A. Course Handout updated on 27th June, 2022

Institute/School Name	Chitkara University Institute of Engineering and Technology		
Department Name	Computer Science & Engineering		
Programme Name	Bachelor of Engineering, Computer Science & Engineering		
Course Name	Programming Abstractions	Session	2022-2023
Course Code	CS179	Semester/Batch	5th/2020
L-T-P (Per Week)	4-0-0	Course Credits	04
Course Coordinator	Dr. Rajat		

1. Objectives of the Course

The course provides a wide scope of learning & understanding of the subject and the main objectives of the course are:

- To make students ready for the programming jobs in software-product based companies.
- Strong problem-solving skills and computer science fundamentals.
- Identify importance of object-oriented programming and difference between structured oriented and object-oriented programming features.
- Exercise and reinforce prior programming knowledge to effectively code standard problems and algorithms with optimized complexity.

2. Course Learning Outcomes

After completion of the course, students will be able to do the following:

CO1: Students will be able to write high quality code.
CO2: To code, document, test, and implement a well-structured, robust computer program.
CO3: Learn debugging issues and end to end testing.
CO4: Deliver features in an agile development environment.
CO5: They will understand the concept of scalability, security and extensible code for software applications based on real life applications.

CO-PO Mapping Grid

Course Learning Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M											
CO2		H	H	H	H						M	
CO3			H	H								
CO4		H	H					H	M	M		
CO5		H	H	M		M		H				H

3. Recommended Books (Reference Books/Text Books):

B01: Object Oriented Programming with C++ by E Balagurusamy, 2001, Tata McGraw-Hill.
B02: Object Oriented Programming in Turbo C++ by Robert Lafore , 1994, The WAITE Group Press.
B03: Complete Reference C++, Herbert Schlitz, TMH.
B04: Cracking the Coding interviews 6th edition by Gayle Laakmann McDowell

4. Other readings and relevant websites:

S. No.	Link of Journals, Magazines, websites and Research Papers
1	https://www.geeksforgeeks.org/c-programming-basics/?msclkid=3330f3bdbece11ec87b7f03e6d69378a
2	https://thecleverprogrammer.com/2020/10/25/the-fundamentals-of-c-programming-language/?msclkid=333199a8bece11ec8c83bf5534909d32
3	https://www.javatpoint.com/cpp-array-of-pointers?msclkid=966ad51dbece11ec949a8b0b78205a7d
4	https://www.w3schools.com/cpp/default.asp
5	https://www.programiz.com/cpp-programming/variables-literals

5. Recommended Tools and Platforms

C++Builder, Visual Studio Code, GCC Compiler, Eclipse

6. Course Plan:

Lecture Number	Topics	Recommended Book / Other reading material
1 – 4	C++ Fundamentals: Data types, Conditional Statements, Loops	B01 B02 Link 1
5 – 8	Arrays, Pointers, Strings & 2-D Arrays in C++	B01 B03 Link 2
ST-I (Syllabus covered from 1-8 lectures)		
9-12	Functions in C++: Inline functions, Default arguments, Function prototyping, Function Overloading	B03
13 - 16	Pointers & Dynamic Memory Management, Asymptotic Notation (Big O)	B01 B03
17 – 24	Recursion, Bitwise Operators	B01 B02 Link 4
25 – 27	Classes and Objects	B02
28 – 32	Constructors and Destructors	B01 Link 3
33 – 36	Operator Overloading and Type Conversion	B02
37 – 40	Inheritance	B02
41 – 45	Virtual base class, Overriding member functions	B01 B03 Link 5
ST-II (Syllabus covered from 17-45 lectures)		
46 – 48	Virtual Functions and Polymorphism: Concept of Binding - Early binding and late binding,	B02 B03 Link 3
49 – 50	Virtual functions, Pure virtual functions, Abstract classes	B02
51 -53	Exception Handling, Templates and Generic Programming	B01 B03
54 – 56	Standard Template Library - Containers, Iterators and Algorithms. Vectors, Lists, Map	B03 Link 5
57 – 64	Single, Double and Circular linked list	B04
65 – 72	Slow and Fast pointer technique, Dividing and Merging Linked Lists	B04

