GOVERNMENT COLLEGE FOR WOMEN, PARADE GROUND, JAMMU
(An Autonomous College)

LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK

FOR

UNDERGRADUATE PROGRAMME IN

BACHELOR OF COMPUTER APPLICATION

BCA

SEMESTER [I-II]

UNDER

CHOICE BASED CREDIT SYSTEM (CBCS)

EFFECTIVE FROM 2020-21, 2021-22, 2022-23

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Content of the Syllabus

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Preamble

Raising the standards of higher education institutions in country has been the endeavour of UGC since the day it was formed. A number of initiatives have been taken to reform the system of imparting education in the institutions of higher education, by improving and upgrading the academic resources and learning environment, to better the quality of teaching and standards of achievement in terms of learning outcomes across various undergraduate programs under the Faculties of Sciences, Humanities, Commerce and Other Professional streams of higher education including Computer science.

One of the very significant reforms in the undergraduate education has been the introduction of Learning Outcomes-based Curriculum Framework (LOCF), which makes learning student-centric, interactive and outcome-oriented with well-defined aims, objectives and goals to achieve. LOCF aims to ensure uniform standards, of education and content delivery across the country irrespective of the institute and location.

Key components of the planning and development of LOCF are Graduate Attributes (GA), Qualification Descriptors (QD), Program Learning Outcomes (PLO) and Course Learning Outcomes (CLO) which are to be achieved at the successful completion of each undergraduate program.

The main objective of adopting this framework is to prepare a comprehensive course structure and detailed syllabi along with quality reading material in order to have uniform standards of education in undergraduate Computer Science programmes. It is a student centric framework where students get to learn fundamentals of computer science along with the latest trends and techniques like Artificial Intelligence, Internet of Things, Machine Intelligence along with advanced skill sets that include Mobile Application Development, Object Oriented Programming among many other courses.

1. Introduction

Computer Science (CS) has evolved as an important branch of science and engineering. It is a discipline that consists of theory and practice and requires abstract as well as concrete thinking. Nowadays, practically everyone is a computer user, and many people are even computer programmers. When seen from a different perspective, Study & application of Computer Science is science of problem solving. The ever evolving discipline of computer science also has strong connections to other disciplines. Applications of Computer Science, have made improvements, have introduced efficacious methods in the study and practice of other fields like engineering, health care, business, etc. Expertise and Knowledge of computer applications has been proving to be of immense benefit in solving the challenges faced in other fields.

Computer science has a wide range of specialties which are Computer Architecture, Software Systems, Graphics, Artificial Intelligence, Computational Science, and Software Engineering. Drawing from a common core, each specialty focuses on specific challenges. Computer Science is practiced by mathematicians, scientists and engineers. Computer Science traces its roots to Mathematics which is the study of reason and logic and these two concepts play a big role in Computer Science too. Science provides the methodology for learning and refinement. Engineering provides the techniques for building hardware and software.

In India, Computer Science was initially introduced at the Master (postgraduate) level as MCA and M.Tech. Later on, engineering programmes such as B.Tech and B.E in Computer Science & Engineering and in Information Technology were introduced in various engineering College/Institutions to cater to the growing demand of trained engineering manpower in IT

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industries. Parallelly, MSc programmes with specialisation in Computer Science were introduced to train manpower. B.Sc and B.Sc(Hons) in Computer Science are also being planned and introduced in different colleges and institutions.

B.Sc with CS and BCA are aimed at undergraduate level training facilitating multiple career paths. Students so graduated, can take up postgraduate programmes in CS leading to research as well as R&D, can be employable at IT industries, or can pursue a teachers' training programme such BEd in Computer Education, or can adopt a business management career. There are several employment opportunities available after thesuccessful completion of an undergraduate programme in CS, graduating students can fetch employment directly in companies as Web Developer, Software Engineer, Network Administrator, Data Scientist, or AI/ML personnel.

The Learning Outcome-based Curriculum Framework in Computer Science is aimed at allowing flexibility and innovation in design and development of course content, in method of imparting training, in teaching learning process and in assessment procedures of the learning outcomes. The emphasis in computer science courses, in outcome-based curriculum framework, help students learn problem solving, accomplishing IT tasks, and expressing creativity, both individually and collaboratively. The proposed framework will help Students learn programming techniques and the syntax of one or more programming languages.

