



Rayat Shikshan Sanstha's

**Sadguru Gadge Maharaj College, Karad
(An Autonomous College)**

Accredited By NAAC with 'A+' (3.63 CGPA) Grade ISO-9001-2015 Certified

Affiliated to Shivaji University, Kolhapur

Department of Computer Science

**B.Sc. Computer Science (Entire) Part-II
Semester III and IV**

Under the Faculty of Science and Technology

Choice Based Credit System (CBCS)

Regulations in accordance with **National Education Policy**

to be implemented **from Academic Year 2024-25**

(Implemented from June, 2024)

**Rayat Shikshan Sanstha's
Sadguru Gadge Maharaj College, Karad
(An Autonomous College)
B.Sc. Computer Science (Entire) Part-II, Semester-III & IV
STRUCTURE OF COURSE**

- **TITLE :** B.Sc. (Computer Science) (Entire)
- **YEAR OF IMPLEMENTATION :** 2024-2025

PREAMBLE:

There are bright career prospects for computer science professionals or software professionals in recent scenario. With the opening of huge software and IT companies in India, the job opportunities for trained professionals have increased considerably. India is known to be a leader in software and IT sector. Computer science graduates pass outs find job opportunities in a variety of environments in academia, research, industry, government, private, business organizations and so on. They are involved in analyzing problems for solutions, formulating and testing, using advanced communications or multimedia equipment, or working in teams for product development. The software and IT companies are the major employers of computer science graduates. They offer the best packages to the young graduates which are unmatched with other branches of science.

• **GENERAL OBJECTIVES OF THE COURSE:**

- The content of the syllabus have been framed as per UGC norms of CBCS Pattern.
- The students are expected to understand the fundamentals, principles, mathematical, recent IT concepts and recent developments in the subject area.
- The practical course is in relevance to the theory courses to improve the understanding of the concepts.
- It is expected to inspire and boost interest of the students towards Computer Science as the main subject.
- To develop the power of appreciations, the achievements in Computer and role in nature and society.
- To enhance student sense of enthusiasm towards IT and to involve them in an intellectually stimulating experience of learning in a supportive environment.

• **DURATION:** 3 YEAR

• **PATTERN:** SEMESTER

• **MEDIUM OF INSTRUCTION:** ENGLISH

Rayat Shikshan Sanstha's
SADGURU GADGE MAHARAJ COLLEGE, KARAD
(AN AUTONOMOUS)
B. Sc. Computer Science (Entire) Part-II (2024-25)
Course Structure NEP-2020 (Major-Minor) w.e.f. June 2024
Evaluation Pattern for Theory and Practical
Semester-III (2024-25)

| Sr. No. | Subject Code | Name of Subject | Credits | TH/PR | CCE | | SEE | | Total Theory/ Practical Marks |
|-------------------------|----------------------|---|------------|-------|-----|-----|-----|-----|-------------------------------|
| | | | | | Max | Min | Max | Min | |
| 1 | N-MJT-BCSE23-301 | Object Oriented Programming with C++ | 2 | TH | 10 | 4 | 40 | 16 | 50 |
| 2 | N-MJT-BCSE23-302 | Cyber Security Essentials | 2 | TH | 10 | 4 | 40 | 16 | 50 |
| 3 | N-MNT-BCSE23-303 | Computer Organization | 2 | TH | 10 | 4 | 40 | 16 | 50 |
| 4 | N-AEC-III-BCSE23-304 | English-III (AEC-III) | 2 | TH | 10 | 4 | 40 | 16 | 50 |
| 5 | N-SEC-II-BCSE23-305 | PHP-I | 2 | TH | - | - | 50 | 20 | 50 |
| 6 | NENV-BCS-1 | Environmental Science-I | 2 | TH | - | - | 50 | 20 | 50 |
| 7 | N-VEC-I-BCSE23-306 | Democracy, Election and Good Governance(DEGG) | 2 | TH | - | - | 50 | 20 | 50 |
| 8 | N-MJP-BCSE23-307 | Computer Science (Practical-III) | 2 | PR | - | - | 50 | 20 | 50 |
| 9 | N-MNP-BCSE23-308 | Electronics (Practical-III) | 2 | PR | - | - | 50 | 20 | 50 |
| 10 | N-SEC-III-BCSE23-309 | Introduction to R Programming | 2 | PR | - | - | 50 | 20 | 50 |
| Total | | | 20 | | | | | | 500 |
| Total of SEM-III | | | 500 | | | | | | |

