DEPARTMENT OF INFORMATION TECHNOLOGY

Lesson Plan

Session: Jan –Jun, 2026

Semester: 4th

Name: _____

University Roll Number: _____

BUDDHA INSTITUTE OF TECHNOLOGY

CL-1 Sector - 7, GIDA, Gorakhpur - 273209 (U.P)
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Index

TIME TABLE

BUDDHA INSTITUTE OF TECHNOLOGY, GIDA, GORAKHPUR

Department of Computer Science & Allied

CLASS TIME TABLE (2025-26 EVEN SEMESTER)

Program: INFORMATION TECHNOLOGY (IT)	w.e.f.: 02 FEBRUARY 2026	SEMESTER: 4-B	ROOM NO: 125(Block 3)

Day / Time	9:10-10:05 AM	10:05-11:00 AM	SHORT BREAK (15 Min.)	11:15-12:10 PM	12:10-01:05PM	LUNCH BREAK (45 Min.)	01:45-2:40 PM	2:40-3:35 PM	3:35-4:30 PM
MON	PP (SKS)	ESE (Mr. NT)		OS (SV)	OOPS (RR)		TAFL (SKP)	OOPS Lab-B1-NS -L-304	
								PP Lab-B2-SKS-L-305	
TUES	TAFL (SKP)	ESE (Mr. NT)		OS (SV)	PY (SKS)		OOPS (RR)	Techedge-VM-L-307	
WED	ESE (Mr. NT)	TC (AS)		OS (SV)	TAFL (SKP)		PY (SKS)	OS Lab-B1-SV-L-304	
								CSW Lab-B2-SKH-L-305	
THU	ESE (Mr. NT)	OOPS (RR)		TC (AS)	CSEP (SKH)		OS (SV)	Techedge-VM-L-307	
FRI	CSW Lab-B1-SKH-L-306			TAFL (SKP)	PY (SKS)		OOPS (RR)	PP Lab-B1-SKS-L-304	
	OOPS-B2-NS-L-402							OS Lab-B2-SV-L-305	
SAT	OS (SV)	OOPS (RR)		ESE (Mr. NT)	TAFL (SKP)				

EVALUATION SCHEME

Subject Code	Subject	Sessional Marks	Exam Marks	Total Marks
THEORY SUBJECTS				
BCS-401	**Operating System**	30	70	100
BCS-402	**Theory of Automata and Formal Language**	30	70	100
BCS-403	**Object Oriented Programming with Java**	30	70	100
BCC-402	**Python Programming**	30	70	100
BAS-401	**Technical Communication**	30	70	100
BOE-403	**Energy Science & Engineering**	30	70	100
PRACTICAL/DESIGN/DRAWING				
BCS-451	**Operating System Lab**	50	50	100
BCS-452	**Object Oriented Programming with Java Lab**	50	50	100
BCS-453	**Cyber Security Workshop**	50	50	100

BUDDHA INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE &ALLIED

PROGRAM: INFORMATION TECHNOLOGY

ACADEMIC YEAR 2025-26 (Even Semester)

LESSON PLAN DETAILS

Semester: IV	Section: **B**	Subject Code: BCS401	Contact Hours /week**: 5**
Course Name: B.Tech			# of credits: 4
Faculty name: Ms. Susheela verma			Designation: Assistant Professor
Sessional Marks: 30		End Semester Examination Marks:100	University Exam Hours: 3

Prerequisites if any:
Operating System

Content delivery methods:	By Face to face delivery, Presentation, Tutorial etc.

COURSE SYLLABUS (as prescribed by University / Board)

Module No	UNIT Contents	Hours	COs
1	**Introduction :** Operating system and functions, Classification of Operating systems- Batch, Interactive, Time sharing, Real Time System, Multiprocessor Systems, Multiuser Systems, Multiprocess Systems, Multithreaded Systems, Operating System Structure- Layered structure, System Components, Operating System services, Reentrant Kernels, Monolithic and Microkernel Systems.	**11**	**CO1**
2	**Concurrent Processes:** Process Concept, Principle of Concurrency, Producer / Consumer Problem, Mutual Exclusion, Critical Section Problem, Dekker's solution, Peterson's solution, Semaphores, Test and Set operation; Classical Problem in Concurrency- Dining Philosopher Problem, Sleeping Barber Problem; Inter Process Communication models and Schemes, Process generation.	**12**	**CO2**
3	**CPU Scheduling:** Scheduling Concepts, Performance Criteria, Process States, Process Transition Diagram, Schedulers, Process Control Block (PCB), Process address space, Process identification information, Threads and their management, Scheduling Algorithms, Multiprocessor Scheduling. Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock.	**15**	**CO3**
4	**Memory Management:** Basic bare machine, Resident monitor, Multiprogramming with fixed partitions, Multiprogramming with variable partitions, Protection schemes, Paging, Segmentation, Paged segmentation, Virtual memory concepts, Demand paging, Performance of demand paging, Page replacement algorithms, Thrashing, Cache memory organization, Locality of reference.	**14**	**CO4**
5	**I/O Management and Disk Scheduling:** I/O devices, and I/O subsystems, I/O buffering, Disk storage and disk scheduling, RAID. File System: File concept, File organization and access mechanism, File directories, and File sharing, File system implementation issues, File system protection and security.	**10**	**CO5**

