Type	Code	ENVIRONMENTAL SCIENCE	L-T-P	Credits	Marks
	AECC-1		3-1-0	3	100
Topic Objective		The objective of this course is to introduce fundamentals of Environmental and its applications in the society			
Prerequisites		Basic concepts of Environment.			
Lecture Scheme		Regular lectures (classroom/virtual class with computer/Smartphone) with use of ICT as and when required, lectures are planned to be interactive with focus on application.			

Evaluation Scheme

Internal Assessment			Written Assessment	Total
Assignment(s)	Unit Test	Mid-Term (Written)	End-Term	
0	0	20	80	100

University Syllabus

Unit No	Topics	Hours
Unit-1	The Environment, The atmosphere, Hydrosphere, Lithosphere, Biosphere , Ecology, Ecosystem, Biochemical Cycle (Carbon and Nitrogen Cycle). Environmental pollution, Air Pollution, Water Pollution, Soil Pollution, Radiation Pollution.	10
Unit-2	Population Ecology, Individual species, Pollution, Community, Control Method of Population, Urbanization and its effect on society. Communicable and non communicable Disease.	10
Unit-3	Environmental Movements in India, Grass root movements, Role of women in environmental movement, Movements in odisha, SPCB and CPCB.	10
Unit-4	Natural Resources, Conservation of natural resources, management and conservation of wildlife protection Act 1972, Environmental Protection. Air act and water act . Natural disaster management	10
	Total (Hours)	40

Text Books:
1. **Environmental Science**: Toward a Sustainable Future" by Richard T. Wright and Dorothy F. Boorse - This book provides a comprehensive overview of environmental science, covering topics such as ecology, conservation, pollution, and sustainability.

2. **"Silent Spring" by Rachel Carson** - Although it was published in 1962, "Silent Spring" remains a seminal work in environmental literature. It explores the impacts of pesticides on the environment and is credited with sparking the modern environmental movement.

3. **"The Sixth Extinction: An Unnatural History**" by Elizabeth Kolbert - This Pulitzer Prize-winning book examines the ongoing extinction crisis facing the planet, exploring the causes and consequences of species loss due to human activity.

4. **"Ecology: Concepts and Applications" by Manuel C. Molles Jr. -** This textbook provides a solid foundation in ecological principles and their application to real-world environmental issues. It covers topics such as population dynamics, community ecology, and ecosystem management.

5. **"Cradle to Cradle: Remaking the Way We Make Things**" by William McDonough and Michael Braun art - This book presents a vision for a sustainable future by rethinking the way products are designed and manufactured. It advocates for a circular economy where waste is minimized, and materials are continually reused and recycled.

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

CO1	Understanding of Environmental Systems: Students should gain an understanding of the various components of environmental systems, including the atmosphere, hydrosphere, lithosphere, and biosphere, and how they interact with one another.
CO2	Knowledge of Environmental Issues: Students should be able to identify and describe key environmental issues such as climate change, pollution, loss of biodiversity, deforestation, and resource depletion. They should understand the causes and consequences of these issues
CO3	Critical Thinking and Problem-Solving Skills: Students should develop critical thinking skills to analyze complex environmental problems and propose effective solutions. This includes the ability to evaluate scientific evidence, consider ethical implications, and make informed decisions.
CO4	Awareness of Human Impact: Students should recognize the ways in which human activities impact the environment, both locally and globally. This includes understanding the social, economic, and political factors driving environmental degradation and the role of sustainability in mitigating these impacts.
CO5	Promotion of Environmental Stewardship: Students should develop a sense of responsibility and stewardship towards the environment. This involves recognizing the importance of conservation, sustainable practices, and environmental activism in protecting natural resources and ensuring the well-being of future generations.

Program Outcomes Relevant to the Course:

PO1	Interdisciplinary Knowledge: Graduates should demonstrate a deep understanding of the interdisciplinary nature of environmental science, integrating concepts from fields such as biology, chemistry, ecology, geology, sociology, and economics..
PO2	Research and Analytical Skills: Graduates should possess strong research and analytical skills, including the ability to collect and analyze data, conduct experiments, and apply scientific methods to investigate environmental issues.
PO3	Problem-Solving Abilities: Graduates should be proficient in identifying, analyzing, and solving complex environmental problems using critical thinking, creativity, and evidence-based approaches.
PO4	Communication Skills: Graduates should be able to effectively communicate scientific information to diverse audiences, including policymakers, stakeholders, and the general public, through written reports, oral presentations, and multimedia platforms.