Many of the learning outcomes of Computer Science can be achieved only by programming a computer for several different meaningful purposes. All students must, therefore, have access to a computer with a modern programming language installed. The computer science framework does not prescribe a specific language. The teacher and students will decide which modern programming languages students will learn. More importantly, students will learn to adapt to changes in programming languages and learn new languages as they are developed.

The present Learning Outcome-based Curriculum Framework for bachelor's degrees in CS is intended to facilitate the students to achieve the following.

- To develop an understanding and knowledge of the basic theory of Computer Science and Information Technology with good foundation on theory, systems and applications such as algorithms, data structures, data handling, data communication and computation.
- To develop the ability to use this knowledge to analyse new situations
- To acquire necessary and state-of-the-art skills to take up industry challenges. The objectives and outcomes are carefully designed to suit to the above-mentioned purpose.
- The ability to synthesize the acquired knowledge, understanding and experience for a better and improved comprehension of the real-life problems
- To learn skills and tools like mathematics, statistics, physics and electronics to find the solution, interpret the results and make predictions for the future developments.

2. Curriculum Planning learning outcome based approach.

At Undergraduate level GCW, Parade offers two programmes of study which are as following:-

1. B.Sc. (Computer Applications)
2. Bachelor Of Computer Applications

2.1. B.C.A. as a curriculum in GCW Parade, Jammu

B.C.A or Bachelor of Computer Science is a general multidiscipline bachelor programme introduced in Govt. College for Women, Parade in 2017. The programme has a balanced emphasis on three science subjects, one of which is computer science. A student studying B.Sc. with Computer Science is required to choose two other subjects from a pool of subjects which

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include Physics, Mathematics, Statistics, Electronics, Chemistry. Different institutions offer different choice of combinations of subjects. Most popular combinations are Physics and Mathematics, Physics and Electronics, Mathematics and Electronics, but there are also combinations like Statistics and Economics or Commerce and Economics alongwith Computer Science.

3. Types of Courses

3.1 Core Course (CC)

A core course is a mandatory course required in degree. Core course of study refers to a series or selection of courses that all students are required to complete before they can move on to the next level in their education or earn a diploma. The general educational purpose of a core course of study is to ensure that all students take and complete courses that are academically and culturally essential. These are the courses that teach students the foundational knowledge and skills they will need in securing the specific degree or diploma. The core courses are designed with an aim to cover the basics that is expected of a student to imbibe in that particular discipline.

Thus, a course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course. The present document specifies the core courses for B.C.A. The purpose of fixing core papers is to ensure that all the institutions follow a minimum common curriculum so that each institution/ university adheres to common minimum standard.

3.2 Electives

Generally a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/ subject of study or which provides an extended scope or which enables an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/skill is called an Elective Course. Different types of elective courses mandated in the present framework are the following.

- Domain Specific Elective (DSE)
- Generic Elective (GE)
- Ability Enhancement Elective (AEEC)

3.2.1.Discipline Specific Elective (DSE)

Elective courses offered under the main discipline/subject of study is referred to as Discipline Specific Elective. The list provided under this category are suggestive in nature and HEI has freedom to suggest its own papers under this category based on their expertise, specialization, requirements, scope and need. The University/Institute may also offer discipline related elective courses of interdisciplinary nature (to be offered by main discipline/subject of study).

3.2.2.Ability Enhancement Courses (AEC)

The Ability Enhancement Courses may be of two kinds:

3.2.2a **Ability Enhancement Compulsory Courses (AECC):** AECC are the courses based upon the content that leads to knowledge enhancement. These are mandatory for all disciplines. Ability Enhancement Compulsory Courses (AECC) are the following.

- AECC-I English
- AECC-II English/Hindi/ MIL Communications
- AECC-III Environment Science

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3.2.2B Skill Enhancement Courses (SEC): SEC courses are value-based and/or skill-based and are aimed at providing hands-on-training, competencies, skills, etc. SEC are at least 2 courses for Honours courses and 4 courses for General bachelor programmes. These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge and should contain both theory and lab/hands-on/training/field work. The main purpose of these courses is to provide students life-skills in hands-on mode to increase their employability. The list provided under this category are suggestive in nature and each university has freedom to suggest their own papers under this category based on their expertise, specialization, requirements, scope and need.

