PERIYAR UNIVERSITY

PERIYAR PALKALAI NAGAR

SALEM – 636011

BACHELOR OF COMPUTER APPLICATIONS (BCA)

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

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. ELIGIBILITY 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 norms set by the Government of Tamil Nadu or an Examination accepted as equivalent thereto by the syndicate, subject to such conditions as may be prescribed, are permitted to appear and qualify for the **Bachelor of Computer Applications** degree examination of this university after a programme of study of three academic years.

5. PROGRAMME OBJECTIVES AND OUTCOMES

➢ 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 and project experience 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, to 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.

➢ Programme Specific Outcomes(PSOs)

After completion of the programme the graduates will be able

PSO1: To understand the fundamental concepts of computer system, including hardware and networking.

PSO2: To Design, and analyze precise specifications of algorithms, procedures, and interaction behavior.

PSO3: To communicate effectively in both verbal and written form in industry and society.

PSO4: To apply the technologies in various fields of Computer Science, including Mobile applications, Web site development and management, databases, and computer networks.

➢ Programme Outcomes(POs)

After completion of the programme, the graduates will be able

PO1: To understand the fundamental concepts of computer system.

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

PO3: To apply the technologies in various fields of Computer Applications.

PO4: To communicate effectively in both verbal and written form in industry and society.

6. DURATION OF THE PROGRAMME

The Programme shall extend over a period of three years comprising of 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 as 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 like NSS, YRC, SPORTS and RRC for the fulfillment of the degree.

8. EXAMINATIONS

The theory examination shall be three hour duration for each subject 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 where 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 certified that the candidate has performed the experiments prescribed for the subject. 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, if found necessary.

10. PASSING MINIMUM MARKS

(a)Theory

The candidate shall be declared to have passed the examination if the candidate **secures not less than 40 marks** 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 BCA

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 same pattern

(ii) Core & 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 2021-22 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	-	-	-	-	6
PART – II	3	3	-	-	-	-	6
ALLIED	4	6	4	6	-	-	20
MAJOR	5	10	13	12	12	5	57
PRATICAL	2	2	2	2	4	8	20
ELECTIVE	-	-	-	-	4	8	12
SBEC	-	-	3	3	3	3	12
NMEC	-	-	2	2	-	-	4
PROFESSIONAL ENGLISH	4	4	-	-	-	-	8
EVS	-	-	-	-	-	-	-
ADD-ON COURSE	-	-	-	-	-	-	-
VALUE EDUCATION	2	-	-	-	-	-	2
EXTENSION ACTIVITY	-	-	-	-	-	1	1
Cumulative Total Credits	23	28	24	25	23	25	148

COURSE OF STUDY AND SCHEME OF EXAMINATION

Part	Subject Code	Subject Title	Hours		Credits	Marks		
			Lect.	Lab		CIA	EA	Total
SEMESTER I								
I	21UFTA01	Tamil I	6	-	3	25	75	100
II	21UFEN01	English I	6	-	3	25	75	100
II	21UCA01	Core I: Problem Solving Through C	6	-	5	25	75	100
III	21UCAP01	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								
I	21UFTA02	Tamil II	6	-	3	25	75	100
II	21UFEN02	English II	6	-	3	25	75	100
III	21UCA02	Core II : Object Oriented Programming Concepts using C ++	3	-	5	25	75	100
III	21UCAP02	Practical II : C++ Programming Lab	-	3	2	40	60	100
III	21UCA03	Core III: Computer Organization and Architecture	4	-	5	25	75	100
III		Allied II	5	-	4	25	75	100
III		Allied II – 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**	**28**	**255**	**645**	**900**

Part	Subject Code	Subject Title	Hours		Credits	Marks		
			Lect.	Lab		CIA	EA	Total
SEMESTER III								
III	21UCA04	Core IV : Data Structure and Algorithms	5	-	5	25	75	100
III	21UCA05	Core V: Operating System	6	-	4	25	75	100
III	21UCA06	Core VI: Relational Database Management Systems	5	-	4	25	75	100
III	21UCAP03	Practical III: SQL and PL/SQL	-	3	2	40	60	100
III		Allied III	7	-	4	25	75	100
III		Allied Practical	-	-	-	-	-	-
III	21UCASP01	SBEC I- Office Automation Lab	-	2	3	40	60	100
IV	NMEC –I	Non –Major Elective – I	2	-	2	25	75	100
	Total		**25**	**5**	**24**	**205**	**495**	**700**
SEMESTER IV								
III	21UCA07	Core VII : Computer Network	5	-	4	25	75	100
III	21UCA08	Core VIII : Programming in Java	5	-	4	25	75	100
III	21UCAP04	Practical IV: Java programming	-	3	2	40	60	100
III	21UCA09	Core IX :Software Engineering	6	-	4	25	75	100
III		Allied IV	5	-	4	25	75	100
III		Allied –Practical	-	2	2	40	60	100
IV	21UCASP02	SBEC - II : Image Editing Tool	-	2	3	40	60	100
IV	NMEC - II	Non –Major Elective – II	2	-	2	25	75	100
IV	Add-on	Add-on Course Internship Programme	-	-	-	-	-	-
	Total		**23**	**7**	**25**	**245**	**555**	**800**