PO5	Ethical and Sustainable Practices: Graduates should demonstrate a commitment to ethical conduct and sustainable practices in environmental management and decision-making. This includes understanding and adhering to principles of environmental ethics, social responsibility, and environmental justice.

Type	Code	LESSON PLAN ENVIRONMENTAL SCIENCE	L-T-P	Credits	Marks
Lecture No	Unit No		3-1-2	4	70
Lecture 1	1	Introduction to Environment and its uses in daily life **Ref:** TB1(1.1-1.2, pg1-15); OR1			
Lecture 2	1	Elements of Environment **Ref:** TB1(1.1-1.2,, pg17-19); OR1			
Lecture 3	1	Environment and its elements with introduction **Ref:** TB1(2.1, pg19-28); OR1			
Lecture 4	1	Hydrosphere, elements of hydrosphere and how it impact the life in the world **Ref:** TB1(2.2, pg42-46); OR1			
Lecture 5	1	Lithosphere and its layers and questions related to lithosphere **Ref:** TB1(2.3-2.8, pg42-46); OR1			
Lecture 6	1	Carbon and nitrogen cycle **Ref:** TB1(4.1-4.6, pg68-76); OR1			
Lecture 7	1	Environmental pollution and its types and impact on the life on earth **Ref:** TB1(4.2-4.6, pg80-87); OR1			
Lecture 8	1	**Radiation pollution and a detailed study** **Ref:** TB1(6.1, pg131-132); OR1			
Lecture 9	1	Class test and Practice			
Lecture 10	1	Selection control structure (Switch Statement). **Ref:** TB1(6.3, pg145-149); OR1			
Lecture 11	2	What is population and introduction to population **Ref:** TB1(6.4, pg171-176); OR1			

Lecture 12	2	Population ecology- a detailed description **Ref:** TB1(6.5, pg178-184); OR1
Lecture 13	2	Population, Community and control methods. Types of control methods **Ref:** TB1(8.1 pg212-227); OR1
Lecture 14	2	An introduction to urbanization **Ref:** TB1(8.3, pg257-265); OR1
Lecture 15	2	Impact of urbanization on economy and society **Ref:** TB1(12.1, pg269-271); OR1
Lecture 16	2	Introduction to communicable and non communicable diseases **Ref:** TB1(12.2, pg381-391); OR1
Lecture 17	2	What are the communicable disease and their spread **Ref:** TB1(12.4, pg389-395); OR1
Lecture 18	2	Overall discussion on the module with important question providing **Ref:** TB1(10.1-10.6, pg403-416); OR1
Lecture 19	3	Introduction to Environmental movements in india **Ref:** TB1(10.3, pg324-333); OR1
Lecture 20	3	Chipko movement and its impact on the society **Ref:** TB1(10.4, pg291-293); OR1
Lecture 21	3	What is state pollution control board and its responsibilities in controlling the environmental pollution **Ref:** TB1(10.5 pg295-318); OR1
Lecture 22	3	Introduction and discussion about central pollution control board **Ref:** TB1(2.3, pg271-280); OR1
Lecture 23	4	Introduction to module 4, natural recourses **Ref:** TB1(10.6, pg3111-315); OR1
Lecture 24	4	Types of natural resources, renewable and non renewable recourses **Ref:** TB1(10.4, pg324-333); OR1
Lecture 25	4	Introduction to the environmental act in India **Ref:** TB1(11.1, pg347-351); OR1
Lecture 26	4	Water act, air act and pollution control act **Ref:** TB1(11.2, pg354-356); OR1
Lecture 27	4	Module 4 important question and doubt clearing class **Ref:** TB1(11.3, pg357-360); OR1
Lecture 28	4	Class test, MCQ **Ref:** TB1(11.4, pg359-362); OR1
Lecture 29	4	Module 4 unit test (20 Marks) **Ref:** TB1(11.5, pg363-369); OR1
Lecture 30	4	Revision of the whole paper, with important questions **Ref:** TB1(11.6, pg371-373); OR1

LESSON PLAN

Type	Code		L-T-P	Credits	Marks
	CORE COURSE-1	**Digital Logic**	3-1-0	4	75
Topic Objective	The objective of this course is to study different methods used for the simplification of Boolean functions and binary arithmetic. To design and implement combinational circuits, synchronous & asynchronous sequential circuits. Study about Semiconductor Memory Systems.				
Prerequisites	Basic analytical, logical, problem solving skills with basic knowledge and usage of computers is required for this course.				
Lecture Scheme	Regular lectures (classroom/virtual class with computer/Smartphone) with use of ICT as and when required, lectures are planned to be interactive with focus on problem solving activities.				