4.Practical/Tutorial

For each core course and DSE course there will be one practical. The list of practical provided is suggestive in nature and each university has the freedom to add/subtract/edit practical from the list depending on their faculty and infrastructure available. Addition will however be of similar nature.

5. Aims of Bachelor of Computer Application.

The Bachelor of Science degree in Computer Science emphasizes problem solving in the context of algorithm development and software implementation and prepares students for effectively using modern computer systems in various applications. The curriculum provides required computer science courses such as programming languages, data structures, computer architecture and organization, algorithms, database systems, operating systems, and software engineering; as well as elective courses in artificial intelligence, computer-based communication networks, distributed computing, information security, graphics, human-computer interaction, multimedia, scientific computing, web technology, and other current topics in computer science. The main aim of this Bachelor's degree is to deliver a modern curriculum that will equip graduates with strong theoretical and practical backgrounds to enable them to excel in the workplace and to be lifelong learners. The purpose of the BCA programs are two fold: (1) to prepare the student for a position involving the design, development and implementation of computer software/hardware, and (2) to prepare the student for entry into a program of postgraduate study in computer science/engineering and related fields.

The Bachelor of Computer Applications focus on the concepts and techniques used in the design and development of software systems. Students in this program explore the conceptual underpinnings of Computer Science -- its fundamental algorithms, programming languages, operating systems, and software engineering techniques. In addition, students choose from a rich set of electives that includes data science, computer graphics, artificial intelligence, database systems, computer architecture, and computer networks, among other topics. A generous allotment of free electives allows students to combine study in computer science with study in auxiliary fields to formulate a program that combines experiences across disciplines.

6. Programme Learning Outcomes for BCA

The Bachelor of Computer Applications program enables students to attain, by the time of graduation:

- Demonstrate the aptitude of Computer Programming and Computer based problem solving skills.

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- Display the knowledge of appropriate theory, practices and tools for the specification, design, implementation
- Ability to learn and acquire knowledge through online courses available at different
- MOOC Providers.
- Ability to link knowledge of Computer Science with other two chosen auxiliary disciplines of study.
- Display ethical code of conduct in usage of Internet and Cyber systems.
- Ability to pursue higher studies of specialization and to take up technical employment.
- Ability to formulate, to model, to design solutions, procedure and to use software tools to solve real world problems and evaluate .
- Ability to operate, manage, deploy, configure computer network, hardware, software operation of an organization.
- Ability to present result using different presentation tools.
- Ability to appreciate emerging technologies and tools.

7. About the Programme

The Bachelor of Computer Application is an undergraduate programme of three years duration based on Semester System and consist of six semester. Each semester will be approximately 5 months duration (minimum 90 working days in a semester). A candidate admitted to theprogramme will be required to pass the course within the prescribed academic years from the year of admission to the first semester with an aggregate criteria of 40 percentage in theory as well as Practical subjects.

8. Passing Criterion

The minimum Grade /Grade Point required to pass each paper in a semester examination under CBCS shall be Grade E / Grade Point 5 in each theory paper/ Practical/Project (wherever applicable) in External Examination and Internal Assessment separately i,e.40(Forty) percentage of marks in theory and practical separately.

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9. Scheme of Course Curriculum is as under:

SEM	Core Courses (CC) with course codes each with 06(04 for theory and 02 for Practicals) credit. 06 compulsory courses	Discipline Specific Electives. 4 courses. One from set of courses in a box	Skill Enhancement Courses SEC 2 courses
I	Computer Fundamentals(UBCATC101)		
	Programming in C-Language(UBCATC102)		
	Practical based on UBCATC101 and UBCATC102(UBCAPC150)		
II	Data structure using C-language(UBCATC201)		
	Digital Electronics(UBCATC202)		
	Practical based on UBCATC201 and UBCATC202(UBCAPC250)		
III	Fundamentals of Operating System (UBCATC301)		Any **One** **1.** PC Assembly 2.Open System Software
	Database Management System(UBCATC302)		
	Practical based on UBCATC301 and UBCATC302(UBCAPC350)		
IV	Software Engineering(UBCATC401)		Any **One** 1.Java Programming 2.Python Programming
	Object oriented programming structures (UBCATC402)		
	Practical based on UBCATC402 (UBCAPC450)		
V	Computer networks and Internet (UBCATC501)	Any **One** **1.**Artificial Intelligence 2.Advanced DBMS	Any **One** 1. Web- Technologies 2.Information Security
	Practical based on UBCATC501 (UBCAPC550)		
VI	Project(UBCAPC650)	Any **One** 1.PHP/SQL 2.Android Programming	

