Annexure – I (Credits)

Proposed CBCS Structure from 2019-20 for Under Graduate Courses

Courses		Papers	Total Credits	Credits for each paper / Semester – BA						Credits for each paper / Semester – B.Com.						Credits for each paper /.Semester – B.Sc.					
				I	II	III	IV	V	VI	I	II	III	IV	V	VI	I	II	III	IV	V	VI
Core Courses DSC	Optional-1	4	20	5	5	5	5	-	-	5	5	5	5	-	-	5	5	5	5	-	-
	Optional-2	4	20	5	5	5	5	-	-	5	5	5	5	-	-	5	5	5	5	-	-
	Optional-3	4	20	5	5	5	5	-	-	5	5	5	5	-	-	5	5	5	5	-	-
Elective Courses DSE	Optional-1	2	10	-	-	-	-	5	5	-	-	-	-	5	5	-	-	-	-	5	5
	Optional-2	2	10	-	-	-	-	5	5	-	-	-	-	5	5	-	-	-	-	5	5
	Optional-3	2	10	-	-	-	-	5	5	-	-	-	-	5	5	-	-	-	-	5	5
Language	English(First Language)	5	20.	4	4	3	3	3	3	4	4	3	3	3	3	4	4	3	3	3	3
	Second Language	5	20	4	4	3	3	3	3	4	4	3	3	3	3	4	4	3	3	3	3
Ability Enhancement Compulsory Course AECC	Environmental Science / Basic Computer Skills	1	2	2	-	-	-	-	-	2	-	-	-	-	-	2	-	-	-	-	-
	Basic Computer Skills / Environmental Science	1	2	-	2	-	-	-	-	-	2	-	-	-	-	-	2	-	-	-	-
Skill Enhancement Course SEC	SEC1	1	2	-	-	2	-	-	-	-	-	2	-	-	-	-	-	2	-	-	-
	SEC2	1	2	-	-	2	-	-	-	-	-	2	-	-	-	-	-	2	-	-	-
	SEC3	1	2	-	-	-	2	-	-	-	-	-	2	-	-	-	-	-	2	-	-
	SEC4	1	2	-	-	-	2	-	-	-	-	-	2	-	-	-	-	-	2	-	-
Generic Elective GE	Open Stream	1	4	-	-	-	-	4	-	-	-	-	-	4	-	-	-	-	-	4	-
Project Work/Optionals		1	4	-	-	-	-	-	4	-	-	-	-	-	4	-	-	-	-	-	4
Total Credits In each semester				25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Total Credits In UG				150						150						150					
Credits under Non-CGPA		NSS /NCC /sports / Extra curricular	6	Upto 6 (2 in each year)						Upto 6 (2 in each year)						Upto 6 (2 in each year)					
		Summer Internship	4	Upto 4 (2 in each, after I & II years)						Upto 4 (2 in each, after I & II years)						Upto 4 (2 in each, after I & II years)					

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DEPARTMENT OF COMPUTER SCIENCE
B.Sc. (Computer Science) Semester – I & II
2020-2021

B.Sc. (Computer Science)

AECC **Fundamentals of Computers**

Theory 2 Hours/Week **2 Credits**

Unit-1

Introduction to Computers: What is a Computer, characteristics of the computers, Generations of Computers classifications of computers, Basic computer Organization, applications of Computers. Input and output devices: Input devices, output devices, soft copy devices, hard copy devices. Computer memory and processors :introduction, memory hierarchy, processor registers, cache memory, primary memory, secondary storage devices, magnetic tapes, floppy disks, hard disks, optical drives, USB Flash drivers, memory cards, mass storage devices, Basic Processor Architecture.

Unit -II

Number system and computer codes: Binary number system, working with binary numbers, octal number system, Hexadecimal number system, Computer software: introduction to computer software, classification of computer software, system software, application software firmware, middleware, acquiring computer software, design and implementation of correct, efficient and maintainable programs. The Internet: Internet, History. Internet service: Electronic mail, File transfer protocol, Internet Conferencing, Electronic news paper, World Wide Web, Online Shopping, search engines. Internet Security: Threats to Internet Security, Preventive measures.

