FOUR YEAR UNDERGRADUATE PROGRAM (NEP–2020)

Program: Bachelor in Science (2024 -28)

DISCIPLINE – COMPUTER SCIENCE

SESSION – 2024 -25

DSC -01 to 08		DSE -01 to 12	
Code	**Title**	**Code**	**Title**
CSSC -01T	Computer Fundamental and Operating System	CSSE -01	Data Communication and Networking
CSSC -01P	**Lab 1**: Operating Systems (DOS, Windows, Linux)	CSSE -02	Computer System Architecture
CSSC -02T	Programming in C++	CSSE -03	Cyber Security and Cyber Law
CSSC -02P	**Lab 2**: Programming in C++	CSSE -04	Introduction to Artificial Intelligence
CSSC -03T	Data Structure	CSSE -05	Computer Graphics
CSSC -03P	**Lab 3**: Data Structure Using C++	CSSE -06T	Machine Learning
CSSC -04T	Relational Database Management System	CSSE -06P	**Lab 8:** Machine Learning
CSSC -04P	**Lab 4**: Relational Database Management System (Oracle/MySQL)	CSSE -07	Software Engineering
CSSC -05T	Programming in Java	CSSE -08	Theory of Computation
CSSC -05P	**Lab 5**: Programming in Java	CSSE -09	Soft Computing
CSSC -06T	Web Technology	CSSE -10	Advanced Operating Systems
CSSC -06P	**Lab 6**: Web Technology	CSSE -11	Cloud Computing
CSSC -07T	Programming in Python	CSSE -12	Major Project
CSSC -07P	**Lab 7**: Programming in Python		
CSSC -08T	Fundamental of IoT and Applications		
CSSC -08P	**Lab 9**: Fundamental of IoT and Applications		
DGE -01 & 02		**VAC**	
CSGE -01T	Computer Fundamental and Operating System	CSVAC-01	Artificial Intelligence
CSGE -01P	**Lab 1**: Operating System (DOS, Windows, Linux)	**SEC**	
CSGE -02T	Programming in C++	CSSEC-01	Multimedia and Animation
CSGE -02P	**Lab 2**: Programming in C++		

Program Outcomes (PO):

- Gain a complete exposure to the theories and practices of Computer science.
- Get transformed into a skilled learner and active programmer, enabling the students to focus on their

higher studies.

- Value computer professionals and programmers.
- Explore how the concepts and applications of Computer science lead to innovative thinking with a problem-solving attitude.

Program Specific Outcomes (PSO):

- Understand the basic Computer knowledge and practical application in operating system.
- Understanding the concept of programming and develop program in C++.
- Understanding the concept of data structure and implementation with C++.
- Understanding the concept of DBMS and implementation in MySQL /Oracle.
- Understanding the concept of OOPs and Java programming and develop program in Java.
- Understanding the concept of web technology and its implementation with HTML/CSS/DHTML/PHP.
- Understand the basic concept of internet of things (IOT).
- Understanding the basic concept of cyber security and cyber law.
- Understanding the basic concept of Artificial Intelligence.

Dr. H.S. Hota
Chairman
Dr. K.G. Dubey
(Dr S K Saha)
Dr. Anil Sharma
(Dr. Swati Jain)
(R. Khaudley)
(Sushil Kumar Sahu)
(Dr. Avanish Shukla Sharma)
(Suresh Thakur)
Shailendra Arya
ANJEETA KUJUR

CURRICULUM STRUCTURE

SCHEME

PROGRAM: B.SC.

DISCIPLINE: COMPUTER SCIENCE

Semester	Course Type	Course Code	Course Title	Total Credit	Total Marks	
					Max	Min
1st Semester	DSC (Major/Core)	CSSC-01T	Computer Fundamental and Operating System	3	100	40
		CSSC-01P	**Lab 1**: Operating Systems (DOS, Windows and Linux)	1	50	20
2nd Semester	DSC (Major/Core)	CSSC-02T	Programming in C++	3	100	40
		CSSC-02P	**Lab 2**: Programming in C++	1	50	20
3rd Semester	DSC (Major/Core)	CSSC-03T	Data Structure	3	100	40
		CSSC-03P	**Lab 3**: Data Structure Using C++	1	50	20
	DSE	CSSE-01	Data Communication and Networking	4	100	40
4th Semester	DSC (Major/Core)	CSSC-04T	Relational Database Management System	3	100	40
		CSSC-04P	**Lab 4**: Relational Database Management System (Oracle/MySQL)	1	50	20
	DSE	CSSE-02	Computer System Architecture	4	100	40
5th Semester	DSC (Major/Core)	CSSC-05T	Programming in Java	3	100	40
		CSSC-05P	**Lab 5**: Programming in Java	1	50	20
	DSE	CSSE-03	Cyber Security and Cyber Law	4	100	40
6th Semester	DSC (Major/Core)	CSSC-06T	Web Technology	3	100	40
		CSSC-06P	**Lab 6**: Web Technology	1	50	20
	DSE	CSSE-04	Introduction to Artificial Intelligence	4	100	40
7th Semester	DSC (Major/Core)	CSSC-07T	Programming in Python	3	100	40
		CSSC-07P	**Lab 7**: Programming in Python	1	50	20

