DEPARTMENT OF COMPUTER SCIENCE

VISION

- To become a center of excellence in computer science with provision of quality education to mold innovative professionals for nation's welfare.

MISSION

- Providing learner-centric teaching-learning process in excellent infrastructure.
- Grooming the students with professional and social ethics.
- Provide latest tools and technology to the students as a part of learning structure.

PROGRAM OUTCOMES (POs)

PO1 Ability to apply mathematics, logic, and statistics to the design, development, and analysis of software systems.

PO2 Ability to understand, design, and analyze precise specifications of algorithms, procedures, and interaction behaviour.

PO3 Ability to design components, systems and/or processes to meet required specifications.

PO4 Ability to be equipped with a range of fundamental principles of Computer Science that will provide the basis for future learning and enable them to adapt to the constant rapid development of the field.

PO5 Ability to demonstrate competence in the practical art of computing in by showing in design an understanding of the practical methods, and using modern design tools competently for complex real-life IT problem.

PO6 Ability to develop creative and effective responses to intellectual, professional and social challenges.

PO7 Ability to apply decision making methodologies to evaluate solutions for efficiency, effectiveness and sustainability.

PROGRAMME EDUCATIONAL OBJECTIVES

PEO1 Graduates of the programme will be successful in their professional careers, including entrepreneurship using their knowledge in computer science (90%).

PEO2 Graduates of the programme will continue to learn and adopt latest technologies to solve reallife problems (60%).

PEO3 Graduates of the programme will pursue research and higher education (40%).

PROGRAMME SPECIFIC OUTCOMES

PSO1 Demonstrate mastery of Computer Science in the following core knowledge areas

Programming Languages and Data Structures

Databases, Software Development and Maintenance

Computer Hardware and Architecture

PSO2 Apply problem-solving skills and the knowledge of computer science to solve real worldproblems.

PSO3 Develop technical project reports and present them orally among the users.

GRADUATE ATTRIBUTES

1) **Knowledge of the discipline**- To acquire an in depth Knowledge in Computer Science. This Graduate Attribute describes the capability of demonstrating comprehensive and considered knowledge in Computer Science.

2) **Technical Competence**-To develop a technical competence among students. Ability to apply technical knowledge and skills in computer science to solve real-world problems. It enables students to evaluate and utilize information and apply their disciplinary knowledge and their professional skills in the workplace.

3) **Creativity and Innovation –** Create stronger platform for **c**reativity and innovation. It is a skill that most required to apply imaginative and reflective thinking to their studies. Students are encouraged to look at the design or issue through differing and novel perspectives. Creativity allows the possibility of a powerful shift in outlook and enables students to be open to thinking about different concepts and ideas. Ability to think innovative to solve complex problems.

4) Problem Solving Skills – Problem solving skills empower students within the context of their programmer, personal and professional lives. Ability to analyze problems, identify solutions and implement them using computer science techniques.

5) Critical Thinking and Analytical Skills - Build the confidence level of student's ability to critically evaluate information, analyze data, and make informed decisions Ability to continuously learn and adapt to new technologies, tools, and methodologies.

6) Communication and Social Skills: The ability to communicate clearly and to work well in a team setting is critical to sustained and successful employment. Ability to effectively communicate technical ideas and solutions to both technical and non-technical audiences. Good communication and social skills involve the ability to listen to, as well as clearly express, information back to others in a variety of ways - oral, written, and visual - using a range of technologies.

7) Ethical and Global Practices- Ethical practice is a key component of professionalism and needs to be instilled in curricula across courses. Ethical behavior involves tolerance and responsibility. It also means behaving appropriately towards colleagues and the community and being sensitive to local and global social justice issues. Understanding of global issues and cultural diversity in the field of computer science.

PROGRAMME STRUCTURE FOR B.Sc COMPUTER SCIENCE

(For those admitted from the academic year 2024-25 and onwards)

Category	Course Type	Course Code	Course Title	Contact Hours	Exam Hours	CIA	ESE	Total Marks	Credits
						Marks			
Semester-1									
PART-I	Language	U24TA1L1	Tamil– I	6	3	25	75	100	3
PART-II	English	U24EN1L1	English – I	6	3	25	75	100	3
PART-III	Core-1	U24CS101	C Programming	5	3	25	75	100	5
	Core Lab- 1	U24CS1P1	C programming Lab	5	3	40	60	100	5
	Elective Generic-I(Allied)	U24CS1A1	Discrete Mathematics	4	3	25	75	100	3
PART-IV	Skill Enhancement Course SEC1 (NME-1)	U24CS1S1	Office Automation	2	-	50	-	50	2
	Foundation Course	U24CSFC1	Problem Solving Techniques	2	-	50	-	50	2
			TOTAL	**30**				**600**	**23**
Semester-II									
PART-I	Language	U24TA2L2	Tamil– II	6	3	25	75	100	3
PART-II	English	U24EN2L2	English - II	6	3	25	75	100	3
PART-III	Core-2	U24CS202	Data Structure and Algorithms	5	3	25	75	100	5
	Core Lab- 2	U24CS2P2	Data Structure and Algorithms Lab	5	3	40	60	100	5
	Elective Generic - 2(Allied)	U24CS2A2	Digital Logic Fundamentals	4	3	25	75	100	3
	Comprehension- I (Self Study Course- Online Exam)	U24CS2C1	Comprehension in Computer Science – I	-	1	-	50	50	1
PART-IV	Skill Enhancement Course SEC2 (NME-2)	U24CS2S2	Introduction to HTML	2	-	50	-	50	2
	Skill Enhancement Course (SEC- 3) (DSC)	U24CS2S3	Understanding Internet	2	2	-	50	50	2
			TOTAL	**30**				**650**	**24**
Semester-III									
PART-I	Language	U24TA3L3	Tamil– III	6	3	25	75	100	3
PART-II	English	U24EN3L3	English – III	6	3	25	75	100	3
PART-III	Core-3	U24CS303	Object Oriented Programming Concepts using C++	5	3	25	75	100	5
	Core Lab -3	U24CS3P3	Object Oriented Programming Concepts using C++	5	3	40	60	100	5

			Lab						
	Elective Generic 3 (Allied)	U24CS3A3	Statistical Method and its Application	4	3	25	75	100	3
PART-IV	Skill Enhancement Course SEC-4 (DSC)	U24CS3S4	Multimedia System	2	-	50	-	50	2
	Ability Enhancement Compulsory Course-1	U24AE301	Environmental Studies	2		50	-	50	2
TOTAL				**30**				**600**	**23**

Semester-IV

PART-I	Language	U24TA4L4	Tamil– IV	6	3	25	75	100	3
PART-II	English	U24EN4L4	English– IV	6	3	25	75	100	3
PART-III	Core-4	U24CS404	Java Programming	4	3	25	75	100	4
	Core Lab-4	U24CS4P4	Java programming Lab	4	3	40	60	100	4
	Elective Generic - 4 (Allied)	U24CS4A4	Optimization Techniques	4	3	25	75	100	3
	Comprehension-II (Self Study Course- Online Exam)	U24CS4C2	Comprehension in Computer Science – II	-	1	-	50	50	1
PART-IV	Skill Enhancement Course SEC5(DSC)	U24CS4S4	IOT and its Applications	2	2	-	50	50	2
	Skill Enhancement Course SEC6(DSC)	U24CS4SP	Web Designing Lab	2	2	-	50	50	2
	Ability Enhancement Compulsory Course	U24AE402	Yoga and Value Education	2	-	50	-	50	2
	Internship/ Institutional Training/ Mini Project(Carried out during II year summer vacation)	U24CS5IT	Internship/ Institutional Training/Mini Project	-	-	Completion			-
TOTAL				**30**				**700**	**24**

Semester-V

PART-III	Core-5	U24CS505	Software Engineering	5	3	25	75	100	4
	Core-6	U24CS506	Database Management System	5	3	25	75	100	4
	Core Lab- 5	U24CS5P5	Database Management System Lab	5	3	40	60	100	4
	Core Elective-1	U24CS5E1A	Image Processing						
		U24CS5E1B	Computational Intelligence	4	3	25	75	100	3

PART	Category	Course Code	Course Title						
		U24CS5E1C	Cryptography						
	Core Elective-2	U24CS5E2A	Introduction to Data Science	4	3	25	75	100	3
		U24CS5E2B	Big Data Analytics						
		U24CS5E2C	Robotics and its Applications						
	Major Group Project	U24CS5MP	Major Group Project with Viva Voce	5		40	60	100	5
PART-IV	Skill Enhancement Course (DSC) SEC7	U24CS5SP	Advanced Excel Lab	2	2	-	50	50	2
	Internship/ Industrial Training/ Mini Project	U24CS5IT	Internship/Industrial Training/Mini Project	-	-	40	60	100	2
	Proficiency Enhancement Course (Self-Study Course)	U24GS5SS	General Studies	-		Completion			2
	MOOC/Spoken Tutorial (Self Study Course - online)			-	-	Completion			2
			TOTAL	**30**				**750**	**31**

Semester-VI

PART	Category	Course Code	Course Title						
PART-III	Core-7	U24CS607	Computer Networks	6	3	25	75	100	4
	Core-8	U24CS608	.Net Programming	6	3	25	75	100	4
	Core Lab -6	U24CS6AP	.Net Programming Lab	6	3	40	60	100	4
	Core Elective -3	U24CS6E3A	Cloud Computing	5	3	25	75	100	3
		U24CS6E3B	Fuzzy Logic						
		U24CS6E3C	Natural Processing Language						
	Core Elective -4	U24CS6E4A	Artificial Neural Network	5	3	25	75	100	3
		U24CS6E4B	Agile Project Management						
		U24CS6E4C	Virtual Reality						
	Comprehension – III (Self Study - Online Exam	U24CS6C3	Comprehension in Computer Science – III	-	1	-	50	50	1
PART-IV	Professional Competency Skill Enhancement Course (SEC8)	U24CS6S5	Quantitative Aptitude	2	2	-	50	50	2
	Extra Department Course Open Elective (Self Study Course)		To be selected from the Courses offered by other departments	-	3	-	100	100	3

PART-V	Extension Activities – NSS, NCC, YRC, Physical Education.	-	-		Completion			1
	NCC*				Completion			
	TOTAL	**30**					**700**	**25**
	Grand Total	**180**					**4000**	**150**

* As per UGC norms,those students who opted NCC under extension activities will be studying the prescribed syllabi of the UGC which will include theory, practical and camp components .Such students who qualify the prescribed requirements will earn an additional **24 credits**.