Semester-IV (2024-25)

| Sr. No. | Subject Code | Name of Subject | Credits | TH/PR | CCE | | SEE | | Total Theory/ Practical Marks |
|--|---------------------|--|---------------------|-------|-----|-----|-----|-----|----------------------------------|
| | | | | | Max | Min | Max | Min | |
| 1 | N-MJT-BCSE23-401 | Data Structure Using C++ | 2 | TH | 10 | 4 | 40 | 16 | 50 |
| 2 | N-MJT-BCSE23-402 | RDBMS | 2 | TH | 10 | 4 | 40 | 16 | 50 |
| 3 | N-MNT-BCSE23-403 | Microcontroller Architecture & Programming | 2 | TH | 10 | 4 | 40 | 16 | 50 |
| 4 | N-AEC-IV-BCSE23-404 | English-IV (AEC-IV) | 2 | PR | 10 | 4 | 40 | 16 | 50 |
| 5 | N-SEC-IV-BCSE23-405 | PHP-II | 2 | TH | - | - | 50 | 20 | 50 |
| 6 | NENVC-BCS-2 | Environmental Science-II | 2 | TH | - | - | 50 | 20 | 50 |
| 7 | N-CC-I-BCSE23-406 | Co-Curricular Course-I | 2 | TH | - | - | 50 | 20 | 50 |
| 8 | N-MJP-BCSE23-407 | Computer Science (Practical-IV) | 2 | PR | - | - | 50 | 20 | 50 |
| 9 | N-MNP-BCSE23-408 | Electronics (Practical-IV) | 2 | PR | - | - | 50 | 20 | 50 |
| 10 | N-SEC-V-BCSE23-409 | Statistical Methods using R | 2 | PR | - | - | 50 | 20 | 50 |
| Total | | | 20 | | | | | | 500 |
| Total of SEM-IV | | | 500 | | | | | | |
| Grand Total of Sem-III and Sem-IV | | | 500+500=1000 | | | | | | |

Note: Ability Enhancement Compulsory Course (AECC)

SEMESTER – III

Course Code: N-MJT-BCSE23-301

Course Title: Object Oriented Programming with C++

Total Contact Hours: 48 hrs (60 lectures of 48 min)

Credits: 02

Teaching Scheme: Theory – 04 Lect. / Week Total Marks: 50

Learning Objectives:

1. To study the concept Object Oriented Programming
2. To understand the operators and control structure in C++
3. To study the constructors and destructors
4. To understand the concept of Inheritance, Polymorphism and it's types

Unit 1: Object Oriented Concepts (12)

Difference between POP and OOP, Concepts of OOP- Data abstraction, Encapsulation, Inheritance- Polymorphism, Basics of C++: Terminology-Tokens, Keywords, Identifiers, constants, Basic data types, Structure of C++ program, Input and output streams.

Unit2: Introduction to C++, Classes and Objects (12)

Operators in C++ : Dynamic Memory allocation (New and Delete), this pointer, Dynamic initialization of variable, reference variables. Control structures-Branching and looping statements, Features of OOP:

Classes and objects: Definitions, class declaration, Member function-Access modifiers : private, public and protected, Defining member functions, static data members, Array of objects, passing object as parameter, inline function, reference arguments, Friend function and friend class.

Unit3: Constructors, Destructors and Operator overloading (10)

Constructors: Definition, types- Default constructor, Copy constructor, Parameterized constructor. Destructors, Operator overloading Definition, Overloading unary and binary operators, Overloading operators using friend function, Rules for overloading operator.

Unit 4: Inheritance and Polymorphism (11)

Inheritance-Defining base and derived class, Types of Inheritance – Single, multiple, multilevel, hierarchical, hybrid, Polymorphism-Definition, Types of polymorphism, Virtual function.

Learning outcomes:

The student should -

1. Understand basic concepts of object oriented programming.
2. Able to use various control structures to improve programming logic.
3. Design classes and objects.
4. Able to use constructor and destructor.
5. Utilize the OOP techniques like operator overloading, inheritance, and polymorphism.

Reference Books:

1. Object oriented programming By E. Balagurusamy. (Unit-I, II, III, IV)
2. C++ Programming –By D. Ravichandran (Unit-I, II, III, IV)
3. Let Us C++ By Yashawant Kanetkar. (Unit-I, II, III, IV)
4. Object Oriented Programming in C++ - Dr. G. T. Thampi, Dr. S. S. Mantha
5. Mastering C++ -By Venugopal.