10. Scheme of Examination / Assessment

The evaluation of each course shall contain two parts: Internal or In Semester Assessment (IA) and External or End-Semester Assessment (EA). The internal grade awarded to the students in each course in a semester shall be published on the notice board at least one week before the commencement of end semester examination. The responsibility of evaluating the internal assessment is vested on the teacher(s) who teaches the course. There will be external Examinations at the end of each semester for both theory and Practical. 20 of the marks allotted to each theory paper and 50of the marks allotted to each practical paper including field work, wherever prescribed, shall be reserved for internal assessment. The evaluation of a candidate shall be awarded and record thereof maintained in accordance with the Regulations prescribed for the purpose under the CBCS as per the following:

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THEORY	Syllabus to be covered in the examination	Time allotted	Weightage
Internal Assessment Test (Pattern: One long answer type question of 06 marks and Five short answer type questions of 03 marks each)	Upto 50 (after 45 days))	1 hour	20
External End Semester University Exam	Upto 100 (after 90 days))	3 hours	80
Total			100

PRACTICAL

Internal Practical Examination+Viva Voce	25 Marks	Total=50 Marks
External Practical Examination+Viva Voce	25 Marks	

Note: In case of failure/re-appear category, the Internal Assessment earned by the candidate as a regular student shall be carried forward to the subsequent examination.

11. Teaching-Learning Process

To meet the set objectives of the course and enable students achieve the expected outcomes of the course from the teaching-learning process any options are appropriately chosen by the teacher.

CLASSROOM TEACHING - Regular classroom and face to face teaching and tutorials can be primarily used for imparting theoretical foundations of Computer Science. Applications of the same may be explained from time to time so that the student can appreciate the theory.

LABORATORY - Lab exercises in programming and usage of package / software tools are an integral part. Open source software/Packages should be preferred over proprietary tools wherever available.

SEMINARS - Guest lectures and seminars involving industry experts and eminent teachers are arranged to help the students understand the practices in the industry and developments in the field.

MOOCS - Teacher choose the appropriate lecture materials and videos on similar courses available online through Massive Open Courses Online in the world wide web (such as NPTEL) to provide good perspective of the course and use cases and promote blended learning.

ASSIGNMENTS - Home assignments should be designed to make student collect information from various sources and solve unfamiliar problems and make comparisons of solutions

SIMULATION - Packages to provide simulated environments to teach various components of networking and hardware working are used wherever feasible.

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12. Instructions for paper setter for Semester(External) Examination.

The question paper will be divided into the following three sections. No question will be repeated in the question paper.

Section A

Total of 5 short answer questions (one from each Unit) shall be set and the candidates are required answer all questions. Answer to a question should not exceed 80 words. Each question shall be of marks.

(5 x 3 = 15 marks)

Section B

Total of 5 medium answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 300 words. Each question shall be of 7 marks.

(5 x 7 = 35 marks)

Section C

It will contain five long answer questions (one from each Unit). The candidates will be required to answer any two questions. Answer to each question should not exceed 600 words. Each question shall be of 15 marks.

(2 X 15 = 30 marks)

Note:-The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.

13.Syllabus

SEMESTER-1st		
Course No:UBCATC-101		**Course: Computer Fundamentals**
Total Marks:100	**Internal Assessment:20**	**Semester Exam:80**
Duration of Examination:1 Hr.		**Credits:04(Theory)02(Practical)**

Learning Outcomes (LO):

LO1. Learn about the beginning of computers starting from basicsLO2. Develop problem solving skills coupled with top down design principles.
LO3. Learn about the computer generation and its evolution.
LO4. Develop the idea of architecture of a processor.
LO5. Learn memories in a computer
LO6. Learn conversions .
LO7. Learn various tools of a windows operating system.
LO8. Learn the editing, formatting and other techniques applied on a document.

