B.Sc. Sem. I-VI
Session 2024-25

Class	Course Code	Course Name	Maximum Marks				Credits			Total Credits	Page No
			Th	IA	Pr	Total	L	T	P		
Bsc.(Computer Science)Sem- I	CSC-111A	Computer Fundamentals & IT	37	38	-	150	2	0	0	2	2-3
	CSC-111B	Programming Using C	37		-		2	0	0	2	4-5
	CSC-111P	Practical Paper A+B CSC-111P	-		38		0	0	2	2	6
Bsc.(Computer Science) Sem-II	CSC-121A	Computer Oriented Numerical and Statistical Methods	37	38	-	150	2	0	0	2	7-8
	CSC-121B	Programming in C++	37		-		2	0	0	2	9-10
	CSC-121P	Practical Paper A+B CSC-121P	-		38		0	0	2	2	11
Bsc.(Computer Science) Sem-III	CSC-231A	Data Structures	56	50	-	200	2	1	0	3	12-13
	CSC-231B	Computer Networks	56		-		2	1	0	3	14-15
	CSC-231P	Practical Paper A+B CSC-231P	-		38		0	0	2	2	16
Bsc.(Computer Science)Sem- IV	CSC-241A	Programming using Python	56	50	-	200	2	1	0	3	17-18
	CSC-241B	Software Engineering	56		-		2	1	0	3	19-20
	CSC-241P	Practical Paper A+B CSC-241P	-		38		0	0	2	2	21
Bsc.(Computer Science) Sem-V	CSC-351	Data Base Management System & Oracle	56	19T 6P	19	100	-	-	-	-	22-24
Bsc.(Computer Science)Sem- VI	CSC-361	Programming using Python	56	19T 6P	19	100	-	-	-	-	25-27

B.Sc. Semester–I
CSC-111A
Computer Fundamental & Information Technology
(THEORY)

Time: 3 Hours

Credits		
L	**T**	**P**
2	**0**	**0**

Maximum Marks: 37
Pass Marks: 35%

Note for paper setter and students:

1. **There will be five sections.**
2. **Section A is compulsory and will be of 9 marks consisting of 8 short answer type questions carrying 1.5 marks each covering the whole syllabus. The answer should not exceed 50 words. The candidate will have to attempt any 6 questions in this section.**
3. **Sections B, C, D and E will be set from units I, II, III & IV respectively and will consist of two questions of 07 marks each from the respective unit. The candidates are required to attempt one question from each of these sections. Each question in these sections should not have more than two subparts.**
4. **Medium of Examination is English Language.**

Course Objectives:

1.	This course will familiarize students with basics of computer, its components.
2.	Students will learn various peripheral devices.
3.	Student will understand different kind of operating systems, networks and role of information systems.

Course Content:

UNIT–I

Introduction: Data, information, data v/s information, definition of computer, Characteristics, uses, block diagram of computer, hardware and software.

Input devices: keyboard, mouse, joystick, scanner, OCR, OMR, bar code reader, web camera.

UNIT–II

Output devices: monitor, printer, plotter.

Memory: Primary, Secondary memory, RAM, ROM, hard disks, optical disks.

UNIT-III

Data & Network Communication

Communication media: Twisted pair, Coaxial, Fibre optics, Wireless, Types & Topologies, Modems, Operating Systems, Functions and its types (Multiuser, Multitasking & Multiprogramming and their examples). Internet, uses and Applications

UNIT-IV

Information System: Introduction to IT & its components, Definition of Information systems, Computer based information systems, Management Information System and its types.

References:

1. Peter Norton, Introduction to Computers,. McGraw Hill.(2017) 7th edition.
2. Ramesh Bangia, Computer Fundamental & information Technology,Firewall Media(2016),2nd edition.
3. Deepak Bharihoke,Computer Fundamental & information Technology,Excel Books(2009),3rd edition.
4. Anita Goel, Computer Fundamentals ,Pearson(2010)1st edition.
5. Effy Oz,Management Information System,Galgotia publisher(2008) 6th edition.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO-1.	Bridge the fundamental concepts of computers with the present knowledge of the students.
CO-2.	Familiarize operating systems, peripheral devices, networking and internet.
CO-3.	Identify the hardware and software concepts, input and output units components of a computer system.
CO-4.	Demonstrate different communication medias.