	DSE	CSSE-05	Computer Graphics	4	100	40
		CSSE-06T	Machine Learning	3	100	40
		CSSE-06P	**Lab 8**: Machine Learning	1	50	20
		CSSE-07	Software Engineering	4	100	40
		CSSE-08	Theory of Computation	4	100	40
8th Semester	DSC (Major/Core)	CSSC-08T	Fundamental of IoT and Applications	3	100	40
		CSSC-08P	**Lab 9:** Fundamental of IoT and Applications	1	50	20
	DSE	CSSE-09	Soft Computing	4	100	40
		CSSE-10	Advanced Operating Systems	4	100	40
		CSSE-11	Cloud Computing	4	100	40
		CSSE-12	Major Project	4	100	40

Dr. H.S. Hota
Chairman

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(Dr. Arvind Shukla)

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(Suresh Thakur)

ANJEETA KUJUR

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF COMPUTER SCIENCE

COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Science (CS) *(Certificate / Diploma / Degree/Honors)*			**Semester - I**	**Session: 2024-2025**
1	Course Code	**CSSC-01T**		
2	Course Title	**Computer Fundamental and Operating System**		
3	Course Type	**DSC (Discipline Specific Course)**		
4	Prerequisite	*As per program*		
5	Course Learning Outcomes (CLO)	After Completing this course, students will be able to: • Study and use of basic concepts and terminology of information technology. • Organize files and documents on storage devices. • Acquire knowledge of ICT and Internet applications. • Develop information technology solutions by evaluating user requirements in advance trends of IT. • Acquire knowledge of MS-Excel, MS-PowerPoint and MS-Access.		
6	Credit Value	**3 Credits**	*Credit = 15 Hours - Learning & Observation*	
7	Total Marks	**Max. Marks: 100**	**Min Passing Marks: 40**	

PART -B: Content of the Course

Total No. of Teaching–Learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	**Indian knowledge System and Computer Science :** Number System in India-Historical evidence, Salient aspect of Indian Mathematics, Bhuta-Samkhya system, Katapayadi system, pingala and the binary system, Sulbha Sutra as modern arithmetic and numerical mathematics. **Fundamental of Computer**: History of computer, Generation of computer, Types of Computers, Block diagram of CPU, Digital and Analogue computers and its evolution. Major components of digital computers, Types of digital computers, Memory addressing capability of CPU, Microprocessors, Single chip Microcomputer, Users interface, hardware, software and firmware, Number system & Computer Codes.	13
II	**Peripheral devices:** I/O Devices-Keyboard, Mouse, Monitor, Impact and Non-Impact Printers, Plotters, Scanner, other Input/output devices I/O Port, Programmable and Non-Programmable I/O port, Inbuilt I/O ports, Parallel and Serial ports, USB, IEEE 1394, AGP, Serial data transfer scheme, Microcontroller, Signal Processor, I/O processor, Arithmetic Processor.	11
III	**Memory:** Memory hierarchy, Primary and Secondary Memory, Cache memory, Virtual Memory, Direct Access storage devices (DASD) Destructive and Non-destructive Readout, Program and data memory, Memory Management Unit (MMU).	10
IV	**Operating System Concepts:** Evolution of Operating Systems: Types of operating systems. Introduction to DOS, History Booting process of DOS, Internal and External commands of DOS, File Structure of DOS. Windows Operating System: History, Version of Windows, Basics of Windows, Windows Explorer, Windows Accessories, Control Panel. Introduction to Linux Operating System, Structure of Linux, Linux command cd, md, rm, mv, cp, ls, cat, find, grep, head, tail.	11