TEXT BOOK : Reema Thereja, Fundamentals of Computers

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B.Sc. (Computer Science) Semester – I & II
2020-2021
FUNDAMENTALS OF COMPUTERS (AECC)
Common for B.A, B.Com, B.Sc
Paper Pattern

Max Marks -40

PART -A

Answer any four questions in Part –A *4X4 M = 16 Marks*

UNIT- I 1

2

3

UNIT- II 4

5

6

Part – B

Answer all Questions 12M X 2 = 24 Marks

UNIT-I

7

or

8

UNIT II

9

or

10

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DEPARTMENT OF COMPUTER SCIENCE
B.Sc. (Computer Science) Semester – I
PAPER – I (Programming in 'C') 2020-2021

DSC–1

Theory	4 Hours/Week	4 credits
Practical	3 Hours/Week	1 credit

Unit – I

Computer Fundamentals: Introduction of Computers.
Program Fundamentals: Generation and Classification of Programming Languages, Compiling, Interpreting, Loading, Linking of a Program, Developing Program, Software Development.
Algorithms: Definitions, Different Ways of Stating Algorithms (Step-form, Pseudo-code, Flowchart), Strategy for Designing Algorithms, Structured Programming Concept.
Basics of C: Overview of C, Developing Programs in C, Parts of Simple C Program, Structure of a C Program, Comments, Program Statements, C Tokens, Keywords, Identifiers, Data Types, Variables, Constants, Operators and Expressions, Expression Evaluation–Precedence and Associativity, Type Conversions.

Unit – II

Input-Output: Non-Formatted and Formatted Input and Output Functions, Escape Sequences,Control Statements: Selection Statements – if, if-else, nested if, nested if-else, comma operator, conditional operator, switch; Iterative Statements–while, for, do-while; Special Control Statement–goto, break, continue, return, exit. Arrays and Strings: One-dimensional Arrays, Character Arrays, Functions from ctype.h, string.h, Multidimensional Arrays.

Unit – III

Functions: Concept of Function, Using Functions, Call-by-Value Vs Call-by-reference, Passing Arrays to Functions, Scope of Variables, Storage Classes, Inline Functions, and Recursion.Pointers: Introduction, Address of Operator (&), Pointer, Uses of Pointers, Arrays and Pointers, Pointers and Strings, Pointers to Pointers, Array of Pointers, Pointer to Array, Dynamic Memory Allocation.

Unit – IV

User-defined Data Types: Declaring a Structure (Union) and its members, Initialization Structure (Union), Accessing members of a Structure (Union), Array of Structures (Union), Structures verses Unions, Enumeration Types.Files: Introduction, Using Files in C, Working with Text Files, Working with Binary Files, Files of Records, Random Access to Files of Records, Other File Management Functions.

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Text Pradip Dey, Manas Ghosh, Computer Fundamentals and Programming in C (2e)

References

E.BalaguruSwamy, Programming in ANSI C

Yashwant Kanetkar, Let Us C

Ivor Horton, Beginning C

Ashok Kamthane, Programming in C

Herbert Schildt, The Complete Reference C

Paul Deitel, Harvey Deitel, C How To Program

Byron S. Gottfried, Theory and Problems of Programming with C

Brian W. Kernighan, Dennis M. Ritchie, The C Programming Language

B. A. Forouzan, R. F. Gilberg, A Structured Programming Approach Using C

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DEPARTMENT OF COMPUTER SCIENCE
B.Sc. (Computer Science) Semester – I
PAPER – I (Programming in 'C') 2020-2021

C Lab

Practical 3 Hours/Week 1 credit

1 Write a program to find the largest two (three) numbers using if and conditional operator.

2 Write a program to print the reverse of a given number.

3 Write a program to print the prime number from 2 to n where n is given by user.

4 Write a program to find the roots of a quadratic equation using switch statement.

5 Write a program to print a triangle of stars as follows (take number of lines from user):

```
*
* * *
* * * * *
* * * * * * *
* * * * * * * * *
```

6 Write a program to find largest and smallest elements in a given list of numbers.

7 Write a program to find the product of two matrices..

8 Write a program to find the GCD of two numbers using iteration and recursion.

9 Write a program to illustrate use of storage classes.

10 Write a program to demonstrate the call by value and the call by reference concepts.

11 Write a program that prints a table indicating the number of occurrences of each alphabet in the text entered as command line arguments.

12 Write a program to illustrate use of data type enum.

13 Write a program to demonstrate use of string functions string.h header file.

14 Write a program that opens a file and counts the number of characters in a file.

15 Write a program to create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file.

16 Write a program that opens an existing text file and copies it to a new text file with all lowercase letters changed to capital letters and all other characters unchanged.

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DEPARTMENT OF COMPUTER SCIENCE
B.Sc. (Computer Science) Semester – II
PAPER – II (Programming in 'C++') 2020-2021

DSC–2

Theory	**4 Hours/Week**	**4 credits**
Practical	**3Hours/Week**	**1 credit**

Unit – I

Introduction to C++: Applications, Example Programs, Tokens, Data Types, Operators, Expressions, Control Structures, Arrays, Strings, Pointers, Searching and Sorting Arrays. Functions: Introduction, Prototype, Passing Data by Value, Reference Variables, Using Reference Variables as Parameters, Inline Functions, Default Arguments, Overloading Functions, Passing Arrays to Functions.
Object Oriented Programming: Procedural and Object-Oriented Programming, Terminology, Benefits, OOP Languages, and OOP Applications.