B.Sc. Semester – I
CSC-111B
Programming Using C
(THEORY)

Time: 3 Hours

Credits		
L	**T**	**P**
2	**0**	**0**

Maximum Marks: 37
Pass Marks: 35%

Note for paper setter and students:

1. **There will be five sections.**
2. **Section A is compulsory and will be of 9 marks consisting of 8 short answer type questions carrying 1.5 marks each covering the whole syllabus. The answer should not exceed 50 words. The candidate will have to attempt any 6 questions in this section.**
3. **Sections B, C, D and E will be set from units I, II, III & IV respectively and will consist of two questions of 07 marks each from the respective unit. The candidates are required to attempt one question from each of these sections. Each question in these sections should not have more than two subparts.**
4. **Medium of Examination is English Language.**

Course Objectives:

1.	The course is designed to provide complete knowledge of C language.
2.	To become familiar with the grammar and semantics of the C programming language.
3.	Students will be able to develop logics which will help them to create programs, applications in C.
4.	Also, by learning the basic programming constructs they can easily switch over to any other language in future.

Course Content:

UNIT–I

Programming Language C

Basics of C: Introduction to C, Applications and Advantages of C, Tokens, Types of Error **.**

Data Types: Basic Data Types, User Defined Data Types, Operators and its types , Hierarchy of Operators.

UNIT–II

Data I/O Functions: Formatted & Unformatted I/O Functions.

Control Statements: Decision and Looping Statements

UNIT–III

Arrays: Definition, types, One Dimensional and Two-Dimensional Arrays, Strings and String functions.

Functions: User Defined & Library Function, methods of passing arguments.

UNIT–IV

Storage Classes: auto, register, static, extern.

Structure and Union: Introduction, defining a structure, declaring structure variables, accessing structure members. Difference between structure and union.

References:

1. Byron Gottfried: *Programming with C*, Schaum's Outline (2018),4th edition.
2. Yashwant Kanetkar,*Let Us C***,** BPB Publication(2017),14th Edition
3**.** Herbert Schildt,*The Complete Reference*,McGraw-Hill(2017)4th edition

Course Outcomes:

Upon completion of this course, the students will be able to:

CO-1.	Use the fundamentals of C programming in trivial problem solving.
CO-2.	Identify solution to a problem and apply control structures and user defined functionsfor solving the problem
CO-3.	Demonstrate the use of Strings and string handling functions.
CO-4.	Ability to work with arrays of complex objects.
CO-5.	Apply skill of identifying appropriate programming constructs for problem solving.

B.Sc. Semester – I

CSC-111P: Practical Paper A+B

Time: 3 Hours

Credits		
L	**T**	**P**
0	**0**	**2**

Teaching Hours (per week):4
Maximum Marks: 38
Pass Marks: 35%

Course Objectives:

1.	Teach the fundamentals so students can efficiently use MS Word
2.	Provide a knowledge base for Computer Fundamentals & MS Word upon which you can build.
3.	Use real-world examples and procedures that will prepare you to be a skilled user of Computer & MS Word, MS Power Point & MS Excel.
4.	Provide hands-on use of Microsoft Office applications Word, Excel and Power Point. Completion of the assignments will result in MS Office applications knowledge and skills.
5.	To practice the fundamental programming methodologies in the C programming language via laboratory experiences.
6.	To code, document, test and implement a well-structured, robust computer program using the C programming language.

Topics for Practical: MS–Word 2010 , MS Power Point 2010

Operational Knowledge and Implementation of programmes in C programming.

Course Outcomes:

Upon completion of this course, the students will be able to:

CO-1.	Identify the applications of computer in daily life.
CO-2.	Understand the practical concepts of MSWord, MS Excel and MS PowerPoint.
CO-3.	Knowledge and understanding on successful completion of this subject the students have the ability to perform tools of MS Office.
CO-4.	Develop skills of working with MS Word, MS Powerpoint, MS excel.
CO-5.	Use the fundamentals of C programming in trivial problem solving.
CO-6.	Apply skill of identifying appropriate programming constructs for problem solving.

B.Sc. SEMESTER–II
CSC-121A
Computer Oriented Numerical and Statistical Methods using C++
(THEORY)

Time: 3 Hours

Credits		
L	**T**	**P**
2	**0**	**0**

Maximum Marks: 37
Pass Marks: 35%

Note for paper setter and students:

1. **There will be five sections.**
2. **Section A is compulsory and will be of 9 marks consisting of 8 short answer type questions carrying 1.5 marks each covering the whole syllabus. The answer should not exceed 50 words. The candidate will have to attempt any 6 questions in this section.**
3. **Sections B, C, D and E will be set from units I, II, III & IV respectively and will consist of two questions of 07 marks each from the respective unit. The candidates are required to attempt one question from each of these sections. Each question in these sections should not have more than two subparts.**
4. **Medium of Examination is English Language.**

Course Objectives:

At the end of the course, the students will be able:	
1.	To understand and implement various concepts of numerical and statistical methods to solve real life problems.
2.	To develop the mathematical skills of the students in the areas of numerical methods.
3.	To provide conceptual understanding of various numerical methods like solution of non-linear equations, system of linear equations, interpolation, numerical integration with an aim of helping the students to understand the fundamentals, concepts and practical use of these methods in the field of computer sciences and applications.
4.	To provide understanding of statistical problems like testing of assumptions using various techniques.