Keywords: *Computer, Input /Output Devices, Memory, Operating System, DOS, Linux.*

Name and Signature of Convener & Members of CBoS:

Dr H.S Hota
Chairman

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PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- P.K. Sinha,Computer Fundamentals, BPB Publication, Sixth Edition.
- V. Rajaraman, Fundamentals of Computers, PHI Sixth Edition.
- B. Ram, Computer Fundamentals Architecture and Organization, New Age International Publishers, Fifth Edition.
- Raja Raman V. Fundamental of Computers, Prentice Hall of India, New Delhi.
- Peter Baer Galvin, Greg Gagne,Operating System Concepts – Abraham Silberschatz, 8th edition, Wiley-India, 2009.

Reference Books Recommended:

- Chetan Shrivastava, Fundamentals of Information Technology, Kalyan Publishers.
- Dr. Santosh Kumar Miri, Computer Fundamentals and Office Automation, Iterative International Publisher IIP.
- Alexis Leon and Mathews Leon, Fundamentals of Information Technology, Vikash Publication.
- Leon and Leon, Fundamental of IT, Leon Tec world.
- Aksoy and Denardis, Introduction to Information Technology, Cengage learning.
- Suresh K. Basandra, Computers Today, Galgotia Publications.
- Dennis P.Curtin, Kim Foley, Kunai Sen and Cathleen Morin, Information Technology – The breaking wave, TMH.
- Kogent Solution Inc., OFFICE 2013 in Simple Steps, DremTech Press.
- Kogent Learning Solutions Inc., Access 2010 in Simple Steps
- Andrew S. Tanenbaum, Modern Operating Systems, 3rd Edition, PHI
- Elmasri, Carrick, Levine, Operating Systems: A Spiral Approach – TMH Edition
- Akshay Singh , Operating System, RGCSM Publications

Online Resources:

- Indian Knowledge System and computer Science from Swayam portal
  https://onlinecourses.swayam2.ac.in/imb23_mg53/preview
- Fundamentals of Computer :
  https://www.w3schools.blog/computer-fundamentals-tutorial
- Fundamentals of Computer, Memory:
  https://www.tutorialspoint.com/computer_fundamentals/index.htm
- Fundamentals of Computer , Windows Operating System :
  https://vikaspedia.in/education/digital-literacy/it-literacy-courses-in-associating-with-msup/computer-fundamentals
- Fundamentals of Computer:
  https://nptel.ac.in/courses/106/103/106103068/
- Introduction to Operating System:
  https://www.w3schools.in/operating-system/tutorials/
- Introduction to Operating System:
  https://www.javatpoint.com/windows.
- Peripheral Devices
  https://www.tutorialspoint.com/what-are-peripheral-devices
- Windows :
  https://www.javatpoint.com/windows
- Linux:
  https://www.javatpoint.com/what-is-linux

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 & 20 Assignment / Seminar - 10 Total Marks - 30	Better marks out of the two Test / Quiz obtained marks in Assignment shall be considered against 30 Marks
End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts.,1 out of 2 from each unit-4x10=40 Marks	

Name and Signature of Convener & Members of CBoS:

Chairman

(Suresh Thakur)

ANJEETA KUJUR

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF COMPUTER SCIENCE
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Science (CS) *(Certificate / Diploma / Degree)*			**Semester - I**	Session: 2024-2025
1	Course Code	CSSC-01P		
2	Course Title	Lab 1: Operating Systems (DOS, Windows, Linux)		
3	Course Type	Practical		
4	Prerequisite	*As per program*		
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Understand the fundamental concepts of DOS, Windows and Linux Operating System. • Understand basics of DOS commands and its types. • Understand features of Windows Operating system. • Understand comparative features of DOS and Windows Operating systems. • Explore functionality of Linux.		
6	Credit Value	1 Credits	*Credit =30 Hours Laboratory or Field Learning/Training*	
7	Total Marks	Max. Marks: 50		Min Passing Marks: 20

PART -B: Content of the Course

Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)