Evaluation Scheme

Internal Assessment			Written Assessment	Total
Assignment(s)	Unit Test	Mid-Term (Written)	End-Term	
0	0	15	60	75

University Syllabus

Unit No	Topics	Hours
Unit-1	Character Codes, Decimal System, Binary System, Decimal to Binary Conversion, Hexadecimal Notation, Boolean Algebra, Basic Logic Functions: Electronic Logic Gates, Synthesis of Logic Functions, Minimization of Logic Expressions, Minimization using Karnaugh Maps, Synthesis with NAND and NOR Gates, Tri-State Buffers	10
Unit-2	Arithmetic: Addition and Subtraction of Signed Numbers, Addition/ Subtraction Logic Unit, Design of Fast Adders: Carry-Look ahead Addition, Multiplication of Positive Numbers, Signed Operand Multiplication: Booth Algorithm, Fast Multiplication: Bit-Pair Recodng Multipliers, Carry-Save Addition of Summands, Integer Division, Floating-Point Numbers and Operations: IEEE Standard for Floating-Point Numbers, Arithmetic Operations on Floating-Point Numbers, Guard Bits and Truncation, Implementing Floating-Point Operations.	10
Unit-3	Flip-Flops Gated Latches, Master-Slave Flip-Flops, Edge-Triggering, T Flip-Flops, JK FlipFlops. Registers and Shift Registers, Counters, Decoders, Multiplexers, Programmable Logic Devices (PLDs), Programmable Array Logic (PAL), Complex Programmable Logic Devices (CPLDs), Field-Programmable Gate Array (FPGA), Sequential Circuits, UP/ DOWN Counters, Timing Diagrams, The Finite State Machine Model, Synthesis of Finite State Machines.	10
Unit-4	Memory System: Semiconductor RAM Memories, Internal Organization of Memory Chips, Static Memories, Asynchronous DRAMS, Synchronous DRAMS, Structure of Large Memories, Memory System Considerations, RAMBUS Memory. Read-Only Memories: ROM, PROM, EPROM, EEPROM, Flash Memory, Speed, Size, and Cost of	10

	Memory. Secondary Storage: Magnetic Hard Disks, Optical Disks, Magnetic Tape Systems.			
	Total (Hours)			40

Text Books:

TB1:   **Carl Hamacher, Z. Vranesic, S. Zaky**: Computer Organization, 5/e (TMH)

Reference Books:

RB1:   **M. Morris Mano**: Digital Logic and Computer Design, Pearson

Online Resources:

OR1:   https://onlinecourses.nptel.ac.in/noc20_cs64/

OR2: https//studytonight.com/courses/cpp-video-tutorial/

OR3: https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/ & Other google searched sites

Type	Code	LESSON PLAN Digital Logic	L-T-P	Credits	Marks
Lecture No	Unit No		3-1-0	4	75
Lecture 1	1	**Topic:** Introduction to digital signals, basics of number system, types of number system. **Ref:** RB1 (1.1); OR1			
Lecture 2	1	**Topic:** Decimal to Binary Conversion, Decimal to Octal and Hexadecimal Conversion. **Ref:** RB1 (1.2, 1.3,1.4); OR1			
Lecture 3	1	**Topic:** Boolean Algebra basics and theorems. **Ref:** RB1 (2.1, 2.2, 2.3); OR1			
Lecture 4	1	**Topic:** Basic Logic Functions, Logic Gates and its types. **Ref:** RB1 (2,4, 2.6,2.7); OR1			
Lecture 5	1	**Topic:** Synthesis of Logic Functions, Minimization of Logic Expressions. **Ref:** RB1 (2.5,3.1); OR1			
Lecture 6	1	**Topic:** Minimization of Logic Expressions, Minimization using Karnaugh Maps **Ref:** RB1 (3.1-3.3); OR1			
Lecture 7	1	**Topic:**, Minimization of different logic functions using Karnaugh Maps. **Ref:** RB1 (3.4-3.5,3.8); OR1			
Lecture 8	1	**Topic:** Synthesis with NAND gate. **Ref:** RB1 (3.6); OR1			
Lecture 9	1	**Topic:** Synthesis with NOR gate. **Ref:** RB1 (3.6,3.7); OR1			
Lecture 10	1	**Topic:** Character Codes, Tri-State Buffers. **Ref:** RB1 (3.8,3.9); OR1			
Lecture 11	2	**Topic:** Introduction to signed numbers, Addition of Signed Numbers. **Ref:** TB1 (1.4); OR1			
Lecture 12	2	**Topic:** Addition/ Subtraction Logic Unit, Basics of fast adder. **Ref:** TB1 (6.1); OR1			
Lecture 13	2	**Topic:** Addition of numbers using Carry-Look ahead adder.			