Unit – II

Classes: Introduction, Defining an Instance of a Class, Why Have Private Members? Separating Class Specification from Implementation, Inline Member Functions, Constructors, Passing Arguments to Constructors, Destructors, Overloading Constructors, Private Member Functions, Arrays of Objects, Instance and Static Members, Friends of Classes, Copy Constructors, Const Object and Const member function, this pointer, Dynamic memory allocation and De allocation new & delete , Operator Overloading.

Unit – III

Inheritance: Introduction, Protected Members and Class Access, Base Class Access Specification, Single inheritance, Multiple, Multilevel, Hybrid, Hierarchical Inhertiance, Function Overriding, Constructors and Destructors in Base and Derived Classes, Redefining Base Class Functions, Class Hierarchies, Polymorphism and Virtual Member Functions, Abstract Base Classes and Pure Virtual Functions, Multiple Inheritance.C++ Streams: Stream Classes, Unformatted I/O Operations, Formatted I/O Operations.

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Unit – IV

Exceptions: Introduction, Throwing an Exception, Handling an Exception, Object-Oriented Exception Handling with Classes, Multiple Exceptions, Extracting Data from the Exception Class, Re-throwing an Exception, Handling the bad_alloc Exception.Templates: Function Templates–Introduction, Function Templates with Multiple Type, Overloading with Function Templates, Class Templates – Introduction, Defining Objects of the Class Template, Class Templates and Inheritance, Introduction to the STL.

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Text Mastering C++ by K. R. Venugopal,2006

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Reference s

Ravichandran, Programming with C++

B. Lippman, C++ Primer

Bruce Eckel, Thinking in C++

K.R. Venugopal, Mastering C++

Herbert Schildt, C++: The Complete Reference

Bjarne Stroustrup, The C++ Programming Language

Sourav Sahay, Object Oriented Programming with C++

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DEPARTMENT OF COMPUTER SCIENCE
B.Sc. (Computer Science) Semester – II
PAPER – II (Programming in 'C++') 2020-2021

C++ Lab

Practical 3 Hours/Week 1 credit

1 a program to.

a. Print the sum of digits of a given number.

b. Check whether the given number is Armstrong or not

c. Print the prime number from 2 to n where n is natural number given.

2 Write a program to find largest and smallest elements in a given list of numbers and sort the given list.

3 Write a program to read the student name, roll no, marks and display the same using class and object.

4 Write a program to implement the dynamic memory allocation and de-allocation using new and delete operators using class and object.

5 Write a program to find area of a rectangle, circle, and square using constructors

6 (a) Write a program to implement copy constructor.

(b) Write a Program to implement constructor overloaded.

(c) Write a program to implement a this Pointer.

7. Write a program using friend functions and friend class.

8 .Write a program to implement constructors

a. Default Constructor, Parameterized Constructor, Copy Constructor.

b. Define the constructor inside/outside of the class

9. Implement all three constructors within a single class as well as use multiple classes (individual classes)

10. Write a program to implement the following concepts using class and object

a. Function overloading

b. Operator overloading (unary/binary(+ and -))

11. Write a program to demonstrate single inheritance, multiple inheritance and multilevel inheritances.

12. Write a program to implement the overloaded constructors.

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13. Write a program to implement the polymorphism and the following concepts using class and object.
    a. Virtual functions
    b. Pure virtual functions
14. Write a program to implement the virtual concepts for following concepts
    a. Constructor (not applied)
    b. Destructor (applied)
15. Write a program to demonstrate static polymorphism using function Overriding.
16. Write a program to demonstrate dynamic polymorphism using function overriding
17. Write a program to implement the template (generic) concepts
    a. Without template class and object
    b. With template class and object

Note : Write the Pseudo Code and draw Flow Chart for the above programs.

Recommended to use Open Source Software: GCC on Linux; DevC++ (or) CodeBlocks

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DEPARTMENT OF COMPUTER SCIENCE
B.Sc. (Computer Science) Semester – III PAPER III
2020-2021

B.Sc. (Computer Science)

DSC-III **Data Structures Using C++**

Theory	4 Hours/Week	4 credits
Practical	3 Hours/Week	1 credit

Unit – I

Fundamental Concepts: Introduction to Data Structures, Types of Data Structures, Introduction to Algorithm, Pseudo-code, Flow Chart, Analysis of Algorithms.

Linear Data Structure Using Arrays: 1-D Arrays, 2-D Arrays, N-D Arrays, Memory Representation and Address Calculation of 1-D, 2-D, N-D Arrays, Concept of Ordered List, String Manipulation, Pros and Cons of Arrays.