Module	Topics (Course contents)	No. of Period
List of Practical Experiment	1. Demonstrate different Directory naming listing structure with all options. 2. Create one file and rename file using DOS command 3. Demonstrate all Internal DOS Commands with Output. 4. Demonstrate all external DOS Commands with output. 5. Introduction to Windows and Familiarity with its controls. 6. Study and use of Desktop, my computer, recycle bin, Task bar. 7. Working with Files and Folder. 8. Use of various window applications: Calculator, notepad and MS-Paint. 9. Explaining control panel options. 10. Working with printers. 11. Create a file using Linux command. 12. Write a Linux command which lists all files and directories. 13. Demonstrate use of grep command. 14. Create Directory using Linux command and create 3 different files in this directory. 15. Delete above created files and directory using Linux command. 16. Explaining various flavors of Linux. **Note:** Concerned teacher can add additional practical exercises as per requirement.	30
Keywords	*DOS, Windows, Linux.*	

Name and Signature of Convener & Members of CBoS:

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PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- Rusell A Stultz, MS DOS 6.22 BPB Publications
- Brain Underdahl,Teach yourself Windows 2000, Wiley Publications.

Reference Books Recommended:

- Peter Norton, Maximizing Windows, Teachmedia.
- Ray Duncan, Advances MS-DOS Programming, BPB
- Akshay Singh, Operating System, RGCSM Publications
- Ray Yao, Shell Scripting in 8 Hours

Online Resources:

- DOS: https://www.javatpoint.com/ms-dos-operating-system
- Windows: https://www.javatpoint.com/windows
- Linux: https://www.javatpoint.com/what-is-linux
- Fundamentals of Computer, Windows Operating System: https://vikaspedia.in/education/digital-literacy/it-literacy-courses-in-associating-with-msup/computer-fundamentals
- DOS: https://www.geeksforgeeks.org/ms-dos-operating-system/

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE): 35 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE):	**Laboratory / Field Skill Performance: On spot Assessment** **A. Performed the Task based on lab. work - 20 Marks** **B. Spotting based on tools & technology (written) – 10 Marks** **C. Viva-voce (Based on principle/technology) - 05 Marks**	Managed by Course teacher as per lab. status

Name and Signature of Convener & Members of CBoS:

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FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF INFORMATION SCIENCE
COURSE CURRICULUM

PART- A: Introduction

Program: Bachelor in Science (CS) *(Certificate / Diploma / Degree/Honors)*	Semester - II	Session: 2024-2025

1	Course Code	CSSC-02T		
2	Course Title	Programming in C++		
3	Course Type	DSC (Discipline Specific Course)		
4	Prerequisite	*As per program*		
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Understand the fundamentals of object oriented programming. • Write programs related to concept of object oriented program • Define functions, class and to create own Libraries. • Write programs for file handling. • Develop small programs to solve real world problems.		
6	Credit Value	3 Credits	*Credit = 15 Hours - Learning & Observation*	
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40	

PART -B: Content of the Course

Total No. of Teaching–Learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	**Introduction and Programming Concepts :** Definition of Program, Source file, Object file, Executable file, Header file, Language Translator- Assembler, Interpreter, Compiler, Testing, Debugging, Linker and Loader, Algorithms, Flow Charts, History of C language, Structure of C program , C Tokens : Identifiers, Keywords, Constants, Variables, Operators, Data Types, Control structure: Conditional and looping statements, Operator Precedence and Associativity, Array and its types, Pointer, Functions : Standard Library and User defined functions, function prototype, Call by value and Call by reference, recursive functions, String functions.	12
II	**Introduction to Object Oriented Programming:** Concept of object oriented programming, Features of C++, Structure of C++ program, Data types, structure, class and objects, Access Specifiers: Private, Public, Protected, inline functions, static data and static functions. **Constructor:** Default constructor, Copy constructor, Parameterized constructor, Destructor.	11
III	**Inheritance and Polymorphism:** Definition, Concept of base and derived class, Types of Inheritance: Single, Multilevel, Multiple, Hierarchical and Hybrid Inheritance. Polymorphism: Definition, Compile time polymorphism: Function overloading, Operator overloading, constructor overloading, Runtime polymorphism: Virtual Function, pure virtual function, Inline function, friend function, friend class.	11
IV	**Input-Output and File Handling :** I/O classes, File and Stream classes, Char I/O, String I/O, Object I/O, File Pointer, Opening and Closing file. **Exception Handling and Standard Template Library:** Definition, Exception basics, try, catch and throws keywords, Template.	11
Keywords	*Token, Identifier, Keyword, Array, Function, Class, Object, Polymorphism, Inheritance, Constructor, Template.*	

Name and Signature of Convener & Members of CBoS:

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(Sharat Thakur)