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A. Theory(Credits:02)

Unit I

History of Computer, Generations and Types (Analog Digital and Hybrid), Characteristics, applications, Benefits and limitation of Computer: Introduction, Components: CPU, Memory: Primary (RAM, ROM, PROM, EPROM,EEPROM), Secondary (Hard Disk, Optical disk, blue ray disk, pen drives), Input Devices, Output Devices.
10HRS

Unit II

Operating system and its functions. Types of Operating System (single user, multi user, time sharing, multitasking, multiprocessing and distributed) Software and its types, Computer languages and its types, Compiler, Interpreter, Assembler, Linker Loader. Introduction to Computer Codes: ASCII, EBCDIC, UNICODE, BCD, GRAY CODE, EXCESS-3
10 HRS

Unit III

Number System: Decimal Number System, Binary Number System, Octal Number System, Hexadecimal Number system. 1 's Compliment and 2's Compliment. Conversion from one number system to another. Binary Arithmetic: Addition, subtraction, multiplication and division.
10 HRS

Unit IV

Word processing and its features, spell check, Grammar Check, Thesaurus, Auto complete, text formatting, borders &shading, inserting header, Footer and page numbers, Drop Cap, Bookmark,adding pictures, smart art, charts, Tables, find &replace feature, Page set up, printing, short cuts, Templates and Wizards, Mail Merge, Macros, exporting word documents
10 HRS

UnitV

Spreadsheet and its features, Entering information in worksheet, Editing cell entry, Moving and Copying data, deleting and insertion cells, rows, columns, custom numeric formats. Working with Formulas and Cell Referencing, Absolute and relative addressing. Functions, Creating Charts, Filters: Auto and Advanced, Creating and using Macros, import &export data Presentation software and its uses, Steps to create power point presentation, Power point views, Inserting pictures/images, Inserting Audio/ video clips, Animating slides etc.
10 HRS

References:

1. P.K Sinha &Priti Sinha, Computer Fundamentals, BPB Publications.
2. Alexix Leon, Mathewes Leon, Fundamentals ofInformation Technology,
3. Suresh K. Basandra, Computer Systems Today, Galgotia Publications.
4. V. Rajaraman, Fundamentals ofComputers,EEE.
5. Peter Nortan, Introduction to Computers, Tata Mcgraw Hill
6. Joyce Coax, Joan Preppernau, Steve Lambert and Curtis Frye,2007 Microsoft Office

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System step by step, Microsoft Press
7. R.K. Taxali, PC Software for Windows

B. Practicum(Credits:02)

Students should be given assignments on following :

1. To learn elementary techniques involving the use of various tools of MS-Word.
2. Learn how to use functions and other parameter in MS-Excel.
3. Learn how to operate a presentation using the tools of MS-Powerpoint.
4. Learns the Binary data conversions and its representation in the memory.
5. Learns the change from the manual to ICT enabled classrooms and how to be a part of it.

SEMESTER-1ST		
Course No:UBCATC-201		**Course: Programming in C-Language**
Total Marks:100	**Internal Assessment:20**	**Semester Exam:80**
Duration of Examination:1 Hr.		**Credits:04(Theory)02(Practical)**

Learning Outcomes (LO):

LO1. Learn to develop simple algorithms and flow charts to solve a problem.
LO2. Develop problem solving skills coupled with top down design principles.
LO3. Learn about the strategies of writing efficient and well-structured computer algorithms/programs.
LO4. Develop the skills for formulating iterative solutions to a problem.
LO5. Learn array processing algorithms coupled with iterative methods.
LO6. Learn text and string processing efficient algorithms.
LO7. Learn searching techniques and use of pointers.
LO8. Understand recursive techniques in programming.

A.Theory(Credits:04)

UNIT-I

Problem solving, Algorithm, flow chart, coding, compilation and debugging History of C language, Structure of C program, compiling, and running a C program, Errors: syntax, linker and logical errors. Character set of C language, identifiers, keywords, data types, variables, constants, expressions. Operators: Mathematical, Unary, Binary, Relational and Logical operators, Operator precedence and associativity.
10 HRS

UNIT-II

Conditional Control statements: if statement, if else statement, nested if statement, if else if ladder and Ternary operator, Switch case statement, GOTO statement. Looping control Statements: While loop, Do while Loop, For loop, Nested loops etc.
10 HRS

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UNIT-III

Functions: Definition, Prototypes, Types of Function, Scope, Call by Value. Storage classes in C, Preprocessor Directives, Macros.