Course Code: N-MJT-BCSE23-302

Course Title: Cyber security

Total Contact Hours: 48 hrs (60 lectures of 48 min)

Credits: 02

Teaching Scheme: Theory – 04 Lect. / Week Total Marks: 50

Course Outcome :

Students who complete this course should be able to:

1. Understand importance of cyber security and security management.
2. Learn different security threats.
3. Understand cyber security laws and importance of security audit.
4. Learn concept of wireless network security.

Unit-1 : Introduction to Cyber Security (12)

Cyber Security: Definition, Importance, Computer ethics, Cyber Security Policy, Data Security, Mobile Device Security, User Security, File Security, Password Security, Browser Security, Email Security, Phishing Encryption, Decryption, Digital Signature, Firewall, Configuring, Windows Firewall.

Unit-2 : Types of Security and Security Management (12)

Types of Security: Background and Current Scenario, Types of Attacks, DoS attack, Goals for Security, E-commerce Security, dimensions of E-commerce security, Security protocols, Computer Forensics, Steganography,

Security Management- Overview of Security Management, Information Classification Process, Security Policy, Risk Management, Security Procedures and Guidelines, Business Continuity and Disaster Recovery, Ethics and Best Practices.

Unit-3 : Security Threats and Access Controls (12)

Security Threats: Definition, Types of Threats - Virus, Worms, Trojan Horse, Malware, Ransom ware, Identity theft etc, Torrent and infected websites, Antivirus-Definition, Types, features, advantages, limitations.

Access Controls: Overview of Authentication and Authorization, Overview of Intrusion Detection Systems, Intrusion Detection Systems and Intrusion Prevention Systems.

Uni4: Wireless Network Security (12)

Wireless Network Security- Components of wireless networks, Security issues in wireless, Wi-Fi Security, Risk of Using Unsecured Wi-Fi, Bluetooth and its security, Firewall, types of firewall.

Reference Books:

1. Computer Network -AS Tannenbum
2. Cyber Security for Beginners: Everything you need to know about it (Cyber security, Cyberwar, Hacking) - Harry Colvin.
3. How NOT To Use Your Smartphone - Rodney D Cambridge.
4. Online Safety: Scams, SPAM, Viruses and Clouds (Cyber Security Community Book - A.M.Perry.
5. Cyber Security Essentials- James Graham, Richard Howard, Ryon Olson (E-book)
6. Network Security Secrets and Solutions – Stuart McClure, Joe Scambray, George Kurtz.
7. Information Assurance Handbook: Effective Computer Security and Risk ManagementStrategies – Corey Schou, Steven Hernandez.
8. Applied Network Security Monitoring: Collection, Detection, and Analysis – Chris Sanders,Jason Smith.
9. E-Commerce- Indian Perspective- P.T. Joseph S.J.
10. E-Commerce and Security- KjellOrsborn (E-book)

N-MJP-BCSE23-307: Computer Science (Practical-III)

Based on Object Oriented Programming with C++

Practical List:

1. Programs based on branching and looping statements.
2. Programs based on constructor and destructor.
3. Programs based on Friend Class
4. Programs based on friend function.
5. Programs based on function overloading concept
6. Programs based on operator overloading concept
7. Programs based on member functions.
8. Programs based on use of constructor and destructor
9. Programs based on inheritance.
10. Programs based on polymorphism

Course Code: N-MNT-BCSE23-303
Course Title: Computer Organization

Total Contact Hours: 48 hrs (60 lectures of 48 min)

Credits: 02 Teaching Scheme: Theory – 04 Lect. / Week Total Marks: 50

Learning Objectives:

1. To Study the Computer Systems
2. To Understand Computer Architecture and Organization
3. To study the Memory organization
4. To study the I/O Organization

Unit 1: Computer Systems (12)

Hardware and Software components, Generation and timeline of Computers, Chronology of Microprocessor Development w.r.t CISC/ RISC families' viz. Intel, Power PC, Overview of Operating Systems, Computer booting process, Instruction set architectures, Operating system case study: DOS, UNIX.

Unit 2 : CPU with reference to 8085 (12)

Programmer's Model: CPU registers- Arithmetic and Logic Units, GPR's and SFR's, Stack, Addressing Modes, Instruction formats and categories- Program flow control, data movement, data Processing, miscellaneous Instructions.