COURSE OUTCOMES: At the end of the Course, the Student will be able to:

CO1	Understand the structure and functions of OS
CO2	Learn about Processes, Threads and Scheduling algorithms.
CO3	Understand the principles of concurrency and Deadlocks
CO4	Learn various memory management scheme
CO5	Study I/O management and File systems.

Mapping of CO v/s PO:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	-	-	-	-	-	-	-	-	1
CO2	3	1	2	2	1	-	-	-	-	-	-	
CO3	3	1	2	1	1	-	-	-	-	-	-	
CO4	3	2	2	1	1	-	-	-	-	-	-	
CO5	2	1	2	1	1	-	-	-	-	-	-	
Average	2.6	1.4	2.00	1.00	0.8	-	-	-	-	-	-	0.2

Mapping of CO v/s PSO:

	PSO1	PSO2	PSO3
CO1	1	1	1
CO2	1	2	2
CO3	2	3	1
CO4	1	2	1
CO5	1	2	1
Average	1.2	2.00	1.2

Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)

Topics to be covered beyond syllabus	

LESSON PLAN

Lecture	Module	Scheduled				Conducted			
		Topic	*RBT Levels	C O Mapping	Date	Topic	Date	No. Of Students	Faculty Sign
1	I	**Introduction:** Operating system and functions,	L1	CO1					
2		Classification of Operating systems- Batch, Interactive, Time sharing,	L1	CO1					
3		Real Time System, Multiprocessor Systems,	L1	CO1					
4		Multiuser Systems, Multiprocess Systems,	L1	CO1					
5		Multithreaded Systems	L1	CO1					
6		**Tutorial-1**							
7	I	Operating System Structure- Layered structure, System Components	L2	CO1					
8		Operating System services, Reentrant Kernels	L2	CO1					
9		Monolithic and Microkernel Systems.	L2	CO1					

10		**Tutorial-2**	L2	CO1					
11		**Revision-1**	L2	CO1					
12		**Concurrent Processes:** Process Concept, Principle of Concurrency	L2	CO2					
13		Producer / Consumer Problem	L3	CO2					
14		Mutual Exclusion, Critical Section Problem	L2	CO2					
15		Dekker's solution	L2	CO2					
16	**II**	Peterson's solution	L3	CO2					
17		**Tutorial-3**		CO2					
18		Semaphores, Test and Set operation	L3	CO2					
19		Classical Problem in Concurrency-Dining Philosopher Problem,	L3	CO2					
20		Sleeping Barber Problem	L3	CO2					
21		Inter Process Communication models and Schemes, Process generation	L2	CO2					
22		**Tutorial-4**		CO2					
23		**Revision-2**		CO2					
24	III	CPU Scheduling: Scheduling Concepts,	L2	CO3					

25		Performance Criteria, Process States,	L2	CO3					
26		Process Transition Diagram,	L2	CO3					
27		Schedulers, Process Control Block (PCB)	L2	CO3					
28		Process address space, Process identification information	L1	CO3					
29		Threads and their management	L1,L2	CO3					
30		**Tutorial-5**		CO3					
31		Scheduling Algorithms(cont)	L2	CO3					
32		Scheduling Algorithms	L2	CO3					
33		Multiprocessor Scheduling	L2	CO3					
34		Deadlock: System model, Deadlock characterization,	L2	CO3					
35		Prevention ,Avoidance and detection	L1	CO3					
36		Recovery from deadlock.		CO3					
37		**Tutorial-6**		CO3					
38		**Revision-3**		CO3					
39	**IV**	Memory Management: Basic bare machine, Resident monitor	L1	CO4					
40		Multiprogramming with fixed partitions	L1	CO4					