*** Allied Practical Examination will be conducted at the end of even semester.**

Part	Subject Code	Subject Title	Hours		Credits	Marks		
			Lect.	Lab		CIA	EA	Total
SEMESTER V								
III	21UCA10	Core X : Data Mining and Warehousing	5	-	4	25	75	100
III	21UCA11	Core XI : Web Technology	5	-	4	25	75	100
III	21UCAP05	Practical V : Web Technology Lab	-	3	2	40	60	100
III	21UCA12	Core XII: Visual Programming	5	-	4	25	75	100
III	21UCAE01/02/03	Elective – I	5	-	4	25	75	100
III	21UCAP06	Practical VI: Programming in VB	-	4	2	40	60	100
IV	21UCASP03	SBEC – III :Mobile Application Development	-	3	3	40	60	100
	Total		**20**	10	**23**	**220**	**480**	**700**
SEMESTER VI								
III	21UCA13	Core XIII : Programming in Python	6	-	5	25	75	100
III	21UCAP07	Practical VII :Python Programming	-	4	3	40	60	100
III	21UCAPR01	Mini Project	-	5	5	40	60	100
III	21UCAE04/05/06	Elective II	6	-	4	25	75	100
III	21UCAE07/08/09	Elective III	6	-	4	25	75	100
IV	21UCAS01	SBEC - IV : Quantitative Aptitude	3	-	3	25	75	100
V	21UEX01	Extension Activity	-	-	1	-	-	-
	Total		**21**	**9**	**25**	**180**	**420**	**600**

ELECTIVE SUBJECTS

Elective – I

Sem	Part	Subject Code	Subject Title
V	III	21UCAE01	Artificial Intelligence
		21UCAE02	Management Information System
		21UCAE03	Mobile Computing

Elective – II

Sem	Part	Subject Code	Subject Title
VI	III	21UCAE04	Wireless Network
		21UCAE05	Computer Graphics
		21UCAE06	Software Testing

Elective – III

Sem	Part	Subject Code	Subject Title
VI	III	21UCAE07	E-Commerce Technology
		21UCAE08	Software Project Management
		21UCAE09	Internet of Things

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Non Major Elective Course – (NMEC)

Extra Disciplinary Subjects offered by the Department of Computer Science/BCA

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

PART	SEM	SUB CODE	SUBJECT TITLE	Lect. Hours	Credit	MARKS		
						CIA	EA	TOTAL
SEMESTER –III & IV								
IV	III	21UCAN01	NMEC I: Basics of Computers	2	2	25	75	100
		21UCAN02	NMEC I: Computer Applications for Automation	2	2	25	75	100
	IV	21UCAN03	NMEC II: Basics of Internet	2	2	25	75	100
		21UCAN04	NMEC II: Image Editing Tool	2	2	25	75	100

SBEC – Skill Based Elective Courses

Part	Semester	Subject Title	Hours		Credits	Marks		
			Lecture	LAB		CIA	EA	Total
IV	III	**SBEC – I :** Office Automation Lab	-	2	3	40	60	100
IV	IV	**SBEC – II :** Image Editing Tool	-	2	3	40	60	100
IV	V	**SBEC - III :** Mobile Application Development	-	3	3	40	60	100
IV	VI	**SBEC-IV :** Quantitative Aptitude	3		3	25	75	100

Allied Subjects for any Degree offered by the Department of Computer Applications
SYLLABUS - CBCS PATTERN

EFFECTIVE FROM THE ACADEMIC YEAR 2021-2022

All Papers should be handled and valued by Computer Science Department only. For University practical examinations both Internal and External examiners should be appointed from Department of Computer Science / Applications. **(Select any one of the Subject options with Practical)**

FIRST OPTION (Allied Computer Science)
First Year / Second Year

PART	SEMESTER	SUBJECT TITLE	Hrs.		CREDIT	MARKS		
			Lect.	Lab		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	SUBJECT TITLE	Hrs.		CREDIT	MARKS		
			Lect.	Lab		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	SUBJECT TITLE	Hrs.		CREDIT	MARKS		
			Lect.	Lab		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 – II Statistical Practical	-	2	2	40	60	100

SECOND OPTION

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

PART	SEMESTER	SUBJECT TITLE	Hrs.		CREDIT	MARKS		
			Lect.	Lab		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

THIRD OPTION

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

PART	SEMESTER	SUBJECT TITLE	Hrs.		CREDIT	MARKS		
			Lect.	Lab		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	69	100

FOURTH OPTION

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

PART	SEMESTER	SUBJECT TITLE	Hrs.		CREDIT	MARKS		
			Lect.	Lab		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	SUBJECT TITLE	Hrs.		CREDIT	MARKS		
			Lect.	Lab		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	**21UCA01**	**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 the 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	**21UCA01**	**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	1.http://www.learn-c.org/ 2.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	**21UCAP01**	**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	**Object Oriented Programming Concepts Using C ++**	**Semester**	**II**
Subject Code	**21UCA02**	**Specialization**	**NA**
Type	**Core: Theory**	**L:T:P:C**	**45:3:0:5**

COURSE OBJECTIVE:

1. To apprehend the basic concepts of C++- Programming language. This course introduces fundamental concepts such as oops, arrays, structures.
2. It covers concepts such as overloading and inheritance and file handling methods.
3. It provides technical skills to design and develop various applications.

CO Number	**CO Statement**	**Knowledge Level**
CO1	Recognize the Basic Terminologies of oops.	K1
CO2	Understanding the classes and objects.	K2
CO3	Understand and apply the over loading, Inheritance and then apply the simple problems.	K3
CO4	Demonstrate the pointers.	K4
CO5	Recognize the operation of Files.	K5