<u>Semester – I</u>

**Part-III B.Sc. Computer Science / Semester – I /Core-1:
C PROGRAMMING (U24CS101)**

Lecture Hours	**:70**	**Tutorial Hours:5**	
Lab Practical Hours	**:-**	**No of Credits :5**	
Contact Hours Per semester	**:75**		
Contact Hours Per week	**:5**		
Internal Marks	**:25**		
External Marks	**:75**		
Total Marks	**:100**		

Objectives of the Course

The Course aims at giving an overall view of the

- programming skills in C.

- C programming basics and its fundamentals.

- concept using if statements, loops, Arrays, etc.

- structures and pointers.

Course Learning Outcome

On successful completion of the Course, the student will be able to

CO1 remember the program structure of C with its syntax and semantics.

CO2 understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files).

CO3 apply the programming principles learnt in real-time problems.

CO4 analyze the various methods of solving a problem and choose the best method.

CO5 code, debug and test the programs with appropriate test cases.

CO-PO and PSO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	3	1	2	2	3	2	3
CO2	2	2	2	1	2	2	2	1	2	2
CO3	3	2	2	3	2	3	1	3	2	3
CO4	1	2	1	2	2	2	3	2	2	1
CO5	1	1	2	2	2	2	2	2	1	2
Total Contribution of COs to POs	10	9	9	11	9	11	10	11	9	11
Weighted Percentage of COs Contribution to POs	66	60	60	73	60	73	66	73	60	73

0 - No Correlation   1 - Weak   2 - Moderate   3 - Strong

COURSE CONTENT

Unit-I   Overview of C   (L-14 hrs)

Overview of C: Importance of C, sample C program, C 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: Arithmetic, Relational, logical, assignment, increment, decrement, conditional, bitwise and special operators, arithmetic expressions, operator precedence, type conversions, mathematical functions. Managing Input and Output Operators: Reading and writing a character, formatted input, formatted output.

Unit -II   Decision Making   (L-14 hrs)

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

Unit-III   Arrays and Functions   (L-14 hrs)

Arrays: Declaration and accessing of one & two-dimensional arrays, initializing two-dimensional arrays, multidimensional arrays. 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-IV   Structures and Unions   (L-14 hrs; T-3hrs)

Structures and Unions: Defining, giving values to members, initialization and comparison of structure variables, arrays of structure, arrays within structures, structures within structures, structures and functions, unions. Preprocessors: Macro substitution, file inclusion.

Unit-V   Pointers   (L-14 hrs; T-2hrs)

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 structures.

Recommended Text:

1. E. Balagurusamy, "*Programming in ANSI C",* Fifth Edition, Tata McGraw-Hill, 2010.

Reference Books:

1. Byron Gottfried, "*Schaum's Outline Programming with C",* Fourth Edition, Tata McGraw-Hill, 2018.

2. Kernighan and Ritchie, "*The C Programming Language",* Second Edition, Prentice Hall, 1998.

3. YashavantKanetkar, "*Let Us C",* Eighteenth Edition, BPB Publications, 2021.

Website and E- learning Sources:

1. https://codeforwin.org/.
2. https://www.geeksforgeeks.org/c-programming-language/.
3. https://www.cprogramming.com/.

Part-III B.Sc. Computer Science / Semester– I /

Core-2: C PROGRAMMING LAB (U24CS1P1)

Lecture Hours	: -	**Tutorial Hours:-**	
Lab Practical Hours	:5	**No of Credits : 5**	
Contact Hours Per semester	:75		
Contact Hours Per week	:5		
Internal Marks	:40		
External Marks	:60		
Total Marks	:100		

Objectives of the Course

The Course aims at giving an overall view of the

- programming skills in C.

- fundamentals of C, Data types in C, mathematical and logical operations.

- concept using loop statements , Arrays and Functions.

- C programming skills to move into specific branches.

Course Learning Outcomes

On successful completion of the Course, the student will be able to

CO1   remember the program structure of C with its syntax and semantics.

CO2   understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files).

CO3   apply the programming principles learnt in real-time problems.

CO4   analyze the various methods of solving a problem and choose the best method.

CO5   code, debug and test the programs with appropriate test cases.

CO-PO and PSO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	3	1	2	2	3	2	3
CO2	2	3	3	1	2	2	2	1	2	2
CO3	3	2	2	3	2	3	1	3	2	3
CO4	1	2	3	2	2	2	3	2	2	1
CO5	2	1	2	2	2	2	2	2	2	1
Total Contribution of COs to POs	11	10	12	11	9	11	10	11	10	10
Weighted Percentage of COs Contribution to POs	73	66	80	73	60	73	66	73	66	66

0 - No Correlation   1 - Weak   2 - Moderate   3 - Strong

List of Exercises

Unit I: Variables, Data types, Constants and Operators

1. Evaluation of expression ex: $((x+y)^2 * (x+z))/w$

2. Temperature conversion problem (Fahrenheit to Celsius)

3. Program to convert days to months and days (Ex: 364 days = 12 months and 4 days)

Unit II: Decision making Statements

4. Maximum of three numbers

5. Calculate Square root of five numbers (using goto statement)

6. Pay-Bill Calculation for different levels of employee (Switch statement)

7. Fibonacci series

8. Pascal's Triangle

Unit III: Arrays, Functions and Strings

9. Sorting data (Ascending and Descending)

10. Matrix Multiplication

11. Function that convert lower case letters to upper case

12. Factorial using recursion.

13. Perform String Operations using Switch Case.

Unit IV: Structures and Macros

14. Structure that describes a Hotel (name, address, grade, avg room rent, number of rooms)

   Perform some operations (list of hotels of a given grade etc.)

15. Using Pointers in Structures.

16. Cricket team details using Union.

17. Write a macro that calculates the max and min of two numbers

Unit V: Pointers and Files

18. Function to exchange two pointer values

19. Creation, insertion and deletion in a linked list

20. Program to read a file and print the data.

21. Program to copy the content of one file to another file.

General Instructions to be followed by student

➢ The student must complete the above listed practical list.

➢ All the listed practical are to be completed by all the students

➢ All the practical should be recorded in the document

➢ Both observation and record should be submitted compulsory.

Recommended Text:

1. E. Balagurusamy, "*Programming in ANSI C*", Fifth Edition, Tata McGraw-Hill, 2010.

Reference Books:

1. Byron Gottfried, "*Schaum's Outline Programming with C*", Fourth Edition, Tata McGraw-Hill, 2018.

2. Kernighan and Ritchie, "*The C Programming Language*", Second Edition, Prentice Hall, 1998.

3. Yashavant Kanetkar*, "Let Us C*", Eighteenth Edition, BPB Publications, 2021.

Website and E- learning Sources:

1. https://codeforwin.org/

2. https://www.geeksforgeeks.org/c-programming-language/

3. http://en.cppreference.com/w/c

5. https://www.cprogramming.com/

Part-III B.Sc. Computer Science / Semester – I / Elective Course 1:

DISCREATE MATHEMATICS (Elective Generic I- U24CS1A1)

Lecture Hours	: 50	**Tutorial Hours :10**
Lab Practical Hours	:-	**No of Credits :3**
Contact Hours Per semester: 60		
Contact Hours Per week	: 4	
Internal Marks	: 25	
External Marks	: 75	
Total Marks	: 100	

Objectives of the Course

The Course aims at giving an overall view of the

- various set theory in discrete mathematics.
- use various functions and relations in discrete mathematics.
- different mathematical logic.
- discrete solution of ordinary problems.

Course Learning Outcomes

On successful completion of the Course, the student will be able to

CO1 solve various problems on numerical methods.

CO2 use approximation to solve problems.

CO3 apply Differentiation and integration concept.

CO4 apply, direct methods for solving linear systems.

CO5 apply Numerical solution of ordinary differential equations.