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PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- Peter Juliff, Program Design, PHI Publications.
- Yashwant Kanetkar, Let us C: BPB Publications.
- E. Balaguruswamy, Programming in ANSI C, Tata McGraw Hill

Reference Books Recommended:

- Y. Kanetkar. Let us C++, B.P.B Publication .
- E. Balaguruswamy, Programming in C++, Tata McGraw Hill.
- R. Kumar, Object Oriented Programming with C++, Prakhar Publication(Hindi)
- Dhupiya, Lakhyani , C++ Programming Alka Publications, Ajmer (Paperback, Dhupiya, Lakhyani)(Hindi)

Online Resources:

- Introduction to C and C++ from SWAYAM/NPTEL
  https://onlinecourses.nptel.ac.in/noc22_cs103/preview
  https://www.youtube.com/watch?v=KG4hjVDw-p8&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=2
- Constant and Inline Function through NPTEL:
  https://www.youtube.com/watch?v=pX6LufLso2M&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=10
- Pointer and Reference NPTEL
  https://www.youtube.com/watch?v=GtsBZ5e1-cE&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=12
- Function Overloading NPTEL
  https://www.youtube.com/watch?v=uJGmGAShHeU&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=13
- Operator Overloading NPTEL
  https://www.youtube.com/watch?v=0jpOwe4d-FE&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=17
- Dynamic Memory Management NPTEL
  https://www.youtube.com/watch?v=lkFK2X6qIc0&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=18
- Class and Object NPTEL
  https://www.youtube.com/watch?v=wtuks_f3vP4&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=24
- Access Specifiers NPTEL
  https://www.youtube.com/watch?v=6ki_W7cXdM0&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=22
- Constructor and Destructor NPTEL
  https://www.youtube.com/watch?v=wtuks_f3vP4&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=24
- C++ different topics from W3School
  https://www.w3schools.com/CPP/default.asp
- C++ different topics from Javatpoint
  https://www.javatpoint.com/cpp-tutorial

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 +20 Assignment / Seminar - 10 Total Marks - 30	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts..1 out of 2 from each unit-4x10=40 Marks	

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FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF INFORMATION SCIENCE
COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Science (CS) *(Certificate / Diploma / Degree)*		**Semester - II**	**Session: 2024-2025**
1	**Course Code**	**CSSC-02P**	
2	**Course Title**	**Lab 2: Programming in C++**	
3	**Course Type**	**DSC**	
4	**Prerequisite**	*As per program*	
5	**Course Learning Outcomes (CLO)**	At the end of this course, the students will be able to: • Understand the fundamental programming concepts and methodologies which are essential to create good C++ programs. • Code, test, and implement a well-structured, robust computer program using the C++ programming language. • Write reusable modules (collections of functions). • Understand design/implementation issues involved with variable allocation and binding, control flow, types, subroutines, parameter passing. • Develop an in-depth understanding of functional, logic, and object-oriented programming paradigms.	
6	**Credit Value**	**1 Credits**	*Credit =30 Hours Laboratory or Field Learning/Training*
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks: 20**

PART -B: Content of the Course

Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)

Module	Topics (Course contents)	No. of Period
List of Practical Experiments.	1. Write a program in C++ for addition of two numbers using float data type. 2. Write a program in C++ to find the biggest number between two numbers. 3. Write a program in C++ to find the factorial value of any entered number using do – while loop. 4. Write a program in C++ for various arithmetic operations using switch case statements. 5. Write a program in C++ for Multiplication of two 3X3 matrices. 6. Write a program in C++ to store five books of information using structure. 7. Write a program in C++ to store six employee information using union. 8. Write a program in C++ to calculate simple interest using call by value and call by reference method. 9. Write a program in C++ to find the sum and average of five numbers using class and objects. 10. Write a program in C++ to multiply two numbers using private and public member functions. 11. Write a program in C++ to print structure like this using scope resolution operator 1 1 2 1 2 3 1 2 3 4 1 2 3 4 5 12. Write a program in C++ for constructor and Destructor.	30

