AVS

COLLEGE OF ARTS & SCIENCE

(AUTONOMOUS)

Attur Main Road, Ramalingapuram, Salem - 106.

(Recognized under section 2(f) & 12(B) of UGC Act 1956 and

Accredited by NAAC with 'A' Grade)

(Co - Educational Institution | Affiliated to Periyar University, Salem

ISO 9001 : 2015 Certified Institution)

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Syllabus for

BCA

CHOICE BASED CREDIT SYSTEM –

LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK

(CBCS – LOCF)

(Applicable to the Candidates admitted from 2023-24 onwards)

VISION

- To attain excellence in the field of education by creating competent scholars with a touch of human values.

MISSION

- To accomplish eminence in the academic domain.
- To provide updated infrastructure.
- To educate value based education.
- To impart skills through efficient training programs.
- To cultivate culture and tradition with discipline and determination.

REGULATIONS

1. Eligibility for Admission:

Higher Secondary pass with Mathematics as one of the Subject. (OR)

Higher Secondary pass with Computer Science / Computer Applications / Information Technology / Computer Technology / Business Mathematics/ Statistics as one of the courses and have not studied Mathematics should undergo a bridge course on Mathematics for a minimum duration of 15 days.

2. Duration:

The programme shall be of three years duration spread over six semesters under choice based credit system.

The Maximum duration to complete the course shall be four academic years after normal completion of the programme.

The medium of instruction/study is English.

3. Eligibility for award of degree:

Candidates who obtain 75% and above in the aggregate shall be deemed to have passed the examination in First Class with Distinction provided they pass all the examinations prescribed for the programme at the first appearance.

Candidates, other than the above, who secure not less than 60% of the aggregate marks in the whole examinations, shall be declared to have passed the examination in First Class.

The remaining successful candidates shall be declared to have passed in Second Class.

Candidates who pass all the examinations prescribed for the programme in first instance and within a period of two academic years from the year of admission are only eligible for University Ranking.

4. Course of Study:

The programme shall be of three years duration spread over six semesters under choice based credit system.

The Maximum duration to complete the course shall be three academic years after normal completion of the programme.

The medium of instruction/study is English.

5. Scheme of Examination:

Evaluation will be done on a continuous basis and will be evaluated four times during the course work.

Evaluation Will be objective type questions, short answers, essay so recombination of these, but the end semester examination is a prescribed question paper pattern.

6. Passing Rules:

The Passing minimum shall be 50% out of 75 marks (30 marks)

(Record Note must be compulsorily submitted while attending the Practical Examination and No passing minimum)

The candidate shall be declared to have passed in the Theory / Practical / Project Work examination, if the candidate secures not less than 50% marks in EA and also in total of the prescribed marks. However submission of a record note book is a must.

The candidate shall be declared to have passed in the theory/practical/Dissertation examination if the candidate secures:

(i)50% marks in the ESE and

(ii)50% in ESE and IA put together

i) Theory

Evaluation of Internal Assessment: (25 Marks)

Evaluation of End Semester Examinations: 75 Marks

ii) Practical

PRACTICAL / MINI PROJECT EXAMINATION

Evaluation of Internal Assessment: 40

External Assessment :60

Programme Outcomes (POs) On successful completion of the BCA	
PO1	Students will acquire basic Practical skills & Technical knowledge along with domain knowledge of different subjects in the Computer Science & humanities stream.
PO2	Students will become employable; Students will be eligible for career opportunities in education field, Industry, or will be able to opt for entrepreneurship.
PO3	Students will possess basic subject knowledge required for higher studies, professional and applied courses.
PO4	Students will be aware of and able to develop solution oriented approach towards various Social and Environmental issues.
PO5	Ability to acquire in-depth knowledge of several branches of Computer Science and aligned areas. This Programme helps learners in building a solid foundation for higher studies in Computer Science and applications.
PO6	The skills and knowledge gained lead to proficiency in analytical reasoning, which can be utilized in modeling and solving real life problems.
PO7	Utilize computer programming skills to solve theoretical and applied problems by critical understanding, analysis and synthesis.
PO8	Ability to share ideas and insights while seeking and benefitting from knowledge and insight of others.
PO9	To recognize patterns and to identify essential and relevant aspects of problems
PO10	Mould the students into responsible citizens in a rapidly changing interdependent society

Program Specific Outcomes (PSOs) After the successful completion of BCA programme the students are expected to	
PSO1	Familiarize the students with suitable software tools of computer science and industrial applications to handle issues and solve problems in mathematics or statistics and real-time application related sciences.
PSO2	Know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand.
PSO3	Understand, formulate, develop programming model with logical approaches to

	Address issues arising in social science, business and other contexts.
PSO4	Acquire good knowledge and understanding to solve specific theoretical and applied problems in advanced areas of Computer science and Industrial statistics.
PSO5	Provide students/learners sufficient knowledge and skills enabling them to undertake further studies in Computer Science or Applications or Information Technology and its allied areas on multiple disciplines linked with Computer Science.
PSO6	Equip with Computer science technical ability, problem solving skills, creative talentandpowerofcommunicationnecessaryforvariousformsofemployment.
PSO7	Develop a range of generic skills helpful in employment, internships & societal activities. Also Get adequate exposure to global and local concerns that provides platform for further exploration into multi-dimensional aspects of computing sciences.

Programme Educational Objectives (PEOs) The BCA programme describes accomplishments that graduates are expected to attain within five to seven years after graduation.	
PEO1	Sound background in fundamental core concepts and Computational principles, which are applied for complex problems Solving.
PEO2	To provide the strong character to uphold the spiritual and cultural values of our country to make students acceptable to both industries and higher education. Developing the professional skills and entrepreneur skills with Team work, leadership and communication qualities.
PEO3	Graduate will be capable of adopting the changing technologies, tools, and industrial environment. Practicing lifelong learning for successful professional career with Ethical values
PEO4	Exhibit professional competencies and knowledge for being a successful technocrat. Adopt creative and innovative practices to solve real-life complex problems.
PEO5	Graduates will promote collaborative learning and spirit of team work through multidisciplinary projects and diverse professional activities.