10 HRS

UNIT-IV

Arrays (Single and double dimensional): Definition, Declaration, Accessing, Bound Checking, Passing to function. Strings: Definition, Declaration, Accessing, Passing to function, Standard Library functions.

10 HRS

UNIT-V

Arrays and Pointers: Accessing single dimensional array using Pointers, Accessing 2D array using Pointers, Passing arrays to functions with pointers. Structures &Unions: Declaring, Initializing and Accessing structures, Passing structures to functions, Array of Structures, Nested Structures, Unions initialization and accessing the members of a union.

10 HRS

References:

1. Gottfried. B, Theory and problems of Programming with C Language, Tata Me Graw Hill.
2. Kenneth. A, C Problem Solving and Programming, PHI.
3. Dan Gookin,C Programming, Wiley Dreamtech.
4. Y. P. Kanetkar, Understanding Pointers In C, BPB Publications.
5. Shubhnandan S. Jamwal; Programming in C; Pearson Publications; le, 2014
6. H.M. Deitel and PJ. Deitel, C How to Program, PHI.

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B. Practicum(Credits:02)

Given the problem statement, students are required to formulate problem, develop flowchart/algorithm, write code, execute and test it. Students should be given assignments on following :

a. To learn elementary techniques involving arithmetic operators and mathematical expressions, appropriate use of selection (if, switch, conditional operators) and control structures

b. Learn how to use functions and parameter passing in functions, writing recursive programs.

2. Write Programs to learn the use of strings and string handling operations.

a. Problems which can effectively demonstrate use of Arrays. Structures and Union. b. Write programs using pointers.

c. Write programs to use files for data input and output.

d. Write programs to implement various algorithms

SEMESTER-2ND

Course No:UBCATC-201		**Course: Data Structures using C-Language**
Total Marks:100	**Internal Assessment:20**	**Semester Exam:80**
Duration of Examination:1 Hr.		**Credits:04(Theory)04(Practical)**

Learning Outcomes(LO):

LO1.To be familiar with fundamental data structures and with the manner in which these data structures can best be implemented; become accustomed to the description of algorithms in both functional and procedural styles

LO2.To have a knowledge of complexity of basic operations like insert, delete, search on these data structures.

LO3.Ability to choose a data structure to suitably model any data used in computer applications.

LO4.Design programs using various data structures including hash tables, Binary and general search trees, heaps, graphs etc.

LO5.Ability to assess efficiency tradeoffs among different data structure implementations.

LO6.Implement and know the applications of algorithms for sorting, pattern matching etc.

UNIT-I

Introduction and Classifications of Data Structures. Data Structure operations. Time and space complexity of algorithms. Asymptotic Notations: Big, Omega, Theta Introduction to Arrays: array structure, Memory Representation, Operations, merging two arrays Searching Algorithms: Liner Search &Binary Search Sorting Algorithms: Bubble Sort, Insertion Sort, Selection Sort, Quick Sort, Time and space complexity of sorting & search algorithms

10 HRS

UNIT - 11

Heap: Introduction, Types of Heap, Insertion, Deletion Linked list, Type of Lists: Single, Double, Circular, Operations on Lists: Traversal, Insertion, Deletion

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10 HRS

UNIT - III

Stack: Introduction, Operations, Applications Queue: Introduction, Types, Operations, Applications
10 HRS

UNIT- IV

Trees: Binary Tree: Properties, Binary Tree Traversal, Binary Search Trees: Introduction, Insertion, Deletion, Complete Binary Trees Graph Basics, Terminologies, Memory Representation
10HRS

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UNIT-V

File Structures: Concepts of fields, records and files. Files: File Organization, Sequential Files, Structure, Operations, Disadvantages, Areas of use, Direct File Organization, Indexed Sequential File Organization and text files, Hashing techniques for direct files.