Note: All Numerical Methods must be coded in C++

Course Content:

UNIT-I

1. Introduction: Importance of Numerical methods and Numerical Analysis, Errors (measures, sources and types).

2. Non-linear Equations: Bisection, False position and Newton Raphson-method.

3. Linear Systems: Direct Methods **(**Gauss Elimination Method, Gauss Jordan Method), ill and well-conditioned systems, iterative methods(Gauss Siedel), Direct v/s iterative methods

UNIT-II

4.Interpolation: Finite differences, Newton's interpolation (Forward, Backward, divided),Lagrange Interpolation.

5.Numerical Integration: Trapezoidal, Simpson's 1/3, 3/8 rule.

UNIT- III

Statistical Techniques

1.Introduction: Classes of error in statistics, Estimation of statistical errors.

2.**Measure of Central Tendency**: Arithmetic ,Geometric, Harmonic mean, median, Mode.

3.**Measure of Dispersion:** Relationship between central tendency and dispersion, Mean deviation, Standard deviation, Co-efficient of variation.

UNIT-IV

4. **Correlation:** Karl Pearson's correlation, Spearman's rank correlation.

5. **Least square method**: Linear(y=a+bx) and non-linear trends

$Y=ax^b$

$Y=ab^x$

$Y=ae^{bx}$

Polynomial fit: $Y= a+bx+cx^2$

References:

1.R.S Salaria:Computed Oriented Numerical Method, Khanna Book publishing CO.(P)Ltd(2016) 5th edition.

2. V. Rajaraman: *Computer Oriented Numerical Methods*, Prentice Hall of India Private Ltd(2019), 4th edition.

3. S.P Gupta, *Statistical Methods*, Sultan Chand & Sons Publications(2021), 43rd edition.

4. M. K. Jain, S .R. K. Iyengar and R. K. Jain, *Numerical Methods for Scientific and Engineering Computation*, New Age International Publishers (2012), 6th edition.

5. E. Balagurusamy, "*Numerical Methods*", Tata McGraw-Hill Publishing Company Ltd., New Delhi, (2008) 24th edition.

Course Outcomes:

On completion of this course students will able to:	
CO-1.	Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions
CO-2.	Apply various numerical methods to find our solution of algebraic and transcendental non-linear equations and also solve system of linear equations numerically using direct and iterative methods.
CO-3.	Understand the methods to construct interpolating polynomials and finite difference concepts (forward, backward, divided) for prediction and also find integration to find area under curve.
CO-4.	Learn fundamentals concepts of statistical and optimization methods.
CO-5.	With reference to frequency distribution and measures of central tendency(like mean, median and mode), measures of dispersion(range, mean deviation ,standard deviation), correlation, and curve fit.

B.Sc. Semester – II

CSC-121B

Programming in C++

(THEORY)

Time: 3 Hours

Credits		
L	**T**	**P**
2	**0**	**0**

Maximum Marks: 37

Pass Marks: 35%

Note for paper setter and students:

1. **There will be five sections.**
2. **Section A is compulsory and will be of 9 marks consisting of 8 short answer type questions carrying 1.5 marks each covering the whole syllabus. The answer should not exceed 50 words. The candidate will have to attempt any 6 questions in this section.**
3. **Sections B, C, D and E will be set from units I, II, III & IV respectively and will consist of two questions of 07 marks each from the respective unit. The candidates are required to attempt one question from each of these sections. Each question in these sections should not have more than two subparts.**
4. **Medium of Examination is English Language.**

Course Objectives:

The learning objectives of this course are:

1.	To understand how C++ improves C with object-oriented features.
2.	To learn how to design C++ classes for code reuse.
3.	To understand the concept of data abstraction and encapsulation.
4.	To learn how inheritance and virtual functions implement dynamic binding with polymorphism.

UNIT-I

Programming Paradigms: Introduction to the object-oriented approach towards programming by discussing Traditional, Structured Programming methodology.

Object Oriented Programming using C++: Elements of OOPS, Characteristics of OOP, Overview of C++, I/O using cout and cin.

UNIT-II

Object and Classes: Class Specifications, class objects, Accessing class member.

Constructor & Destructor: Constructor, Definition, Overloading, Types of Constructors. Destructor.