		Ref: TB1 (6.2); OR1
Lecture 14	2	**Topic:** Multiplication of Positive Numbers, basics of signed number. **Ref:** TB1 (6.3); OR1
Lecture 15	2	**Topic:** Signed Operand Multiplication: Booth Algorithm. **Ref:** TB1 (6.4); OR2
Lecture 16	2	**Topic:** Fast Multiplication: Bit-Pair Recoding Multipliers. **Ref:** TB1 (6.5); OR3
Lecture 17	2	**Topic:** Carry-Save Addition of Summands. **Ref:** TB1 (6.6); OR1
Lecture 18	2	**Topic:** Restoring Integer Division, Non restoring Integer Division. **Ref:** TB1 (6.6); OR1
Lecture 19	2	**Topic:** Floating-Point Numbers, IEEE Standard for Floating-Point Numbers single precision. **Ref:** TB1 (6.7); OR2
Lecture 20	2	**Topic:** IEEE Standard for Floating-Point Numbers double precision, Guard Bits and Truncation, Arithmetic Operations. **Ref:** TB1 (6.7); OR1
Lecture 21	3	**Topic:** Introduction to combinational circuits.MUX and its types. **Ref:** TB1 (A.10); OR2
Lecture 22	3	**Topic:** Decoders and its types. **Ref:** TB1 (A.9); OR3
Lecture 23	3	**Topic:** Basics of Programmable Logic Devices (PLDs), Programmable Array Logic (PAL). **Ref:** TB1 (A.11); OR3
Lecture 24	3	**Topic:** Concept of Complex Programmable Logic Devices (CPLDs), Field-Programmable Gate Array (FPGA). **Ref:** TB1 (A.11, A.12); OR1
Lecture 25	3	**Topic:** Introduction to sequential circuits. Introduction to latch and flip-flops. SR Flip flop **Ref:** TB1 (A.6); OR1
Lecture 26	3	**Topic:** JK Flip-flop, T Flip-Flops. **Ref:** TB1 (A.6); OR2
Lecture 27	3	**Topic:** Master-Slave Flip-Flops, Edge-Triggering. **Ref:** TB1 (A.6); OR1
Lecture 28	3	**Topic:** Basics of Counters, UP/ DOWN Counters, Timing Diagrams. **Ref:** TB1 (A.8,A.13); OR1
Lecture 29	3	**Topic:** Introduction to Registers and Shift Registers. **Ref:** TB1 (A.7); OR1
Lecture 30	3	**Topic:** Concept of Finite State Machine Model, Synthesis of Finite State Machines.. **Ref:** TB1 (A.13); OR1
Lecture 31	4	**Topic:** Basics of memory, concept of primary and secondary memory. **Ref:** TB1 (5.1); OR2
Lecture 32	4	**Topic:** Internal Organization of Memory Chips. Concept and function of Static Memories. **Ref:** TB1 (5.2.1); OR3
Lecture 33	4	**Topic:** Difference between SRAM and Asynchronous DRAMS.