CO-PO and PSO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	3	1	2	2	3	2	3
CO2	2	2	2	2	2	2	2	2	2	2
CO3	3	2	2	3	2	3	1	1	2	3
CO4	1	2	1	2	2	1	3	2	2	1
CO5	1	1	2	2	2	2	2	2	1	1
Total Contribution of COs to POs	10	10	9	12	11	10	10	10	11	10
Weighted Percentage of COs Contribution to POs	66	66	60	80	73	66	66	60	73	66

0 - No Correlation   **1 - Weak**   **2 - Moderate**   **3 - Strong**

COURSE CONTENT

Unit-I   Set Theory   (L-10 hrs)

Set theory-Sets and elements-Specifications of sets-Identity and Cardinality-Set inclusion- Equality of sets-proper sets Power sets-Universal set-Operations on sets-ordered pairs Cartesian product of sets.

Unit-II Relations and Function   (L-8 hrs)

Relations and functions-Definition-example- Relations on sets- Equivalence relations- Equivalence Class – Functions.

Unit-III Mathematical Logic   (L-12 hrs; T-3 hrs)

Mathematical logic Introduction – Statement (Propositions) – Laws of Formal Logic – Basic Set of Logical operators/operations - Propositions and Truth Tables – Algebra Propositions - Tautologies and Contradictions – Logical Equivalence – Logical Implication – Normal Forms.

Unit-IV Matrix Algebra   (L-12 hrs; T-3 hrs)

Matrix algebra Introduction – Definition of a Matrix - Types of Matrices – Operations on Matrices – Related Matrices – Transpose of a Matrix – Symmetric and Skew-symmetric Matrices – Complex Matrix – Conjugate of a Matrix – Determinant of a Matrix – Typical SquareMatrices.

Unit-V Adjoint Matrix   (L-8hrs;T-4 hrs)

Adjoint and Inverse of a Matrix –Singular and Non-singular Matrices – Adjoint of a Square Matrix – Properties of Adjoint of a Matrix – Properties of Inverse of a Matrix.

Recommended Text:

1. Swapan kumar chakraborty and Bikash kanti Sarkar *"Discrete mathematics"*,OxfordUniversity,Press2.

Reference Books:

1.Seymour Lipschutz and Marc Lars Lipson *"Discrete Mathematics",* Third Edition,TataMcGraw Hill Education Private Limited.

2.J.P.Tremblay,R.Manohar," *Discrete Mathematical Structures with Aplications to Computer Science" TMH edition.*

Website and E- learning Sources:

1.https://dev.to/shamimularefin/best-discrete-mathematics-resources-that-all-should-know-1d09.

2https://discrete.openmathbooks.org/dmoi3.html.

Part-IV B.Sc. Computer Science / Semester – I /Skill

Enhancement Course-I: Office Automation (U24CS1S1)

Lecture Hours	**: 30**	**Tutorial Hours:-**	
Lab Practical Hours	**:-**	**No of Credits :2**	
Contact Hours Per semester	**: 30**		
Contact Hours Per week	**: 2**		
Internal Marks	**: 50**		
External Marks	**: -**		
Total Marks	**: 50**		

Objectives of the Courses

The Course aims at giving an overall view of the

- computer skills to impart training for students in Microsoft Office which has different components like MS Word, MS Excel and Power point.
- editor, spread sheet and presentation software.

Course Learning Outcomes

On successful completion of the Course, the student will be able to

CO1 understand the basics of computer systems and its components.

CO2 learn the basic concepts of a word processing package.

CO3 apply the basic concepts of electronic spreadsheet software.

CO4 create a presentation using Power-Point tool.

CO5 apply the basic concepts of database management system.

CO-PO and PSO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	3	1	2	2	3	2	3
CO2	2	2	2	1	2	2	2	1	2	2
CO3	3	2	2	3	2	3	1	3	2	3
CO4	1	2	1	2	2	2	3	2	2	1
CO5	1	1	2	2	2	2	2	2	1	1
Total Contribution of COs to POs	10	9	9	11	9	11	10	11	9	10
Weighted Percentage of COs Contribution to POs	66	60	60	73	60	73	66	73	60	66

0 - No Correlation   1 - Weak   2 - Moderate   3 - Strong

COURSE CONTENT

Unit-I   Introduction   (L-6 hrs)

Introductory concepts**:** Memory unit – CPU-Input Devices: Key board, Mouse and Scanner. Output devices: Monitor, Printer. Introduction to Operating systems & its features: DOS – UNIX– Windows. Introduction to programming languages.

Unit-II   Word Processing   (L-6 hrs)

Word Processing**:** Open, Save and close word document; Editing text – tools, formatting, bullets, Spell Checker - Document formatting – Paragraph alignment, indentation, headers and footers, numbering, printing – Preview, options, merge.

Unit-III Spreadsheets   (L-6 hrs)

Spreadsheets**:** Excel – opening, entering text and data, formatting, navigating; Formulas – entering, handling and copying; Charts – creating, formatting and printing, analysis tables, preparation of financial statements, introduction to data analytics.

Unit-IV Database Concepts   (L-6 hrs)

Database Concepts**:** The concept of data base management system; Data field, records, and files, Sorting and indexing data; Searching records. Designing queries, and reports; linking of data files; Understanding Programming environment in DBMS, Developing menu drive applications in query language (MS – Access).

Unit-V   Power Point   (L-6 hrs)

Power point: Introduction to Power point - Features – Understanding slide typecasting & viewing slides- creating slide shows. Applying special object – including objects & pictures-Slide transition - Animation effects, audio inclusion, timers.

Recommended Text:

1. Peter Norton, *"Introduction to Computers" –Tata McGraw-Hill,* 2015.

Reference Book:

1. Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons *"Microsoft 2003"* tata McGraw-Hill, 2018.

Website and E- learning Sources:

1. Web content from NDL / SWAYAM or open source web resource.

Part-IV B.Sc. Computer Science / Semester – I / Foundation Course
(Problem Solving Techniques-U24CSFC1)

Lecture Hours	:30	**Tutorial Hours :**	
Lab Practical Hours	:-	**No of Credits :2**	
Contact Hours Per semester	:30		
Contact Hours Per week	: 2		
Internal Marks	:50		
External Marks	:-		
Total Marks	:50		

Objectives of the Courses

The Course aims at giving an overall view of the

- importance of algorithms and programs, and to know the basic problem solving.
- efficient strategies and algorithms to solve standard problems, thus laying a firm foundation for designing algorithmic solutions to problems.

Course Learning Outcomes

On Successful completion of the Course, the student will be able to

CO1 understand the systematic approach to problem solving.

CO2 know the approach and algorithms to solve specific fundamental problems.

CO3 understand the efficient approach to solve specific factoring-related problems.

CO4 understand the efficient array-related techniques to solve specific problems.

CO5 understand the efficient methods to solve specific problems related to text processing.

CO-PO and PSO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	3	1	2	2	3	2	3
CO2	2	2	2	1	2	2	2	1	2	2
CO3	3	2	2	3	2	3	1	2	2	3
CO4	1	2	1	2	2	2	3	2	2	1
CO5	2	1	2	2	2	2	2	2	1	1
Total Contribution of COs to POs	11	10	9	9	11	11	10	10	11	10
Weighted Percentage of COs Contribution to POs	73	66	60	60	73	73	66	60	73	66

0 - No Correlation   1 - Weak   2 - Moderate   3 - Strong

COURSE CONTENT

Unit-I Introduction   (L-6 hrs)

Introduction: History, characteristics and limitations of Computer. Hardware/Anatomy of Computer: CPU, Memory, Secondary storage devices, Input Devices and Output devices. Types of Computers: PC, Workstation, Minicomputer, Main frame and Supercomputer. Software: System software and Application software. Programming Languages: Machine language, Assembly language, High- level language,4 GL and 5GL-Features of good programming language. Translators: Interpreters and Compilers.

Unit-II Data Types   (L-6 hrs)

Data: Data types, Input, Processing of data, Arithmetic Operators, Hierarchy of operations and Output. Different phases in Program Development Cycle (PDC).Structured Programming: Algorithm: Features of good algorithm, Benefits and drawbacks of algorithm. Flowcharts: Advantages and limitations of flowcharts, when to use flowcharts, flowchart symbols and types of flowcharts. Pseudocode: Writing a pseudocode. Coding, documenting and testing a program: Comment lines and types of errors. Program design: Modular Programming.

Unit-III Structures   (L-6 hrs)

Selection Structures: Relational and Logical Operators - Selecting from Several Alternatives – Applications of Selection Structures. Repetition Structures: Counter Controlled Loops – Nested Loops– Applications of Repetition Structures.

Unit-IV Arrays   (L-6 hrs)

Data: Numeric Data and Character Based Data. Arrays: One Dimensional Array - Two   Dimensional Arrays – Strings as Arrays of Characters.

Unit-V Data Flow Diagrams   (L-6 hrs)

Data Flow Diagrams: Definition, DFD symbols and types of DFDs. Program Modules: Subprograms-Value and Reference parameters- Scope of a variable - Functions -Recursion. Files: File Basics-Creating and reading a sequential file- Modifying Sequential Files.

Recommended Text:

1. Stewart Venit, *"Introduction to Programming: Concepts and Design",* Fourth Edition, Dream Tech Publishers,2010.

Reference Book:

1. Steven G.Krantz *"Techniques of Problem Solving",2013.*

Website and E- learning Sources:

1. https://www.codesansar.com/computer-basics/problem-solving-using- computer.html.

2. http://www.nptel.iitm.ac.in.