CREDIT DISTRIBUTION FOR 3 YEARS BCA PROGRAMME

Part	Course Type	Credits per Course	No. of Papers	Total Credits
Part I	Language – I (Tamil/Hindi/French)	3	4	12
Part II	Language – II (English)	3	4	12
Part III	Core Courses- Theory	4	5	20
		5	3	15
	Core Courses- Practical	4	3	12
		3	3	09
	Major Elective Courses- Theory	4	2	08
		3	2	06
	Major Elective Courses- Practical	-	-	-
	Generic Discipline Specific/ Allied Courses – Theory	5	4	20
	Generic Discipline Specific/ Allied Courses – Practical	-	-	-
	Field Project	4	1	04
Total				**94**
Part IV	Non Major Elective Courses	2	2	04
	Skill Enhancement Courses	2	5	10
	Professional Competency Skill Enhancement Course	2	2	04
	EVS (Environmental Studies)	2	1	02
	Value Education	2	1	02
	Internship	2	1	02
	Research Project (for PG only)	-	-	-
	MOOC/ SWAYAM/ NPTEL Courses	2	1	2
Total				**26**
Part V	Extension Activity (NSS/NCC/Physical Education)	1	1	1
Total Credits				**145**

CONSOLIDATED SEMESTER WISE AND COMPONENT WISE CREDIT DISTRIBUTION FOR 3 YEARS BCA

Parts	Semester I	Semester II	Semester III	Semester IV	Semester V	Semester VI	Total Credits
Part I	**3**	**3**	**3**	**3**	**-**	**-**	**12**
Part II	**3**	**3**	**3**	**3**	**-**	**-**	**12**
Part III	**13**	**13**	**14**	**12**	**22**	**20**	**94**
Part IV	**4**	**4**	**6**	**6**	**4**	**2**	**26**
Part V	**-**	**-**	**-**	**-**	**-**	**1**	**1**
Total	**23**	**23**	**26**	**24**	**26**	**23**	**145**

*Part I, II and Part III components will be separately taken into account for CGPA calculation and classification for the under graduate programmes and the other components IV and V have to completed during the duration of the programmes as per the norms, to be eligible for obtaining the UG degree.

METHOD OF EVALUATION

Evaluation	Components		Marks
Internal Evaluation	Continuous Internal Assessment Test	15	25 Marks
	Assignments	3	
	Class Participation	2	
	Distribution of marks for Attendance (in percentage) 96 – 100: 5 Marks 91 – 95: 4 Marks 86 – 90: 3 Marks 81 – 85: 2 Marks	5	
External Evaluation	End Semester Examination		75 Marks
Total			**100 Marks**

Note: 1.UG Programmes- A candidate must score minimum 10 marks in Internal and 30 marks in External Evaluation.

CONTINUOUS INTERNAL ASSESSMENT

Categorizing Outcome Assessment Levels Using Bloom's Taxonomy

Level	Cognitive Domain	Description
K1	Remember	It is the ability to remember the previously learned concepts or ideas.
K2	Understand	The learner explains concepts or ideas.
K3	Apply	The learner uses existing knowledge in new contexts.
K4	Analyze	The learner is expected to draw relations among ideas and to compare and contrast.
K5	Evaluate	The learner makes judgments based on sound analysis.
K6	Create	The learner creates something unique or original.

Question Paper Blue Print for Continuous Internal Assessment- I & II

Duration: 2 Hours							**Maximum: 50 marks**
Section	**K level**						**Marks**
	K1	**K2**	**K3**	**K4**	**K5**	**K6**	
A (no choice)	10						10 X 1 =10
B (no choice)		1	1				2 X 5 =10
C (either or choice)				3			3 x 10 = 30
Total							50 marks

Note: K4 and K5 levels will be assessed in the Model Examination whereas K5 and K6 Levels will be assessed in the End Semester Examinations.

Question Paper Blue Print for Continuous Internal Assessment- I

Time: 2 Hours Total Marks: 50 Marks Minimum Pass: 20 Marks

Unit	Section - A	Section – B	Section – C
I	Q.N. 1, 2, 3, 4, 5	Q.N. 11	Q.N. 13 A, 13 B
I or II	-	-	Q.N. 14 A, 14 B
II	Q.N. 6, 7, 8, 9, 10	Q.N. 12	Q.N. 15 A, 15 B

SECTION – A (10 X 1 = 10 Marks)

ANSWER ALL THE QUESTIONS

SECTION – B (2 X 5 = 10 Marks)

ANSWER ALL THE QUESTIONS

SECTION – C (3 X 10 = 30 Marks)

ANSWER ALL THE QUESTIONS (Either or Choice)

Question Paper Blue Print for Continuous Internal Assessment- II

Time: 2 Hours Total Marks: 50 Marks Minimum Pass: 20 Marks

Unit	Section - A	Section – B	Section – C
III	Q.N. 1, 2, 3, 4, 5	Q.N. 11	Q.N. 13 A, 13 B
III or IV	-	-	Q.N. 14 A, 14 B
IV	Q.N. 6, 7, 8, 9, 10	Q.N. 12	Q.N. 15 A, 15 B

SECTION – A (10 X 1 = 10 Marks)

ANSWER ALL THE QUESTIONS

SECTION – B (2 X 5 = 10 Marks)

ANSWER ALL THE QUESTIONS

SECTION – C (3 X 10 = 30 Marks)

ANSWER ALL THE QUESTIONS (Either or Choice)

Question Paper Blue Print for Model Examination & End Semester Examination

Duration: 3 Hours								Maximum: 75 marks
Section		K level						Marks
		K1	K2	K3	K4	K5	K6	
A (no choice, three questions from each unit)		15						15 X 1 =15
B (choice, one question from each unit)			1	1				2 X 5 =10
C (either or choice & two questions from each unit)	Courses with K4 as the highest cognitive level				4	1		5 x 10 = 50
	Course with K5 as the highest cognitive level wherein three K4 questions and two K5 questions are compulsory.				3	2		
	Course with K6 as the highest cognitive level wherein two questions each on K4, K5 and one question on K6 are compulsory.				2	2	1	
Total								75 marks

Question Paper Blue Print for Model Examination & End Semester Examination

Time: 3 Hours Total Marks: 75 Marks Minimum Pass: 30 Marks

Unit	Section - A	Section – B	Section – C
I	Q.N. 1, 2, 3	Q.N. 16	Q.N. 21 A, 21 B
II	Q.N. 4, 5, 6	Q.N. 17	Q.N. 22 A, 22 B
III	Q.N. 7, 8, 9	Q.N. 18	Q.N. 23 A, 23 B
IV	Q.N. 10, 11, 12	Q.N. 19	Q.N. 24 A, 24 B
V	Q.N. 13, 14, 15	Q.N. 20	Q.N. 25 A, 25 B

SECTION – A (15 X 1 = 15 Marks)

ANSWER ALL THE QUESTIONS

SECTION – B (2 X 5 = 10 Marks)

ANSWER ANY TWO QUESTIONS

SECTION – C (5 X 10 = 50 Marks)

ANSWER ALL THE QUESTIONS (Either or Choice)

Question Paper Blue Print for Model Practical Examination & End Semester Examination (Practical)

Time: 3 Hours Total Marks: 100 Marks Minimum Pass: 40 Marks

Practical Marks	Maximum Mark	Minimum Mark
Internal	25	10
External	75	30
Total	100	40

Evaluation for End Semester Examinations (Practical)

Record	10 marks
Problem Understanding	10 marks
Implementation	20 marks
Viva-voce	05 marks
Debugging and Modification	20 marks
Result with units	10 marks
TOTAL	**75 MARKS**

*Submission of record with due certification is a must for external practical examinations.