41		Multiprogramming with variable partitions	L2	CO4					
42		Protection schemes, Paging	L2	CO4					
43		Paging	L2	CO4					
44		**Tutorial-7**		CO4					
45		Segmentation,	L2	CO4					
46		Paged segmentation	L2	CO4					
47		Virtual memory concepts	L2	CO4					
48		Demand paging & Performance of demand paging	L2	CO4					
49		Page replacement algorithms		CO4					
50		Thrashing, Cache memory organization, Locality of reference.	L1	CO4					
51		**Tutorial-8**		CO4					
52		**Revision-4**		CO4					
53	**V**	I/O Management and Disk Scheduling: I/O devices, and I/O subsystems, I/O buffering	L1, L2	CO5					
54		Disk storage and disk scheduling	L1, L2	CO5					
55		RAID		CO5					

56		**Tutorial-9**		CO5					
57		File System: File concept, File organization and access mechanism	L2	CO5					
58		File directories, and File sharing	L2	CO5					
59		File system implementation issues	L2	CO5					
60		File system protection and security.	L2	CO5					
61		**Tutorial-10**		CO5					
62		**Revision-5**		CO5					

Class Test	**Syllabus**
CT-01	Class 1-Class 29
CT-02	Class 30-Class 60
PRE-AKTU	Full Syllabus

***Revised Bloom's Taxonomy (RBT) Levels:**
L1 – Remembering; L2 – Understanding; L3 – Applying; L4 – Analysing; L5 – Evaluating; L6 - Creating

Text Books:

T1. Aho, Sethi & Ullman, "Compilers: Principles, Techniques and Tools", Pearson Education.
T2. V Raghvan, "Principles of Compiler Design", TMH.

Faculty Sign **HOD's Sign**

LESSON PLAN DETAILS

Semester: IV	Section: D	Course Code: BCS 402	Contact Hours /week**: 5**
Course Name: Theory of Automata and Formal Languages			# of credits: 4
Faculty name: Mr. Shrawan Kumar Pandey			Designation: Assistant Professor
Sessional Marks: 30		End Semester Examination Marks:70	University Exam Hours: 3

Prerequisites if any:
Set Theory

Content delivery methods:	By Face to face delivery, Presentation, Tutorial etc.

COURSE SYLLABUS (as prescribed by University / Board)

Module No	UNIT Contents	Hours	COs
1	**Basic Concepts and Automata Theory:** Introduction to Theory of Computation- Automata, Computability and Complexity, Alphabet, Symbol, String, Formal Languages, Deterministic Finite Automaton (DFA)- Definition, Representation, Acceptability of a String and Language, Non Deterministic Finite Automaton (NFA), Equivalence of DFA and NFA, NFA with ε-Transition, Equivalence of NFA's with and without ε-Transition, Finite Automata with output- Moore Machine, Mealy Machine, Equivalence of Moore and Mealy Machine, Minimization of Finite Automata	**14**	**CO1**
2	**Regular Expressions and Languages:** Regular Expressions, Transition Graph, Kleen's Theorem, Finite Automata and Regular Expression- Arden's theorem, Algebraic Method Using Arden's Theorem, Regular and Non-Regular Languages- Closure properties of Regular Languages, Pigeonhole Principle, Pumping Lemma, Application of Pumping Lemma, Decidability- Decision properties, Finite Automata and Regular Languages	**12**	**CO2**
3	**Regular and Non-Regular Grammars:** Context Free Grammar(CFG)-Definition, Derivations, Languages, Derivation Trees and Ambiguity, Regular Grammars-Right Linear and Left Linear grammars, Conversion of FA into CFG and Regular grammar into FA, Simplification of CFG, Normal Forms- Chomsky Normal Form(CNF), Greibach Normal Form (GNF), Chomsky Hierarchy, Programming problems based on the properties of CFGs.	**13**	**CO3**
4	**Push Down Automata and Properties of Context Free Languages:** Nondeterministic Pushdown Automata (NPDA)- Definition, Moves, A Language Accepted by NPDA, Deterministic Pushdown Automata(DPDA) and Deterministic Context free Languages(DCFL), Pushdown Automata for Context Free Languages, Context Free grammars for Pushdown Automata, Two stack Pushdown Automata, Pumping Lemma for CFL, Closure properties of CFL, Decision Problems of CFL, Programming problems based on the properties of CFLs.	**14**	**CO4**