Unit 3 : Memory Organization (reference 8085, 80286) (11)

Memory Width, Interfacing memory with microprocessor, data (Scratchpad RAM, Storage EEPROM) and Code memory, Address generation, Memory Management, MMU responsibilities and features.

Unit 4: I/O Organization (reference 8085) (10)

Computer Peripherals and Interfacing (Peripheral Control Signals), Peripheral Mapping- Memory Mapped, I/O Mapped. Modes of Transfer- byte block. Ports- Parallel and Series.

Reference Books:

1. Computer Organization – J.P.Hays TMH(Unit-I&Unit-III)
2. Computer System Architecture - Morris Mano, Prentice-Hall of India(Unit-IV)
3. Microprocessor and Microcontroller- Krishna Kant(Unit-I&Unit-II&Unit-III)
4. The Pentium Microprocessor- James Antonakos(Unit-I)

Learning Outcomes:

1. Student will be able to understand computer system/operating system.
2. Student will be able to understand memory organization
3. Student will be able to use of computer peripherals.
4. Design and analyze the programmer's model

N-MNP-BCSE23-308: Electronics (Practical-III)

Based on Computer Organization

| Sr. No. | Practical Name |
|----------------|--|
| 1 | Study of ON/OFF Temperature Controller |
| 2 | LDR based Light Control System |
| 3 | Study of DAC (R-2R ladder) |
| 4 | Study of Decoder(2:4 or 3:8) |
| 5 | Addition Operations using 8085 microprocessor |
| 6 | Subtraction Operation using 8085 microprocessor |
| 7 | Write ALP program using CALL and RET instruction |
| 8 | Using ALP for memory block transfer |
| 9 | Study of Analog Multiplexer |
| 10. | Built and test Precision rectifier using OP-AMP |

Course Code: N-AEC-III-BCSE23-304
Course Title: : English-III (AEC-III)
Total Contact Hours: 30 hrs (45 lectures of 48 min)
Credits: 02 Teaching Scheme: Theory – 04 Lect. / Week Total Marks: 50

MODULE I

- A. Interview Skills
- B. Enterprise - Nissim Ezekiel

MODULE II

- A. English for Competitive Examinations
- B. The Look-Out Man - Nicholas Bentley

MODULE III

- A. Forgetting Our Own History - SudhaMurty B.
- B. i. The Butterfly – ArunKolatkar
- ii. For Your Lanes, My Country --Faiz Ahmed Faiz

Reference Books:

1. SudhaMurty, Wise and Otherwise: A Salute to Life, Penguin Books India, 2006
 2. Ability Enhancement Compulsory Course (Cbcs) For B. Sc. Part III English For Communication (Compulsory English) Shivaji University Press. 2020.
- The Oxford India Anthology of Twelve Modern Indian Poets (1992) ed. by Arvind Krishna Mehrotra and published by Oxford University Press, New Delhi.

Course Code: N-SEC-II-BCSE23-305

Course Title: PHP-I

Total Contact Hours: 48 hrs (60 lectures of 48 min)

Credits: 02 Teaching Scheme: Theory – 04 Lect. / Week Total Marks: 50

Course Objectives:

1. PHP basic syntax for variable types and calculation.
2. Creating conditional structures.
3. Storing data in Arrays.
4. To know data types and operators.

Unit-I Introduction to PHP.

- What is PHP?, Advantages and Disadvantages of PHP, PHP Basic syntax, Variables, Datatypes,
- PHP Constant, PHP Operators, Benefits of using PHP MYSQL, Embed PHP in HTML/HTML in PHP, First PHP Program.

Unit II Control Flow Statement and Array.

- **Decision making statement:** If Statement, IF.....Else Statement, if... if else Statement, Nested if Statement.
- **Looping Statement:** For loop, While loop, Do....while loop, for each loop.
- **Branching Statement:** Switch case Statement
- **Arrays:** PHP Enumerated Arrays, Associative Arrays, Arrays Iteration, PHP Multi-dimensional Arrays, Arrays Functions.