Semester – II

Part-III B.Sc. Computer Science / Semester – II /Core-2:

DATASTRUCTURE & ALGORITHMS (U24CS202)

Lecture Hours	**: 70**	**Tutorial Hours:5**
Lab Practical Hours	**: -**	**No of Credits :5**
Contact Hours Per semester : 75		
Contact Hours Per week	**:5**	
Internal Marks	**:25**	
External Marks	**:75**	
Total Marks	**:100**	

Objectives of the Courses

The Course aims at giving an overall view of the

- concepts of data structures and algorithms.
- basics of the various data structures and make the students knowledgeable in the area of data structures.
- insight into the various algorithm design techniques.

Course Learning Outcomes

On successful completion of the Course, the student will be able to

CO1 introduce the concepts of Data structures and to understand simple linear data structures.

CO2 learn the basics of stack data structure, its implementation and application

CO3 appropriate data structure in context of solution of given problem and demonstrate a familiar it with major data structures.

CO4 know the basic concepts of algorithms

CO5 give clear idea on algorithmic design paradigms like Dynamic Programming, Backtracking, Branch and Bound.

CO-PO and PSO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	3	1	2	2	3	2	3
CO2	2	2	2	1	2	2	2	1	2	2
CO3	3	2	2	3	2	3	1	3	2	3
CO4	1	2	1	2	2	2	3	2	2	1
CO5	1	1	2	2	2	2	2	2	1	1
Total Contribution of COs to POs	10	9	9	11	9	11	10	11	9	10
Weighted Percentage of COs Contribution to POs	66	60	60	73	60	73	66	73	60	66

0 - No Correlation   1 - Weak   2 - Moderate   3 - Strong

COURSE CONTENT

Unit -I   Abstract Data Types   (L-15 hrs)

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   (L-15 hrs)

Stack ADT-Operations- Applications- Evaluating arithmetic expressions 15 – Conversion of infix to postfix expression-Queue ADT-Operations Circular Queue- Priority Queue- deQueue applications of queues.

Unit-III   Tree ADT   (L-10 hrs; T-2 hrs)

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

Unit-IV   Graph   (L-15 hrs)

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   (L-15 hrs; T-3 hrs)

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.

Recommended Texts:

1. Mark Allen Weiss, *"Data Structures and Algorithm Analysis in C++",* 4th Edition Pearson Education2014.

2. Reema Thareja*, "Data Structures Using C",* 2nd Edition Oxford Universities Press, 2014.

Reference Books:

1. Thomas H.Cormen, ChalesE.Leiserson,RonaldL.Rivest, Clifford Stein*, "Introduction t toAlgorithms",* McGraw Hill, 3rd Edition,2009.

2. Aho, Hopcroft and Ullman, *"Data Structures and Algorithms",* Pearson Education, 2003.

Website and E- learning Sources:

1. https://www.programiz.com/dsa.

2. https://www.geeksforgeeks.org.

Part-III B.Sc. Computer Science / Semester – II /Core Lab-2:

DATASTRUCTURE & ALGORITHMS LAB (U24CS2P2)

Lecture Hours	**: -**	**Tutorial Hours :-**	
Lab Practical Hours	**: 5**	**No of Credits :5**	
Contact Hours Per semester : 75			
Contact Hours Per week	**: 5**		
Internal Marks	**: 40**		
External Marks	**: 60**		
Total Marks	**: 100**		

Objectives of the Courses

The Course aims at giving an overall view of the

- basic data structures using C.

- linear and non-linear data structures in problem solving.

- functions and recursive functions by means of data structures.

- searching and sorting algorithms.

Course Learning Outcomes

On successful completion of the Course, the student will be able to

CO1 implement data structures using C.

CO2 implement various types of linked lists and their applications.

CO3 implement Tree Traversals.

CO4 implement various algorithms in C.

CO5 implement different sorting and searching algorithms.

CO-PO and PSO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PSO1	PSO2	PSO3
CO1	3	2	3	2	1	2	2	3	2	3
CO2	2	2	2	1	2	2	2	1	3	2
CO3	3	2	2	3	2	3	1	3	2	3
CO4	2	2	3	2	2	2	3	2	2	1
CO5	1	1	2	2	2	2	2	2	3	1
Total Contribution of COs to POs	11	9	12	10	9	11	10	11	12	10
Weighted Percentage of COs Contribution to POs	73	60	80	66	60	73	66	73	80	66

0 - No Correlation   1 - Weak   2 - Moderate   3 - Strong

COURSE CONTENT

List of Exercises:

Implement the following exercises using C Programming language:

1. Search an element in a list using Binary Search.

2. Implementation of Stack- Push and Pop.

3. Implementation of Queue – Enqueue and Dequeue

4. Implementation of Binary Tree Traversals using recursion.

    a) Pre-Order b) In-Order   c) Post-Order

5. Implementation of Breadth First Search algorithm.

6. Implementation of Depth First Search algorithm.

7. Implementation of Merge Sort

8. Implementation of Quick Sort

General Instructions to be followed by student

➢ The student must complete the above listed practical list.

➢ All the listed practical are to be completed by all the students

➢ All the practical should be recorded in the document

➢ Both observation and record should be submitted compulsory

Recommended Texts:

1. Mark Allen Weiss, *"Data Structures and Algorithm Analysis in C++"*, Pearson Education, 4th Edition, 2014.

2. Reema Thareja, *"Data Structures Using C"*, Oxford Universities Press, 2nd Edition, 2014.

Reference Books:

1. Thomas H.Cormen,Chales E.Leiserson Ronald L.Rivest, Clifford Stein*," Introduction to Algorithms"*, McGraw Hill 3rd Edition, 2009.

2. Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education, 2003.

Website and E- learning Sources:

1. https://www.programiz.com/dsa.

Part-III B.Sc. Computer Science / Semester – II / Elective
Generic 2: Digital Logic Fundamentals(U24CS2A2)

Lecture Hours :55	**Tutorial Hours** :5
Lab Practical Hours :-	**No of Credits** :3
Contact Hours Per semester:60	
Contact Hours Per week :4	
Internal Marks :25	
External Marks :75	
Total Marks :100	

Objectives of the Courses

The Course aims at giving an overall view of the

➢ concepts in number system.

➢ digital logic fundamentals and implementation.

Course Learning Outcomes

On successful completion of the Course, the student will be able to

CO1 understand the concepts of number systems.

CO2 learn conversions.

CO3 construct truth table.

CO4 learn SOP and POS.

CO5 understand various simplifications.

CO-PO and PSO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	2	1	2	2	3	2	3
CO2	2	2	2	1	2	2	2	1	2	2
CO3	3	2	2	3	2	3	1	3	2	3
CO4	2	2	1	2	2	2	3	2	2	1
CO5	1	1	2	2	2	2	2	2	1	1
Total Contribution ofCOs to POs	11	9	9	10	9	11	10	11	9	10
Weighted Percentage of COs Contribution toPOs	73	60	60	66	60	73	66	73	60	66

0 - No Correlation   **1 - Weak**   **2 - Moderate**   **3 - Strong**

COURSE CONTENT

Unit-I   Number Systems   (L-11 hrs)

Number Systems :Codes and Digital Logic 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. Digital Logic: The Basic gates NOT, OR , AND –Universal Logic Gates NOR,NAND – AND-OR Invert Gates.

Unit-II   Combinational Logic   (L-11 hrs)

Combinational Logic: Circuits Boolean Laws and Theorems – Sum of Products Method–Truth Table to Karnaugh Map –Pairs, Quads and Octets –Karnaugh Simplifications –Don't Care Conditions –Product of Sums Method –Product of Sums Simplification.

Unit- III   Data Processing   (L-11 hrs; T-2 hrs)

Data Processing and Arithmetic circuits :Multiplexers –Demultiplexers –1-of-16-Decoders – BCD- to- Decimal Decoders – Seven-Segment decoders –Encoders –Exclusive-OR gates. Arithmetic Circuits: Binary Addition –Binary Subtraction –Unsigned Binary Numbers –Sign- Magnitude Numbers – 2's Complement Representation –2's Complement Arithmetic.

Unit-IV   Flip-Flops   (L-11 hrs)

Flip-Flops :RS Flip Flops –Edge Triggered RS Flip Flops -Edge Triggered D Flip Flops -Edge Triggered JK Flip Flops –JK Master Slave Flip Flops.

Unit-IV   Registers   (L-11 hrs; T-3 hrs)

Registers : Types of Registers –Serial in serial out –serial in parallel out –parallel in serial out –parallel in parallel out–Universal Shift Register.

Recommended Text:

1.Albert Paul Malvino & DonaldP.Leach, "*Digital Principles and Applications",* Seventh Edition, McGraw Hill Education private limited,2017.

Reference Books:

1. A.Anand Kumar,"*Fundamentals of Digital Circuits",* Second Edition,PHI Learning Private Limited,2017.
2. M.Morris Mano, "*Digital design",* Third Edition, PearsonEducation,2016.

Website and E- learning Sources:

1. https://www.tutorialspoint.com/.

Part-IV B.Sc. Computer Science / Semester – II /

Skill Enhancement Course-2: Introduction to HTML (U24CS2S2)

Lecture Hours :35	**Tutorial Hours:-**
Lab Practical Hours :-	**No of Credits :2**
Contact Hours Per semester :30	
Contact Hours Per week :2	
Internal Marks :50	
External Marks :-	
Total Marks :50	

Objectives of the Course

The Course aims at giving an overall view of the

> ➢ internet basics.

> ➢ various HTML tags.