Subject Title	**Object Oriented Programming Concepts Using C ++**	**Semester**	**II**	
Subject Code	**21UCA02**	**Specialization**	**NA**	
Type	**Core: Theory**	**L:T:P:C**	**45:3:0:5**	
Unit	**Contents**		**Levels**	**Sessions**
I	Introduction to C++ - key concepts of Object-Oriented Programming –Advantages – Object Oriented Languages – I/O in C++ - C++ Declarations. Control Structures : - Decision Making and Statements : If ..else, jump, goto, break, continue, Switch case statements - Loops in C++ : for, while, do - functions in C++ - inline functions – Function Overloading.		**K1**	**8**
II	Classes and Objects: Declaring Objects – Defining Member Functions – Static Member variables and functions – array of objects –friend functions – Overloading member functions – Bit fields and classes – Constructor and destructor with static members.		**K2**	**8**
III	Operator Overloading: Overloading unary, binary operators – Overloading Friend functions – type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchal, Hybrid, Multi path inheritance – Virtual base Classes – Abstract Classes.		**K3**	**8**
IV	Pointers – Declaration – Pointer to Class , Object – this pointer – Pointers to derived classes and Base classes – Arrays – Characteristics – array of classes – Memory models – new and delete operators – dynamic object – Binding, Polymorphism and Virtual Functions.		**K4**	**10**
V	Files – File stream classes – file modes – Sequential Read / Write operations – Binary and ASCII Files – Random Access Operation – Templates – Exception Handling - String – Declaring and Initializing string objects – String Attributes – Miscellaneous functions .		**K5**	**11**
	Learning Resources			
Text books	1. E. Balagurusamy, "*Object-Oriented Programming with C++",* TMH 2013, 7th Edition.			
Reference Books	1. Ashok N Kamthane, "*Object-Oriented Programming with ANSI and Turbo C++",* Pearson Education 2003. 2. Maria Litvin & Gray Litvin, "*C++ for you*", Vikas publication 2002.			
Website/ Link	NPTEL & MOOC courses titled Object oriented programming concepts using C++ 1.https://nptel.ac.in/courses/106/105/106105151/ 2.http://www.learn-cpp.org/			

Mapping with Programme Outcomes

CO Number	PS01	PS02	PS03	PS04
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

Subject Title	**PRACTICAL I : C++ Programming Lab**	**Semester**	**II**
Subject Code	**21UCAP02**	**Specialization**	**NA**
Type	**Core: Practical**	**L:T:P:C**	**45:0:3:2**

COURSE OBJECTIVE:

1. To enable the students to design and develop the C++ programs.
2. To qualify the students working with overloading and inheritance.
3. To improve creative thinking in virtual functions and files.

LIST OF PROGRAMS

1. Write a C++ program to demonstrate function overloading, Default Arguments and Inline function.
2. Write a C++ program to demonstrate Class and Objects with the concept of Passing Objects to Functions.
3. Write a C++ program to demonstrate Constructor and Destructor.
4. Write a C++ program to demonstrate Unary and Binary Operator Overloading.
5. Write a C++ program to demonstrate:
    - Single Inheritance.
    - Multilevel Inheritance.
    - Multiple Inheritance.
    - Hierarchical Inheritance.
    - Hybrid Inheritance.
6. Write a C++ program to demonstrate Virtual Functions.
7. Write a C++ program to manipulate a Text File.
8. Write a C++ program to perform Sequential I/O Operations on a file.
9. Write a C++ program to find the Biggest Number using Command Line Arguments.
10. Write a C++ program to demonstrate Class Template.
11. Write a C++ program to demonstrate Exception Handling.

COURSE OUTCOME:

On successful completion of the course, the students will

1. Understand the features in OOPS.
2. Select and apply proper statement relative to problems.
3. Combine multiple features in C++ to implement complex problems.

Subject Title	**COMPUTER ORGANIZATION AND ARCHITECTURE**	**Semester**	**II**
Subject Code	**21UCA03**	**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	**21UCA03**	**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**	**10**
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**	**10**
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**	**12**
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**	**12**
	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	**DATA STRUCTURES AND ALGORITHMS**	**Semester**	**III**
Subject Code	**21UCA04**	**Specialization**	**NA**
Type	**Core: Theory**	**L:T:P:C**	**71:5:0:5**

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**	**III**	
Subject Code	**21UCA04**	**Specialization**	**NA**	
Type	**Core: Theory**	**L:T:P:C**	**71:5:0:5**	
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**	**12**
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**	**12**
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**	**17**
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**	**17**
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**	**13**
	Learning Resources			
Text Books	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	**OPERATING SYSTEM**	**Semester**	**III**
Subject Code	**21UCA05**	**Specialization**	**NA**
Type	**Core: Theory**	**L:T:P:C**	**86:6:0:4**

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**	**III**	
Subject Code	**21UCA05**	**Specialization**	**NA**	
Type	**Core: Theory**	**L:T:P:C**	**86:6:0:4**	
Unit	**Contents**		**Levels**	**Sessions**
I	Introduction – History of operating system- Different kinds of operating system – Operation system concepts - System calls-Operating system structure.		**K1**	**17**
II	Processes and Threads: Processes – threads – thread model and usage – inter process communication.		**K2**	**17**
III	Scheduling - Memory Management: Memory Abstraction – Virtual Memory - page replacement algorithms.		**K1,K3**	**17**
IV	Deadlocks: Resources- introduction to deadlocks – deadlock detection and recovery – deadlocks avoidance – deadlock prevention. Multiple processor system: multiprocessors – multi computers.		**K3,K4**	**17**
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**	**18**
	Learning Resources			
Text Books	1. 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

Subject Title	**RELATIONAL DATABASE MANAGEMENT SYSTEMS**	**Semester**	**III**
Subject Code	**21UCA06**	**Specialization**	**NA**
Type	**Core: Theory**	**L:T:P:C**	**71:5:0:4**