Reference Books

1. PHP Concepts Unleashed For Novice – Vol I by Dr. Poornima G. Naik (Author), Dr. Kavita S. Oza (Author)
2. PHP Concepts Unleashed For Novice – Vol II by Dr. Poornima G. Naik (Author), Dr. Kavita S. Oza (Author)

Course Code: N-SEC-III-BCSE23-309
Course Title: Introduction to R Programming
Total Contact Hours: 30 hrs (30 lectures of 48 min)

Credits: 02 Teaching Scheme: Theory – 04 Lect. / Week Total Marks: 50

Course Outcomes: At the end of this course students will be able to:

- CO1: Understand basics of R programming.
- CO2: Know various built-in functions in R.
- CO3: Understand the control structure in R.
- CO4: Understand the data visualization in R.

Unit 1 : Introduction

- 1.1 Installation and introduction to R, History and features of R, Why R?, data input / output variables in R: Numeric, character, logical and complex
- 1.2 Class (), Object identification: is.na, is.numeric, is.character, is.matrix, is.vector, is.null, is.factor, as. functions, Creation of vector using commands: combine, scan, seq, rep, edit, sort, length, which, order
- 1.3 Operations on data: Assignment operators in R, leftwards assignments (<- <<-, =) rightwards assignments (->, ->>, =), Listing and deleting the objects: matrix, data.frame, cbind, rbind ,converting objects,
- 1.4 Arithmetic and simple functions: sum, prod, sort,

Unit 2: Control Structure in R, Data visualization & interpretation

- 2.1 Matrix computation: addition, multiplication, determinant, inverse, rank, Import and export data: read.table, read.csv, file.choose, write.table, write.csv.
- 2.2 Data Visualization: -Diagrammatic representation: simple bar diagram, sub-divided bar diagram, multiple bar diagram. -Graphical representation: Scatter plot, histogram, frequency polygon, ogive curve.
- 2.3 Control structure: for loop, while loop, if else statement, break statement, switch case.
- 2.4 Installation of packages, Exploratory data analysis: mean, quantiles, aggregate function, functions from apply family.

Reference Books:

1. Crawley, M. J. (2006): Statistics - An introduction using R. John Wiley, London 32
2. Purohit, S.G.; Gore, S.D. and Deshmukh, S.R. (2015): Statistics using R, second edition. Narosa Publishing House, New Delhi.
3. Verzani, J. (2005): Using R for Introductory Statistics, Chapman and Hall /CRC Press, New York

Practical

1. R-tools for statistical computing (Some commonly used built-in R-functions)
2. R-tools for statistical computing (Data Frames)
3. R-tools for statistical computing (Matrix calculations)
4. R-tools for statistical computing (Diagrammatic representation of data: multiple bar diagram.)
5. R-tools for statistical computing (Graphical representation of data: Histogram, Frequency polygon.)
6. R-tools for statistical computing (Control structure)
7. R-tools for statistical computing (Installation of packages)

SEMESTER-IV

Course Code: N-MJT-BCSE23-401

Course Title: Data Structure Using C++

Total Contact Hours: 48 hrs (60 lectures of 48 min)

Credits: 02 Teaching Scheme: Theory – 04 Lect. / Week Total Marks: 50

Course Outcome:

- At the end of this course, student should be able understand the most basic aspects of data structures including Stacks, Queue, Linked list and Tree.
- Should able to understand different sorting and searching algorithms.
- Should able to understand implementations of linked list, stack and queue.

Unit-1 : Concepts of Data structure, Array (12)

Concept of Data, Data Object, Types of Data- Atomic Data, Non-atomic Data
Concept of Data Structure Abstract data type (ADT), Array Definition, Array Operations, Applications of Array(Polynomial evaluation and addition of two polynomials), Multi-dimensional arrays.

Unit-2 : Algorithm Analysis (12)

Space complexity, time complexity
Asymptotic notation (Big O, Omega Ω , Theta θ)
Searching algorithms- Linear search, binary search and their algorithms
Sorting algorithm-Bubble Sort, insertion sort, selection sort, quick sort and their algorithms.

Unit-3 : Stack and Queue (12)

Stack, Concept of Stack, Operations on Stack-push, pop, peek
Array implementation of Stack, Linked List implementation of Stack Applications of Stack- Recursion, Infix, Prefix, Postfix, conversion from Infix to Prefix and Infix to Postfix Queue, Concepts of queue, Operations on Queue-Insert, Delete, peek, Array implementation of queue, Linked List Implementation of Queue, Types of Queue-Linear, Circular and Priority, Applications of Queue

Unit-4 : Linked List and Tree (12)