UNIT-III

Inheritance: Concept of inheritance, Base & derived classes, Access Specifiers, Class Hierarchies, Types of Inheritance with examples.

UNIT-IV

Operator Overloading: Overloading unary and binary operators, Type Conversion using Operator Overloading.

Virtual Functions and Polymorphism: Virtual functions, friend functions, static function, this pointer, polymorphism, Types of Polymorphism with examples.

References:

1. The Complete Reference By Herbert Schildt ,Fourth Edition,2002
2. Teach yourself C++, Herbert Schildth, Tata McGraw Hill.
3. Designing Object Oriented Software RebaccaWirfs - Brock Brian Wilerson, PHI.
4. Object Oriented Programming in Turbo C++, Robert Lafore, Galgotia Publication.

Course Outcomes:

Upon completion of this course, the students will be able to:

CO-1.	Understand the difference between the top-down and bottom-up approach.
CO-2.	Apply the concepts of object-oriented programming.
CO-3.	Design and implement C++ classes for code reuse.
CO-4.	Apply virtual and pure virtual function & complex programming situations.

B.Sc. Semester – II

CSC-121P: Practical Paper A+B

Time: 3 Hours

Credits		
L	**T**	**P**
0	**0**	**2**

Teaching Hours (per week):4
Maximum Marks: 38
Pass Marks: 35%

Course Objectives:

1.	To enhance the problem solving skills of students using an extremely powerful problem solving tool namely numerical methods.
2.	This will help students to choose, develop and apply the appropriate numerical techniques for your problem, interpret the results, and assess accuracy.
3.	The problems cover **I.** Systems of linear equations; linear least squares problems **II.** Interpolation and approximation.
4.	To learn how to write inline functions for efficiency and performance.
5.	To know the syntax and semantics of the C++ programming language.

Operational Knowledge and Implementation of Numerical Methods & Statistical techniques in C++.

Course Outcomes:

On completion of this course students will able to:

CO-1.	Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions.
CO-2.	Apply various numerical methods to find solution of algebraic and transcendental non-linear equations and also solve system of linear equations numerically using direct and iterative methods.
CO-3.	Understand the methods to construct interpolating polynomials and finite difference concepts (forward, backward, and divided) for prediction and also find integration to find area under curve.
CO-4.	Impart knowledge in such a way that students should be able to use of concept of Object-Oriented Programming approach in their programming skills.
CO-5.	Provide the knowledge of implementation of various features of C++ i.e. concept of Object, Object communication, Encapsulation, Data hiding, overloading, etc.
CO-6.	Acquire in depth knowledge and develop software in C++.
CO-7.	Understand how to do programming in C++environment.

B.Sc. Semester – III
CSC-231A
Data Structures
(THEORY)

Time: 3 Hours

Credits		
L	**T**	**P**
2	**1**	**0**

Maximum Marks: 56
Pass Marks: 35%

Note for paper setter and students:

1. **There will be five sections.**
2. **Section A is compulsory and will be of 12 marks consisting of 8 short answer type questions carrying 2 marks each covering the whole syllabus. The answer should not exceed 50 words. The candidate will have to attempt any 6 questions in this section.**
3. **Sections B, C, D and E will be set from units I, II, III & IV respectively and will consist of two questions of 11 marks each from the respective unit. The candidates are required to attempt one question from each of these sections. Each question in these sections should not have more than two subparts.**
4. **Medium of Examination is English Language.**

Course Objectives:

At the end of the course, the students will be able to:

1.	Provide the knowledge of basic data structures and their implementations.
2.	Understand importance of data structures in context of writing efficient programs.
3.	Implement Array, stack, queue, linked list data structures.

UNIT- I

Data Structure: Introduction to elementary Data Organization, Common Operation on Data Structures, **Algorithm**: Definition, Complexity, Big O Notation, Time-Space Trade-off between Algorithm.
Arrays: Array Defined, Representing Arrays in memory, various operations on Linear arrays, multi-Dimensional arrays.

UNIT- II

Linked Lists: Introduction, representing linked list in memory, advantages of using linked lists over arrays, Various operations of linked lists.

UNIT- III

Stacks: Description of STACK structure, Implementation of stack using arrays and linked lists, application of stack: Evaluation of Postfix Expression, converting Arithmetic expression from infix notational to polish and Recursion.

Queues: Description of queue structure, Implementation of queue using arrays and linked lists, Priority Queue, Deque.

UNIT- IV

Sorting and Searching: Sorting Algorithms, bubble sort, selection sort, insertion sort, merge **sort, heap sort, quick sort technique to sort an array.**
Searching Algorithms : Linear search and binary search.