Course Learning Outcomes

On successful completion of the Course, the student will be able to

CO1 gain knowledge on web application.

CO2 get an idea of various tags.

CO3 understand client/server technology.

CO4 understand the problem solving skill.

CO5 able to understand graphs, charts etc.

CO-PO and PSO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PSO1	PSO2	PSO3
CO1	3	2	2	3	1	2	2	3	2	3
CO2	2	2	2	1	2	2	2	1	2	2
CO3	3	2	2	3	2	3	1	3	2	3
CO4	1	2	1	2	2	2	3	2	2	1
CO5	1	1	2	2	2	2	2	2	1	1
Total Contribution of COs to POs	10	9	9	11	9	11	10	11	9	10
Weighted Percentage of COs Contribution to POs	66	60	60	73	60	73	66	73	60	66

0 - No Correlation   1 - Weak   2 - Moderate   3 - Strong

COURSE CONTENT

Unit-I   Introduction   (L-6 hrs)

Introduction to HTML: Designing a Home page – History of HTML – HTML generations- HTML Documents-Anchor tag –Hyperlinks –Sample HTML documents.

Unit-II   Header Section   (L-6 hrs)

Head and Body section: Header Section –Title-Prologue-Links-Colorful web page –Comments lines Designing the body: Heading printing –Aligning the headings-Horizontal rule- paragraph- Tab settings- Image and pictures Embedding PNG format Images.

Unit-III   List   (L-6 hrs)

Ordered and unordered lists: List-Unordered lists- headings in a list – ordered lists- Nested lists. Table handling: Tables- table creation in HTML- Width of the Tables and cells-Cells spanning multiple rows/Columns- Coloring cells – Column specification.

Unit-IV   Frames   (L-6 hrs)

Frames: Frame set - Definition – Frame definition –Nested Frames Web Page Design Project : Frameset Definition – Animals – Birds – Fish Forms: Action attributes –Method attributes – Enctype attribute – Drop down list- sample forms.

Unit-V   DHTML   (L-6 hrs)

DHTML and Style sheets: Defining styles –Elements of styles- Linking a style sheet to an HTML document –Inline styles –Internal & External style sheets – Multiple styles.

Recommended Text:

1. C. Xavier," *World Wide Web Design with HTML"* , TMH, 2001.

Reference Books:

1.H.M.Deital, P.J.Deital & A.B.Goldberg," *Internet & World Wide Web",* Pearson Education.

2.Mathew's lenon and Alxis leon, Vijay, " *Fundamentals of information technology",* Nicole private limited, Chennai.

Website and E- learning Sources:

1.https://www.programiz.com/dsa
2.https://www.W3Schools.com

B.Sc. Computer Science / Semester – II /Skill Enhancement-3:
Understanding Internet (U24CS2S3)

Lecture Hours : 30	**Tutorial Hours:-**
Lab Practical Hours:-	**No of Credit :2**
Contact Hours Per semester : 30	
Contact Hours Per week : 2	
Internal Marks : -	
External Marks : 50	
Total Marks : 50	

Objectives of the Course

The Course aims at giving an overall view of the

- ➢ history of internet.
- ➢ basic programming languages.
- ➢ Cyber security and computer virus.

Course Learning Outcomes
On successful completion of the Course, the student will be able to

CO1 handle large amounts of data.

CO2 aggregate numeric data and summarize into categories and subcategories.

CO3 filtering, sorting, and grouping data or subsets of data.

CO4 create pivot tables to consolidate data from multiple files.

CO5 presenting data in the form of charts and graphs.

CO-PO and PSO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	3	1	2	2	3	2	3
CO2	2	2	2	1	2	2	2	1	2	2
CO3	3	2	2	3	2	3	1	3	2	3
CO4	1	2	1	2	2	2	3	2	2	1
CO5	1	1	2	2	2	2	2	2	1	1
Total Contribution of COs to POs	10	9	9	11	9	11	10	11	9	10
Weighted Percentage of COs Contribution to POs	66	60	60	73	60	73	66	73	60	66

0 - No Correlation   **1 - Weak**   **2 - Moderate**   **3 - Strong**

COURSE CONTENT

Unit-I   History of Computers   (L-6 hrs)

Man and Machines - Human Capability of five senses to see, hear, smell, speak and act - Basic Structure of a Computer - Data - Characteristics of a Computer-History of Computers -Classification of Computers.

Unit-II   Programming Languages   (L-6 hrs)

Application Software and Programming Languages - Application Software - Packaged Software Products (Off-the-Shelf Products) - Office Automation - Core Banking System - Enterprise Software Products – SAP - Sales Force – Oracle - CRM and ERP - Early High Level Programming Languages - Translators (Compilers and Interpreters) – FORTRAN – BASIC – COBOL – PASCAL - C Language - Web Programming Languages – HTML - Java Script - Objected Oriented Programming with C++ - C++ Language - C# Language - Java Programming - Modern Programming Language – Python - GO Language - Swift Language - Kotlin Language - R Language - Artificial Intelligence Languages - Database Management Software.

Unit-III   Digital Transformation   (L-6 hrs)

Digital Transformation - Data (High Value Commodity) - Digital Transformation in Business - Features of Digital Transformation - 15 Banking and Financial Services Industry (BFSI) - Human Resource Management – Healthcare - Big Data Analytics in Healthcare - Virtual Reality Wearable medical device.

Unit-IV   Cyber Security   (L-6 hrs)

Cyber Security - IT Assets - Risk and Vulnerabilities - Computer Security Types - Fundamental Principles of Security - Physical Safety and Security - Access Control - Biometric Access Control - Network Security - AAA Server -– Firewall – Malware – Spyware – Adware – Spamware – Virus – Ransomware – Worms - Trojan Horse.

Unit-V   Computer Virus   (L-6 hrs)

Computer Virus - Types of Computer Viruses - Antivirus Protection - Digital Signature - Cyber Crime – Hacking – Phishing - Spam e-mails - Attack using Malware - ATM Skimming – Ransomware - Fake News - Deep fake – Cyberbullying.

Recommended Text:

1. C. Xavier *,"Fundamentals of Internet and Emerging Technologies"* , New Age International Publishers Ltd., New Delhi., Chapters 1, 2, 3 and 9 to 16 only,2021.

Reference Books:

1. *"Introduction to Computer Science",* Second Edition, ITL Education Solutions Ltd, Pearson Education.
2. Peter Norton *,"Introduction to Computers"* , 7th Edition, McGraw Hill Education
3. V.Rajaram," *Fundamentals of Computers"*, 5th Edition, PHI.

Website and E- learning Sources:

1. Website Resources from NDL Library, E-content from open source libraries.

Part-III B.Sc. Computer Science / Semester –III Core-5:

OBJECT ORIENTED PROGRAMMING CONCEPTS USING C++ (U24CS303)

Lecture Hours	:70	**Tutorial Hours**	:5
Lab Practice Hours	:-	**No of Credits**	:5
Contact Hours Per Semester	:75		
Contact Hours Per Week	:5		
Internal marks	:25		
External Marks	:75		
Total Marks	:100		

Objectives of the Course

The Course aims at giving an overall view of the

- ➢ program structure of C++ with its syntax and semantics.
- ➢ dynamic memory management techniques using pointers, constructors, destructors, etc.
- ➢ concept of function overloading, operator overloading, virtual functions and polymorphism.
- ➢ oops concept, exception handling, generic programming.
- ➢ use of various OOPs concepts with the help of programs.

Course Learning Outcomes

On successful completion of the Course, the student will be able to

CO1 remember the program structure of C++ with its syntax and semantics.

CO2 understand the programming principles in C++ (data types, operators, branching and looping, arrays, functions).

CO3 apply the programming principles learnt in real-time problems.

CO4 analyze the various methods of solving a problem and choose the best method.

CO5 code, debug and test the programs with appropriate test cases.

CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3
CO1	3	2	2	3	2	3	3	3	2	3
CO2	2	2	2	3	2	2	3	1	2	2
CO3	3	3	3	2	2	3	2	3	2	3
CO4	3	2	2	3	3	2	2	2	2	1
CO5	3	2	2	2	3	3	3	2	1	1
Total Contribution of COs to POs	14	11	11	13	12	13	13	11	9	10
Weighted Percentage of COs Contribution to POs	93.33	73.33	73.33	86.67	80	86.67	86.67	73	60	66

0-No Correlation   1-Weak   2-Moderate   3-Strong

COURSE CONTENT

Unit – I   Introduction to C++   **(L-14 hrs; T-2hrs)**

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   **(L- 14 hrs)**

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   Inheritance   **(L-14 hrs)**

Inheritance: Types of Inheritance –Single, Multilevel, Multiple, Hierarchal, Hybrid operator overloading: overloading unary, binary operator-Overloading Friend functions – type, Multipath inheritance-Virtual base Classes-Abstract Classes.

Unit – IV   Pointers   (L-14 hrs ; T-3 hrs)

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   (L- 14 hrs)

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.

Recommended Text:

1.E. Balagurusamy, *"Object-Oriented Programming with C++"*, TMH , 7th Edition,2013.

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 and E- learning Sources:

1. https://www.w3School.com.
2. https://www.geeksforgeeks.org/c++ programing.