**A student should complete all requires experiments to get 10 marks for the record.

Scheme of Examination for B.C.A

First Year – Semester - I

Part	Course Code	Course Title	Ins. Hrs	Credit	CIA	ESE	Total
I	23UFTA01	Podhu Tamil – I	3	3	25	75	100
II	23UFEN01	General English – I	3	3	25	75	100
III	23UCACC01	Core Course I – Python Programming	5	5	25	75	100
	23UCACCP01	Core Course II – Practical - Python Programming Lab	3	3	25	75	100
	23UMAEGS05	Elective Course EC I - Generic Specific - Introduction to Linear Algebra	6	5	25	75	100
IV	23UCAFC01	Foundation Course FC– Structured Programming in C	3	2	25	75	100
	23UTANE01	Non Major Elective Course - Pechukkalai Thiran	2	2	25	75	100
Total			**25**	**23**			

First Year – Semester - II

Part	Course Code	Course Title	Ins. Hrs	Credit	CIA	ESE	Total
I	23UFTA02	Podhu Tamil – II	3	3	25	75	100
II	23UFEN02	General English - II	3	3	25	75	100
III	23UCACC02	Core Course III - Object Oriented Programming Concepts using C++	5	5	25	75	100
	23UCACCP02	Core Course IV- Practical - C++ Programming Lab	4	3	25	75	100
	23UMAEGS04	Elective Course EC II - Generic Specific - Optimization Techniques	3	3	25	75	100
	23UMAGSP03	Elective Course EC II - Generic Specific - Optimization Techniques Practical	2	2	25	75	100
IV	23UCASE02	Skill Enhancement Course III - Introduction to HTML	3	2	25	75	100
	23UBXNE002	Non Major Elective Course - Managerial Skill Development	2	2	25	75	100
Total			**25**	**23**			

Second Year – Semester - III

Part	Course Code	Course Title	Ins. Hrs	Credit	CIA	ESE	Total
I	23UFTA03	Podhu Tamil – III	3	3	25	75	100
II	23UFEN03	General English - III	3	3	25	75	100
III	23UCACC03	Core Course V- Data Structures and Algorithms	5	5	25	75	100
	23UCACCP03	Core Course VI – Practical - Data Structures and Algorithms using C++ Lab	4	4	25	75	100
	23USTAT04	Elective Course EC III - Generic Specific – Allied-Statistical Method and its Application-I.	5	5	25	75	100
IV	23UCASE04	Skill Enhancement Course IV- PHP Programming	2	2	25	75	100
	23UCASE05	Skill Enhancement Course V- Software Testing	2	2	25	75	100
	23UES01	Environmental Studies	1	2	25	75	100
Total			**25**	**24**			

Second Year – Semester - IV

Part	Course Code	Course Title	Ins. Hrs	Credit	CIA	ESE	Total
I	23UFTA04	Podhu Tamil – IV	3	3	25	75	100
II	23UFEN04	General English - IV	3	3	25	75	100
III	23UCACC04	Core Course VII - Programming in Java	5	4	25	75	100
	23UCACCP04	Core Course VIII – Practical - Programming in Java Lab	5	3	25	75	100
	23USTAT05	Elective Course EC IV - Generic Specific Allied - Statistical Method and its Application-II.	5	5	25	75	100
IV	23UCASE11	Skill Enhancement Course VI - Advanced Excel	2	2	25	75	100
	23UCASE13	Skill Enhancement Course VII - Cyber Forensics	2	2	25	75	100
IV		SWAYAM/NPTL/MOOC	-	2	-	-	100
Total			**25**	**26**			

Third Year – Semester – V

Part	Course Code	Course Title	Ins. Hrs	Credit	CIA	ESE	Total
III	23UCACC05	Core Course IX – Operating System	4	4	25	75	100
	23UCACC06	Core Course X - ASP.Net Programming	4	4	25	75	100
	23UCACCP05	Core Course XI Practical - ASP.Net Programming Lab	4	4	25	75	100
	23UCADE05	Elective Course EC V - Generic Specific Database Management System	3	3	25	75	100
	23UCADE09	Elective Course EC VI - Discipline Specific - Image Processing	4	3	25	75	100
	23UCACCPR1	Core Course XII - Project with Viva voce	4	4	25	75	100
IV		Value Education	2	2	-	-	-
	23UCATR1	Internship/Industrial Training (Summer vocational end of the IV semester activity)	-	2	-	-	-
		Total	**25**	**26**			

Third Year – Semester - VI

Part	Course Code	Course Title	Ins. Hrs	Credit	CIA	ESE	Total
III	23UCACC07	Core Course XIII – Computer Networks	5	4	25	75	100
III	23UCACC08	Core Course XIV – Data Analytics using R Programming	5	4	25	75	100
	23UCACCP06	Core Course XV- Practical - R Programming Lab	5	4	25	75	100
	23UCADE13	Elective Course - EC VII - Artificial Intelligence	4	4	25	75	100
	23UCADE17	Elective Course – EC VIII - Discipline Specific - Cloud Computing	4	4	25	75	100
IV	23UCASE18	Professional Competency - Skill Enhancement Course VIII - Organization Behavior	2	2	25	75	100
V		Extension Activity	-	1	-	-	-
		Total	**25**	**23**			

***Ins. Hrs** – Instructional Hours**, CIA-** Continuous Internal Assessment**, ESE-** End Semester Examination

Semester: I	Course Code: 23UCACC01	Hours/Week: 5	Credit: 5
COURSE TITLE: CORE COURSE I – PYTHON PROGRAMMING			

Course Overview:

1. Learn the basics of python, Do simple programs on python,
   Learn how to use an array.
2. Develop program using selection statement, Work with Looping and jump statements, Do programs on Loops and jump statements.
3. Concept of function, function arguments, Implementing. The concept strings in various application, Significance of Modules, Work with functions, Strings and modules.
4. Work with List, tuples and dictionary, Write program using list, tuples and dictionary.

Learning Objectives:

1. To make students understand the concepts of Python programming.
2. To apply the OOPs concept in PYTHON programming.
3. To impart knowledge on demand and supply concepts.
4. To make the students learn best practices in PYTHON programming
5. To know the costs and profit maximization

Unit - I	Basics of Python Programming	09 Hours

History of Python - Features of Python – Literal - Constants - Variables – Identifiers – Keywords - Built - in Data Types Output Statements – Input Statements-Comments – Indentation-Operators – Expressions - Type conversions. Python Arrays: Defining and Processing Arrays – Array methods.

Unit - II	Control Statements:	09 Hours

Selection/Conditional Branching statements: if, if-else, nested if and if-elif-else statements. Iterative Statements: while loop, for loop, else suite in loop and nested loops. **Jump Statements:** break, continue and pass statements**.**

Unit - III	Functions, Function Arguments, Python Strings, Modules	09 Hours

Functions: Function Definition – Function Call – Variable Scope and its Life time-Return Statement. Variable Length Arguments - Recursion. Python Strings: String operations - Immutable Strings – Built - in String Methods and Functions - String Comparison. Modules: import statement- The Python module – dir () function – Modules and Namespace – Defining our own modules.

Unit - IV	Lists, Dictionaries	09 Hours

Lists: Creating list - Access values in List - Updating values in Lists - Nested lists - Basic list operations - List Methods. Tuples: Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples – Difference between lists and tuples. Dictionaries: Creating, Accessing, Updating and Deleting Elementsina Dictionary – Dictionary Functions And Methods - Difference between Lists and Dictionaries.