Stacks: Concept, Primitive Operations, Abstract Data Type, Representation Stacks Using Arrays, Prefix, Infix, Postfix Notations for Arithmetic Expression, Applications of Stacks– Converting Infix Expression to Postfix Expression, Evaluating the Postfix Expression, Checking Well-formed (Nested) Parenthesis, Processing of Function Calls, Reversing a String.

Unit – II

Recursion: Introduction, Recurrence, Use of Stack in Recursion, Variants of Recursion, Execution of Recursive Calls, Recursive Functions, Iteration versus Recursion. Queues: Concept, Primitive Operations, Abstract Data Type, Representation Queues Using Arrays, Circular Queue, Double-Ended Queue, Applications of Queues. Linked Lists: Introduction, Concept, Terminology, Primitive Operations-creating, inserting, deleting, traversing, Representation of Linked Lists, Linked List Abstract Data Type, Linked List Variants - Singly Linked List, Doubly Linked List, Linear and Circular Linked List, Representation Stacks and Queues Using Linked Singly Lists, Application of Linked List–Garbage Collection.

Unit – III

Trees: Introduction, Representation of a General Tree, Binary Tree Introduction, Binary Tree Abstract Data Type, Implementation of Binary Trees, Binary Tree Traversals – Preorder, Inorder, Postorder Traversals, Applications of Binary Trees Briefly. Graphs: Introduction, Graph Abstract Data Type, Representation of Graphs, Graph Traversal – Depth-First Search, Breadth-First Search, Spanning Tree – Prim's Algorithm, Kruskal's Algorithm. Hashing: Introduction, Hash Functions, Collision Resolution Strategies.

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Unit – IV

Searching and Sorting: Sequential (Linear) Search, Binary Search, Bubble Sort, Insertion Sort, Selection Sort, Quick Sort, Merge Sort, and Comparison of Sorting Techniques. Heaps: Concept, Implementation, Abstract Data Type, Heap Sort.

Text Varsha H. Patil, Data Structures Using C++

References Seymor Lipschutz, Data Structures (Revised 1e)

Nell Dale, C++ Plus Data Structures

Adam Drozdek, Data Structures and Algorithms in C++

Mark Allen Weiss, Data structures and Algorithm Analysis in C++ (4e)

D.S. Malik, C++ Programming: Program Design Including Data Structures (6e)

Michael Main,Walter Savitch,Data Structures and Other Objects Using C++ (4e)

Michael T. Goodrich, R. Tamassia, David M. Mount, Data Structures and Algorithms in C++ Yonghui Wu, Jiande Wang, Data Structure Practice for Collegiate Programming Contests and Education

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DEPARTMENT OF COMPUTER SCIENCE
B.Sc. (Computer Science) Semester – III PAPER III
2020-2021

B.Sc. (Computer Science)

Data Structures Using C++ Lab

Practical 3 Hours/Week 1 credit

1 Write programs to implement the following using an array: a) Stack ADT b) Queue ADT.

2 Write a program to convert the given infix expression to postfix expression using stack.

3 Write a program to evaluate a postfix expression using stack.

4 Write a program to ensure the parentheses are nested correctly in an arithmetic expression.

5 Write a program to find following using Recursion
a) Factorial of +ve Integer b) n^{th} term of the Fibonacci Sequence c) GCD of two +ve integers

6 Write a program to create a single linked list and write functions to implement the following operations.
a) Insert an element at a specified position
b) Delete a specified element in the list
c) Search for an element and find its position in the list
d) Sort the elements in the list ascending order

7 Write a program to create a double linked list and write functions to implement the following operations.
a) Insert an element at a specified position
b) Delete a specified element in the list
c) Search for an element and find its position in the list
d) Sort the elements in the list ascending order

8 Write a program to create singular circular linked lists and function to implement the following operations.
a) Insert an element at a specified position
b) Delete a specified element in the list
c) Search for an element and find its position in the list

9 Write programs to implement the following using a single linked list:
a) Stack ADT b) Queue ADT.

10 Write a program to implement Binary search technique using Iterative method and Recursive methods.

11 Write a program for sorting the given list numbers in ascending order using the following technique: Bubble sort and Selection sort

12 Write a program for sorting the given list numbers in ascending order using the following technique: Insertion sort and Quick sort

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DEPARTMENT OF COMPUTER SCIENCE
B.Sc. (Computer Science) Semester – IV PAPER IV
2020-2021

B.Sc. (Computer Science)

DSC–IV **Database Management Systems**

Theory	4 Hours/Week	4 credits
Practical	3 Hours/Week	1 credit

Unit – I

Introduction to Databases: Introduction, Traditional File-Based Systems, Database Approach, Roles in the Database Environment, Advantages and Disadvantages of DBMSs, The Three-Level ANSI-SPARC Architecture, Database Languages, DDL,DML,DCL ,TCL Data Models, Functions of a DBMS.