		Ref: TB1 (5.2.3); OR3
Lecture 34	4	**Topic:** Synchronous DRAMS, Structure of Large Memories. **Ref:** TB1 (5.2.4, 5.2.5); OR1
Lecture 35	4	**Topic:** Considerations of memory system, RAMBUS Memory. **Ref:** TB1 (5.2.6,5.2.7); OR2
Lecture 36	4	**Topic:** Introduction to ROM, PROM, EPROM, EEPROM. **Ref:** TB1 (5.3.1-5.3.4); OR3
Lecture 37	4	**Topic:** Flash Memory, Comparison of Speed, Size, and Cost of Memory. **Ref:** TB1 (5.3.5,5.4); OR2
Lecture 38	4	**Topic:** Introduction to secondary memory, Magnetic Hard Disks. **Ref:** TB1 (5.9,5.9.1); OR1
Lecture 39	4	**Topic:** Concept of Optical Disks. **Ref:** TB1 (5.9.2); OR1
Lecture 40	4	**Topic:** Magnetic Tape Systems. **Ref:** TB1 (5.9.3); OR1

Type	Code	PROGRAMMING USING C++	L-T-P	Credits	Marks
CS	CC-2		3-1-2	4	100
Topic Objective	• To know about the Object Oriented Programming concepts. • To learn basics of C++ programming language. • To be able to develop logics to create programs/ applications in C++.				
Prerequisites	Basic analytical, logical, problem solving skills with basic knowledge and usage of computers is required for this course.				
Lecture Scheme	Regular lectures (classroom/virtual class with computer/Smartphone) with use of ICT as and when required, lectures are planned to be interactive with focus on application.				

Evaluation Scheme

Internal Assessment			Written Assessment	Total
Assignment(s)	Unit Test	Mid-Term (Written)	End-Term	
0	0	15	60	75

University Syllabus

Unit No	Topics	Hours
Unit-1	Principles of Object-Oriented Programming: Object-Oriented Programming (OOP) Paradigm, Basic Concepts of OOP, Benefits of OOP, Characteristics of OOPS, Object Oriented Languages, Applications of OOP. Introduction to C++, Difference between C & C++, Tokens, Data types, Operators, Structure of C++ Program, C++ statements, Expressions and Control Structures. Functions in C++: Argument passing in function, Inline Functions, Default Arguments, Const. Arguments, Friend function.	10
Unit-2	Classes and Objects: Defining Member Functions, Making an outside Function Inline, Nested Member Functions, Private Member Functions, Arrays within a Class, Memory Allocation for Objects, Static Data Members, Static Member Functions, Arrays of Objects, Objects as Function Arguments, Friend Functions. Constructors & Destructors: Constructors Parameterized Constructors, Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Constructor, Dynamic Constructors, Destructors.	10
Unit-3	Inheritance: Basics of Inheritance, Type of Inheritance, Virtual Base Classes, Abstract Classes, Member Classes, Nesting of Classes. Polymorphism: Pointers, Pointers to Objects, this Pointer, Pointers to Derived Classes, Virtual Functions, Pure Virtual Functions, Function Overloading, Operator Overloading.	10
Unit-4	Managing Console I/O Operations: C++ Streams, C++ Stream Classes, Unformatted I/O Operations, Formatted Console I/O Operations, Managing Output with Manipulators. Files: Classes for File Stream Operations, Opening and Closing a File, Detecting end-of-file, File Modes, File Pointers and their Manipulations, Sequential Input and Output Operations, Updating a File: Random Access, Error Handling during File Operations, Command-line Arguments.	10
	Total (Hours)	40

Text Books

1. E. Balgurusawmy, Object Oriented Programming with C++, 4/e (TMH).
2. Paul Deitel, Harvey Deitel, "C++: How to Program", 9/e. Prentice Hall. Online Resources:

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

CO1	Understand OOP concept, characteristics and applications of OOP and fundamentals of C++.
CO2	Apply the OOP concept to write C++ program in proper program structure.
CO3	Apply inheritance concept to reuse code in C++ program and use of pointers in writing polymorphism programs.
CO4	Analyze the Basics of files to write C++ program and know Error handling during file operation.