Unit - V	Python File Handling	09 Hours

Python File Handling: Types of files in Python - Opening and Closing files - Reading and Writing files: write() and write lines() methods - append() method – read() and read lines() methods – with keyword – Splitting words – File methods - File Positions - Renaming and deleting files.

Text Book(s):

1. Reema Thareja, ― Python Programming using problem solving approach, First Edition, 2017, Oxford University Press.

2. Dr. R. Nageswara Rao, ―Core Python Programming, First Edition, 2017, Dream tech Publishers.

Reference Books:

1. VamsiKurama, ―PythonProgramming:AModernApproach‖, PearsonEducation.

2. MarkLutz,‖LearningPython‖,Orielly.

3. AdamStewarts, ―PythonProgramming‖, Online.

4. FabioNelli, ―PythonDataAnalytics‖, APress.

5.KennethA.Lambert,―FundamentalsofPython–FirstPrograms‖,CENGAGE Publication.

Web Resources :

1. https://www.programiz.com/python-programming .

2. https://www.guru99.com/python-tutorials.html .

3. https://www.w3schools.com/python/python_intro.asp .

4.https://www.geeksforgeeks.org/python-programming-language/

5.https://en.wikipedia.org/wiki/Python_(programming_language)

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	Learn the basics of python, Do simple programs on python, Learn how to use an array.	K1
CO2	Develop program using selection statement, Work with Looping and jump statements, Do programs on Loops and jump statements.	K2
CO3	Concept of function, function arguments, Implementing The concept strings in various application, Significance of Modules, Work with functions, Strings and modules.	K3
CO4	Work with List, tuples and dictionary; Write program using list, Tuples and dictionary.	K4
CO5	Usage of File handlings in python, Concept of reading and writing files, Do programs using files.	K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping (COs vs POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	2	2	3	3	3	**2**	**2**	**2**
CO2	3	2	2	3	2	3	2	3	2
CO3	3	2	2	3	2	2	2	3	2
CO4	3	2	2	3	2	3	3	2	3
CO5	3	2	2	3	3	3	2	3	2

3 – Strong, 2- Medium, 1- Low

Semester: I	Course Code: 23UCACCP01	Hours/Week: 3	Credit: 3
COURSE TITLE: CORE COURSE II – PRACTICAL - PYTHON PROGRAMMING LAB			

Course Overview:

1. Analyze various concepts of PYTHON language to solve the problem in an efficient way.
2. Develop a PYTHON program for a given problem and test for its correctness.
3. To build and package Python modules for reusability.

Learning Objectives:

1. Be able to design and program Python applications.
2. Be able to create loops and decision statements in Python.
3. Be able to work with functions and pass arguments in Python.
4. Be able to build and package Python modules for reusability.
5. Be able to read and write files in Python.

EXERCISE No	LAB EXERCISES	Required Hours (56 Hours)
1	Program using variables, constants, I/O statements in Python.	4 Hours
2	Program using Operators in Python.	4 Hours
3	Program using Conditional Statements.	4 Hours
4	Program using Loops.	4 Hours
5	Program using Jump Statements.	4 Hours
6	Program using Functions.	4 Hours
7	Program using Recursion.	4 Hours
8	Program using Arrays.	4 Hours
9	Program using Strings.	4 Hours
10	Program using Modules.	4 Hours
11	Program using Lists.	4 Hours
12	Program using Tuples.	4 Hours
13	Program using Dictionaries.	4 Hours
14	Program for File Handling.	4 Hours

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	Demonstrate the understanding of syntax and semantics.	K1
CO2	Identify the problem and solve using PYTHON programming techniques.	K2
CO3	Identify suitable programming constructs for problem solving.	K3
CO4	Analyze various concepts of PYTHON language to solve the problem in an efficient way.	K4
CO5	Develop a PYTHON program for a given problem and test for its correctness.	K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping (COs vs POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	2	2	2	3	2	2	1	3
CO2	2	1	3	2	-	2	3	2	-
CO3	3	3	1	1	1	2	1	1	2
CO4	2	3	3	1	-	1	3	2	-
CO5	3	2	3	1	1	-	2	-	2

3 – Strong, 2- Medium, 1- Low

Semester: I	Course Code: 23UCAFC01	Hours/Week: 3	Credit: 2
COURSE TITLE: FOUNDATION COURSE FC – STRUCTURED PROGRAMMING IN C			

Course Overview:

1. Analyze the various methods of solving a problem and choose the best method
2. Understand the Coding, debugging and test the programs with appropriate Test cases
3. To understand the concept of implementing pointers.

Learning Objectives:

1. To familiarize the students with the Programming basics and the fundamentals of C, Data types in C, Mathematical and logical operations.
2. To understand the concept using if statements and loops
3. This unit covers the concept of Arrays
4. This unit covers the concept of Functions
5. To understand the concept of implementing pointers.

Unit - I	Overview of C	06 Hours

Overview of C: Importance of C, sample C program program structure, executing C program. Constants, Variables, and Data Types: Character set, C tokens, keywords and identifiers, constants, Variables, data types, declaration of variables, Assigning values to variables Assignment statement, declaring a variable as constant, as volatile. Operators and Expression.

Unit - II	Decision Making and Branching	06 Hours

Decision Making and Branching: Decision making with If, simple IF, IF ELSE, nested IF ELSE, ELSEIF ladder, switch, GOTO statement. Decision Making and Looping: While, Do-While, For, Jumps in loops

Unit - III	Arrays	06 Hours

Arrays: Declaration and accessing of one & two - dimensional arrays, initializing two - dimensional arrays, multi dimensional arrays.

Unit - IV	Functions	06 Hours

Functions: The form of C functions, Return values and types, calling a function, categories of functions, Nested functions, Recursion, functions with arrays, call by value, call by reference, storage classes - character arrays and string functions

Unit - V	Pointers	06 Hours

Pointers: definition, declaring and initializing pointers, accessing a variable through address and through pointer, pointer expressions, pointer increments and scale factor, pointers and arrays, pointers and functions, pointers and

Text Book(s):

1. E. Balagurusamy, Programming in ANSIC, Fifth Edition, Tata McGraw - Hill, 2010.

Reference Books:

1. Byron Gottfried, Schaum‘s Out line Programming with C, Fourth Edition, Tata McGraw - Hill, 2018.
2. Kernighan and Ritchie, The C Programming Language, Second Edition, Prentice Hall, 1998
3. YashavantKanetkar,LetUsC,EighteenthEdition,BPBPublications,2021

Web Resources:

1. https://codeforwin.org/
2. https://www.geeksforgeeks.org/c-programming-language/
3. http://en.cppreference.com/w/c
4. http://learn-c.org/
5. https://www.cprogramming.com/

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom’s Level
CO1	Remember the program structure of C with its syntax and semantics	K1
CO2	Understand the programming principles in C(data types, operators, branching and looping, arrays, functions, structures, pointers and files)	K2
CO3	Apply the programming principles learnt in real-time problems	K3
CO4	Analyze the various methods of solving a problem and choose the best method	K4
CO5	Code, debug and test the programs with appropriate Test cases	K5
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create		