Linked List
Concept of Linked List
Memory representation of Linked List
Operations on Linked List(Insertion, Deletion, Display and Search)
Types of Linked List: Singly, Doubly Linked List & Circular Linked List **Tree**- Concept of Tree, Tree terminology (root, child, parent, sibling, descendent, ancestor, leaf/external node, branch node/internal node, degree, edge, path, level, depth, height of node, height of tree, forest)
Binary Tree- definition , types (Full/Proper / Plane, Complete, Perfect, Skewed, Balanced)
Binary search tree- Operations on BST – Create, Insert, Search, Delete, traversals (Preorder, In order, Post order)

Reference Books :

1. Data structure through C++- Yashwant Kanitkar (BPB Publications)
2. Principles of Data structures using c++ - Vinu V. Das(New Age International Publication)
3. Data Structures with C- SEYMOUR LIPSCHUTZ(Tata McGraw-Hill)
4. Data structures, Algorithms and Applications in C++, S. Sahni, University Press (India)Pvt. Ltd, 2nd edition, Universities Press Orient Longman Pvt. Ltd.

Course Code N-MJT-BCSE23-402

Course Title: RDBMS

Total Contact Hours: 48 hrs (60 lectures of 48 min)

Credits: 02 Teaching Scheme: Theory – 04 Lect. / Week Total Marks: 50

Course Outcomes:

1. Improving skill about data operation.
2. Ability to handle database.
3. Ability to design & develop proper database.
4. SQL/MY-SQL helps to get knowledge about data operations.

Unit-1: Introduction to RDBMS (12)

- Data ,Database, DBMS, RDBMS, Concepts of Data Models object based, Record based (Network, Hierarchical, Relational), Physical
- Concept of RDBMS Terminologies: relation, attribute, domain, tuple, entities, DBA and Responsibilities of DBA
- Relational Model: Structure of Relational Database, Relational Algebra.

Unit-2: Structured Query Language (SQL) (12)

- SQL: Data types-fixed length, variable length, ex.
- Data Constraints-Primary key, Foreign key, Null, Check, Default
- Clauses-(Select, where, group by, order by).
- SQL Operators: Logical, Relational, Special-In, Between, Like
- Sub Queries and Join-Sub queries and Nesting sub queries, Join: Equi join, Simple join , Outer join ,self-join
- Views, Indexes, Sequence

Unit-3: Introduction to PL-SQL (12)

- Comparison between SQL & PL-SQL
- Structure of PL-SQL block.
- Benefits of PL/SQL over SQL
- Control structure: if statement, case statement, Loops-Simple looping, For, While.
- Need of Iterative and looping statements in data handling

Unit-4: Introduction to My SQL (12)

- Difference between SQL and MySQL, Creating a Database and Tables, Inserting, Selecting, Ordering, Limiting, Grouping, Analyzing and Manipulating Data, Changing, Deleting,
- Searching, Database and Table Schema Statements, Data Manipulation Statements and Functions, Table Statements and Functions, Replication Statements and Functions.
- Aggregate Clauses, Aggregate Functions, String Functions, Date and Time Functions, Mathematical Functions.

Reference book:

1. Data base system concept- Korth Silberschartz.
2. SQL-PL/SQL by Ivan Bayross BPB Publications.
3. Structure query language-By Osborne
4. Learning MySQL by O'reilly

N-MJP-BCSE23-407: Computer Science (Practical-IV)

Based on Data Structure Using C++ & RDBMS

- **Based on Data Structure using C++**
 1. Write a C++ programs to implement recursive i) Linear search ii) Binary search
 2. Write a C++ programs to implement i) Bubble sort ii) Selection sort iii) quick sort iv) insertion sort
 3. Write a C++ programs to implement the following using an array.
 - a) Stack ADT b) Queue ADT
 4. Write a C++ programs to implement list ADT to perform following operations:
 - a) Insert an element into a list.
 - b) Delete an element from list
 - c) Search for a key element in list
 - d) count number of nodes in list
 5. Write C++ programs to implement the following using a singly linked list.
 - a) Stack ADT b) Queue ADT
 6. Write a C++ program to perform the following operations:
 - a) Insert an element into a binary search tree.
 - b) Delete an element from a binary search tree.
 - c) Search for a key element in a binary search tree.
 7. Write C++ programs for implementing the following sorting methods: insertion sort, bubble sort , selection sort, quick sort

- **Based on RDBMS**
 1. Create student master and student detailed table with appropriate field to apply following constraint on field.
 - a. Primary Key
 - b. Foreign Key
 - c. Not null key
 - d. default key
 - e. Check constraint etc.
 2. Create student table with appropriate field and do.
 - a. Insert 10 appropriate records
 - b. Update any record
 - c. Delete record
 - d. Alter table
 - e. drop table
 3. Use any tables and do select operations using Operators.
 4. Use any tables and do select operations using different clauses,
 - a. where
 - b. group by
 - c. order by etc
 5. Use any tables and do select operations using different aggregate functions.
 6. Use any tables and do sub queries and join operator.
 7. Use any tables and do select operations using different string functions.
 8. To show the table Index, View on existing table.