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

Subject Title	**RELATIONAL DATABASE MANAGEMENT SYSTEMS**	**Semester**	**III**	
Subject Code	**21UCA06**	**Specialization**	**NA**	
Type	**Core: Theory**	**L:T:P:C**	**71:5:0:4**	
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**	**11**
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**	**15**
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**	**15**
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**	**15**
V	PL/SQL Composite Data Types: Records – Tables – Varrays. Named Blocks: Procedures – Functions – Packages - Triggers – Data Dictionary Views.		**K5**	**15**
	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	Alexix Leon & Mathews Leon, "Essential of DBMS", 2nd reprint, Vijay Nicole Publications, 2009.
Website / Link	1.https://www.w3schools.com/sql 2. https://www.tutorialspoint.com/sql 3. 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	**21UCAP03**	**Specialization**	**NA**
Type	**Core: Practical**	**L:T:P:C**	**45:0:3:2**

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, update) 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	SBEC I - OFFICE AUTOMATION LAB	Semester	III
Subject Code	21UCASP01	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	**COMPUTER NETWORKS**	**Semester**	**IV**
Subject Code	**21UCA07**	**Specialization**	**NA**
Type	**Core: Theory**	**L:T:P:C**	**71:5:0:4**

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

Subject Title	**COMPUTER NETWORKS**	**Semester**	**IV**	
Subject Code	**21UCA07**	**Specialization**	**NA**	
Type	**Core: Theory**	**L:T:P:C**	**71:5:0:4**	
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**	**10**
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**	**15**
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**	**15**
IV	Network Layer - Design Issues - Routing Algorithms - Congestion Control Algorithms - IP Protocol - IP Addresses - Internet Control Protocols.		**K3,K4**	**15**
V	Transport Layer - Services - Connection Management - Addressing, Establishing and Releasing a Connection - Simple Transport Protocol - Internet Transport Protocols (ITP) - Network Security: Cryptography.		**K5**	**16**
	Learning Resources			
Text Books	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

Subject Title	**PROGRAMMING IN JAVA**	**Semester**	**IV**
Subject Code	**21UCA08**	**Specialization**	**NA**
Type	**Core: Theory**	**L:T:P:C**	**71:5:0:4**

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	**21UCA08**	**Specialization**	**NA**	
Type	**Core: Theory**	**L:T:P:C**	**71:5:0:4**	
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**	**17**
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**	**17**
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**	**13**
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		**K5**	**12**

	display - Graphics Class: Drawing and filling lines – Rectangles – Polygon – Circles – 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/java 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	21UCAP04	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.

Subject Title	**SOFTWARE ENGINEERING**	**Semester**	**IV**
Subject Code	**21UCA09**	**Specialization**	**NA**
Type	**Core: Theory**	**L:T:P:C**	**86:6:0:4**

COURSE OBJECTIVE:

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

CO Number	**CO Statement**	**Knowledge Level**
CO1	Remember the basics of software engineering and models.	K1
CO2	Understand requirement and Analysis.	K2
CO3	Demonstrate the functions of software design.	K3
CO4	Study the object modeling.	K4
CO5	Analyze testing technologies.	K5

Subject Title	**SOFTWARE ENGINEERING**	**Semester**	**IV**	
Subject Code	**21UCA09**	**Specialization**	**NA**	
Type	**Core: Theory**	**L:T:P:C**	**86:6:0:4**	
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**	**17**
II	Requirement Analysis and Specification – Gathering and Analysis – SRS – Formal System Specification		**K2**	**17**
III	Software Design – Overview – Characteristics – Cohesion & Coupling – Layered design – Approaches Function Oriented Design – Structured Analysis – DFD – Structured Design – Detailed design		**K3**	**17**
IV	Object Modeling using UML – OO concepts – UML – Diagrams – Use case, Class, Interaction, Activity, State Chart – Postscript		**K4**	**17**
V	Coding & Testing – coding – Review – Documentation – Testing – Black-box, White-box, Integration, OO Testing, Smoke testing.		**K5**	**18**
	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	**PS01**	**PS02**	**PS03**	**PS04**
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

Subject Title	**SBEC IV : IMAGE EDITING TOOL**	**Semester**	**IV**
Subject Code	**21UCASP02**	**Specialization**	**NA**
Type	**SBEC: Practical**	**L:T:P:C**	**30:0:2:3**

COURSE OBJECTIVE:

1. To impart Practical Training in PHOTO SHOP 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.

LIST OF PROGRAMS:

1. Design a greeting card for birthday using different text effects.
2. Apply various filter effects to an image.
3. Design the front page of the college calendar using gradient.
4. Create a pattern using pattern stamp tool and clone stamp tool.
5. Design a web page layout.
6. Design a bunch of flowers.
7. Perform/Simulate Plastic Surgery on any part of the face.
8. Create See-through texts
9. Convert Black and White Photo to Color Photo
10. Fill a text with an appropriate image (Example: The word “Flower” should be filled with some flower image

COURSE OUTCOME:

1. Study all the Basic tools in Photo Shop.
2. Practice the usage of web page creation and useable objects.
3. Apply various effects on image.
4. Analysis the use of coloring on images.

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 analyse 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	**DATA MINING AND WAREHOUSING**	**Semester**	**V**
Subject Code	**21UCA10**	**Specialization**	**NA**
Type	**Core: 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 basics of data mining.	K1
CO2	Understand data mining query language.	K2
CO3	Demonstrate the mining associative rules.	k3
CO4	Study classification and prediction.	K4
CO5	Analyze cluster Technologies.	K5

Subject Title	**DATA MINING AND WAREHOUSING**	**Semester**	**V**	
Subject Code	**21UCA10**	**Specialization**	**NA**	
Type	**Core: 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**	**12**
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**	**12**
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**	**13**
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**	**17**
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**	**17**
	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

Mapping with Programme Outcomes

CO Number	PS01	PS02	PS03	PS04
CO1	S	S	M	-
CO2	M	S	-	S
CO3	S	S	L	M
CO4	M	S	M	L
CO5	S	M	M-	L

S- Strong , M- Medium , L – Low

Subject Title	**WEB TECHNOLOGY**	**Semester**	**V**
Subject Code	**21UCA11**	**Specialization**	**NA**
Type	**Core: Theory**	**L:T:P:C**	**75:5:0:4**

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	**21UCA11**	**Specialization**	**NA**	
Type	**Core: Theory**	**L:T:P:C**	**75:5:0:4**	
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**	**15**
	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			

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	**21UCAP05**	**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.