Part-III B.Sc. Computer Science / Semester –III /Core-6:

OBJECT ORIENTED PROGRAMMING CONCEPTS USING C++ (U24CS3P3)

Lecture Hours	:-	**Tutorial Hours**	:-
Lab Practice Hours	:75	**No of Credits**	:5
Contact Hours Per Semester	:75		
Contact Hours Per Week	:5		
Internal marks	:40		
External Marks	:60		
Total Marks	:100		

Objectives of the Course

The Course aims at giving an overall view of the

- ➢ core syntax and semantics of C++ programming.
- ➢ process of data structure using C++.
- ➢ concept of class, inheritance, polymorphism.
- ➢ ability to write program in C++.

Course Learning Outcomes

On successful completion of the Course, the student will be able to

CO1 describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.

CO2 understand dynamic memory management techniques using pointers, constructors, destructors.

CO3 describe the concept of function overloading, operator overloading, virtual functions and Polymorphism.

CO4 classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming.

CO5 demonstrate the use of various OOPs concepts with the help of programs.

CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3
CO1	3	2	2	3	2	3	3	3	2	3
CO2	2	2	2	3	2	2	3	1	2	2
CO3	3	3	3	2	2	3	2	3	2	3
CO4	3	2	2	3	3	2	2	2	2	1
CO5	3	2	2	2	3	3	3	2	1	1
Total Contribution of COs to POs	14	11	13	11	13	9	9	11	9	10
Weighted Percentage of COs Contribution to POs	93.33	73.33	86.33	73.33	86.67	60	60	73	60	66

0-No Correlation   **1-Weak**   **2-Moderate**   **3-Strong**

Course Content

List of Lab Exercises

1. Write a C++ program to demonstrate function overloading, Default Arguments and Inline function.

2. Write a C++ program to demonstrate Class and Objects Program to implement Parameterized Constructor.

3. Write a C++ program to demonstrate the concept of Passing Objects to Functions Program to Overload Unary Minus Operator.

4. Write a C++ program to demonstrate the Friend Functions.

5. Write a C++ program to demonstrate the concept of Passing Objects to Functions.

6. Write a C++ program to demonstrate Constructor and Destructor.

7. Write a C++ program to demonstrate Unary Operator Overloading.

8. Write a C++ program to demonstrate Binary Operator Overloading.

9. Write a C++ program to demonstrate: Single Inheritance, Multilevel Inheritance.

10. Write a C++ program to demonstrate Virtual Functions.

11. Write a C++ program to manipulate a Text File.

12. Write a C++ program to perform Sequential I/O Operations on a file.

13. Write a C++ program to find the Biggest Number using Command Line Arguments.

14. Write a C++ program to demonstrate Class Template.

15. Write a C++ program to demonstrate Exception Handling.

General Instructions to be followed by student

  ➢ The student must complete the above listed practical list.

  ➢ All the listed practical are to be completed by all the students.

  ➢ All the practical should be recorded in the document.

  ➢ Both observation and record should be submitted compulsory.

Recommended Text :

  1. E. Balagurusamy, *"Object-Oriented Programming with C++",* TMH , 7th Edition,2013.

Reference Book:

  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 and E- learning Sources:

  1. https://www.w3School.com.
  2. https://www.geeksforgeeks.org/c++ programing.

Part-III B.Sc Computer Science / Semester – III   Elective Generic -3

STATISTICAL METHOD AND ITS APPLICATION (U24CS3A3)

Lecture Hours	:55	**Tutorial Hours**	:5
Lab Practice Hours	:-	**No of Credit**	:3
Contact Hours Per Semester	:60		
Contact Hours Per Week	:4		
Internal marks	:25		
External Marks	:75		
Total Marks	:100		

Objective of the Course

The Course aims at giving an overall view of the

 ➢ important and various concept in applied statistics.

 ➢ various types of statistical techniques.

Course Learning Outcomes

On successful completion of the Course, the student will be able to

CO1 understand the methods of studying trends and tendencies in data.

CO2 measure the trend and identify its type and construct seasonal indices.

CO3 understand the methods of analyzing correlation.

CO4 construct weighted and unweight index numbers.

CO5 analyze the optimum schedule and assignment schedule.

CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3
CO1	3	2	2	3	2	3	3	3	2	3
CO2	2	2	2	3	2	2	3	1	2	2
CO3	3	3	3	2	2	3	2	3	2	3
CO4	3	2	2	3	3	2	2	2	2	1
CO5	3	2	2	2	3	3	3	2	1	1
Total Contribution of COs to POs	14	11	13	11	13	9	9	11	9	10
Weighted Percentage of COs Contribution to POs	93	73	86	73	86	60	60	73	60	66

0-No Correlation   1-Weak   2-Moderate   3-Strong

Course Content

Unit- I   Introduction   (L-12 hrs; T-3 hrs)

Definition – Importance – Application – Collection of data – Primary and Secondary Data – Sampling design – Types of samples – Statistical errors – Classification of data – Tabulation
– Presentation of data – Diagrams.

Unit- II Measures of Central tendency   (L-10 hrs)

Measures of Central tendency – Mean – Median – Mode – Geometric Mean – Harmonic Mean – Measures of dispersion – Range – Quartile deviation – Mean deviation – Standard deviation.

Unit- III Correlation   (L-11 hrs)

Correlation – Meaning – Types – Scatter diagram – Karl Pearson's coefficient of correlation – Rank correlation – Concurrent deviation method -   Bi-variate frequency distribution.

Unit- IV Index numbers   (L-10 hrs;T2- hrs)

Index numbers – Meaning – Construction of index number – Problems – Methods of construction – Test of consistency – Fixed base – Chain base – Base conversion and shifting – Consumer price index – Formula.

Unit- V   Time series   (L-12 hrs)

Time series – Components – Moving average – Methods of least squares – Measurement of seasonal variations – Simple average, Ratio-to-trend method, Ratio-to moving average method – Link relative method.

Recommended Text :

1. R.S.N. Pillai and Bagavathi,*" Statistics, Theory and Practice",* published   by S.Chand   and   Company New Delhi, 2010.

References Books:

1. Dr. S. P. Gupta, "*Statistical methods"*, published by S. Chand & sons, New Delhi, 2014.
2. G.C. Beri,"*Business Statistics"*, Tata McGraw Hill Edition, 1978.

Website and E- learning Sources:

 1. https://www.w3School.com.
 2. https://www.geeksforgeeks.org/statistical methods.

Part-III B.Sc Computer Science/Semester – III SKILL ENHANCEMENT COURSE

(SEC-4):MULTIMEDIA SYSTEM (U24CS3S4)

Lecture Hours	:30	**Tutorial Hours**	:-
Lab Practice Hours	:-	**No of Credits**	:2
Contact Hours Per Semester	:30		
Contact Hours Per Week	:2		
Internal marks	:50		
External Marks	:-		
Total Marks	:50		

Objective of the Course

The Course aims at giving an overall view of the

➢ image File Formats, Sounds Audio File format.

➢ concepts of Animation and Digital Video Containers.

➢ stages of Multimedia Project.

Course Learning Outcomes

On successful completion of the Course, the student will be able to

CO1 understand the concept, importance, application and the process of developing multimedia.

CO2 have basic knowledge and understanding about image related processing.

CO3 understand the framework of frames and bit images to animations.

CO4 speaks about the multimedia projects and stages of requirement in phases of project.

CO5 understand the cost involved in multimedia planning, designing, and producing.

CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3
CO1	2	2	2	3	2	3	3	3	2	3
CO2	2	2	2	3	2	2	3	1	2	2
CO3	2	3	2	2	2	3	2	3	2	3
CO4	3	2	3	3	3	2	2	2	2	1
CO5	3	2	3	2	3	3	3	2	1	1
Total Contribution of COs to POs	12	11	12	13	12	13	13	11	9	10
Weighted Percentage of COs Contribution to POs	80	73.33	80	86.67	80	86.67	86.67	73	60	66

0-No Correlation   **1-Weak**   **2-Moderate**   **3-Strong**

Course Content

Unit- I Introduction to Multimedia   (L-6 hrs)

What is Multimedia: Definition – Where to use Multimedia - Delivering Multimedia? Text: About Fonts and Faces - Using Text in Multimedia - Computers and Text - Font Editing and Design Tools -Hypermedia and Hypertext.

Unit- II   Images   (L-6 hrs)

Images: Plan Approach - Organize Tools - Configure Computer Workspace -Making Still Images – Color - Image File Formats. Sound: The Power of Sound -DigitalAudio-MidiAudio-Midivs.DigitalAudio-MultimediaSystemSoundsAudio File Formats -Vaughan's Law of Multimedia Minimums - Adding Sound to Multimedia Project.

Unit- III Animation   (L-6 hrs)

Animation: The Power of Motion-Principles of Animation-Animation by Computer - Making Animations that Work. Video: Using Video - Working with Video and Displays-Digital Video Containers-Obtaining Video Clips -Shooting and Editing Video.

Unit- IV   Making Multimedia   (L-6 hrs)

Making Multimedia: The Stage of Multimedia Project - The Intangible Needs -The Hardware Needs - The Software Needs - An Authoring Systems Needs-Multimedia Production Team.

Unit- V   Planning and Costing   (L-6 hrs)

Planning and Costing: The Process of Making Multimedia-Scheduling-Estimating - RFPs and Bid Proposals. Designing and Producing - Content and Talent: Acquiring Content-Ownership of Content Created for Project-Acquiring Talent.