ST-III (Syllabus covered from 46-72 lectures)		
73 – 80	Stacks implementation using Arrays, Linked Stacks	B04
81 – 88	2 stacks in a Array, k stacks in an array, tower of hanoi, Queues implementation using Arrays, Linked Queues	B04
89 – 90	Circular Queues, Implement Queue using Stacks	B04
ST-IV (Syllabus covered from 73-90 lectures)		

7. Delivery/Instructional Resources

Lecture Number	**Topics**	**PPT** *(link of ppts on the central server)*	**Industry Expert Session***(If **yes**: link of ppts on the central server)*	**Web References**	**Audio-Video**
1 - 4	C++ Fundamentals: Data types, Conditional Statements, Loops	https://docs.google.com/spreadsheets/d/1iJ62gyMnRJ1iJ_PsgYkO14Lqcde47R2qUdYz55uispA/edit#gid=0		https://nptel.ac.in/courses/106105151?msclkid=73cc4c8ebee711ecbb58f65283278d97	https://nptel.ac.in/courses/106105151?msclkid=73cc4c8ebee711ecbb58f65283278d97
5 – 8	Arrays, Pointers, Strings & 2-D Arrays in C++,	https://docs.google.com/spreadsheets/d/1iJ62gyMnRJ1iJ_PsgYkO14Lqcde47R2qUdYz55uispA/edit#gid=0		https://nptel.ac.in/courses/106105151?msclkid=73cc4c8ebee711ecbb58f65283278d97	https://nptel.ac.in/courses/106105151?msclkid=73cc4c8ebee711ecbb58f65283278d97
9 - 12	Functions in C++: Inline functions, Default arguments, Function prototyping, Function Overloading	https://docs.google.com/spreadsheets/d/1iJ62gyMnRJ1iJ_PsgYkO14Lqcde47R2qUdYz55uispA/edit#gid=0		https://nptel.ac.in/courses/106105151?msclkid=73cc4c8ebee711ecbb58f65283278d97	https://nptel.ac.in/courses/106105151?msclkid=73cc4c8ebee711ecbb58f65283278d97
13 - 16	Pointers & Dynamic Memory Management, Asymptotic Notation (Big O)	https://docs.google.com/spreadsheets/d/1iJ62gyMnRJ1iJ_PsgYkO14Lqcde47R2qUdYz55uispA/edit#gid=0		https://nptel.ac.in/courses/106105151?msclkid=73cc4c8ebee711ecbb58f65283278d97	https://nptel.ac.in/courses/106105151?msclkid=73cc4c8ebee711ecbb58f65283278d97
17 - 24	Recursion, Bitwise Operators	https://docs.google.com/spreadsheets/d/1iJ62gyMnRJ1iJ_PsgYkO14Lqcde47R2qUdYz55uispA/edit#gid=0		https://nptel.ac.in/courses/106105151?msclkid=73cc4c8ebee711ecbb58f65283278d97	https://nptel.ac.in/courses/106105151?msclkid=73cc4c8ebee711ecbb58f65283278d97
25 – 27	Classes and Objects	https://docs.google.com/spreadsheets/d/1iJ62gyMnRJ1iJ_PsgYkO14Lqcde47R2qUdYz55uispA/edit#gid=0		https://nptel.ac.in/courses/106105151?msclkid=73cc4c8ebee711ecbb58f65283278d97	https://nptel.ac.in/courses/106105151?msclkid=73cc4c8ebee711ecbb58f65283278d97