References:

1. Seymour Lipschutz, Theory and Problems of Data Structures, Schaum's Outline Series, McGraw Hill Company,2017
2. Data Structures through C by Yashwant Kanetkar,BPB Publications,3rd edition,2017
3. Data Structures through C++ ,by Yashwant Kanetkar, BPB Publications 4th edition,2018
4. *Data Structures and Algorithms Made Easy By Narasimha Karumanchi5th* edition,2016

Course Outcome:

CO-1.	Student will be able to learn the basic types of data structures, implementation and application.
CO-2.	Students will be able to use linear and non-linear data structure like stacks, queues, linked list.
CO-3.	Implement various searching and sorting algorithms
CO-4.	Student will be able to handle operations like traversing searching, insertion, deletion, mechanism etc. on various data structures.

B.Sc. Semester – III
CSC-231B
Computer Networks
(THEORY)

Time: 3 Hours

Credits		
L	**T**	**P**
2	**1**	**0**

Maximum Marks: 56
Pass Marks: 35%

Note for paper setter and students:

1. **There will be five sections.**
2. **Section A is compulsory and will be of 12 marks consisting of 8 short answer type questions carrying 2 marks each covering the whole syllabus. The answer should not exceed 50 words. The candidate will have to attempt any 6 questions in this section.**
3. **Sections B, C, D and E will be set from units I, II, III & IV respectively and will consist of two questions of 11 marks each from the respective unit. The candidates are required to attempt one question from each of these sections. Each question in these sections should not have more than two subparts.**
4. **Medium of Examination is English Language.**

Course Objectives:

1.	To develop an understanding of different components of computer networks, various protocols, modern technologies and their applications.
2.	To understand the working principle of various communication protocols.
3.	Study the basic taxonomy and terminology of the computer Networking and enumerate the layers of OSI model and TCP/IP model.
4.	Gain core Knowledge of network layer routing protocols and IP addressing.
5.	To know the concept of data transfer between nodes.

UNIT – I

Introduction: Network Definition, Components of a network, network types and topologies, Uses of computer networks, network architecture, Modem and its types.

UNIT -II

Reference Model: OSI reference model, TCP/IP reference model, Comparison of OSI and TCP reference model.

Transmission Media: Coaxial cable, Twisted pair cable, Fiber optics & satellites.

UNIT – III

Local Area Network Protocols: CSMA Protocols, IEEE standards 802(Token Bus, Token Ring, FDDI).

Network Security and Privacy: Brief introduction to cryptography.

UNIT- IV

Data Link Layer Design Issues: Services provided to Network layer framing, error control, flow control, Error detection & correction, Elementary Data link Protocols.

Design Issues of Network Layer: Services provided to transport layer, types of routing.

References:

1. Tanenbaum Andrew.S: '*Computer Network'*, Pearson Prentice Hall(2013), 5th edition.
2. Stalings Willam: 'Data and Computer Communications',Pearson Prentice Hall (2014),9th Edition
3. Behrouz A Forouzan.:'*Data Communication and Networking'*,McGraw Hill(2007),4th Edition.
4. Larry L. Peterson, Bruce S. Davie: '*Computer Networks: A Systems'* ApproachMorgan kauffmann (2011)5th edition

Outcomes:

The students will be able to:

CO-1.	Identify the available internet access technologies and for each of these access technologies, provide a range of transmission rates and networking devices.
CO-2.	Recognize the technological trends of Computer Networking.
CO-3.	Discuss the process of Transmission media in networks.
CO-4.	Describe the component and working of wireless networks.
CO-5.	Outline a suitable routing protocol for interconnected networks.

B.Sc. Semester – III

CSC-231P: Practical Paper A+B

Time: 3 Hours

Credits		
L	**T**	**P**
0	**0**	**2**

Teaching Hours (per week):4
Maximum Marks: 38
Pass Marks: 35%

The learning objectives of this course are:

1.	Provide the knowledge of basic data structures and their implementations.
2.	Implement Array, stack, queue, linked list data structures.
3.	To develop an understanding of different components of computer networks, various protocols, modern technologies and their applications.
4.	To understand the working principle of various communication protocols in computer networks.

Operational knowledge and Implementation of programmes in C++ of data structures

Computer Networks Practical:

1. Study of different network devices in detail.
2. Connect the computers in Local Area Network.
3. Study of basic network command and Network configuration commands.
4. Implement different LAN topologies using Network Simulator

Upon completion of this course, the students will be able to:

CO-1.	Student will be able to learn the basic types of data structures, implementation and application.
CO-2.	Students will be able to use linear and non-linear data structure like stacks, queues, and linked list.
CO-3.	Implement various searching and sorting algorithms
CO-4.	Provides students with hands on training regarding design, troubleshooting and evaluation of computer networks.