COURSE OUTCOME:

1. Study all the Basic tools.
2. Practice the usage of web page creation and useable objects.
3. Apply various effects webpage.
4. Analysis the use of java script and html code.

Subject Title	**VISUAL PROGRAMMING**	**Semester**	**V**
Subject Code	**21UCA12**	**Specialization**	**NA**
Type	**Core: Theory**	**L:T:P:C**	**75:5:0:4**

COURSE OBJECTIVE:

- To introduce the basics of VB.
- To understand the concepts MDI Applications, ADO and Active X.
- To improve creative thinking in creating forms.

CO Number	**CO Statement**	**Knowledge Level**
CO1	Remember the basics of VB.	K1
CO2	Understand data and files in VB.	K2
CO3	Demonstrate the MDI Applications.	K3
CO4	Study of data control.	K4
CO5	Analyze the ADO and Active X.	K5

Subject Title	**VISUAL PROGRAMMING**	**Semester**	**V**	
Subject Code	**21UCA12**	**Specialization**	**NA**	
Type	**Core: Theory**	**L:T:P:C**	**75:5:0:4**	
Unit	**Contents**		**Levels**	**Sessions**
I	Welcome to Visual Basic – Creating an Application – IDE Forms and Controls – Variables in Visual Basic.		**K1**	**15**
II	Writing Code in Visual Basic – Working with File – Me		**K2**	**15**
III	Multiple Document Interface Applications – Debugging Tips – The Common Dialog Control.		**K3**	**15**
IV	Introduction to Database – Working with the Data Control – Data Access Objects.		**K4**	**15**
V	ActiveX Data Objects – Crystal and Data Report – Active X.		**K5**	**15**
	Learning Resources			
Text Books	Programming with Visual Basic 6.0, Mohammed Azam, Vikas Publishing House Pvt. Ltd., Chennai.			
Reference Books	1. Gary Cornell, "Visual Basic 6 from the Ground up", McGraw-Hill Education,1998 2. Julia Case Bradley and Anita C.Millspaugh, "Programming in Visual Basic 6.0", Tata McGraw-Hill Edition, 2011.			
Website/ Link	NPTEL & MOOC courses titled VB https://www.freetutes.com/learn-vb6/			

Mapping with Programme Outcomes

CO Number	**PS01**	**PS02**	**PS03**	**PS04**
CO1	S	M	M	--
CO2	M	S	L	-
CO3	S	M	L	M
CO4	S	M	M	L
CO5	S	M	L	L

S- Strong , M- Medium , L – Low

Subject Title	**PRACTICAL V : PROGRAMMING IN VB**	**Semester**	**V**
Subject Code	**21UCAP06**	**Specialization**	**NA**
Type	**Core: Practical**	**L:T:P:C**	**60:0:4:2**

COURSE OBJECTIVE:

1. To enable the students to design and develop the VB programs.
2. To qualify the students working with numbers and strings.
3. To improve creative thinking in creating forms.

LIST OF PROGRAMS:

1. Construction of an Arithmetic Calculator (Simple).
2. Writing simple programs using loops and decision making statements.
   a. Generate Fibonacci series.
   b. Find the sum of N numbers.
   c. To display the numbers/symbols in triangle format.
3. Write a program to create a menu and MDI Forms.
4. Write a program to create a simple input screen with four basic controls to read input and write it to a file.
5. Write a program to display files in a directory using DriveListBox, DirListBox and FileListBox control and open, edit and save text file using Rich text box control.
6. Write a program to illustrate Common Dialog Control and to open, edit and save text file
7. Write a program to develop windows based installation file with Student Registration form and Login form using database access
8. Develop a program to Insert, update, delete a Record in database using ADO
9. Write a program to implement Personal Information System using MDI and Standard ADODC controls and reports.
10. Write a program to implement animation using timers.
11. Railways Reservation System (Using Tables).

COURSE OUTCOME:

On successful completion of the course, the students will

1. Understand the features in VB.
2. Select and apply statements for design forms.
3. Combine multiple features in interface and database.

Subject Title	SBEC III : MOBILE APPLICATION DEVELOPMENT	Semester	V
Subject Code	21UCASP03	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.

Subject Title	**PROGRAMMING IN PYTHON**	**Semester**	**VI**
Subject Code	**21UCA13**	**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	**21UCA13**	**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**	**15**
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**	**11**
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			

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	**21UCAP07**	**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	**21UCAS01**	**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 the data representation methods.	K5

Subject Title	**QUANTITATIVE APTITUDE**	**Semester**	**VI**	
Subject Code	**21UCAS01**	**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**	**08**
II	Problems on Ages - Surds and Indices - percentage - profits and loss - ratio and proportion - partnership - Chain rule.		**K2**	**08**
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**	**08**
IV	Permutation and combination - probability - True Discount - Bankers Discount - Height and Distances - Odd man out & Series.		**K4**	**08**
V	Calendar - Clocks - stocks and shares - Data representation - Tabulation - Bar Graphs - Pie charts - Line graphs.		**K5**	**09**
	Learning Resources			
Text Books	"Quantitative Aptitude", R.S. AGGARWAL., S. Chand & Company Ltd.,			
Reference Books	"Quantitative Aptitude for Competitive examinations" Abhijit Guha – 4th edition – Tata MH			
Website / Link	1. https://textbook.com/aptitude 2.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

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

ANNEXURE II

CONTENTS

Chapter Page No.

