational Database Schemas - Update Operations, Transactions, and Dealing with Constraint Violations.			**K3**	**18**
IV	Basic SQL - SQL Data Definition and Data Types - Specifying Constraints in SQL - Basic Retrieval Queries in SQL - INSERT, DELETE, and UPDATE Statements in SQL - Additional Features of SQL.			**K4**	**18**
V	More SQL: Complex Queries, Triggers, Views, and Schema Modification - More Complex SQL Retrieval Queries - Specifying Constraints as Assertions and Actions as Triggers -Views (Virtual Tables) in SQL.			**K5**	**18**
	Learning Resources				
Text Books	RamezElmasri and Shamkant B. Navathe, ‒Fundamentals of database systems‖,6thEdition, Addison-Wesley Publication, 2011.				
Reference Books	Raghu Ramakrishnan, Madison,Johannes Gehrke,‒Database Management Systems‖, 3rd Edition,McGraw-Hill Higher Education, 2003.				
Website/ Link	1.www.db-book.com/db7 2.www.mheducation.co.in				

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	S	M	M
CO2	S	M	L	S
CO3	S	M	L	M
CO4	M	S	M	M
CO5	S	M	L	L

S- Strong , M- Medium , L – Low

Subject Title	**E-COMMERCE TECHNIQUES**	Semester	II/IV
Subject Code	**21UCSA04**	Specialization	NA
Type	**Allied: Theory**	**L:T:P:C**	**56:4:0:4**

COURSE OBJECTIVE:

1. To improve the understanding of E-COMMERCE and E-payments.
2. To prepare the students implement HTML and E- mail creation.

CO Number	CO Statement	Knowledge Level
CO1	Remember the basics of Ecommerce and Indian Business.	K1
CO2	Understand WWW.	K2
CO3	Demonstrate the E payment system.	K3
CO4	Study the basics of Web Designing.	K4
CO5	Analyze Email components.	K5

Subject Title	E-COMMERCE TECHNIQUES		Semester	II/IV
Subject Code	**21UCSA04**		Specialization	NA
Type	Allied: Theory		L:T:P:C	56:4:0:4
Unit	**Contents**		Levels	Sessions
I	History of E-commerce and Indian Business Context: E-Commerce –Emergence of the Internet – Emergence of the WWW – Advantages of E-Commerce – Transition to E-Commerce in India – The Internet and India – E-transition Challenges for Indian Corporate. Business Models for E-commerce: Business Model – E-business Models Based on the Relationship of Transaction Parties - E-business Models Based on the Relationship of Transaction Types. .		**K1**	**12**
II	Enabling Technologies of the World Wide Web: World Wide Web – Internet Client-Server Applications – Networks and Internets – Software Agents – Internet Standards and Specifications – ISP.E-Marketing : Traditional Marketing – Identifying Web Presence Goals – Online Marketing – E-advertising – E-branding.		**K2**	**12**
III	E-Payment Systems: Main Concerns in Internet Banking – Digital Payment Requirements – Digital Token-based e-payment Systems – Classification of New Payment Systems – Properties of Electronic Cash – Cheque Payment Systems on the Internet. Information systems for Mobile Commerce: Introduction – Wireless Applications – Cellular Network – Wireless Spectrum – Technologies for Mobile Commerce – Wireless Technologies.		**K3**	**12**
IV	HTML and Web Designing: Brief History of HTML – HTML Tags – Table Creation – Hyperlink – Reference – Headings – Alignment - Simple Web Page Creation.		**K4**	**10**
V	E-mail: Email – Email Components - use of Email–Email creation–browsing–search engines–downloads.		**K5**	**10**
	Learning Resources			
Text Books	1. P.T.Joseph, ‒E-Commerce - An Indian Perspective‖, 4th Edition, PHI Learning, 2012. 2. C Xavier, ‒World Wide Web Design with HTML‖, 13th Reprint, Tata McGraw Hill, 2006. 3. A.Leon and M.Leon, ‒Introduction to Information Technology‖, 1st Edition, Vijay Nicole Publications, 2013.			
Reference Books	1. David Whiteley, ‒E-Commerce Strategy, Technologies and Applications‖, 1st Edition, Tata Mc-Graw-Hill, 2001. 2. Kamalesh K Bajaj and Debjani Nag, ‒E-Commerce – The cutting edge of Business‖, 2nd Edition, Tata McGraw-Hill Education, 2005.			

	3. Alexis Leon and Mathews Leon, ‒Internet for Everyone‖, 15th Anniversary Edition, Leon Tech world, UBS Publications, 2012. 4. Ritendra Goel, ‒e-commerce‖, New Age International Publishers, 2016.
Website/ Link	https://e_commerce_pdf_download.peatix.com/ www.tutorialpoints.com/html https://books.google.com/books/about/a//_wide_web_design_with_html.html?id =6apoxl=z4nwc

Mapping with Programme Outcomes

CO Number	PO1	PO2	PO3	PO4
CO1	S	M	L	L
CO2	S	M	L	L
CO3	S	M	L	L
CO4	M	S	M	M
CO5	S	M	M	L

S- Strong , M- Medium , L – Low

Note: This paper should be handled and valued by Department of Computer Science.

Subject Title	**ALLIED PRACTICAL - II HTML PROGRAMMING**	**Semester**	**II/IV**
Subject Code	**21UCSAP02**	**Specialization**	**NA**
Type	**Allied: Practical**	**L:T:P:C**	**30:0:2:2**

COURSE OBJECTIVE:

1. To enable the students to design and develop the WEB PAGES.
2. To qualify the students working with tags in table .
3. To improve creative thinking in forms ,lists and frames.

LIST OF PROGRAMS

1. Write HTML code to develop a web page that contains the different background and foreground color, with various styles.

2. Write HTML code to create a Webpage that contains an Image at its left hand side of the page when user clicks on the image; it should open another web page that displays the details of that image.

3. Create a web Page using HREF tag having the attribute ALINK, VLINK etc.

4. Create a web page, when user clicks on the link it should go to the bottom of the page.

5. Write a HTML code to create a web page of pink color and display moving message in red color.

6. Create a web page, showing an ordered list of name of your five friends and unordered list of any five your hobbies.

7. Create a HTML document containing a nested list showing the content page of any book.

8. Create a student mark list in HTML using Tables.

9. Create a HTML page to demonstrate the usage of Frames. Choose the content of the page on your own.

10. Design an application for pay slip through HTML forms.

COURSE OUTCOME:

On successful completion of the course, the students will

1. Understand the features in HTML.
2. Select and apply tags for create text, list and table.
3. Combine multiple features in forms, frames and texts.

Note: For University Practical Exam, both Internal and External should be appointed from Department of Computer Science.

B.Sc-Computer Science Syllabus under CBCS Pattern with effect from 2021-2022 Onwards