10 HRS

References:

1) Data Structures - Seymour Lipschutz (Schaum's Outlines)
2) Data Structure and File Using C - Abhay Abhyankar.
3) Fundamental of Data Structure in C - Sahani.
4) Data Structure Using C - Radhakrishanan and Shrivastav.
5) Data Structure Using C- R.S.Salaria
6) Simplified Approach to Data Structures- Vishal Goyal, Lalit Goyal, et.al

B.Practicum(credits:04)

Students are required to write and practically execute programs to solve problem using various data structures. The teacher can suitably device problems which help students experiment using the suitable datastructures and operations. Some of the problems are indicated below.

1.Write program that uses functions to perform the following:

2.Creation of list of elements where the size of the list, elements to be inserted and deleted are dynamically given as input.

3.Implement the operations, insertion, deletion at a given position in the list and search for an element in the list

4.To display the elements in forward / reverse order

5.Write a program that demonstrates the application of stack operations (Eg: infix expression to postfix conversion)

6.Write a program to implement queue data structure and basic operations on it (Insertion, deletion, find length) and code atleast one application using queues.

7.Write a program that uses well defined functions to Create a binary tree of elements and Traverse the a Binary tree in preorder, inorder and postorder,

8.Write program that implements linear and binary search methods of searching for an elements in a list.

9.Write and trace programs to understand the various phases of sorting elements using the methods

a.Insertion Sort

b.Quicksort

c.Bubble sort

10.Write and trace programs to Create a Binary search tree and insert and delete from the tree.

11.Represent suitably a graph data structure and demonstrate operations of travesrals on it.

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SEMESTER-2ND

Course No:UBCATC-202		**Course: Fundamentals of Digital Electronics**
Total Marks:100	**Internal Assessment:20**	**Semester Exam:80**
Duration of Examination:1 Hr.		**Credits:04(Theory)**

Learning Outcomes(LO):
LO1.To make students understand the basic structure, operation and characteristics of digital computer.
LO2.To familiarize the students with arithmetic and logic unit as well as the concept of the concept of pipelining.
LO3.To familiarize the students with hierarchical memory system including cache memories and virtual memory.
LO4.To make students know the different ways of communicating with I/O devices and standard I/O interfaces.

UNIT - I
Overview of computers, Integer &floating point representation, Rules of Floating point Arithmetic, parity, Error detection and correction methods using Hamming technique, ASCII code representation, Number systems &their inter - conversion rules, Rules of addition/subtraction for r's, (r - 1)'s complements.

10 HRS

UNIT - II
Logic gates, And, OR, NOT, NAND, XOR, NOR, XNOR Gates &their design.
Boolean Algebra: Binary arithmetic, Boolean Expressions, Laws of Boolean Algebra, De-Morgan laws, K - map, simplification of Boolean Expressions using SOP, POS,
K - map techniques.
10HRS

UNIT - III
Combinational circuits: Half &Full adders &subtractors, parallel adders and subtractors.
Encoder, decoder, Multiplexer, De - Multiplexer, code converters.
Sequential circuits: Flip-flop and its types, registers and their types, &bi - directional register.
10HRS

UNIT -IV
Memory organization: Memory Hierarchy, Memory, its types (RAM/ROM), characteristics of memory, memory address map to CPU, cache memory.

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10HRS

UNIT - V

I/O devices FD/HD disks, VDU;VO organization: Modes of I/O transfer like DMA, programmed control, interrupts technique. Interrupt &instruction: Interrupt, its types &its life cycle, instruction life cycle.
10 HRS

References:

1. Gear, C.W., Computer Organization and Programming McGraw - Hill, 1975.
2. Tannenbaum, A.S., Structured Computer Organization Prentice - Hall of India.
3. Mano, M.M., Computer System Architecture, Prentice - Hall, ofIndia, 1983.
4. Langholz, G., Grancioni, J. and Kandel, A.: Elements of Computer Organization, Prentice - Hall International, 1988.
5. Assembler Manual for the chosen machine.
6. Hayes, Computer Architecture and Organization, McGraw - Hill International Edition.
7. Sloan, M.E., Computer Hardware and Organization, 2nd Edn, Galgotia pub\., Pvt. Ltd.
8. Floyd: Digital Fundamentals, 3rd edn, Universal bookstall, and pvt.ltd

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