5	**Turing Machines and Recursive Function Theory :** Basic Turing Machine Model, Representation of Turing Machines, Language Acceptability of Turing Machines, Techniques for Turing Machine Construction, Modifications of Turing Machine, Turing Machine as Computer of Integer Functions, Universal Turing machine, Linear Bounded Automata, Church's Thesis, Recursive and Recursively Enumerable language, Halting Problem, Post's Correspondance Problem, Introduction to Recursive Function Theory.	**17**	**CO5**

COURSE OUTCOMES: At the end of the Course, the Student will be able to:

CO1	Make use of knowledge of basic concepts of automata theory for solving the problems of NFA, DFA, Mealy and Moore machine.
CO2	Utilize concept of Arden's theorem in DFA.
CO3	Apply fundamental concepts of regular grammar and CFG for solving the problems of regular language and CFL.
CO4	Model PDA for context free languages.
CO5	Model Turing Machine for computational problem.

Mapping of CO v/s PO:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	2	-	-	-	1	1	1
CO2	3	3	2	2	-	2	-	-	-	1	1	1
CO3	3	3	2	2	-	2	-	-	-	1	1	1
CO4	3	3	2	2	-	2	-	-	-	1	1	1
CO5	3	3	2	2	-	2	-	-	-	1	1	1
Average	3	3	2	2	-	2	-	-	-	1	1	1

Mapping of CO v/s PSO:

	PSO1	PSO2	PSO3
CO1	2	-	-
CO2	2	-	-
CO3	2	-	-
CO4	2	-	-
CO5	2	-	-
Average	2	-	-

Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)

Topics to be covered beyond syllabus	NA

LESSON PLAN

Lecture	Module	Scheduled				Conducted			
		Topic	***RBT Levels**	**C O Mapping**	**Date**	**Topic**	**Date**	**No. Of Students**	**Faculty Sign**
1	I	Introduction to Theory of Computation- Automata	L3	CO1					
2		Computability and Complexity,	L3	CO1					
3		Alphabet, Symbol, String	L3	CO1					

4		Formal Languages,	L3	CO1					
5		Deterministic Finite Automaton (DFA)- Definition, Representation	L3	CO1					
6		**Tutorial-1**	L3	CO1					
7		Acceptability of a String and Language, Non Deterministic Finite Automaton (NFA) , Equivalence of DFA and NFA,	L3	CO1					
8		NFA with ε-Transition, Equivalence of NFA's with and without ε-Transition	L3	CO1					
9		Finite Automata with output- Moore Machine, Mealy Machine,	L3	CO1					
10		Equivalence of Moore and Mealy Machine	L3	CO1					
11		Minimization of Finite Automata	L3	CO1					
12		**Tutorial-2**	L3	CO1					
13	II	Regular Expressions, Transition Graph	L3	CO2					
14		Kleen's Theorem,	L3	CO2					
15		Finite Automata and Regular Expression- Arden's theorem,	L3	CO2					
16		Finite Automata and Regular Languages	L3	CO2					
17		Algebraic Method Using Arden's Theorem,	L3	CO2					
18		**Tutorial-3**	L3	CO2					

19		Regular and Non-Regular Languages-	L3	CO2					
20		Closure properties of Regular Languages,	L3	CO2					
21		Pigeonhole Principle, Pumping Lemma.	L3	CO2					
22		Application of Pumping Lemma, Decidability- Decision properties,	L3	CO2					
23		Finite Automata and Regular Languages	L3	CO2					
24		**Tutorial-4**	L3	CO2					
25	III	Context Free Grammar(CFG)-Definition,	L3	CO3					
26		Derivations, Languages	L3	CO3					
27		Derivation Trees and Ambiguity	L3	CO3					
28		Regular Grammars-Right Linear and Left Linear grammars	L3	CO3					
29		Conversion of FA into CFG	L3	CO3					
30		**Tutorial-5**	L3	CO3					
31		Regular grammar into FA	L3	CO3					
32		Simplification of CFG, Normal Forms-Chomsky Normal Form(CNF)	L3	CO3					
33		Greibach Normal Form (GNF),	L3	CO3					