Program Outcomes Relevant to the Course:

PO1	**Computing Knowledge**: Apply the knowledge of mathematics, science, logic, computing fundamentals to address complex problems.
PO2	**Problem Analysis:** Ability in identifying, formulating and analyzing problems to derive substantiated conclusions through the applications of complex solutions.
PO3	**Design and Development**: Create solutions and system processes tailored to address complex IT challenges, leveraging both background knowledge and relevant tools.
PO4	**Investigation Techniques**: Employ computing knowledge and methodologies, such as experimental design, data analysis, interpretation and information synthesis to draw valid conclusions.
PO5	**Utilization of Modern Technology/Tools**: Skillfully create, select and apply appropriate techniques, resources and computing tools while understanding their limitations.
PO6	**Individual and Team Work:** Proficient in both independent and collaborative work across diverse environments, including leadership roles.
PO7	**Technocrat and Society:** Utilize contextual knowledge to assess societal, legal and security issues relevant to professional practices.
PO8	**Effective Communication**: Proficient in conveying complex ideas, writing reports, creating presentations and delivering messages to diverse audience.
PO9	**Ethics**: Adhere to ethical principles and professional norms for conducting oneself in a professional context.
PO10	**Skill and Competency**: Demonstrate the ability to analyze and apply the local and global impacts of project management, while consistently upgrading skill sets and navigating design various trade-offs.
PO11	**Lifelong Learning**: Recognize the necessity and possess the readiness and capability to engage in independent and continuous learning within the evolving landscape of technology.

Mapping of COs to POs: (1: Low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2		3					3	
CO2	3	3	2		3					3	
CO3	3	3	2		3					3	
CO4	3	3	2		3					3	

Type	Code	LESSON PLAN		L-T-P	Credits	Marks
Lecture No	Unit No	**PROGRAMMING USING C++**		3-1-2	4	75
Lecture 1	1	**Topic:** Introduction to Object Oriented Programming, A comparison of recent C++ Languages used in industry/research. **Ref:** TB1 (1.1, 1.2); OR1				
Lecture 2	1	**Topic:** Programming Paradigms and limitation of structural language, Introduction to OOP and its advantages. **Ref:** TB1 (1.3, 1.6); OR2				
Lecture 3	1	**Topic:** Basic Characteristics of OOPS, Different Object Oriented Languages, Applications of OOP in real life and industry. **Ref:** TB1 (1.7, 1.8); OR1				
Lecture 4	1	**Topic:** A comparison between C & C++, Different Tokens used in C++, Basic Data types. **Ref:** TB1 (2,1, 3.2,3.5,3.6,3.7); OR1				
Lecture 5	1	**Topic:**, Operators used in C++. **Ref:** TB1 (3.13-3.18); OR3				
Lecture 6	1	**Topic:**, Basic Structure of C++ Program, C++ statements **Ref:** TB1 (2.3,2.4,2.6); OR4				
Lecture 7	1	**Topic:**, Expressions and their types, Control Structures used in C++ program. **Ref:** TB1 (3.19,3.20,3.24); OR5				
Lecture 8	1	**Topic:**, Argument passing in function, use of pass by reference in C++. **Ref:** TB1 (4.2,4.3,4.4,4.5); OR1				
Lecture 9	1	**Topic:** Inline function. Default, Arguments, Const. Arguments **Ref:** TB1 (4.6,4.7,4.8); OR1				
Lecture 10	1	**Topic:** Function overloading, Friend and virtual function. **Ref:** TB1 (4.9,4.10); OR2				
Lecture 11	2	**Topic:** Basic concept of class, Defining Member Functions inside and outside class. **Ref:** TB1 (5.3,5.4,5.5,5.6); OR2				
Lecture 12	2	**Topic:** Nesting of Member Functions, Private Member Functions. **Ref:** TB1 (5.7,5.8); OR1				
Lecture 13	2	**Topic:** Arrays within a Class, Memory Allocation for Objects. **Ref:** TB1 (5.9,5.10); OR1				
Lecture 14	2	**Topic:** Static Data Members, Static Member Functions. **Ref:** TB1 (5.11,5.12); OR1				
Lecture 15	2	**Topic:** Arrays of Objects, Objects as Function Arguments. **Ref:** TB1 (5.13,5.14); OR3				
Lecture 16	2	**Topic:** Friend Functions, Introduction to Constructors, Application of constructor. **Ref:** TB1 (5.15,6.1,6.2); OR4				
Lecture 17	2	**Topic:** Types of Constructor Parameterized Constructors, Constructors with Default Arguments. **Ref:** TB1 (6.3,6.5); OR1				
Lecture 18	2	**Topic:** Dynamic Initialization of Objects, Copy Constructor. **Ref:** TB1 (6.6,6.7); OR1				