28 - 32	Constructors and Destructors	https://docs.google.com/spreadsheets/d/1iJ62gyMnRJ1iJ_PsgYkO14Lqcde47R2qUdYz55uispA/edit#gid=0		https://nptel.ac.in/courses/106105151?msclkid=73cc4c8ebee711ecbb58f65283278d97	https://nptel.ac.in/courses/106105151?msclkid=73cc4c8ebee711ecbb58f65283278d97
33 - 36	Operator Overloading and Type Conversion	https://docs.google.com/spreadsheets/d/1iJ62gyMnRJ1iJ_PsgYkO14Lqcde47R2qUdYz55uispA/edit#gid=0		https://nptel.ac.in/courses/106105151?msclkid=73cc4c8ebee711ecbb58f65283278d97	https://nptel.ac.in/courses/106105151?msclkid=73cc4c8ebee711ecbb58f65283278d97
37 - 40	Inheritance	https://docs.google.com/spreadsheets/d/1iJ62gyMnRJ1iJ_PsgYkO14Lqcde47R2qUdYz55uispA/edit#gid=0		https://nptel.ac.in/courses/106105151?msclkid=73cc4c8ebee711ecbb58f65283278d97	https://nptel.ac.in/courses/106105151?msclkid=73cc4c8ebee711ecbb58f65283278d97
41 – 45	Virtual base class, Overriding member functions	https://docs.google.com/spreadsheets/d/1iJ62gyMnRJ1iJ_PsgYkO14Lqcde47R2qUdYz55uispA/edit#gid=0		https://nptel.ac.in/courses/106105151?msclkid=73cc4c8ebee711ecbb58f65283278d97	https://nptel.ac.in/courses/106105151?msclkid=73cc4c8ebee711ecbb58f65283278d97
46 - 48	Virtual Functions and Polymorphism: Concept of Binding - Early binding and late binding,	https://docs.google.com/spreadsheets/d/1iJ62gyMnRJ1iJ_PsgYkO14Lqcde47R2qUdYz55uispA/edit#gid=0		https://nptel.ac.in/courses/106105151?msclkid=73cc4c8ebee711ecbb58f65283278d97	https://nptel.ac.in/courses/106105151?msclkid=73cc4c8ebee711ecbb58f65283278d97
49 - 50	Virtual functions, Pure virtual functions, Abstract classes	https://docs.google.com/spreadsheets/d/1iJ62gyMnRJ1iJ_PsgYkO14Lqcde47R2qUdYz55uispA/edit#gid=0		https://nptel.ac.in/courses/106105151?msclkid=73cc4c8ebee711ecbb58f65283278d97	https://nptel.ac.in/courses/106105151?msclkid=73cc4c8ebee711ecbb58f65283278d97
51 -53	Exception Handling, Templates and Generic Programming,	https://docs.google.com/spreadsheets/d/1iJ62gyMnRJ1iJ_PsgYkO14Lqcde47R2qUdYz55uispA/edit#gid=0		https://nptel.ac.in/courses/106105151?msclkid=73cc4c8ebee711ecbb58f65283278d97	https://nptel.ac.in/courses/106105151?msclkid=73cc4c8ebee711ecbb58f65283278d97
54 - 56	Standard Template Library - Containers, Iterators and Algorithms. Vectors, Lists, Map	https://docs.google.com/spreadsheets/d/1iJ62gyMnRJ1iJ_PsgYkO14Lqcde47R2qUdYz55uispA/edit#gid=0		https://nptel.ac.in/courses/106105151?msclkid=73cc4c8ebee711ecbb58f65283278d97	https://nptel.ac.in/courses/106105151?msclkid=73cc4c8ebee711ecbb58f65283278d97
57 – 64	Single, Double and Circular linked list	https://docs.google.com/spreadsheets/d/1iJ62gyMnRJ1iJ_PsgYkO14Lqcde47R2qUdYz55uispA/edit#gid=0		https://www.javatpoint.com/singly-linked-list-vs-doubly-linked-list	https://www.youtube.com/watch?v=ra9RVLh-Jsk