34		Chomsky Hierarchy	L3	CO3					
35		Programming problems based on the properties of CFGs	L3	CO3					
36		**Tutorial 6**	L3	CO3					
37	IV	Nondeterministic Pushdown Automata (NPDA)- Definition,	L3	CO4					
38		Moves, A Language Accepted by NPDA	L3	CO4					
39		Deterministic Pushdown Automata(DPDA)	L3	CO4					
40		Deterministic Context free Languages(DCFL)	L3	CO4					
41		Pushdown Automata for Context Free Languages,	L3	CO4					
42		**Revision Class 1**	L3	CO4					
43		**Tutorial 7**	L3	CO4					
44		Context Free grammars for Pushdown Automata, Two stack Pushdown Automata	L3	CO4					
45		Pumping Lemma for CFL,	L3	CO4					
46		Closure properties of CFL, Decision Problems of CFL, Programming problems based on the properties of CFLs.	L3	CO4					

47		**Revision Class 2**	L3	CO4					
48		**Tutorial-8**	L3	CO4					
49	V	Basic Turing Machine Model, Representation of Turing Machines	L3	CO5					
50		Language Acceptability of Turing Machines, Techniques for Turing Machine Construction.	L3	CO5					
51		Modifications of Turing Machine, Turing Machine as Computer of Integer Functions	L3	CO5					
52		Universal Turing machine, Linear Bounded Automata	L3	CO5					
53		**Revision Class 3**	L3	CO5					
54		**Tutorial-9**	L3	CO5					
55		Church's Thesis, Recursive and Recursively Enumerable language	L3	CO5					
56		Halting Problem, Post's Correspondence Problem, Introduction to Recursive Function Theory	L3	CO5					
57		**Revision Class 4**	L3	CO5					
58		**Tutorial-10**	L3	CO5					

Class Test	Syllabus
CT-01	Class 1-Class 29
PRE-AKTU	Full Syllabus

***Revised Bloom's Taxonomy (RBT) Levels:**
L1 – Remembering; L2 – Understanding; L3 – Applying; L4 – Analysing; L5 – Evaluating; L6 - Creating

Text Books:
T1 K. L. P. Mishra and N. Chandrashekaran, " Theory of Computer Science: Automata, Languages and Computation ", PHI Publication.
T2. Peter Linz, "An Introduction to Formal Languages and Automata", Wordpress.

Faculty Sign **Program Head's Sign**

LESSON PLAN DETAILS

Semester: IV	Section: D	Course Code: BCS403	Contact Hours /week**: 5**
Course Name: Object Oriented Programming with Java			# of credits: 3
Faculty name : **Prof. (Dr.) Roop Ranjan**			Designation: Associate Professor
Sessional Marks:30		End Semester Examination Marks:70	University Exam Hours: 3

Prerequisites if any:
Basics of Computers and Programming

Content delivery methods:	Marker and Board, PPT and Video Lectures

COURSE SYLLABUS (as prescribed by University / Board)

Module No	UNIT Contents	Hours	COs
1	**Introduction:** Why Java, History of Java, JVM, JRE, Java Environment, Java Source File Structure, and Compilation. Fundamental, **Programming Structures in Java**: Defining Classes in Java, Constructors, Methods, Access Specifies, Static Members, Final Members, Comments, Data types, Variables, Operators, Control Flow, Arrays & String. **Object Oriented Programming**: Class, Object, Inheritance Super Class, Sub Class, Overriding, Overloading, Encapsulation, Polymorphism, Abstraction, Interfaces, and Abstract Class. **Packages:** Defining Package, CLASSPATH Setting for Packages, Making JAR Files for Library Packages, Import and Static Import Naming Convention for Packages	**16**	**CO1**
2	**Exception Handling**: The Idea behind Exception, Exceptions & Errors, Types of Exception, Control Flow in Exceptions, JVM Reaction to Exceptions, Use of try, catch, finally, throw, throws in Exception Handling, In-built and User Defined Exceptions, Checked and Un-Checked Exceptions. Input /Output Basics: Byte Streams and Character Streams, Reading and Writing File in Java. Multithreading: Thread, Thread Life Cycle, Creating Threads, Thread Priorities, Synchronizing Threads, Inter-thread Communication.	**12**	**CO2**