Mapping (COs vs POs)									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	1	2	2	2	2	-	2	-	2
CO2	2	2	2	2	-	2	2	2	2
CO3	3	2	2	1	1	-	2	-	2
CO4	3	2	2	1	-	1	2	2	2
CO5	1	2	2	2	2	3	2	-	2

3 – Strong, 2- Medium, 1- Low

Semester: II	**Course Code: 23UCACC02**	**Hours/Week: 5**	**Credit: 5**
COURSE TITLE: CORE COURSE III - OBJECT ORIENTED PROGRAMMING CONCEPTS USING C++			

Course Overview:

1. Understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files)
2. Analyze the various methods of solving a problem and choose the best method
3. Code, debug and test the programs with appropriate test cases

Learning Objectives:

1. To familiarize the students with the Programming basics and the fundamentals of C, Data types in C, Mathematical and logical operations.
2. To understand the concept using if statements and loops
3. This unit covers the concept of Arrays
4. This unit covers the concept of Functions
5. To understand the concept of implementing pointers.

Unit - I	**Introduction to C++**	**15 Hours**

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

Unit - II	Classes and Objects:	15 Hours

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.

Unit - III	Operator Overloading:	15 Hours

Operator Over loading: Over loading unary, binary operators – Overloading Friend functions – type conversion – Operator Overriding Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchal, Hybrid, Multi path inheritance – Virtual base Classes – Abstract Classes.

Unit - IV	Pointers	15 Hours

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.

Unit - V	Files	15 Hours

Files – File stream classes – File Operations - 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.

Text Book(s):

1. E. Balagurusamy, –Object – Oriented Programming with C++‖,TMH2013,7thEdition.

Reference Books:

1. Ashok N Kamthane,–Object - Oriented Programming with ANSI and Turbo C++‖, PearsonEducation2003.
2. Maria Litvin & Gray Litvin, –C++foryou‖, Vikaspublication2002.

Web Resources:

1. https://alison.com/course/introduction-to-c-plus-plus-programming

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes: Upon successful completion of this course, the student will be able to		
COs	**Statements**	**Bloom's Level**
CO1	Remember the program structure of C with its syntax and semantics.	K1
CO2	Understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files)	K2
CO3	Apply the programming principles learnt in real time problem.	K3
CO4	Analyze the various methods of solving a problem and choose the best method	K4
CO5	Code, debug and test the programs with appropriate test cases	K5
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create		

Mapping (COs vs POs)									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	2	1	-	-	1	2	1	2
CO2	2	2	2	1	-	-	2	1	2
CO3	3	1	1	-	1	-	2	1	2
CO4	1	2	1	2	2	1	2	1	2
CO5	3	2	1	2	3	2	2	1	2

3 – Strong, 2- Medium, 1- Low

Semester: II	Course Code: 23UCACCP02	Hours/Week: 4	Credit: 3
COURSE TITLE: CORE COURSE IV- PRACTICAL - C++ PROGRAMMING LAB			

Course Overview:

1. Analyze the various methods of solving a problem and choose the best method.
2. Code, debug and test the programs with appropriate test cases.
3. Analyze the various methods of solving a problem and choose the best method.

Learning Objectives:

1. Describetheproceduralandobjectorientedparadigmwithconceptsofstreams, classes, functions, data and objects
2. Understand dynamic memory management techniques using pointers, constructors, destructors, etc
3. Describe the concept of function overloading, operator overloading, virtual functions and polymorphism
4. Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming.
5. Demonstrate the use of various OOPs concepts with the help of programs.

EXERCISE No	LAB EXERCISES	Required Hours (56 Hours)
1	Write a C++ program to demonstrate function overloading, Default Arguments and Inline function.	1 Hours
2	Write a C++program to demonstrate Class and Objects.	1 Hours
3	Write a C++ program to demonstrate the concept of Passing Objects to Functions.	2 Hours
4	Write a C++ program to demonstrate the Friend Functions.	2 Hours
5	Write a C++ program to demonstrate the concept of Passing Objects to Functions.	2 Hours
6	Write a C++ program to demonstrate Constructor and Destructor.	2 Hours
7	Write a C++ program to demonstrate Unary Operator Overloading.	2 Hours
8	Write a C++ program to demonstrate Binary Operator Overloading.	2 Hours
9	Write a C++ program to demonstrate: • Single Inheritance • Multilevel Inheritance • Multiple Inheritance	10 Hours

	• Hierarchical Inheritance • Hybrid Inheritance	
10	Write a C++ program to demonstrate Virtual Function.	2 Hours
11	Write a C++ program to manipulate a Text File.	2 Hours
12	Write a C++ program to perform Sequential I/O Operations on a file.	2 Hours
13	Write a C++ program to find the Biggest Number using Command Line Arguments.	2 Hours
14	Write a C++ program to demonstrate Class Template	2 Hours
15	Write a C++ program to demonstrate Function Template.	2 Hours
16	Write a C++ program to demonstrate Exception Handling.	2 Hours

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	Remember the program structure of C with its syntax and semantics.	K1
CO2	Understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files).	K2
CO3	Apply the programming principles learnt in real time problems.	K3
CO4	Analyze the various methods of solving a problem and choose the best method.	K4
CO5	Code, debug and test the programs with appropriate test cases.	K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping (COs vs POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	3	3	3	1	2	3	1	2
CO2	2	3	3	3	1	2	3	1	2
CO3	2	3	3	3	1	2	3	1	2
CO4	2	3	3	3	1	2	3	1	2
CO5	2	3	3	3	1	2	3	1	2

3 – Strong, 2- Medium, 1- Low

Semester: II	Course Code: 23UCASE02	Hours/Week: 3	Credit: 2
COURSE TITLE: SKILL ENHANCEMENT COURSE III - INTRODUCTION TO HTML			

Course Overview:

1. Understand the page formatting. Concept of list
2. Creating Web Pages and Web Site
3. Create a link with in a webpage.

Learning Objectives:

1. Insert a graphic with in a webpage.
2. Create a link with in a webpage.
3. Create a table within a webpage.
4. Insert the adding levels within a webpage.
5. Insert or delete ordered lists within a webpage. Create a webpage.

Unit - I	Introduction	06 ours

Introduction: Web Basics: What is Internet – Web browsers – What is Webpage - HTML Basics: Understanding tags.

Unit - II	Tags	06 Hours

Tags for Document structure (HTML, Head, Body Tag). Block level text elements: Headings paragraph(<p>tag) – Font style elements:(bold, italic, font, small, strong, strike, big tags)

Unit - III	Lists	06 Hours

Lists: Types of lists: Ordered, Unordered – Nesting Lists – Other tags: Marquee, HR, BR - Using Images – Creating Hyperlinks.

Unit - IV	Tables	06 Hours

Tables: Creating basic Table, Table elements, Caption – Table and cell alignment – Row span, Cols pan – Cell padding.