13. Write a program in C++ for multiple inheritance.
14. Write a program in C++ for operator overloading.
15. Write a program in C++ for friend class and friend function.
16. Write a program in C++ for virtual function and virtual class.
17. Write a program in C++ for Exception Handling.
18. Write a program in C++ to open and close a file using file Handling.
19. Given two ordered arrays of integers, write a program to merge the two-arrays to get an ordered array.
20. WAP to display Fibonacci series (i) using recursion, (ii) using iteration
21. WAP to calculate Factorial of a number (i) using recursion, (ii) using iteration
22. WAP to calculate GCD of two numbers (i) with recursion (ii) without recursion.
23. Create a Matrix class using templates. Write a menu-driven program to perform following Matrix Operations (2-D array implementation): a) Sum b) Difference c) Product d) Transpose 22. Create the Person class. Create some objects of this class (by taking information from the user). Inherit the class Person to create two classes Teacher and Student class. Maintain the respective information in the classes and create, display and delete objects of these two classes (Use Runtime Polymorphism).
24. Create a class Triangle. Include overloaded functions for calculating area. Overload assignment operator and equality operator.
25. Create a class Box containing length, breadth and height. Include following methods in it: a) Calculate surface Area b) Calculate Volume c) Increment, Overload ++ operator (both prefix & postfix) d) Decrement, Overload -- operator (both prefix & postfix) e) Overload operator == (to check equality of two boxes), as a friend function f) Overload Assignment operator g) Check if it is a Cube or cuboid
26. Create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file.
27. Write a program to retrieve the student information from the file created in the previous question and print it in the following format: Roll No. Name Marks
28. Copy the contents of one text file to another file, after removing all whitespaces.
29. Write a program for exception handling.
30. Write a program to insert data into file and to display it.

Note: Concerned teacher can add additional practical exercises as per requirement.

Keywords	*Array, Function, Structure, union, matrix, constructor, destructor, inheritance.*

Name and Signature of Convener & Members of CBoS:

Dr. H.S. Hota
Chairman

ANJEETA KUMAR

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- Peter Juliff, Program Design, PHI Publications.
- Yashwant Kanetkar, Let us C: BPB Publications.
- E. Balaguruswamy, Programming in ANSI C, Tata McGraw Hill

Reference Books Recommended:

- Y. Kanetkar, Let us C++, B.P.B Publication .
- E. Balaguruswamy, Programming in C++, Tata McGraw Hill.
- R. Kumar, Object Oriented Programming with C++, Prakhar Publication(Hindi)
- Dhupiya, Lakhyani , C++ Programming Alka Publications, Ajmer (Paperback, Dhupiya, Lakhyani)(Hindi)

Online Resources:

- Introduction to C and C++ from SWAYAM/NPTEL
  https://onlinecourses.nptel.ac.in/noc22_cs103/preview
  https://www.youtube.com/watch?v=KG4hjVDw-p8&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=2
- Constant and Inline Function through NPTEL:
  https://www.youtube.com/watch?v=pX6LufLso2M&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=10
- Pointer and Reference NPTEL
  https://www.youtube.com/watch?v=GtsBZ5c1-cE&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=12
- Function Overloading NPTEL
  https://www.youtube.com/watch?v=uJGmGAShHeU&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=13
- Operator Overloading NPTEL
  https://www.youtube.com/watch?v=0jpOwe4d-FE&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=17
- Dynamic Memory Management NPTEL
  https://www.youtube.com/watch?v=lkFK2X6qIc0&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=18
- Class and Object NPTEL
  https://www.youtube.com/watch?v=wtuks_f3vP4&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=24
- Access Specifiers NPTEL
  https://www.youtube.com/watch?v=6ki_W7cXdM0&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=22
- Constructor and Destructor NPTEL
  https://www.youtube.com/watch?v=wtuks_f3vP4&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=24
- C++ different topics from W3School
  https://www.w3schools.com/CPP/default.asp
- C++ different topics from Javatpoint
  https://www.javatpoint.com/cpp-tutorial

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:		
Maximum Marks:	50 Marks	
Continuous Internal Assessment (CIA):	15 Marks	
End Semester Exam (ESE):	35 Marks	
Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar +Attendance - 05 Total Marks - 15	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):	**Laboratory / Field Skill Performance: On spot Assessment** **A. Performed the Task based on lab. work - 20 Marks** **B. Spotting based on tools & technology (written) – 10 Marks** **C. Viva-voce (based on principle/technology) - 05 Marks**	**Managed by Course teacher as per lab. status**

Name and Signature of Convener & Members:

1. Dr. H.S. Hota
2. Dr. Swati Jain
3. Dr. Surendra Patel
4. Dr. S. K. Sahu
5. Mr. Prakash Kumar Tripathi
6. Dr. Anil Kumar Sahu
7. Mr. L.K. Gavel

ANJEETA KUJUK