Recommended Text:

1.TayVaughan*,"Multimedia:MakingItWork"*,8thEdition,Osborne/McGraw-Hill,2001.

Reference Book:

1. RalfSteinmetz&KlaraNahrstedt"*MultimediaComputingCommunication&Applications*",
   Pearson Education,2012.

Website and E- learning Sources:

1.https://www.geeksforgeeks.org/multimedia-systems-with-features-or-characteristics/

Part-III B.Sc. Computer Science / Semester – IV-Core-4
Java Programming (U24CS404)

Lecture Hours	:55	**Tutorial Hours**	:5
Lab Practice Hours	:-	**No of Credits**	:4
Contact Hours Per Semester	:60		
Contact Hours Per Week	:4		
Internal marks	:25		
External Marks	:75		
Total Marks	:100		

Objectives of the Course

The Course aims at giving an overall view of the

- ➢ principles in Java programming.
- ➢ Java programming basics.
- ➢ OOPs Concepts.
- ➢ concept of Packages, AWT, Swing and Event handling.

Course Learning Outcomes

On successful completion of the Course, the student will be able to

CO1 understand the basic Object-oriented concepts. Implement the basic constructs of Core Java.

CO2 implement inheritance, packages, interfaces and exception handling of Core Java.

CO3 implement multi-threading and I/O Streams of Core Java

CO4 implement AWT and Event handling

CO5 use Swing to create GUI.

	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PSO 1	PSO 2	PSO 3
CO1	3	2	2	3	1	2	2	3	2	3
CO2	2	2	2	1	2	2	2	1	2	2
CO3	3	2	2	3	2	3	1	3	2	3
CO4	1	2	1	2	2	2	3	2	2	1
CO5	1	1	2	2	2	2	2	2	1	1
Total Contribution ofCOs to POs	10	9	9	11	9	11	10	11	9	10
Weighted Percentage of COs Contribution toPOs	66	60	60	73	60	73	66	73	60	66

0 - No Correlation   1 - Weak   2 - Moderate   3 – Strong

Course Content

Unit- I Introduction to JAVA Programming   (L -11 hrs)

Introduction: Review of Object Oriented concepts – History of Java – Java buzz words – JVM architecture - Datatypes - Variables - Scope and life time of variables - arrays - operators – control statements - type conversion and casting - simple java program - constructors - methods - Static block - Static Data – Static Method String and String Buffer Classes.

Unit- II Inheritance   (L- 11 hrs)

Inheritance: Basic concepts - Types of inheritance - Member access rules - Usage of this and Super key word - Method Overloading - Method overriding - Abstract classes - Dynamic method dispatch - Usage of final keyword. Packages: Definition-Access Protection Importing Packages. Interfaces: Definition– Implementation–Extending Interfaces. Exception Handling: try – catch- throw - throws – finally – Built-in exceptions - Creating own Exception classes.

Unit- III Multithreaded Programming   (L -11 hrs ; T- 2 hrs)

Multithreaded Programming: Thread Class-Runnable interface –Synchronization–Using synchronized methods– Using synchronized statement- Interthread Communication –Deadlock.I/O Streams: Concepts of streams - Stream classes- Byte and Character stream - Reading console Input and Writing Console output - File Handling.

Unit- IV   AWT Controls   (L- 11 hrs)

AWT Controls: The AWT class hierarchy - user interface components- Labels - Button - Text Components - Check Box - Check Box Group - Choice - List Box - Panels – Scroll Pane - Menu - Scroll Bar. Working with Frame class - Color - Fonts and layout managers. Event Handling: Events - Event sources - Event Listeners - Event Delegation Model (EDM) - Handling Mouse and Keyboard Events - Adapter classes - Inner classes

Unit- V   Swing   (L -11 hrs ;T -3 hrs)

Swing**:** Introduction to Swing - Hierarchy of swing components. Containers - Top level containers - JFrame - JWindow - JDialog - JPanel - JButton - JToggleButton - JCheckBox - JRadioButton - JLabel,JTextField - JTextArea - JList - JComboBox - JScrollPane.

Recommended Texts:

1.Herbert Schildt*, "The Complete Reference",* Tata McGraw Hill, New Delhi, 7th Edition, 2010.

2.Gary Cornell, "*Core Java 2 – Fundamentals"*, Volume IAddison Wesley, 1999.

Reference Book:

1.Y. Daniel Liang, "*Introduction to Java Programming"*, 7th Edition, Pearson Education India, 2010.

Website and E- learning Sources:

1. https://javabeginnerstutorial.com/core-java-tutorial

2. http://docs.oracle.com/javase/tutorial/

3. https://www.coursera.org/

Part-III B.Sc. Computer Science / Semester – IV / Core Lab-4:

JAVA PROGRAMMING LAB (U24CS4P4)

Lecture Hours	:-	Tutorial Hours :-	
Lab Practice Hours	:60	No of Credits :4	
Contact Hours Per Semester	:60		
Contact Hours Per Week	:4		
Internal marks	:40		
External Marks	:60		
Total Marks	:100		

Objectives of the Course

The Course aims at giving an overall view of the

- ➢ Java programming.
- ➢ Java/AWT/ programming basics.
- ➢ OOPs Concepts.

Course Learning Outcomes

On successful completion of the Course, the student will be able to

- **CO1** understand the basic Object-oriented concepts, Implement the basic constructs of Core Java
- **CO2** implement inheritance, packages, interfaces and exception handling of Core Java.
- **CO3** implement multi-threading and I/O Streams of Core Java
- **CO4** implement AWT and Event handling.
- **CO5** use Swing to create GUI.

CO-PO and PSO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PSO 1	PSO 2	PSO 3
CO1	3	2	2	3	1	2	2	3	2	3
CO2	2	2	2	2	2	2	2	1	2	2
CO3	3	2	2	3	2	3	1	3	2	3
CO4	2	2	1	2	2	2	3	2	2	1
CO5	2	1	2	2	2	2	2	2	1	1
Total Contribution ofCOs to POs	12	9	9	12	9	11	10	11	9	10
Weighted Percentage of COs Contribution toPOs	80	60	60	80	60	73	66	73	60	66

0 - No Correlation   1 - Weak   2 - Moderate   3 – Strong

Course Content
Part A - JAVA Programming Lab

List of Lab Exercises:

1. Write a Java program that prompts the user for an integer and then prints out all the prime numbers up to that Integer.

2. Write a Java program to multiply two given matrices.

3. Write a Java program that displays the number of characters, lines and words in a text

4. Generate random numbers between two given limits using Random class and print messages according to the range of the value generated.

5. Write a program to do String Manipulation using Character Array and perform the following string operations:
   a. String length
   b. Finding a character at a particular position
   c. Concatenating two strings

6. Write a program to perform the following string operations using String class:

   a. String Concatenation
   b. Search a substring
   c. To extract substring from given string

7. Write a program to perform string operations using String Buffer class:

   a. Length of a string
   b. Reverse a string
   c. Delete a substring from the given string

8. Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.

9. Write a threading program which uses the same method asynchronously to print the numbers 1to10 using Thread1 and to print 90 to100 using Thread2.

10. Write a program to demonstrate the use of following exceptions.

   a. Arithmetic Exception
   b. Number Format Exception

       c.   ArrayIndexOutofBoundException

       d.   NegativeArraySizeException

11. Write a Java program that reads on file name from the user, then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes

12. Write a program to accept a text and change its size and font. Include bold italic options. Use frames and controls.

13. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. (Use adapter classes).

14. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divide by zero.

15. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with "stop" or "ready" or "go" should appear above the buttons in a selected color. Initially there is no message shown.

General Instructions to be followed by student
  ➢ The student must complete the above listed practical list.
  ➢ All the listed practical are to be completed by all the students.
  ➢ All the practical should be recorded in the document.
  ➢ Both observation and record should be submitted compulsory.

Recommended Texts :
  1. Herbert Schildt, "*The Complete Reference*", Tata McGraw Hill, New Delhi, 7th Edition, 2010.
  2. Gary Cornell, "*Core Java 2 – Fundamentals*", Volume 1,Addison Wesley, 1999.

Reference Book:
  1. Y. Daniel Liang,"*Introduction to Java Programming*", 7th Edition, Pearson Education India, 2010.

Website and E learning Sources:
  1. https://www.w3schools.com/java/
  2. http://java.sun.com
  3. http://www.afu.com/javafaq.html

Part B - Minor Project

General Guidelines

1. A team of 5 to 6 members will be followed as a group. They have to select any given topic by using C, C++, java and Python.

2. As the project work constitutes a major component in most of the professional programs and it is to be carried out with due care and should be executed with seriousness by the candidates. The student can formulate a project problem with the help of Guide.

Part-III B.Sc. Computer Science / Semester – IV/ Elective Generic 4: OPTIMIZATION TECHNIQUES (U24CS4A4)

Lecture Hours :55	**Tutorial Hours** :5
Lab Practice Hours :-	**No of Credits** :3
Contact Hours Per Semester :60	
Contact Hours Per Week :4	
Internal marks :25	
External Marks :75	
Total Marks :100	

Objectives of the Courses

The Course aims at giving an overall view of the

➢ applications and problems that can be addressed using Operation research techniques.

Course Learning Outcomes

On successful completion of the Course, the student will be able to

CO1 apply operations research techniques like linear programming problem in industrial optimization problems.

CO2 understand the theory of games for solving simple games

CO3 use linear programming in the formulation of shortest route problem.