Unit - V	Frames	06 Hours

Frames: Frameset – Targeted Links – No frame – Forms: Input, Text area, Select, Option.

Text Book(s):

1. Mastering HTML 5and CSS3 Made Easy‖,Teach UCompInc.,2014.
2. Thomas Michaud, "Foundations of Web Design: Introduction to HTML & CSS"

Web Resources:

1. https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf
2. https://www.w3schools.com/html/default.asp

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	On completion of this course, students will	K1
CO2	Knows the basic concept in HTML Concept of resources in HTML	K2
CO3	Knows Design concept. Concepts of Meta Data Understand the concept of save the files.	K3
CO4	Understand the page formatting. Concept of list	K4
CO5	Creating Links. Know the concept of creating link to email address	K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping (COs vs POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	3	3	3	3	3	2	3	3
CO2	3	3	2	3	3	3	2	3	3
CO3	2	3	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	2	3	3
CO5	3	3	3	2	3	3	2	3	3

3 – Strong, 2- Medium, 1- Low

Semester: II	Course Code: 23UBXNE002	Hours/Week: 2	Credit: 2
COURSE TITLE: NON MAJOR ELECTIVE COURSE - MANAGERIAL SKILL DEVELOPMENT			

Course Overview:

1. Explore more advanced Management Skills such as conflict resolution, empowerment, working with teams and creating a positive environment for change.
2. Employ critical-thinking and analytical skills to investigate complex business problems to propose viable Solutions.
3. Make persuasive presentations that reveal strong written and oral communication skills needed in the workplace

Learning Objectives:

1. To improve the self-confidence, groom the personality and build emotional Competence.
2. To address self-awareness and the assessment of core management skills such as communication, working with teams and creating a positive environment for change..
3. To assess the Emotional intelligence.
4. To induce critical-thinking and analytical skills to investigate complex problems to propose viable solutions.
5. To improve professional etiquettes

Unit - I	Self	11 Hours

Core Competency - Understanding of Self - Components of Self - Self – identity – Self –concept = Self - confidence and Self - Image - Skill Analysis and finding the right fit. – Self - learning styles - Attitude towards change and applications of skills

Unit - II	Self Esteem	08 Hours

Meaning & Importance - Components of self – esteem - High and low self - esteem - Measuring our self - esteem and its effectiveness - Personality mapping tests - Appreciative Intelligence

Unit - III	Building Emotional Competence	08 Hours

Emotional Intelligence – Meaning - Components, Importance and Relevance - Positive and Negative Emotions - Healthy and Unhealthy expression of Emotions - The six - phase model of Creative Thinking: ICEDIP model

Unit - IV	Thinking skills	08 Hours

The Mind/Brain/Behavior - Thinking skill - Critical Thinking and Learning - Making Predictions and Reasoning - Memory and Critical Thinking - Emotions and Critical Thinking - Creativity: Definition and earning of creativity - The nature of creative thinking - Convergent and Divergent thinking, Idea generation and evaluation (Brain Storming) - Image generation and evaluation

Unit - V	Communication related to course	10 Hours

How to make oral presentations - Conducting Meetings - Reporting of Projects - Reporting Of Case Analysis Answering in viva Voce-Assignment writing Debates - Presentations-Role plays and group discussions on current topics - Audio and Video Recording of the above exercises to improve the non - verbal communication and professional etiquettes

Text Book(s):

1. Managerial Skill Articles.
2. The Management Skills of SALL Managers - SiSAL Journal.
3. Managerial Skills by Dr.K.Alex S. CHAND.
4. Managerial Skills 2 by Cynthia Menezes Prabhu, Pen to Print Publishing LLP.
5. Gallagher (2010), Skills Development for Business & Management Students, Oxford University Press. PROF. SANJIV

Reference Books:

1. Joshi, G. (2015), Campus to Corporate-Your Roadmap to Employability, Sage Publication
2. McGrath E. H. (9 Ed. 2011), Basic Managerial Skills, Prentice Hall India Learning Private Limited.
3. Whetten D. (e Ed. 2011), Developing Management Skills, Prentice Hall India Learning Private Limited.
4. P. Varshney , A. Dutta, Managerial Skill Development, Alfa Publications, 2012.
5. EQ- soft skills for Corporate Carrer by Dr. Sumeet Suseelan.

Web Resources:

1. https://www.ipjugaad.com/syllabus/ggsip-university-bba-4th-semester-managerial- skill-development-syllabus/63
2. https://www.academia.edu/4358901/managerial_skill_development_pdf
3. https://www.academia.edu/4358901/managerial_skill_development_pdf

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	Identify the personal qualities that are needed to sustain in the world of work.	K1
CO2	Explore more advanced Management Skills such as conflict resolution, empowerment, working with teams and creating a positive environment for change	K2
CO3	Acquire practical management skills that are of Immediate use in management or leadership positions.	K3
CO4	Employ critical-thinking and analytical skills to investigate complex business problems to propose viable Solutions.	K4
CO5	Make persuasive presentations that reveal strong written and oral communication skills needed in the workplace	K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping (COs vs POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	1
CO3	3	3	3	3	3	3	2	2	2
CO4	3	3	3	3	3	3	3	1	3
CO5	3	3	3	3	3	3	1	3	2

3 – Strong, 2- Medium, 1- Low

Semester: II	Course Code:23UCANE11	Hours/Week: 2	Credit: 2
COURSE TITLE: NON MAJOR ELECTIVE COURSE - ADVANCED EXCEL			

Course Overview:

1. The major objective in introducing the Advanced Excel course is to impart training for students in Microsoft Office which has different components like Data validations, Pivot tables, Charts and Graphs tools, etc.
2. The course is highly practice oriented rather than regular classroom teaching.
3. To acquire knowledge on Advanced Excel.

Learning Objectives:

1. Handle large amounts of data
2. Aggregate numeric data and summarize into categories and sub categories.
3. Filtering, sorting, and grouping data or subsets of data.
4. Create pivot tables to consolidate data from multiple files.
5. Presenting data in the form of charts and graphs.

Unit - I	Basics of Excel	08 Hours

Basics of Excel, Customizing common options, Absolute and relative cells, Protecting and un-protecting worksheets and cells, Working with Functions, Writing conditional expressions logical functions lookup and reference functions, VlookUP with Exact Match, Approximate Match Nested VlookUP with Exact Match, VlookUP with Tables, Dynamic Ranges Nested VlookUP with Exact Match, Using VLookUP to consolidate Data from Multiple Sheets.

Unit - II	Data Validations	07 Hours

Data Validations, Specifying a valid range of values, Specifying a list of valid values Specifying custom validations based on formula, Specifying custom validations based on formula, Working with Templates Designing the structure of a template, Templates for standardization of worksheets, Sorting and Filtering Data, Sorting tables, Multiple level sorting custom sorting, Filtering data for selected view, advanced filter options, Working with Reports Creating subtotals, Multiple level subtotal.