Lecture 19	2	**Topic:** Dynamic Constructor. Use of different types of constructor with examples
Lecture 20	2	**Topic:** Concept of Destructor, Difference between constructor and destructor. **Ref:** TB1 (6.11); OR1
Lecture 21	3	**Topic:** Introduction to Inheritance, Advantages of inheritance, Making private member inheritable. **Ref:** TB1 (8.2,8.3,8.4); OR2
Lecture 22	3	**Topic:** Different Types of Inheritance, Concept of Virtual Base class **Ref:** TB1 (8.5-8.9); OR3
Lecture 23	3	**Topic:** Abstract Classes, Member Classes: Nesting member class. **Ref:** TB1 (8.10-8.12); OR3
Lecture 24	3	**Topic:** Basic concept of Polymorphism, Types of polymorphism, Dynamic binding, static binding. **Ref:** TB1 (9.1); OR1
Lecture 25	3	**Topic:** Basic concept of Pointer, Pointers to Objects. **Ref:** TB1 (9.2,9.3); OR1
Lecture 26	3	**Topic:** this Pointer, Pointers to Derived Classes. **Ref:** TB1 (9.4,9.5); OR4
Lecture 27	3	**Topic:** Concept and rules of Virtual Functions. Working of Virtual function **Ref:** TB1 (9.6); OR5
Lecture 28	3	**Topic:** Concept of Pure Virtual Functions, relation between pure virtual function and abstract class. **Ref:** TB1 (9.7); OR1
Lecture 29	3	**Topic:** Concept of Function Overloading, Function overloading vs Function overriding. **Ref:** TB1 (4.9); OR1
Lecture 30	3	**Topic:** Concept of Operator Overloading. **Ref:** TB1 (3.22,7.1,7.2); OR1
Lecture 31	4	**Topic:** I/O Operations: Introduction to C++ Streams, C++ Stream Classes. **Ref:** TB1 (10.1,10.2,10.3); OR4
Lecture 32	4	**Topic:** Unformatted I/O Operations , Formatted Console I/O Operations. **Ref:** TB1 (10.4,10.5); OR3
Lecture 33	4	**Topic:** Managing Output with Manipulators. **Ref:** TB1 (10.6); OR5
Lecture 34	4	**Topic:** Working with files, Classes for File Stream Operations, Opening and Closing a File. **Ref:** TB1 (11.2,11.3); OR1
Lecture 35	4	**Topic:** Detecting end of-file, more about File Modes. **Ref:** TB1 (11.4,11.5); OR2
Lecture 36	4	**Topic:** File Pointers and their Manipulations. **Ref:** TB1 (11.6); OR3
Lecture 37	4	**Topic:** Sequential Input and Output Operations. **Ref:** TB1 (11.7); OR4
Lecture 38	4	**Topic:** Concept of Updating a File: Random Access. **Ref:** TB1 (11.8); OR1
Lecture 39	4	**Topic:** Concept of Error Handling during File Operations,. **Ref:** TB1 (11.9); OR1
Lecture 40	4	**Topic:** Command-line Arguments, examples **Ref:** TB1 (11.10); OR1