Relational Model: Introduction, Terminology, Integrity Constraints, Views.

The Relational Algebra: Unary Operations, Set Operations, Join Operations, Division Operation, Aggregation and Grouping Operations.

Unit – II

SQL: Introduction, Data Manipulation–Simple Queries, Sorting Results, Using the SQL Aggregate Functions, Grouping Results, Sub-queries, ANY and ALL, Multi-table Queries, EXISTS and NOT EXIST, Combining Result Tables, Database Updates.

SQL: The ISO SQL Data Types, Integrity Enhancement Feature–Domain Constraints, Entity Integrity, Referential Integrity, General Constraints, Data Definition–Creating a Database, Creating a Table, Changing a Table Definition, Removing a Table, Creating an Index, Removing an Index, Views–Creating a View, Removing a View, View Resolution, Restrictions on Views, View Updatability, WITH CHECK OPTION, Advantages and Disadvantages of Views, View Materialization, Transactions, Discretionary Access Control–Granting Privileges to Other Users, Revoking Privileges from Users.

Advanced SQL: The SQL Programming Language–Declarations, Assignments, Control Statements, Exceptions, Cursors, Subprograms, Stored Procedures, Functions, and Packages, Triggers, Recursion.

Unit – III

Entity–Relationship Modeling: Entity Types, Relationship Types, Attributes, Keys, Strong and Weak Entity Types, Attributes on Relationships, Structural Constraints, Problems with ER Models–Fan Traps, Chasm Traps.

Enhanced Entity–Relationship Modeling: Specialization/Generalization, Aggregation, Composition. Functional–Dependencies: Anomalies, Partial Functional Dependency, Transitive Functional Dependency, Multi Valued Dependency, Join Dependency.

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Normalization: The Purpose of Normalization, How Normalization Supports Database Design, Data Redundancy and Update Anomalies, Functional Dependencies in brief, The Process of Normalization,1NF, 2NF, 3NF, BCNF. The Database Design Methodology for Relational Databases (Appendix–D).

Unit – IV

Transaction Management: Transaction Support–Properties of Transactions, Database Architecture, Concurrency Control–The Need for Concurrency Control, Serializability and Recoverability, Locking Methods, Deadlock, Time Stamping Methods, Multi-version Timestamp Ordering, Optimistic Techniques, Granularity of Data Items, Database Recovery–The Need for Recovery, Transactions and Recovery, Recovery Facilities, Recovery Techniques, Nested Transaction Model.

Security: Database Security–Threats, Computer-Based Controls–Authorization, Access Controls, Views, Backup and Recovery, Integrity, Encryption, RAID.

Text Thomas M. Connolly, Carolyn E. Begg, Database Systems–A Practical Approach to Design,

References

Implementation, and Management (6e)
Sharon Allen, Evan Terry, Beginning Relational Data Modeling
Jeffrey A. Hoffer, V. Ramesh, Heikki Topi, Modern Database Management Raghu Ramakrishnan, Johannes Gehrke, Database Management Systems Ramez Elmasri, Shamkant B. Navathe, Fundamentals of Database Systems
Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts
C Coronel, S Morris, Peter Rob, Database Systems: Design, Implementation, and Management

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DEPARTMENT OF COMPUTER SCIENCE
B.Sc. (Computer Science) Semester – IV PAPER IV
2020-2021

B.Sc. (Computer Science)

Database Management Systems Lab

Practical **3 Hours/Week** **1 credit**

SQL

1. DDL Commands and Constraints
2. DML Commands
3. DCL Commands
4. TCL Commands
5. Operators with Select Statement(Relational ,Logical, Like etc)
6. Integrity and Referential Constraints (Primary Key,Foreign Key, Unique Key, NOT NULL,Check)
7. Numeric Functions, String Functions, Date and Time Functions
8. Set Operators
9. Sub queries
10. Joins(Outer Join, Inner Join, Self -Join)
11. Views
12. **Develop any five databases and perform queries related to the above concepts.**

PL/SQL Programs

1. Write simple PL/SQL program
2. Write PL/SQL code using control statements
3. Write PL/SQL code using functions.
4. Write PL/SQL code using stored procedures
5. Write PL/SQL code to illustrate Exceptions(Error Handling)
6. Write PL/SQL code to illustrate Implicit Cursors
7. Write PL/SQL code to illustrate Explicit Cursors
8. Write PL/SQL code to implement Triggers
9. Write PL/SQL code to illustrate Recursion.
10. Write PL/SQL code to implement packages.

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Note: Recommended to use open source database softwares like Oracle , MySQL , PostgreSQL etc.