Course Code N-MNT-BCSE23-403

Course Title: Microcontroller Architecture & Programming

Total Contact Hours: 48 hrs (60 lectures of 48 min)

Credits: 02 Teaching Scheme: Theory – 04 Lect. / Week Total Marks: 50

Unit-1: INTRODUCTION TO MICROCONTROLLER (12)

Comparison of Microcontroller & Microprocessor, Survey of 4-Bit, 8-Bit, 16- Bit And32-Bit Microcontrollers and their application areas, Study of 8051 and its Family(89C51, 8031, 8032, 8052, 8751, Phillips (RD2)89C51VRD2).

Architecture of 8051:Block Diagram of 8051 and Study of Internal Blocks, Reset and Clock, Registers, Flags and Internal Memory, SFR, I/O Ports.

Unit-2: 8051 INSTRUCTION SET (12)

Study of 8051 Instruction Set and Addressing Modes,

Data transfer, Arithmetic, Logical, JUMP, Loops & CALL instructions, Bit manipulation Instructions.

Unit-3: FACILITIES IN 8051 (12)

Timer and Counter: Timer and Counters, Timer modes, Programming the timers in Mode 1,Mode 2 using assembly and C. Time delay generation.

Serial Port : Serial port of 8051, RS-232 standard and IC MAX-232, Baud rate in 8051, programming for transmitting character through serial port using assembly and C.

Unit-4 :INTERFACING METHODES (12)

Interfacing with 8051: LED, Switch, Relay, Opto-coupler, Thumb wheel switch and Seven segment display, Stepper Motor , DC motor (PWM), LCD (16 X 2), with respective programming in assembly language OR embedded C for all.

Reference Books

1. 8051 Microcontrollers 2nd Edition -Mazidi Pearson
2. 8051 Microcontroller -Ayala K.J.
3. 8051 Microcontroller -Deshmukh Ajay TMH

N-MNP-BCSE23-408: Electronics (Practical-IV)

Based on Microcontroller Architecture & Programming

| Sr.No. | Practical Name |
|---------------|---|
| 1 | Interfacing of LED with 8051 |
| 2 | Interfacing 7-segment display with 8051 |
| 3 | Time Delay Generation using Timers |
| 4 | Interfacing Stepper Motor with 8051 |
| 5 | Interfacing DC motor with 8051 |
| 6 | Arithmetic operations using 8051 |
| 7 | Logical Operation using 8051 |
| 8 | Interfacing of DAC with 8051 |
| 9 | Interfacing of ADC with 8051 |
| 10 | Interfacing of LCD with 8051 |

Course Code N-AEC-IV-BCSE23-404
Course Title: English-IV (AEC-IV)
Total Contact Hours: 30 hrs (45 lectures of 48 min)
Credits: 02 Teaching Scheme: Theory – 04 Lect. / Week Total Marks: 50

MODULE IV

- A. Group Discussion
- B. Evolution - Alexie Sherman Alexie

MODULE V

- A. Media Writing
- B. When Ideas Make Money

MODULE VI

- A. Bhaurao in America – P. G.Patil
- B. (i) The Grass is Really Like Me- Kishwar Naheed
(ii) The Road Not Taken- Robert Frost

Reference Books:

1. R.Chaudhary, Media Writing, Anmol Publications, 2010
2. Bolton, Robert.. People skills: how to assert yourself, listen to others, and resolve conflicts. New York: Simon & Schuster. 1986
3. ABILITY ENHANCEMENT COMPULSORY COURSE (CBCS) For B. Sc. Part III ENGLISH FOR COMMUNICATION (Compulsory English) Shivaji University Press.2020
4. The bountiful banyan: A biography of karmaveerBhaurao Patil, Br.P.G.Patil, Mcmillan India,2002.
5. Malgudi Days, R.K.Narayan, Penguin Classic, 2006