Unit - III	Pivot tables	06 Hours

Creating Pivot tables Formatting and customizing Pivot tables, Advanced options of Pivot tables, Pivot charts, Consolidating data from multiple sheets and files using Pivot tables, External data

sources, Data consolidation feature to consolidate data, Show Value As % of Row, %of Column, Running Total, Compare with Specific Field Viewing Subtotal under Pivot, Creating Slicers

Unit - IV	Excel Functions	06 Hours

More Functions Date and time functions, Text functions Database functions, Power Functions Formatting Using auto formatting option for worksheets, Using conditional formatting option for rows, columns and cells What If Analysis, Goal Seek, Data Tables, Scenario Manager.

Unit - V	Charts and Graphs	08 Hours

Charts, Formatting Charts, 3D Graphs, Bar and Line Chart together, Secondary Axis in Graphs, Sharing Charts with PowerPoint/ MS Word, Dynamically New Features Of Excel Spark lines, Inline Charts, data Charts Overview of all the new features.

Text Book(s):

1. Excel 2019 All
2. Microsoft Excel 2019 PivotTable Data Crunching.

Web Resources:

1. https://www.simplilearn.com
2. https://www.javatpoint.com
3. https://www.w3schools.com

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to:

COs	Statements	Bloom's Level
CO1	Understand the basics of Excel and its components.	K2
CO2	Understand and apply to create a presentation using Charts and Graphs	K3
CO3	Know about the basic concepts of Pivot tables	K2
CO4	Apply the basic concepts of various Excel Functions	K3
CO5	Use basic concepts of Data validations.	K3

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping (COs vs POs)						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	2	2	2	1	3	-
CO2	3	2	2	1	1	3
CO3	3	2	1	2	1	3
CO4	3	3	2	2	2	1
CO5	3	2	1	3	1	3

3 - Strong, 2 – Medium, 1 - Low

Semester: III	**Course Code: 23UCACC03**	**Hours/Week: 5**	**Credit: 5**
COURSE TITLE: CORE COURSE V- DATA STRUCTURES AND ALGORITHMS			

Course Overview:

1. Understand the concept of Dynamic memory management, data types, algorithms, Big Onotation
2. Understand basic data structures such as arrays, linked lists, stacks and queues
3. Solve problem involving graphs, trees and heaps
4. Describe the hash function and concepts of collision and Its resolution methods

Learning Objectives:

1. To understand the concepts of ADTs
2. To learn linear data structures-lists, stacks, queues
3. To learn Tree structures and application of trees
4. To learn graph structures and application of graphs
5. To understand various sorting and searching

Unit - I	**Linked List**	**15 Hours**

Abstract Data Types (ADTs) - List ADT - array - based implementation – linked list implementation singly linked lists - circular linked lists – doubly - linked lists - applications of lists - Polynomial Manipulation - All operations – Insertion – Deletion – Merge - Traversal

Unit - II	Stack and Operations	15 Hours

Stack ADT – Operations – Applications - Evaluating arithmetic expressions – Conversion of infix to postfix expression - Queue ADT – Operations - Circular Queue - Priority Queue – de - Queue applications of queues

Unit - III	Tree traversals	15 Hours

Tree ADT - tree traversals - Binary Tree ADT - expression trees - applications of trees - binary search tree ADT - Threaded Binary Trees - AVL Trees – B – Tree – B + Tree – Heap - Applications of heap.

Unit - IV	Graph	15 Hours

Definition - Representation of Graph - Types of graph - Breadth first traversal – Depth first traversal - Topological sort - Bi-connectivity – Cut vertex – Euler circuits - Applications of graphs.

Unit - V	Searching	15 Hours

Searching - Linear search - Binary search – Sorting - Bubble sort - Selection sort - Insertion sort – Shell sort – Radix sort – Hashing – Hash functions – Separate chaining - Open Addressing- Rehashing Extendible Hashing

Text Book(s):

1. Mark Allen Weiss,–Data Structures and Algorithm Analysis in C++, Pearson Education 2014, 4th Edition.
2. Reema Thareja,–Data Structures Using C‖, Oxford Universities Press 2014, 2nd Edition

Reference Books:

1. Thomas H. Cormen, Chales E.Leiserson, Ronald L. Rivest, Clifford Stein,–Introduction to Algorithms‖, McGraw Hill2009, 3rdEdition.
2. Aho, Hopcroft and Ullman,–Data Structures and Algorithms ‖,Pearson Education 2003

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes: Upon successful completion of this course, the student will be able to		
COs	**Statements**	**Bloom's Level**
CO1	On completion of this course, students will	K1
CO2	Understand the concept of Dynamic memory management, data types, algorithms, Big Onotation	K2
CO3	Understand basic data structures such as arrays, linked lists, stacks and queues	K3
CO4	Describe the hash function and concepts of collision and Its resolution methods	K4
CO5	Solve problem involving graphs, trees and heaps	K5
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create		

Mapping (COs vs POs)									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	3	3	-	1	-	-	-	1
CO2	1	2	1	-	-	-	-	-	-
CO3	3	1	2	1	-	-	1	1	1
CO4	2	2	1	-	-	1	2	1	-
CO5	3	1	1	-	-	-	2	1	-

3 – Strong, 2- Medium, 1- Low

Semester: III	Course Code: 23UCACCP03	Hours/Week: 4	Credit: 4
COURSE TITLE: CORE COURSE VI – PRACTICAL - DATA STRUCTURES AND ALGORITHMS USING C++ LAB			

Course Overview:

1. Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data
2. Understand basic data structures such as arrays, linked lists, stacks and queues
3. Understand basic data structures such as arrays, linked lists, stacks and queues

Learning Objectives:

1. To understand the concepts of ADTs
2. To learn linear data structures-lists ,stacks, queues
3. To learn Tree structures and application of trees
4. To learn graph structures and application of graphs
5. To understand various sorting and searching

EXERCISE No	LAB EXERCISES	Required Hours (56 Hours)
1	Write a program to implement the List ADT using arrays and linked lists.	5 Hours
2	Write a programs to implement the following using a singly linked list. • Stack ADT • Queue ADT	5 Hours
3	Write a program that reads an infix expression, converts the expression to postfix form and then evaluates the postfix expression (use stack ADT).	5 Hours
4	Write a program to implement priority queue ADT.	5 Hours
5	Write a program to perform the following operations: • Insert an element into a binary search tree. • Delete an element from a binary search tree. • Search for a key element in a binary search tree.	5 Hours
6	Write a program to perform the following operations • Insertion into an AVL-tree • Deletion from an AVL-tree	5 Hours
7	Write program for the implementation of BFS and DFS for a given graph.	5 Hours

8	Write a programs for implementing the following searching methods: • Linear search • Binary search.	5 Hours
9	Write a programs for implementing the following sorting methods: • Bubble sort • Selection sort • Insertion sort • Radix sort.	5 Hours

Text Book:

1. Mark Allen Weiss,–Data Structures and Algorithm Analysis in C++‖,Pearson Education 2014, 4th Edition.
2. Reema Thareja,–Data Structures Using C‖, Oxford Universities Press 2014, 2nd Edition

Reference Books:

1. Thomas H. Cormen, Chales E. Leiserson, Ronald L.Rivest ,Clifford Stein,–Introduction to Algorithms‖,McGraw Hill 2009, 3rd Edition
2. Aho, Hopcroft and Ullman,–Data Structures and Algorithms‖, Pearson Education 2003

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	On completion of this course, students will Understand the concept of Dynamic memory management, data types, algorithms, Big Onotation	K1
CO2	Understand basic data structures such as arrays, linked lists, stacks and queues	K2
CO3	Describe the hash function and concepts of collision and Its resolution methods	K3
CO4	Solve problem involving graphs, trees and heaps	K4
CO5	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data	K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping (COs vs POs)									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	3	3	2	1	-	2	3	1
CO2	1	2	1	-	-	2	2	3	1
CO3	3	1	2	1	-	-	2	3	1
CO4	2	2	1	2	3	1	2	3	1
CO5	3	2	1	-	-	-	2	3	1

3 – Strong, 2- Medium, 1- Low

Semester: III	**Course Code: 23UCASE04**	**Hours/Week: 2**	**Credit: 2**
COURSE TITLE: SKILL ENHANCEMENT COURSE IV- PHP PROGRAMMING			

Course Overview:

1. To get a knowledge on OOPS with PHP.
2. Manipulate files and directories.
3. To get an experience on various web application development techniques.

Learning Objectives:

1. To provide the necessary knowledge on basics of PHP.
2. To design and develop dynamic, data base-driven web applications using PHP version.
3. To get an experience on various web application development techniques.
4. To learn the necessary concepts for working with the files using PHP.
5. To get a knowledge on OOPS with PHP.

Unit - I	**Introduction to PHP**	**09 Hours**

Introduction to PHP - Basic Knowledge of web sites - Introduction of Dynamic Web site - Introduction to PHP-Scope of PHP - XAMPP and WAMP Installation

Unit - II	PHP Programming Basics & Embedding HTML in PHP	09 Hours

PHP Programming Basics - Syntax of PHP - Embedding PHP in HTML - Embedding HTML in PHP. Introduction to PHP Variable - Understanding Data Types – Using Operators - Using Conditional Statements - If(), else if() and else if condition Statement.

Unit - III	LOOPS & PHP Functions	09 Hours

Switch () Statements - Using the while () Loop - Using the for () Loop PHP Functions. PHP Functions - Creating an Array - Modifying Array Elements - Processing Arrays with Loops - Grouping Form Selections with Arrays - Using Array Functions.

Unit - IV	PHP Advanced Concepts	09 Hours

PHP Advanced Concepts – Reading and Writing Files - Reading Data From a File.

Unit - V	Managing Sessions and Using Session Variables	09 Hours

Managing Sessions and Using Session Variables - Destroying a Session - Storing Data in Cookies - Setting Cookies.

Text Book(s):

1. Head First PHP & MySQL : ABrain – Friendly Guide – 2009 - Lynnmighley and Michael Morrison.
2. The Joy of PHP:A Beginner's Guide to Programming Interactive Web Applications with PHP and MySQL - Alan Forbes

Reference Books:

1. PHP: The Complete Reference - Steven Holzner.
2. DTE ditorial Services (Author), −HTML 5 Black Book (CoversCSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery)‖, Paperback 2016, 2nd Edition.

Web Resources:

1. https://www.w3schools.com/php/default.asp

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes: Upon successful completion of this course, the student will be able to		
COs	**Statements**	**Bloom's Level**
CO1	Write PHP scripts to handle HTML forms	K1
CO2	Write regular expressions including modifiers, operators, and meta characters.	K2
CO3	Create PHP Program using the concept of array.	K3
CO4	Create PHP programs that use various PHP library functions	K4
CO5	Manipulate files and directories.	K5
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create		

Mapping (COs vs POs)									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	3	1	1	-	1	1	1	2
CO2	2	-	1	1	2	1	1	1	-
CO3	3	3	1	1	-	1	2	1	-
CO4	1	3	2	1	-	1	1	1	2
CO5	3	2	1	1	-	1	1	1	-

3 – Strong, 2- Medium, 1- Low

Semester: III	Course Code: 23UCASE05	Hours/Week: 2	Credit: 2
COURSE TITLE: SKILL ENHANCEMENT COURSE V- SOFTWARE TESTING			

Course Overview:

1. To discuss various software testing issues and solutions in software unit test, integration and system testing.
2. Have an ability to use software testing methods and modern software testing tools for their testing projects
3. To learn about Logic based testing and decision tables
4. Have an ability to identify the needs of software test automation, and define and develop a test tool to support test automation.

Learning Objectives:

1. To study fundamental concepts in software testing
2. To discuss various software testing issues and solutions in software unit test, integration and system testing.
3. To study the basic concept of Data flow tests and Domain testing.
4. To Acquire knowledge on path product sand path expressions.
5. To learn about Logic based testing and decision tables

Unit - I	Introduction	06 Hours

Introduction: Purpose – SDLC Model - Productivity and Quality in Software – Testing Vs Debugging – Model for Testing – Bugs – Types of Bugs – Testing and Design Style.

Unit - II	Flow / Graphs	06 Hours

Flow / Graphs and Path Testing – Achievable paths – Path instrumentation Application Transaction Flow Testing Techniques.

Unit - III	Data Flow Testing Strategies	06 Hours

Data Flow Testing Strategies - Domain Testing: Domains and Paths – Domains and Interface Testing.

Unit - IV	Linguistic & Structural Metric	06 Hours

Linguistic – Metrics – Structural Metric – Path Products and Path Expressions. Syntax Testing – Formats – Test Cases

Unit - V	Testing	06 Hours

Logic Based Testing – Decision Tables – Transition Testing – States,State Graph, Stat Testing

Text Book(s):

1. B. Beizer, –Software Testing Techniques‖, II Edn., Dream Tech India, New Delhi, 2003.
2. K.V.K.Prasad,–Software Testing Tools‖, Dream Tech. India, New Delhi, 2005

Reference Books:

1. Burnstein, 2003, –Practical Software Testing‖, Springer International Edn.
2. E.Kit,1995,—Software Testing in the Real World: Improving the Process‖, Pearson Education, Delhi.
3. R. Rajani, and P.P. Oak, 2004, —Software Testing‖, Tata Mcgraw Hill, New Delhi.

Web Resources

1. https://www.javatpoint.com/software-testing-tutorial
2. https://www.guru99.com/software-testing.html

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	Students learn to apply software testing knowledge and engineering methods	K1
CO2	Have an ability to identify the needs of software test automation, and define and develop a test tool to support test automation.	K2
CO3	Have an ability understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods.	K3
CO4	Have basic understanding and knowledge of contemporary issues in software testing, such as component-based software testing problems	K4
CO5	Have an ability to use software testing methods and modern software testing tools for their testing projects	K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping (COs vs POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	3	2	2	2	-	2	1	1
CO2	3	2	2	3	3	2	1	2	1
CO3	2	3	3	2	2	3	-	2	1
CO4	2	1	2	2	2	1	2	1	2
CO5	2	2	3	2	2	2	2	1	2

3 – Strong, 2- Medium, 1- Low