In practical examination students have to

- **Create database**
- **Create tables with their integrity constraints**
- **Insert the data into tables and then execute the queries**
- **Answer any six queries from ten queries given by the examiner.**

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B.Sc. I Year I Semester (CBCS) : Data Science Syllabus

(With Mathematics Combination)

(Examination at the end of Semester - I)

Paper – I : Fundamentals of Information Technology

[4 HPW :: 4 Credits :: 100 Marks (External:80, Internal:20)]

Objectives:

1. **To deal with the basic concepts of computers.**
2. **To discuss about the computer hardware, its components and basic computer architecture.**
3. **To understand the basic computer software including the operating system and its concepts.**
4. **To introduce the software development process**
5. **To introduce the basic concept of programming**

Outcomes:

Students should be able to

1. Identify the components of a computer and their functions.
2. Understand the concept of networking, LAN, Internet, and working of www.
3. Understand the notion of problem solving using computer by programming
4. Understand the notion of Software Project and the Process of software development

Unit-I

Data and Information: Introduction, Types of Data, Simple Model of a Computer, Data Processing Using a Computer, Desktop Computer [Reference 1]

Acquisition of Numbers and Textual Data: Introduction, Input Units, Internal Representation of Numeric Data, Representation of Characters in Computers, Error-Detecting Codes [Reference 1]

Unit-II

Data Storage: Introduction, Storage Cell, Physical Devices Used as Storage Cells, Random Access Memory, Read Only Memory, Secondary Storage, Compact Disk Read Only Memory (CDROM), Archival Store [Reference 1]

Central Processing Unit: Introduction, Structure of a Central Processing Unit, Specifications of a CPU, Interconnection of CPU with Memory and I/O Units, Embedded Processors [Reference 1]

Unit-III

Computer Networks: Introduction, Local Area Network (LAN), Applications of LAN, Wide Area Network (WAN), Internet, Naming Computers Connected to Internet, Future of Internet Technology [Reference 1]

Input Output Devices: Introduction, Keyboard, Video Display Devices, Touch Screen Display, E-Ink Display, Printers, Audio Output [Reference 1]

Computer Software: Introduction, Operating System, Programming Languages, Classification of Programming Languages, Classification of Programming Languages Based on Applications [Reference 1]

Unit-IV

The Software Problem: Cost, Schedule, and Quality, Scale and Change [Reference 2]
Software Processes: Process and Project, Component Software Processes, Software Development Process Models [Reference 2]
Programming Principles and Guidelines: Structured Programming, Information Hiding, Some Programming Practices, Coding Standards [Reference 2]

References

1. V Rajaraman. Introduction to Information Technology, 3rd Edition, PHI Learning Private Limited, 2018
2. Pankaj Jalote. Concise Introduction toSoftware Engineering, Springer, 2011

BOS

COMPUTER SCIENCE

2020 - 2021

Controller of Exams copy

This book contains BOS approved syllabus of computer Science UG I, II, III, IV, V sem AECC & SEC also and B.A (DH) also.
(odd & even sem)
Along with panel of examiners and paper pattern.

Dr. Lolla Pavani
11/12/2020

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2020-2021

B.Sc. (Computer Science)

Paper Pattern

Time: 3 Hours

Max Marks: 80

PART -A

Answer any eight questions

8X4 M = 32 Marks

UNIT- I 1
2
3

UNIT- II 4
5
6

UNIT- III 7
8
9

UNIT- IV 10
11
12

Part – B

Answer all Questions

12X4 = 48 Marks

UNIT- I 13
or
14

UNIT- II 15
or
16

UNIT- III 17
or
18

UNIT- IV 19
or
20

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w.e.f 2019-2020

B.Sc. (Computer Science)

Paper Pattern

Time: 3 Hours **Max Marks: 80**

PART -A

Answer any eight questions **8X4 M = 32 Marks**

UNIT- I 1
2
3

UNIT- II 4
5
6

UNIT- III 7
8
9

UNIT- IV 10
11
12

Part – B

Answer all Questions **12MX4 = 48 Marks**

UNIT- I 13
or
14

UNIT- II 15
or
16

UNIT- III 17
or
18

UNIT- IV 19
or
20

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B.Sc. (Computer Science) Semester – V & VI
Papers(,IX,X,XI,XII)
2020-2021

B.Sc. (Computer Science)

Paper Pattern

Time: 2 Hours **Max Marks: 35**

PART -A

Answer ALL **5X3 M = 15 Marks**

1. UNIT- I
2. UNIT- II
3. UNIT- III
4. UNIT- IV
5. From Any Unit

Part – B

Answer all Questions **4X5 = 20 Marks**

6 a) UNIT- I
or
6 b) UNIT- I

7a) UNIT- II
or
7b) UNIT- II

8a) UNIT- III
or
8b) UNIT- III

9a) UNIT- IV
or
9b) UNIT- IV

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B.Sc. (Computer Science) Semester – I & II
2020-2021
Paper Pattern

Practical Question Paper — 3 Hours
Max Marks -40

Answer any Two — 10M X 2 = 20 MARKS

UNIT – I	1 Program
UNIT- II	1 Program
UNIT-III	1 Program
UNIT -IV	1 Program

Viva – 10 Marks

Record – 10 Marks.