B.Sc. Semester – IV

CSC-241A

Programming using Python

(THEORY)

Time: 3 Hours **Teaching Hours (per week):3**

Credits		
L	**T**	**P**
2	**1**	**0**

Total Hours: 45

Maximum Marks: 56

Pass Marks: 35%

Note for paper setter and students:

1. **There will be five sections.**
2. **Section A is compulsory and will be of 12 marks consisting of 8 short answer type questions carrying 2 marks each covering the whole syllabus. The answer should not exceed 50 words. The candidate will have to attempt any 6 questions in this section.**
3. **Sections B, C, D and E will be set from units I, II, III & IV respectively and will consist of two questions of 11 marks each from the respective unit. The candidates are required to attempt one question from each of these sections. Each question in these sections should not have more than two subparts.**
4. **Medium of Examination is English Language.**

Course objectives:

1.	Describe the core syntax and semantics of Python programming language.
2.	Discover the need for working with the strings and functions.
3.	Illustrate the process of structuring the data using lists, dictionaries, tuples and sets.
4.	Infer the Object-oriented Programming concepts in Python.

UNIT-I

Introduction to Python: Process of Computational Problem Solving, Python Programming Language.

Data and Expressions: Literals, Variables and Identifiers, operators, Expressions, Statements and Data Types.

UNIT -II

Control Structures: Selection (if, if-else, nested, if-elif-else), Looping(for, While statement),transfer(break, continue, pass).

Functions and Modules: Fundamental Concepts, Program Routines, Flow of Execution, Parameters & Arguments .

UNIT-III

Lists: List(Creation, accessing, methods),using different operator with lists.

Tuples & Dictionaries: Dictionaries (Creation, accessing, methods), Tuple (Creation, accessing, methods).

UNIT- IV

Files: Opening Files, Using Text Files.
Exception Handling: Concept of Error and Exception Handling.

References:

1. Kenetkar Yashavant: Let us python,bpb publication(2021) 3rd edition
2. Kenneth Lambert: '*Fundamentals of Python'* Cengage Learning , (2017), 2nd edition
3. Mark Lutz: *Learning Python* O'Reilly Media, (2013) 5th edition.
4. Sheetal Taneja,Naveen Kumar :*Python programming* Pearson(2017) 1st edition
5. Jeeva Jose:*Introduction to computing problem solving with python* Khanna book Publishing(2016)
6. E.Balagursamy:*Introduction to Computing and Problem Solving using Python,*McGraw Hill Education (India) Pvt Ltd(2016).

Course Outcomes:

CO-1.	To impart knowledge of one of the latest and powerful programming languages – Python.
CO-2.	To make students understand about to read and write files.
CO-3.	To give a broad view of concept of Object-Oriented Programming (OOP) applied in Python.
CO-4.	To learn how to identify Python object types.

B.Sc. Semester – IV
CSC-241B
Software Engineering
(THEORY)

Time: 3 Hours

Credits		
L	**T**	**P**
2	**1**	**0**

Maximum Marks: 56
Pass Marks: 35%

Note for paper setter and students:

1. **There will be five sections.**
2. **Section A is compulsory and will be of 12 marks consisting of 8 short answer type questions carrying 2 marks each covering the whole syllabus. The answer should not exceed 50 words. The candidate will have to attempt any 6 questions in this section.**
3. **Sections B, C, D and E will be set from units I, II, III & IV respectively and will consist of two questions of 11 marks each from the respective unit. The candidates are required to attempt one question from each of these sections. Each question in these sections should not have more than two subparts.**
4. **Medium of Examination is English Language.**

Course Objectives:

1.	Give the basic knowledge in Software Engineering process, focusing on the different process models.
2.	To inculcate in students' different concepts of software engineering principles.
3.	To produce efficient, reliable, robust and cost- effective software solutions.
4.	Ability to develop, maintain and evaluate large-scale software systems.

UNIT – I

Introduction to Software: Definition, Software characteristics, Software components, Software Applications.

Software Process Models: Definition, Software Engineering Paradigms, waterfall method, prototyping, The Spiral model.

UNIT- II

Software Metrics: Role of Metrics and measurement, Metrics for software productivity and quality, Measurement software, function oriented metrics, Metrics for software quality.

Software Requirement Specification (SRS): Characteristics of requirements and its components, SRS Document.