Type	Code	Discrete mathematical structures(GE/IC-1)	L-T-P	Credits	Marks
Lecture No	Unit No		3-1-0	4	75
Lecture 1	1	**Topic:**introduction to Logic **Ref:**TB1 ; TB2; OR1;OR2			
Lecture 2	1	**Topic**: The foundations: Logic and proofs **Ref:**TB1 ; TB2; OR1;OR2			
Lecture 3	1	**Topic:**Basic of propositional logic and propositional equivalences **Ref:**TB1 ; TB2; OR1;OR2;OR3			
Lecture 4	1	**Topic:**Predicates and quantifiers ,Nested quantifiers. **Ref:**TB1 ; TB2; OR1;OR2			
Lecture 5	1	**Topic:**Rules inference, Mathematical Induction. **Ref:**TB1 ; TB2; OR1;OR2			
Lecture 6	1	**Topic** :Basic of sets,Defination ,Types and operation of sets. **Ref:**TB1 ; TB2; OR1;OR2			
Lecture 7	1	**Topic** :Relations and functions,types and definations. **Ref:**TB1 ; TB2; OR1;OR2			
Lecture 8	1	**Topic**Closures of Equivalence Relations **Ref:**TB1 ; TB2; OR1;OR2			
Lecture 9	1	**Topic** :Partial ordering well ordering definition with examples. **Ref:**TB1 ; TB2; OR1;OR2;OR3			
Lecture 10	1	**Topic:**ordering, Lattice, Sum of products and product of sums principle of Inclusions and Exclusions. **Ref:**TB1 ; TB2; OR1;OR2:OR3			
Lecture 11	2	**Topic:**The basic of counting,Fundamental principle of counting(FPC) **Ref:**TB1 ; TB2; OR2			
Lecture 12	2	**Topic:**Permutation:Defination ,Examples and numericals regarding permutations. **Ref:**TB1 ; TB2; OR1;OR2			
Lecture 13	2	**Topic:**Combinations:Defination formula and numerical regarding combinations. **Ref:**TB1 ; TB2; OR1;OR2			
Lecture 14	2	**Topic:**ThePigeonhole principle **Ref:**TB1 ; TB2; OR1;OR2.			
Lecture 15	2	**Topic:**Some basicnumericals about Pigeonhole principle. **Ref:**TB1 ; TB2; OR1;OR2			
Lecture 16	2	**Topic:**Recurrence Relation:Defination and types of recurrence relations. **Ref:**TB1 ; TB2; OR1;OR2			
Lecture 17	2	**Topic:**properties of recurrence relations **Ref:**TB1 ; TB2; OR1;OR2			
Lecture 18	2	**Topic:**Solving Recurrence relations **Ref:**TB1 ; TB2; OR1;OR2			
Lecture 19	2	**Topic:**generating functions. Solving Recurrence using generating functions. **Ref:**TB1 ; TB2; OR1;OR2			
Lecture 20	2	**Topic:**addition problems regarding recurrence relation. **Ref:**TB1 ; TB2; OR1;OR2			
Lecture 21	3	**Topic:**Introduction to graphs, graphs terminologies **Ref:**TB1 ; TB2; OR1;OR2:OR3			
Lecture 22	3	**Topic:**Representation of graphs isomerphisim **Ref:**TB1 ; TB2; OR1;OR2			
Lecture 23	3	**Topic:**connectivity of graphs. **Ref:**TB1 ; TB2; OR1;OR2			

Lecture 24	3	**Topic:**Euler and Hamiltonian Paths **Ref:** TB1 ; TB2; OR1;OR2,
Lecture 25	3	**Topic**: Introduction to tree,definition with examples **Ref:**TB1 ; TB2; OR1;OR2
Lecture 26	3	**Topic:**Introduction to tree traversal. **Ref:**TB1 ; TB2; OR1;OR2
Lecture 27	3	**Topic**: spanning tree and tree search **Ref:**TB1 ; TB2; OR2
Lecture 28	3	**Topic**: spanning tree and tree search: Breadth first search, **Ref:**TB1 ; TB2; OR2;OR1
Lecture 29	3	**Topic:**spanning tree and tree search: Depth first search **Ref:**TB1 ; TB2; OR2
Lecture 30	3	**Topic:**introduction to cut-set,cut-vertex. Ref**:**TB1 ; TB2; OR2
Lecture 31	4	**Topic**: Introduction to modelling computation. **Ref:**TB1 ; TB2; OR2;OR3
Lecture 32	4	**Topic:**Finite State Machine,definition with examples **Ref:**TB1 ; TB2; OR2
Lecture 33	4	**Topic:**Finite-state machines with no output. **Ref:**TB1 ; TB2; OR2
Lecture 34	4	**Topic**: Deterministic Finite Automata (DFA) **Ref:**TB1 ; TB2; OR2
Lecture 35	4	**Topic:**Non Deterministic Finite Automata (DFA) **Ref:**TB1 ; TB2; OR2;OR3
Lecture 36	4	**Topic:**Grammars and Language **Ref:**TB1 ; TB2; OR2
Lecture 37	4	**Topic:**Language Recognition,Regular sets and regular Grammars. **Ref:**TB1 ; RB1; OR1
Lecture 38	4	**Topic**: A set of not recognized by a finite-state automa **Ref:**TB1 ; TB2; OR2,OR3
Lecture 39	4	**Topic:**Application of Pumping Lemma for Regular Language**.** **Ref:**TB1 ; TB2; OR2
Lecture 40	4	**Topic**: computing functions with turning machines. **Ref:**TB1 ; TB2; OR2;OR3