ANNEXURE III

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 Computer Application

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/Information Science/Computer Applications 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 ARTIFICIAL INTELLIGENCE	Semester	V
Subject Code	21UCAE01	Specialization	NA
Type	Elective : Theory	L:T:P:C	71:5:0:4

COURSE OBJECTIVE:

1. To make the student understand the concepts of Artificial Intelligence.
2. To familiar with various AI Techniques and Expert Systems.
3. To have enriched knowledge regarding heuristic search, Knowledge representation and Expert systems.

CO Number	CO Statement	Knowledge Level
CO1	Remember the basic concepts of Artificial Intelligence.	K1
CO2	Understanding Heuristic Search techniques.	K1,K2
CO3	Apply Knowledge representations.	K3
CO4	Evaluate Using Predicate Logic.	K4
CO5	Implement Expert System	K5

Subject Title	SEMESTER – V PAPER – I ARTIFICIAL INTELLIGENCE	Semester	V	
Subject Code	21UCAE01	Specialization	NA	
Type	Elective : Theory	L:T:P:C	71:5:0:4	
Unit	Contents		Levels	Sessions
I	Introduction: AI Problems – AI techniques – Criteria for success. Problems, Problem Spaces, Search: State space search – Production Systems – Problem Characteristics – Issues in design of Search.		K1	11
II	Heuristic Search techniques: Generate and Test – Hill Climbing – Best-Fist, Problem Reduction, Constraint Satisfaction, Means-end analysis.		K1,K2	15
III	Knowledge representation issues: Representations and mappings – Approaches to Knowledge representations – Issues in Knowledge representations – Frame Problem.		K3	15
IV	Using Predicate Logic: Representing simple facts in logic – Representing Instance and Isa relationships – Computable functions and predicates – Resolution – Natural deduction.		K4	15
V	Representing knowledge using rules: Procedural Vs Declarative knowledge – Logic programming – Forward Vs Backward reasoning – Matching – Control knowledge Brief explanation of Expert Systems-Definition- Characteristics-architecture- Knowledge Engineering- Expert System Life Cycle-Knowledge Acquisition Strategies- Expert System Tools.		K5	15
	Learning Resources			
Text Books	Elaine Rich and Kevin Knight, Shiva Shankar Nair, "*Artificial Intelligence*", McGraw-Hill Companies, 3rd edition.			
Reference Books	1. Stuart Russell & Peter Norvig , "*Artificial Intelligence A Modern Approach*", Perason, 2nd Edition. 2. George F Luger , "*Artificial Intelligence"*, Pearson 2002, 4th Edition. 3. V S Janaki Raman, K Sarukesi, P Gopalakrishnan, "*Foundations of Artificial Intelligent and Expert Systems*", MacMillan Indialimited.			
Website / Link	NPTEL & MOOC courses titled Artificial Intelligence and ExpertSystems 1.https://nptel.ac.in/courses/106106140/ 2.https://nptel.ac.in/courses/106106126/			

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 – V PAPER – II MANAGEMENT INFORMATION SYSTEMS	Semester	V
Subject Code	21UCAE02	Specialization	NA
Type	Elective : Theory	L:T:P:C	71:5:0:4

COURSE OBJECTIVE:

1. To make the student understand the concepts Management information system.
2. To familiar with E-Business.
3. To be exposed to MIS in Web environment.

CO Number	CO Statement	Knowledge Level
CO1	Remember the basic concepts of MIS.	K1
CO2	Understanding MIS services.	K1,K2
CO3	Apply decision making concepts.	K3
CO4	Evaluate MIS e services.	K4
CO5	Implement Enterprise Management Systems.	K5

Subject Title	SEMESTER – V PAPER – II MANAGEMENT INFORMATION SYSTEMS	Semester	V	
Subject Code	21UCAE02	Specialization	NA	
Type	Elective : Theory	L:T:P:C	71:5:0:4	
Unit	Contents		Levels	Sessions
I	INTRODUCTION TO MIS: MIS concept – Definition – Role of MIS – Impact of MIS – MIS and the User – Management as a Control system – MIS: a support to Management – Management Effectiveness and MIS – Organization as a system – Organizational Behaviours. Process Management: Planning – Organizing – Staffing – Coordinating – Directing and – Controlling.		K1	11
II	STRATEGIC MANAGEMENT OF BUSINESS PERFORMANCE: Essentiality of Strategic Planning – Tools of Planning – Strategic Management of Business Performance – What is Strategy? – Class and Types of Strategies. Electronic Business Technology: Introduction to E-Business – Models of E-Business-Electronic Payment System – Security in E-Business – MIS and E-Business. A tool for business management: Internet and Web Process Management – strategic Management under Web – Web Enabled Business Management – Application system Architecture in Web – MIS in Web Environment		K1,K2	15
III	DECISION MAKING: Decision-making concepts – Decision-making process– Behavioral Concepts in Decision-making – Organizational Decision-making – MIS and Decision-making – Decision Methods Tools and Procedures. Information and Knowledge: Information Concepts – Information: a quality product – Classification of Information – Methods of data and Information Collection – Value of Information – General Model of a Human as an Information Processor. Choice of Information Technology: Nature of IT decision – Strategic Decision – Configuration Design – Evaluation.		K3	15
IV	APPLICATIONS IN MANUFACTURING SECTOR: Personnel, financial, production, raw material and Marketing Managements. Applications in Service Sector: Introduction to Service Sector – Creating MIS: Service Industry.		K4	15
V	MANAGEMENT OF GLOBAL ENTERPRISE: Enterprise Management Systems – ERP system – ERP Model and Modules –Benefits of ERP –ERP Product Evolution - ERP Implementation – EMS and MIS. Technology of Information Systems: Introduction – Data Processing – Transaction Processing – Application Processing – Information System processing – Human Factors and User Interface -Real Time Systems and Good Design.		K5	15
	Learning Resources			