UNIT – III

Software Design: Software design and its activities, Preliminary and detailed design activities, Characteristics of a good software design, Cohesion and Coupling, Structured Analysis, Function Oriented Design, Object-Oriented Design (UML diagram, Class Diagram, Activity Diagram etc)

UNIT- IV

Testing Fundamentals: Unit Testing, Integration Testing, Validation Testing, System Testing.

References:

1. Roger S. Pressman:*Software Engineering*,McGraw Hill(2010), 7th edition
2. Pankaj Jalote: *Integrated Approach to Software Engineering*,Springer (2013) 2nd Edition
3. Rajib Mall:*Fundamental of Software Engineering,PHI learning(2018)5th edition*
4. Ian Sommerville:*Software Engineering,Pearson(2011)9th edition*

Course Outcomes:

On completion of this course student will be able to:

CO-1.	Decompose the given project in various phases of a lifecycle.
CO-2.	Choose appropriate process model depending on the user requirements.
CO-3.	Perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance.
CO-4.	Know various processes used in all the phases of the product.
CO-5.	Apply the knowledge, techniques, and skills in the development of a software product.

B.Sc. Semester – IV

CSC-241P: Practical Paper A+B

Time: 3 Hours **Teaching Hours (per week):4**

Maximum Marks: 38

Pass Marks: 35%

Credits		
L	**T**	**P**
0	**0**	**2**

The learning objectives of this course are:

1.	Describe the core syntax and semantics of Python programming language.
2.	Discover the need for working with the strings and functions.
3.	Illustrate the process of structuring the data using lists, dictionaries, tuples and sets.
4.	Ability to understand the structure and development methodologies of software systems using software engineering.

Implement Programs using Python Programming Concepts.

Apply the knowledge of software engineering techniques:

1. Development of DFD, data dictionary, E-R diagram, structured chart for the project.
2. To study and draw various UML diagrams.
3. To illustrate the use of class diagrams.
4. To draw an activity diagram and use case diagram for ATM and Library Management System.

Course Outcomes:

Upon completion of this course, the students will be able :

CO-1.	To impart knowledge of one of the latest and powerful programming languages – Python.
CO-2.	To make students understand about to read and write files.
CO-3.	To apply the knowledge of software engineering techniques for the development of a software product in Design phase.

B.Sc. (Computer Science)
Semester – V
Computer Science
CSC-351: Data Base Management System & Oracle

Time: 3 Hours **Total Marks: 100**
Credit Hours (per week):4 **Theory Marks: 56**
Total Hours: 60 **Theory Internal Assessment M: 19**
Practical Marks: 19
Practical Internal Assessment M: 06

Note: 1. Medium of Examination is English Language.
2. The question paper covering the entire course shall be divided into three sections.

Instructions for Paper Setters:

Section A: It will have question No.1 consisting of 10 very short answer questions from the entire syllabus. Students will attempt 6 questions. Each question will carry two marks with answer to each question up to 10 lines in length. The total weightage being **12 marks**.

Section B: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 2, 3, 4 and 5 will be set by the examiner from Unit-I of the syllabus. The students will be required to attempt any two questions. Each question will carry 11 marks. The total weightage of this section shall be **22 marks.**

Section C: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 6, 7, 8 and 9 will be set by the examiner from Unit-II of the syllabus. The students will be required to attempt any two questions. Each question will carry 11 marks. The total weightage of this section shall be **22 marks.**

Course Objectives:

1.	To provide a sound introduction to the discipline of database management as a subject in its own right, rather than as a compendium of techniques and product-specific tools.
2.	To familiarise the participant with the nuances of database environments towards an information-oriented data-processing oriented framework.

UNIT-I

DBMS: Introduction to database management system, components of DBMS, ER. Diagrams, Data Description.

Language, Data Manipulation Language, SQL.

Data Models: Hierarchical Model, Network Model and Relational Model, Relational Databases. Relational Algebra and Calculus Normalisation.

Database Security, Protection, Integrity, Recovery, Concurrency, Control, Decomposition. Distributed Databases, Knowledge Base/Expert Systems and Object Oriented Databases.

UNIT-II
Oracle 10g

SQL * PLUS

Introduction to Oracle 10

SQL - DDL, DML, DCL.

Join methods & Sub query, Union, Intersection.
Built in Functions, View Security amongst users, Sequences, indexing object features of Oracle 10.

PL/SQL

Introduction to PL/SQL.
Cursors - Implicit & Explicit.
Procedures, Functions & Packages.
Database Triggers.

References:

1. Desai B.C.: An Introduction to Database Systems, Galgotia Publishers.
2. Date C.J. An Introduction to Database Systems, Vol. I, Narosa Publishers.