65 – 72	Slow and Fast pointer technique, Dividing and Merging Linked Lists	https://docs.google.com/spreadsheets/d/1iJ62gyMnRJ1iJ_PsgYkO14Lqcde47R2qUdYz55uispA/edit#gid=0		https://www.geeksforgeeks.org/merge-two-sorted-linked-lists/	https://www.youtube.com/watch?v=n5_9DMCX0Yk
73 – 80	Stacks implementation using Arrays, Linked Stacks	https://docs.google.com/spreadsheets/d/1iJ62gyMnRJ1iJ_PsgYkO14Lqcde47R2qUdYz55uispA/edit#gid=0		https://www.geeksforgeeks.org/stack-data-structure/	https://www.youtube.com/watch?v=JvuaAgDar1c
81 – 88	2 stacks in a Array, k stacks in an array, tower of Hanoi, Queues implementation using Arrays, Linked Queues	https://docs.google.com/spreadsheets/d/1iJ62gyMnRJ1iJ_PsgYkO14Lqcde47R2qUdYz55uispA/edit#gid=0		https://www.geeksforgeeks.org/stack-data-structure/	https://www.youtube.com/watch?v=JvuaAgDar1c
89 – 90	Circular Queues, Implement Queue using Stacks	https://docs.google.com/spreadsheets/d/1iJ62gyMnRJ1iJ_PsgYkO14Lqcde47R2qUdYz55uispA/edit#gid=0		https://www.programiz.com/dsa/circular-queue	https://www.youtube.com/watch?v=fbonDkYsKj0

8. Action plan for different types of learners

Slow Learners	Average Learners	Advanced Learners
• Remedial Class for slow learners to revise specific topics. • Individual feedback of each slow learner.	• Doubt Class for average learners • Special Doubt session will be arranged for ST topics. • Doubts of individual student will be resolved.	• Certification exams will be offered to interested students.

9. Evaluation Scheme & Components:

Evaluation Component	Type of Component	No. of Assessments	Weightage of Component	Mode of Assessment
Component 2	Subjective Test/Sessional Tests (STs)	4*	40%	Offline/Online
Component 3	End Term Examinations	1	60%	Offline/Online
Total		**100%**		

*Out of 4 STs, the ERP system automatically picks the best 3 STs marks for evaluation of the STs as final marks.

10. Details of Evaluation Components:

Evaluation Component	Description	Syllabus Covered (%)	Timeline of Examination	Weightage (%)
Component 2	ST 01	Up to 20%	3rd Week	40%
	ST 02	21% - 50%	5th Week	
	ST 03	51% - 80%	7th Week	
	ST 04	81% - 100%	9th Week	
Component 3	End Term Examination*	100%	11th Week	60%
Total				100%

*As per Academic Guidelines minimum 75% attendance is required to become eligible for appearing in the End Semester Examination.

11. Syllabus of the Course:

Lecture Number	Topics	No. of Lectures	Weightage %
1 – 4	C++ Fundamentals: Data types, Conditional Statements, Loops	4	30 %
5 – 8	Arrays, Pointers, Strings & 2-D Arrays in C++	4	
9 - 12	Functions in C++: Inline functions, Default arguments, Function prototyping, Function Overloading	4	
13 - 16	Pointers & Dynamic Memory Management, Asymptotic Notation (Big O)	4	
17 – 24	Recursion, Bitwise Operators	8	
25 – 27	Classes and Objects	3	20 %
28 – 32	Constructors and Destructors	5	
33 – 36	Operator Overloading and Type Conversion	4	
37 – 40	Inheritance	4	
41 – 45	Virtual base class, Overriding member functions	5	20 %
46 – 48	Virtual Functions and Polymorphism: Concept of Binding - Early binding and late binding,	3	
49 – 50	Virtual functions, Pure virtual functions, Abstract classes	2	
51 -53	Exception Handling, Templates and Generic Programming	3	
54 – 56	Standard Template Library - Containers, Iterators and Algorithms. Vectors, Lists, Map	3	
57 – 64	Single, Double and Circular linked list	8	30 %
65 – 72	Slow and Fast pointer technique, Dividing and Merging Linked Lists	8	
73 – 80	Stacks implementation using Arrays, Linked Stacks	8	
81 – 88	2 stacks in a Array, k stacks in an array, tower of hanoi, Queues implementation using Arrays, Linked Queues	8	
89 – 90	Circular Queues, Implement Queue using Stacks	2	

This Document is approved by:

Designation	Name	Signature
Course Coordinator	Dr. Rajat	
Head Academic Delivery	Dr. Ambuj Aggarwal	
CSE 3rd Year Dean	Dr. Rupali Gill	
Dean (Academics Affairs)	Dr. Rajnish Sharma	
Date		