Text Books	WamanSJawadekar, Management Information Systems Text and cases,Tata McGraw Hill Publications.5 Edition,2013
Reference Books	1. James A O'Brien &George MMarakas,Management Information Systems,Tata McGrawHillPublications,7 Edition, 2007 2. Kenneth C Laudon& Jane P Laudon,Management InformationSystems managing the digital firmPHIPublications12thEdition,2011 3. MahadeoJaiswal& Monika Mital ,Management Information Systems Oxford Publications2004
Website / Link	NPTEL.ac.in/courses/122105022/ 1. www.guru99.com/mis-tutorial.html 2. www.academia.edu/4246296/Management_Information_Systems_Tutorial

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 – V PAPER – III MOBILE COMPUTING	Semester	V
Subject Code	21UCAE03	Specialization	NA
Type	Elective : Theory	L:T:P:C	71:5:0:4

COURSE OBJECTIVE:

1. To make the student to understand the concepts of mobile computing.
2. Get 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 adhoc system.	K4
CO5	Implement mobile operating system.	K5

Subject Title	SEMESTER – V PAPER – III MOBILE COMPUTING	Semester	V	
Subject Code	21UCAE03	Specialization	NA	
Type	Elective : Theory	L:T:P:C	71:5:0:4	
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 IssuesFixed Assignment Schemes – Random Assignment Schemes – Reservation Based Schemes		K1	11
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	15
III	Mobile Telecommunication System-Global System for Mobile Communication (GSM) – General Packet Radio Service (GPRS) – Universal Mobile Tele communication System (UMTS).		K3	15
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	15
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	15
	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 PrakashAgarval, Qing and An Zeng, "*Introduction to Wireless and Mobile systems*", Thomson Asia Pvt Ltd.2005. 3. UweHansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, "*Principles of Mobile Computing*", Springer 2003.			
Website / Link	NPTEL & MOOC courses titled MobileComputing 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

ELECTIVE II

Subject Title	SEMESTER – VI PAPER – I WIRELESS NETWORK	Semester	VI
Subject Code	21UCAE04	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 – I WIRELESS NETWORK	Semester	VI	
Subject Code	21UCAE04	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	15
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	17
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	4GIntroduction – 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 SkoldAnd 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	1.www.tutorialspoint.com/wireless-Network 2.www.iqytechnicalcollege.com 3.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 – II COMPUTER GRAPHICS	Semester	VI
Subject Code	21UCAE05	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 scan 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 – II COMPUTER GRAPHICS	Semester	VI	
Subject Code	21UCAE05	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	15
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	17
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	1.www.javatpoint.com/computer-graphics 2.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

Subject Title	SEMESTER – VI PAPER – III SOFTWARE TESTING	Semester	VI
Subject Code	21UCAE06	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 – III SOFTWARE TESTING	Semester	VI	
Subject Code	21UCAE06	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	15
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	17
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	SrinivasanDesikan, Gopalaswamy RameshSoftware 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 ,HandbookPackt 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			

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

ELECTIVE III

Subject Title	SEMESTER – VI PAPER – I E-COMMERCE TECHNOLOGY	Semester	VI
Subject Code	21UCAE07	Specialization	NA
Type	Elective : Theory	L:T:P:C	86:6:0:4

COURSE OBJECTIVE:

1. To provide students with an overview and understanding of e-commerce with a specific emphasis on Internet Marketing.
2. To explore the major issues associated with e-commerce-security, privacy, intellectual property rights, authentication, encryption, acceptable use policies, and legal liabilities.

CO Number	CO Statement	Knowledge Level
CO1	Obtain a general understanding of basic business management concepts.	K1
CO2	Have complete knowledge about basic technical concepts relating to E-Commerce.	K1,K2
CO3	Obtain thorough understanding about the security issues, threats and challenges of E-Commerce.	K3
CO4	Evaluate e-Payment Systems.	K4
CO5	Implement Mobile Commerce	K5

Subject Title	SEMESTER – VI PAPER – I E-COMMERCE TECHNOLOGY	Semester	VI	
Subject Code	21UCAE07	Specialization	NA	
Type	Elective : Theory	L:T:P:C	86:6:0:4	
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	15
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	17
III	E-Security: Information system Security – Security on the Internet – E-business Risk Management Issues – Information Security Environment in India. Legal and Ethical Issues : Cybers talking – Privacy is at Risk in the Internet Age – Phishing – Application Fraud – Skimming – Copyright – Internet Gambling – Threats to Children.		K3	18
IV	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 – Risk and e-Payment Systems – Designing e-payment Systems – Digital Signature – Online Financial Services in India - Online Stock Trading		K4	18
V	Information systems for Mobile Commerce: What is Mobile Commerce? – Wireless Applications –Cellular Network – Wireless Spectrum – Technologies for Mobile Commerce – Wireless Technologies –Different Generations in Wireless Communication – Security Issues Pertaining to Cellular Technology. Portals for E- Business: Portals – Human Resource Management – Various HRIS Modules		K5	18
	Learning Resources			
Text Books	P.T.Joseph, S.J., "E-Commerce - An Indian Perspective", PHI 2012, 4th Edition.			
Reference Books	1. David Whiteley , "E-Commerce Strategy, Technologies and Applications", Tata McGraw Hill,2001. 2. Ravi Kalakota, Andrew B Whinston, "Frontiers of Electronic Commerce", Pearson 2006, 12thImpression.			