SEE Nature of Question paper and Scheme of marking for English Total Marks-40

| Q.No | Sub. Que. | Type of Question | Based on | Marks |
|-------------|-----------|--|----------------------|-----------|
| Q.1 | A | Fill in the blanks | Prose and Poetry | 04 |
| | B | Answer the following in one word/phrase | Prose and Poetry | 04 |
| Q.2. | A | Answer the following questions in threeto four sentences each (4 out of 6) | Prose and Poetry | 08 |
| Q.2 | B | Short notes (1 out of 2) | Prose and Poetry | 04 |
| Q.3 | A | Attempt any one of the following | Communication skills | 05 |
| | B | Attempt any one of the following | Communication skills | 05 |
| Q.4 | A | Attempt any one of the following | Communication skills | 05 |
| | B | Attempt any one of the following | Communication skills | 05 |

Course Code: N-SEC-IV-BCSE23-405

Course Title: PHP-II

Total Contact Hours: 48 hrs (60 lectures of 48 min)

Credits: 02 Teaching Scheme: Theory – 04 Lect. / Week Total Marks: 50

Course Objectives:

1. To study the concepts of OOPS
2. To Understand Abstract method and class.
3. To Database installation.
4. To Study , design and develop applications in PHP using MySQL.

Unit-1: PHP OOPS

Introduction, Declaring class, objects, constructor, destructor, Inheritance, Polymorphism, Abstract method and class, Interface.

Unit-2: MySQL

Introduction to Databases, Installation, Connection with MySQL, Create MySQL database, Creating database, Creating tables, Inserting values in table, Displaying, changing, searching, deleting records from the table

Reference Books:

1. PHP and MySQL By Dreamtech Publications
2. PHP 5.1 for Beginners – By Ivan Bayross and Sharanam Shah(Shroff Publishers & Distributors)
3. Beginning PHP 6, Apache, MySQL Web Development- By Timothy Boronczyk, Elizabeth Naramore, Jason Gerner, Yann Le Scouarnec, Jeremy Stolz, Michael K. Glass

Course Code: N-SEC-V-BCSE23-409
Course Title: Statistical Methods using R
Total Contact Hours: 30 hrs. (60 lectures of 48 min)
Credits: 02 Teaching Scheme: Theory – 04 Lect. / Week Total Marks: 50

Course Outcomes: At the end of this course students will be able to:

- CO1: Evaluate various Sampling methods.
- CO2: Evaluate various descriptive statistics measures using R.
- CO3: Apply correlation and regression.
- CO4: Apply different parametric tests using R.

Unit 1- Sampling Methods, Measures of Dispersion&Moments, Skewness and Kurtosis

- 1.1 Simple random sampling (SRSWR, SRSWOR, Stratified sampling and Systematic sampling)
- 1.2 Mean, Median and Mode.
- 1.3 Range, quartile deviation, mean deviation, (Relative measures) Standard deviation, Variance, C.V.
- 1.4 Karl Pearson's coeff. of skewness, Bowley's coeff. of skewness, Pearsonian coeff. of skewness, Kurtosis

Unit-2 Correlation, Regression, Probability distribution and Design of Experiment

- 2.1 Scatter diagram, Karl Pearson's coefficient of correlation, Spearman's Rank Correlation coefficient
- 2.2 lines of regression.
- 2.3 Probability and Probability Distributions (Uniform distribution, Binomial distribution, Geometric distribution, poison distribution), Plots to check normality: Box plot, Q- Q plot. shapiro.test(x)
- 2.4 Design of experiment (One-way ANOVA, Two-way ANOVA).

Reference Books:

1. Crawley, M. J. (2006): Statistics - An introduction using R. John Wiley, London 32
2. Purohit, S.G.; Gore, S.D. and Deshmukh, S.R. (2015): Statistics using R, second edition. Narosa Publishing House, New Delhi.
3. Verzani, J. (2005): Using R for Introductory Statistics, Chapman and Hall /CRC Press, New York

• **Practical**

1. R-tools for statistical computing (Measures of central tendency)
2. R-tools for statistical computing (Measures of dispersion)
3. R-tools for statistical computing (Correlation and Regression)
4. R-tools for statistical computing (Discrete probability distribution)
5. R-tools for statistical computing (Check for normality)
6. R-tools for statistical computing (One-way ANOVA)
7. R-tools for statistical computing (Two-way ANOVA)