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B.Sc. (Computer Science) Semester – III & IV
2020-2021
Paper Pattern

Practical Question Paper — **3 Hours**

Max Marks -40

Answer any Two — **10M X 2 = 20 MARKS**

UNIT – I	1 Program
UNIT- II	1 Program
UNIT-III	1 Program
UNIT -IV	1 Program

Viva – 10 Marks

Record – 10 Marks.

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B.Sc. (Computer Science) Semester – V&VI
(Papers [illegible] IX,X,XI,XII)
2020-2021
Paper Pattern

Practical Question Paper

3 Hours
Max Marks -18

Answer any Two

5M X 2 = 10MARKS

UNIT – I	1 Program
UNIT- II	1 Program
UNIT-III	1 Program
UNIT -IV	1 Program

Viva – 4 Marks

Record – 4 Marks.

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DEPARTMENT OF COMPUTER SCIENCE
B.Sc. (Computer Science) Semester – III
2020-2021

B.Sc. (Computer Science)

SEC–I **Python – 1**

Theory :2 Hours/Week 2 credits

Unit-I

Introduction to Python: Python, Features of Python, Execution of a Python Program, Viewing the Byte Code, Flavors of Python, Python Virtual Machine, Frozen Binaries, Memory Management in Python, Garbage Collection in Python, Comparisons between C and Python, Comparisons between Java and Python.

Writing Our First Python Program: Installing Python for Windows, Installing numpy, Setting the Path to Python, Writing Our First Python Program, Executing a Python Program, Getting Help in Python, Getting Python Documentation Help, Reopening the Python Program in IDLE.

Data types in Python: Comments in Python, Doc strings, How Python Sees Variables, Data types in Python, Built-in data types, bool Data type, Sequences in Python, Sets, Literals in Python, Determining the Data type of a Variable, What about Characters, User-defined Data types, Constants in Python, Identifiers and Reserved words, Naming Conventions in Python.

Unit – II

Operators in Python: Arithmetic Operators, Assignment Operators, Unary Minus Operator, Relational Operators, Logical Operators, Boolean Operators, Bitwise Operators, Membership Operators, Identity Operators, Operator Precedence and Associativity, Mathematical Functions.

Input and Output: Output statements, Input Statements, Command Line Arguments.

Control Statements: Control Statements, The if Statement, A Word on Indentation, The if … else Statement, The if … elif … else Statement, The while Loop, The for Loop, Infinite Loops, Nested Loops, The else Suite, The break Statement, The continue Statement, The pass Statement, The assert Statement, The return Statement.

Panda(Introduction to Series and DataFrames)

Text Kenneth A. Lambert, Fundamentals of Python First Programs

Tony Gaddis, Starting Out With Python

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Reference s

Dr.R.Nageswar Rao, Core Python Programming
James Payne, Beginning Python using Python 2.6 and Python 3
Paul Gries, Practical Programming: An Introduction to Computer Science using Python 3
Mark Lutz, Learning Python

Note: Student friendly video lecturers pertaining to this course are available at http:// spoken-tutorial.org/

Teachers are advised to teach this courses in the computer lab itself, so that the interested students may derive some time to perform few programs their own.

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B.Sc. (Computer Science) Semester – III
2020-2021
B.Sc. (Computer Science)

Feb-21

SEC–II **Operating System – 1**

Theory :2 Hours/Week 2 credits

Unit-I

Introduction : Computer- System Architecture, Computing Environments. Operating-System, Structures: Operating-System, Services; User Interface for Operating System, Introduction to Unix, System calls, Types of System Calls, Storage Structure, Storage hierarchy.

Unit – II

Process Management: Process Concepts, Process States, Process Control Block, CPU Scheduling Concepts, Scheduling Criteria, Scheduling Alogorithms.
Deadlocks: System Model, Deadlock Characterization-Necessary conditions, Resource allocation Graph

Text Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Opertating system concepts (9e)

References Naresh Chauhan, Priciples of Operating Systems

Thomas W. Doeppner, Operating System in Depth

Andrew S. Tanenbaum, Modern Operating systems

William Stallings, Operating Systems – Internals and Design Priniciples

Dhananjay M. Dhandhere, Operating Systems – aConcept Based Apporach

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B.Sc. (Computer Science) Semester – IV
2020-2021

B.Sc. (Computer Science)