Course Outcomes:

CO-1.	Gain ability to handle large volumes of structured, semi-structured, and unstructured data using database technologies.
CO-2.	Appreciate the need for DB approach and understand the components and roles of DBMS
CO-3.	Apply DB system development life cycle to business problems
CO-4.	Implement a set of relations in the chosen DBMS
CO-5.	Development and Administration using MySQL and to make students understand about to read and write files.

B.Sc. (Computer Science)
Semester – V
COMPUTER SCIENCE
CSC-351: Database Management System and Oracle
(Practical)

Credit Hours(per week):4 **Practical Marks: 19**
Total Hours:60 **Practical Internal Assessment M: 06**

Practical based on Database System and Oracle

B.Sc. (Computer Science)
Semester – VI
CSC-361: Programming using Python

Time: 3 Hours **Total Marks: 100**
Credit Hours (per week):4 **Theory Marks: 56**
Total Hours: 60 **Theory Internal Assessment M: 19**
Practical Marks: 19
Practical Internal Assessment M: 06

Note: 1. Medium of Examination is English Language.
2. The question paper covering the entire course shall be divided into three sections.

Instructions for Paper Setters:

Section A: It will have question No.1 consisting of 10 very short answer questions from the entire syllabus. Students will attempt 6 questions. Each question will carry two marks with answer to each question up to 10 lines in length. The total weightage being **12 marks**.

Section B: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 2, 3, 4 and 5 will be set by the examiner from Unit-I of the syllabus. The students will be required to attempt any two questions. Each question will carry **11 marks**. The total weightage of this section shall be **22 marks.**

Section C: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 6, 7, 8 and 9 will be set by the examiner from Unit-II of the syllabus. The students will be required to attempt any two questions. Each question will carry **11 marks**. The total weightage of this section shall be **22 marks.**

Course objectives:

1.	Describe the core syntax and semantics of Python programming language.
2.	Discover the need for working with the strings and functions.
3.	Illustrate the process of structuring the data using lists, dictionaries, tuples and sets.
4.	Infer the Object-oriented Programming concepts in Python.
5.	To develop the ability to write database applications in Python.

UNIT-I

Introduction to Python: Process of Computational Problem Solving, Python Programming Language

Data and Expressions: Literals, Variables and Identifiers, Operators, Expressions, Statements and Data Types

Control Structures: Boolean Expressions (Conditions), Logical Operators, Selection Control, Nested conditions, Debugging

Lists: List Structures, Lists (Sequences) in Python, Iterating Over Lists (Sequences) in Python

Functions: Fundamental Concepts, Program Routines, Flow of Execution, Parameters & Arguments

Iteration: While statement, Definite loops using For, Loop Patterns, Recursive Functions,

Recursive Problem Solving, Iteration vs. Recursion

UNIT-II

Dictionaries: Dictionaries and Files, Looping and dictionaries, Advanced text parsing
Files: Opening Files, Using Text Files, String Processing, Exception Handling
Objects and Their Use: Introduction to Object Oriented Programming
Modular Design: Modules, Top-Down Design, Python Modules
Using Databases and SQL: Database Concepts, SQLite Manager Firefox Add-on, SQL basic summary, Basic Data modeling, Programming with multiple tables

Reference Books:

1. Python for Informatics, Charles Severance, version 0.0.7
2. Introduction to Computer Science Using Python: A Computational Problem-Solving Focus, Charles Dierbach, Wiley Publications, 2012, ISBN : 978-0-470-91204-1
3. Introduction To Computation And Programming Using Python, GUTTAG JOHN V, PHI, 2014, ISBN-13: 978-8120348660
4. Introduction to Computating& Problem Solving Through Python, Jeeva Jose and Sojan P. Lal,Khanna Publishers, 2015, ISBN-13: 978-9382609810
5. Introduction to Computing and Programming in Python, Mark J. Guzdial, Pearson Education, 2015, ISBN-13: 978-9332556591
6. Fundamentals of Python by Kenneth Lambert, Course Technology, Cengage Learning , 2015
7. Learning Python by Mark Lutz, 5th Edition, O'Reilly Media, 2013.

Course Outcomes:

CO-1.	To impart knowledge of one of the latest and powerful programming languages – Python.
CO-2.	To make students understand about to read and write files.
CO-3.	To give a broad view of concept of *Object-Oriented Programming (OOP) applied in Python.
CO-4.	To learn how to connect Python programs to a database.
CO-5.	To learn how to identify Python object types.

B.Sc. (Computer Science)
Semester – VI
COMPUTER SCIENCE
(Practical)

Credit Hours (per week):4 **Practical Marks: 19**
Total Hours(per week):60 **Practical Internal Assessment M: 06**

Practical based on Programming using Python.