CO4 gain knowledge about network construction and to find critical path and total project duration.

CO-PO and PSO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	2	3	1	2	2	3	2	3
CO2	2	2	2	2	2	2	2	1	2	2
CO3	2	2	2	3	2	3	1	3	2	3
CO4	2	2	1	2	2	2	3	2	2	1
CO5	2	1	2	2	2	2	2	2	1	1
Total Contribution of COs to POs	10	9	9	12	9	11	10	11	9	10
Weighted Percentage of COs Contribution to POs	66	60	60	80	60	73	66	73	60	66

0 - No Correlation   1 - Weak   2 - Moderate   3 - Strong

Course Content

Unit –I   Linear Programming   (L- 11 hrs)

Linear Programming: Introduction to linear and non-linear programming formulation of different models. Geometry of linear programming, Graphical method, Linear programming (LP) in standard form, Solution of LP by simplex and revised simplex methods.

Unit-II   Transportation problem   (L- 11 hrs)

Transportation problem: Formulation- Transportation problem as a special case of Linear Programming Problem - Initial Basic Feasible Solution by North -West Corner Rule, Matrix Minima and Vogel's Approximation Methods - Optimal solution through MODI Tableau for Balanced and Unbalanced Transportation problem - Degeneracy in Transportation Problem.

Unit- III   Assignment Problem   (L -11 hrs ;T- 2 hrs)

Assignment problem: Formulation- Assignment problem as a special case of Transportation Problem and Linear Programming Problem - Optimal solution using Hungarian Method for Balanced and Unbalanced Problems - Traveling Salesman problem

Unit- IV   Game Theory   (L 11 hrs)

Game Theory: Characteristics of Game Theory- Two Persons Zero Sum Game - Maximum and Minimax Criterion - Pure strategy games - Mixed strategy - Principle of dominance - Limitations of Games Theory.

Unit- V   Network Analysis   (L11 hrs ; T 3 hrs)

Network Analysis: Introduction - Network diagram representation, time estimates and critical path in network analysis – Forward pass computations, Backward pass computations, Determination of critical path (CPM), Project Evaluation and Review Technique (PERT)- expected time, and variance and expected duration of the project with simple examples.

Recommended Texts:

1. KantiSwarup, Gupta, P.K. and Manmohan : "*Operations Research*", 13th Edition, Sultan
    Chand and Sons,2014.
2. J.K.Sharma ," *Operations Research:Thoery and applications*",5th edition, Macmillan India Ltd,2012.

Reference Books:

1. S.D.Sharma : "*Operations Research; Theory,Methods and applications*",15th edition,Reprint
Kedarnath,2012.

2.Taha, H. A. : "*Operations Research: An Introduction*", 8th Edition, Prentice Hall of India,2019.

3. P. K. Gupta and D. S. Hira, "*Operations Research*", S. Chand & co., 2015.

4.R. Ravindran, D. T. Philips and J. J. Solberg, "*Operations Research: Principles and Practice*", 2 nd
edition John Wiley & Sons, 2007.

Website and E- learning Sources:

1. https://www.w3schools.com/
2.https://www.GeeeksforGeeks.org

Part-IV B.Sc. Computer Science / Semester – IV /Skill Enhancement Course-5:
IOT AND ITS APPLICATIONS (U24CS4S5)

Lecture Hours	:30	Tutorial Hours	:-
Lab Practice Hours	:-	No of Credits	:2
Contact Hours Per Semester	:30		
Contact Hours Per Week	:2		
Internal marks	:		
External Marks	:50		
Total Marks	:50		

Objectives of the Courses

The Course aims at giving an overall view of the

➢ basic concepts of Internet of Things.

➢ IoT applications in different domain and to analyze their performance.

Course Learning Outcomes

On successful completion of the Course, the student will be able to

CO1 work with IoT standards and techniques.

CO2 analyze data by utilizing machine to machine (m2m) algorithms.

CO3 apply different IoT algorithms and communication model.

CO4 perform analytics on device to communication.

CO5 understand IoT security.

CO-PO and PSO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PSO 1	PSO 2	PSO 3
CO1	3	2	3	3	1	2	2	3	2	3
CO2	2	2	3	2	2	2	2	1	2	2
CO3	3	2	2	3	2	3	1	3	2	3
CO4	2	2	2	2	2	2	3	2	2	1
CO5	2	1	2	2	2	2	2	2	1	1
Total Contribution ofCOs to POs	12	9	12	12	9	11	10	11	9	10
Weighted Percentage of COs Contribution toPOs	80	60	80	80	60	73	66	73	60	66

0 - No Correlation   1 - Weak   2 - Moderate   3 - Strong

Course Content

Unit- I   Introduction to IoT   (L- 6 hrs)

IoT and Web Technology, The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on Research Topics.

Unit- II   M2M   (L- 6 hrs)

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 designprinciples and needed capabilities, An IoT architecture outline, standards considerations.

Unit- III   IoT Architecture   (L- 6 hrs)

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 view.

Unit-IV   IoT Applications   (L- 6 hrs)

IoT Applications for Value Creations Introduction, IoTapplications for industry: Future Factory Concepts, Brown field 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 Gas Industry, Opinions on IoT Application and Value for Industry, Home Management.

Unit- V   IoT Security   (L- 6 hrs)

Internet of Things Privacy, Security and Governance Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security.

Recommended Text :

1. Vijay Madisetti and Arshdeep Bahga, ―*Internet of Things: (A Hands-on Approach*),
   Universities Press (INDIA) Private Limited , 1st Edition,2014.

Reference Books:

1. Michael Miller, "*The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the World*",* kindle version, 2015.

2. Francis daCosta, "*Rethinking the Internet of Things: A Scalable Approach to Connecting Everything*", Apress Publications, 1st Edition, 2013.

3. Waltenegus Dargie, ChristianPoellabauer, *"Fundamentals of Wireless Sensor Networks: Theory and Practice,2013.*

4..CunoPfister, "Getting Started with the Internet of Things",   O'Reilly Media, 2011.

Website and E learning Sources:

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

Part-IV B.Sc. Computer Science / Semester – IV /Skill Enhancement Course-6: WEB DESIGNING LAB (U24CS4SP)

Lecture Hours	:-	**Tutorial Hours :-**	
Lab Practice Hours	:30	**No of Credits** :2	
Contact Hours Per Semester	:30		
Contact Hours Per Week	:2		
Internal marks	:		
External Marks	:50		
Total Marks	:50		

Objective of the Course

The course aims at giving an overall view of the
  - ➢ concept of web designing.
  - ➢ web design tool.
  - ➢ CSS, scripting language.

Course Learning Outcomes

On successful completion of the Course, the student will be able to

  CO1 remember basic concepts of Web Sites structure.

  CO2 understand anatomy of a Web Page formation.

  CO3 apply CSS based designs.

  CO4 illustrate – XML Programming and AJAX.

  CO5 demonstrate JavaScript and VBScript.

CO-PO and PSO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PSO 1	PSO 2	PSO 3
CO1	3	2	3	3	1	2	2	3	2	3
CO2	2	2	3	2	2	2	2	1	2	2
CO3	3	2	2	3	2	3	1	3	2	3
CO4	2	2	2	2	2	2	3	2	2	1
CO5	2	1	2	2	2	2	2	2	1	1
Total Contribution of COs to POs	12	9	12	12	9	11	10	11	9	10
Weighted Percentage of COs Contribution to POs	80	60	80	80	60	73	66	73	60	66

0 - No Correlation   1 - Weak   2 - Moderate   3 - Strong

LIST OF WEB PROGRAMMING LAB EXPERIMENTS

1. Design a webpage that makes use of
   a. Document Structure Tags
   b. Various Text Formatting Tags
   c. List Tags
   d. Image and Image Maps

2. Design a webpage that makes use of
   a. Table tags
   b. Form Tags (forms with various form elements)
   c. Navigation across multiple pages
   d. Embedded Multimedia elements

3. Design a webpage that make use of Cascading Style Sheets with
   a. CSS properties to change the background of a Page
   b. CSS properties to change Fonts and Text Styles
   c. CSS properties for positioning an element

4. Write JavaScript code for
   a. Performing various mathematical operations such as
      calculating factorial /finding Fibonacci Series / Displaying
      Prime Numbers in a given range / Evaluating Expressions /
      Calculating reverse of a number
   b. Validating the various Form Elements

5. Write JavaScript code for
   a. Demonstrating different JavaScript Objects such as String, RegExp, Math, Date
   b. Demonstrating different JavaScript Objects such as Window, Navigator

6. Create a XML file with Internal / External DTD and display it using
   a. CSS
   b. XSL

7. Design a webpage to handle asynchronous requests using AJAX on
   a. Mouse over
   b. Button click

8. Design a webpage with some jQuery animation effects.

General Instructions to be followed by student

➢ The student must complete the above listed practical list.

➢ All the listed practical are to be completed by all the students.

➢ All the practical should be recorded in the document.

➢ Both observation and record should be submitted compulsory.

Recommended Text:

1.Elisabeth Robson, Eric Freeman *"Head First HTML and CSS: A Learner's Guide to Creating Standards-Based Web Pages",* 2nd Edition, 2012.

Reference Book:

1.Prem Kumar, "*Web Design With HTML & CSS : HTML & CSS Complete Beginner's Guide*", 2021.

Website and E- learning Sources:

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