SEC–III **Python – 2**

Theory :2 Hours/Week 2 credits

Unit – I

Arrays in Python: Array, Advantages of Arrays, Creating an Array, Importing the Array Module, Indexing and Slicing on Arrays, Processing the Arrays, Types of Arrays, Working with Arrays using numpy, Creating Arrays using array(), linespace, logspace, arange(), zeros() and ones() Functions, Mathematical Operations on Arrays, Comparing Arrays, Aliasing the Arrays, Viewing and Copying Arrays, Slicing and Indexing in numpy Arrays, Dimensions of Arrays, Attributes of an Array, The reshape() Method, The flatten() Method, Working with Multi-dimensional Arrays, Indexing in Multi-dimensional Arrays, Slicing the Multi-dimensional Arrays, **Matrices in numpy,** Getting Diagonal Elements of a Matrix, Finding Maximum and Minimum Elements, Finding Sum and Average of Elements, Products of Elements, Sorting the Matrix, Transpose of a Matrix, Matrix Addition and Multiplication, Random Numbers.

Strings and Characters: Creating Strings, Length of a String, Indexing in Strings, Slicing the Strings, Repeating the Strings, Concatenation of Strings, Checking Membership, Comparing Strings, Removing Spaces from a String, Finding Sub Strings, Counting Substrings in a String, Strings are Immutable, Replacing a String with another String, Splitting and Joining Strings, Changing Case of a String, Checking Starting and Ending of a String, String Testing Methods, Formatting the Strings, Working with Characters, Sorting Strings, Searching in the Strings, Finding Number of Characters and Words, Inserting Sub String into a String.

Unit – II

Functions, modules and panda: Difference between a Function and a Method, Defining a Function, Calling a Function, Returning Results from a Function, Returning Multiple Values from a Function, Functions are First Class Objects, Pass by Object Reference, Formal and Actual Arguments, Positional Arguments, Keyword Arguments, Default Arguments, Variable Length Arguments, Local and Global Variables, The Global Keyword, Passing a Group of Elements to a Function, Recursive Functions, Anonymous Functions or Lambdas, Function Decorators, Generators, Structured Programming, Creating our Own Modules in Python, The Special Variable name.

Lists and Tuples: List, Creating Lists using range() Function, Updating the Elements of a List, Concatenation of Two Lists, Repetition of Lists, Membership in Lists, Aliasing and Cloning Lists, Methods to Process Lists, Finding Biggest and Smallest Elements in a List,

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Sorting the List Elements, Number of Occurrences of an Element in the List, Finding Common Elements in Two Lists, Storing Different Types of Data in a List, Nested Lists, Nested Lists as Matrices, List Comprehensions, Tuples, Creating Tuples, Accessing the Tuple Elements, Basic Operations on Tuples, Functions to Process Tuples, Nested Tuples, Inserting Elements in a Tuple, Modifying Elements of a Tuple, Deleting Elements from a Tuple.

Dictionaries: Operations on Dictionaries, Dictionary Methods, Using for Loop with Dictionaries, Sorting the Elements of a Dictionary using Lambdas, Converting Lists into Dictionary, Converting Strings into Dictionary, Passing Dictionaries to Functions, Ordered Dictionaries.

Text : Kenneth A. Lambert, Fundamentals of Python

Tony Gaddis, Starting Out With Python

Reference s

R. Nageswara Rao, *Corer Python Programming,* Dreamtech Press

Mark Lutz, Learning Python

James Payne, Beginning Python using Python 2.6 and Python 3

Paul Gries, Practical Programming: An Introduction to Computer Science using Python 3

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B.Sc. (Computer Science) Semester – IV
2020-2021

B.Sc. (Computer Science)

SEC–IV Operating System –II

Theory 2 Hours/Week 2 credits

Unit - I

Memory Management: Main Memory, Swapping, Contiguous Memory Allocation, Paging. Structure of the Page Table, Segmentation.
Virtual Memory: Demand paging, page Replacement, algorithms, Thrashing
Mass-Storage Structure: Overview, Disk structure Disk scheduling algorithms –FCFS, SSTF, SCAN, C-SCAN scheduling,
Disk Management, swap- Space Management, RAID Structure.

Unit-II

File System : File Concept, Access Methods, Directory and Disk Structure, File- System Mounting, Protection.
File System Structure and Implementation, Directory Implementation, Allocation methods, Free- Space
Management, Recovery, Network File system.
Protection and Security: Goals of Protection, Principles of Protection, Domain of Protection. Access matrix, Access Control, Revocation of Access Rights, The Security Problem, Program Threats, System and
Network Threats.

Text Abraham Silberschatz, Peter Baer galvin, Greg Gangne, Operating System Concepts (9e)

Refernces

1. Thomas W. Doeppner , Operating Systems in Depth
2. Andrew S. Tanenbaum, Modern Operating systems
3. William stallings, Operating systems – Internals and Design Principles
4. dhananjay M. Dhandhere, Operating Systems – A Concept Based approach

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