Website / Link	1. https://www.docsity.com/en/e-commerce-notes-pdf-lecture-notes-university-level/2484734/ 2. https://magnetoitsolutions.com/blog/advantages-and-disadvantages-of-ecommerce

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 SOFTWARE PROJECT MANAGEMENT	Semester	VI
Subject Code	21UCAE07	Specialization	NA
Type	Elective : Theory	L:T:P:C	86:6:0:4

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 – VI PAPER - II SOFTWARE PROJECT MANAGEMENT	Semester	VI	
Subject Code	21UCAE07	Specialization	NA	
Type	Elective : Theory	L:T:P:C	86:6:0:4	
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	17
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	18
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	18
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	18
	Learning Resources			
Text Books	Robert T. Futrell, Donald F. Shafer, Linda I. Safer, "*Quality Software Project Management*", Pearson Education Asia 2002.			
Reference Books	1. PankajJalote, "*Software Project Management in Practice*", Addison Wesley2002. 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/			

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 – VI PAPER – III INTERNET OF THINGS	Semester	VI
Subject Code	21UCAE09	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	21UCAE09	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 ResearchTopics.		K1	15
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	17
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 Education2015. 2. Francis da Costa, "*Rethinking the Internet of Things: A Scalable Approach to Connecting Everything*", Apress Publications 2013, 1stEdition. **3.** WaltenegusDargie, Christian Poellabauer, "*Fundamentals of Wireless Sensor Networks: Theory and Practice*", Wiley 2014**.**			

	4. CunoPfister, "*Getting Started with the Internet of Things*", O'Reilly Media2011.
Website /Link	1.https://github.com/connectIOT/iottoolkit 2.https://www.arduino.cc/ 3.https://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	21UCAN01	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 the data processing.	K5

Subject Title	SEMESTER – III PAPER – I BASICS OF COMPUTERS	Semester	III	
Subject Code	21UCAN01	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	05
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	05
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	05
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	05
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	06
	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, PritiSinha, "Computer Fundamentals", 3. BPB Publications, 2004. 4. Anita Goel, "Computer Fundamentals", 1st Edition, Pearson Education India, 2010.			
Website/ Link	1.https://www.gopeople.edu/blog/the_basics_of_computer_science_how_to_get_started 2.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	21UCAN02	Specialization	NA
Type	NMEC: Theory	L:T:P:C	26:2:0:2

COURSE OBJECTIVE:

1. To acquire knowledge on editor, spread sheet and 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

Subject Title	SEMESTER – III PAPER – II COMPUTER APPLICATIONS FOR AUTOMATION	Semester	III	
Subject Code	21UCAN02	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	05
II	MS-Word: Basics –Do's and Don'ts – Menus – Commands – Tool Bars – Icons – Word Formatting Tool Bar		K2	05
III	MS-Excel: Basics – Do's and Don'ts – Menus – Commands – Tool Bars – Icons		K3	05
IV	MS-PowerPoint: Basics – Menus – Tool Bars – Navigation		K4	05
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	06
	Learning Resources			
Text Books	Sanjay Saxena, "MS-Office 2000 for everyone", Vikas Publishing House Pvt. Ltd, Reprint 2006			
Reference Books	1. NellaiKannan, "MS-Office", Nels Publications, 3rd Edition, 2004. 2. John Walkenbach, Herb Tyson, Michael R.Groh, FaitheWempen 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			

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	21UCAN03	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

Subject Title	SEMESTER – IV PAPER – I BASICS OF INTERNET	Semester	IV	
Subject Code	21UCAN03	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**	**05**
II	Internet Technologies: Modem - Internet addressing – Physical connections – Telephone Lines – Internet browsers – Internet Explorer – Netscape Navigator.		**K2**	**05**
III	Introduction to HTML: Designing a home page – HTML documents – Anchor tag – Hyper Links. Traditional text and formatting		**K3**	**05**
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**	**05**
V	Frames: Frameset – Targeted Links – No frame – Forms : Input, Textarea, Select, Option.		**K5**	**06**
	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	21UCAN04	Specialization	NA
Type	NMEC: Theory	L:T:P:C	26:2:0:2

COURSE OBJECTIVE:

1. To impart Practical Training in PHOTO SHOP 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	21UCAN04	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	05
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	05
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	05
IV	Working with Layer Styles and Filter Effects: Understanding Layer Styles - Working with Smart Objects - Understanding Filters.		K4	05
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	06
	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 DanaeDayley, 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

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, PritiSinha, "Computer Fundamentals", BPB Publications, 2004. Anita Goel, "Computer Fundamentals", 1st Edition, Pearson Education India, 2010\			
Website/ Link	1.https://www.gopeople.edu/blog/the_basics_of_computer_science_how_to_get_started 2.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

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	10
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	10
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	12
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	12
	Learning Resources			
Text Books	1. Step by Step 2007 Microsoft Office System -Joyce Cox and Team ,PHI learning Private ltd,Newdelhi 2009 2. Sanjay Saxena, "MS-Office 2000 for everyone", Vikas Publishing House Pvt. Ltd, Reprint 2006			

Reference Books	1. NellaiKannan, "MS-Office", Nels Publications, 3rd Edition, 2004. 2. John Walkenbach, Herb Tyson, Michael R.Groh, FaitheWempen 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	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 heck, 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	15
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	17
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",6th Edition, Addison-Wesley Publication, 2011.			
Reference Books	Raghu Ramakrishnan, Madison,JohannesGehrke,"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 the 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", 1stEdition, 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. RitendraGoel, "e-commerce", New Age International Publishers, 2016.
Website/ Link	1.https://e_commerce_pdf_download.peatix.com/ 2.www.tutorialpoints.com/html 3.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

Paper should be handled and valued by Computer Science Department.

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/BCA.