3	**Java New Features**: Functional Interfaces, Lambda Expression, Method References, Stream API, Default Methods, Static Method, Base64 Encode and Decode, ForEach Method, Try-with resources, Type Annotations, Repeating Annotations, Java Module System, Diamond Syntax with 08 Inner Anonymous Class, Local Variable Type Inference, Switch Expressions, Yield Keyword, Text Blocks, Records, Sealed Classes	**11**	**CO3**
4	**Java Collections Framework**: Collection in Java, Collection Framework in Java, Hierarchy of Collection Framework, Iterator Interface, Collection Interface, List Interface, ArrayList, LinkedList, Vector, Stack, Queue Interface, Set Interface, HashSet, LinkedHashSet, SortedSet Interface, TreeSet, Map Interface, HashMap Class, LinkedHashMap Class, TreeMap Class, Hashtable Class, Sorting, Comparable Interface, Comparator Interface, Properties Class in Java.	**10**	**CO4**
5	**Spring Framework:** Spring Core Basics-Spring Dependency Injection concepts, Spring Inversion of Control, AOP, Bean Scopes- Singleton, Prototype, Request, Session, Application, Web Socket, Auto wiring, Annotations, Life Cycle Call backs, Bean Configuration styles Spring Boot: Spring Boot Build Systems, Spring Boot Code Structure, Spring Boot Runners, Logger, BUILDING RESTFUL WEB SERVICES, Rest Controller, Request Mapping, Request Body, Path Variable, Request Parameter, GET, POST, PUT, DELETE APIs, Build Web Applications	**11**	**CO5**

COURSE OUTCOMES: At the end of the Course, the Student will be able to:

CO1	Understand the Programming structures in JAVA, Object Oriented Programming and Packages.
CO2	Implement exception handling, file handling, and multi-threading in Java
CO3	Apply new java features to build java programs.
CO4	Analyze java programs with Collection Framework
CO5	Understand web and RESTful Web Services with Spring Boot using Spring Framework concepts

Mapping of CO v/s PO:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	2	1	1	-	-	-	-	-	-	1
CO2	3	2	2	1	1	-	-	-	-	-	-	1
CO3	3	2	2	1	1	-	-	-	-	-	-	1
CO4	3	2	2	1	1	-	-	-	-	-	-	1
CO5	3	2	2	1	1	-	-	-	-	-	-	1
Average	3	2	2	1	1	-	-	-	-	-	-	1

Mapping of CO v/s PSO:

	PSO1	PSO2	PSO3
CO1	2	2	2
CO2	2	2	2
CO3	2	2	2
CO4	2	2	2
CO5	2	2	2
Average	2	2	2

Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)

Topics to be covered beyond syllabus	NA

LESSON PLAN

L & M	Scheduled	Conducted

		Topic	*RBT Levels	C O Mapping	Date	Topic	Date	No. Of Students	Faculty Sign
1	I	Introduction: Why Java, History of Java,	L2						
2		JVM, JRE, Java Environment	L2						
3		Source File Structure and Compilation. Fundamental,	L2						
4		Programming Structures in Java: Defining Classes in Java,	L2						
5		Constructors, User defined Methods	L2						
6		Access Specifies, Static Members, Final Members,	L2						
7		Comments, Data types, Variables	L2						
8		Operators, Control Flow, Arrays & String.	L2						
9		**Tutorial 1**	L2						
10		Class, Object, Inheritance Super Class, Sub Class	L2						
11		Method Overriding, Method Overloading,	L2						
12		Encapsulation, Polymorphism	L2						

13		Abstraction, Interfaces, and Abstract Class	L2						
14		Packages: Defining Package, CLASSPATH Setting for Packages, Making JAR Files for Library Packages,	L2						
15		import and Static Import Naming Convention for Packages	L2						
16		**Tutorial 2**							
17	II	Exception Handling: The Idea behind Exception, Exceptions & Errors,	L2						
18		Types of Exception, Control Flow in Exceptions,	L3						
19		JVM Reaction to Exceptions, Use of try, catch, finally,	L2						
20		throw, throws in Exception Handling,	L3						
21		In-built and User Defined Exceptions Checked and Un-Checked Exceptions.	L2						
22		**Tutorial 3**							
23		Input /Output Basics: Byte Streams and Character Streams,	L3						
24		Reading and Writing File in Java.	L3						
25		Multithreading: Thread, Thread Life Cycle,	L3						
26		Creating Threads, Thread Priorities,	L3						
27		Synchronizing Threads, Inter-thread Communication.	L3						

28		**Tutorial 4**							
29	III	Java New Features: Functional Interfaces, Lambda Expression,	L2						
30		Method References, Stream API, Default Methods, Static Method,	L3						
31		Base64 Encode and Decode, For-Each Method,	L3						
32		Try-with resources, Type Annotations, Repeating Annotations,	L3						
33		Java Module System,	L2						
34		**Tutorial 5**							
35		Diamond Syntax with Inner Anonymous Class,	L2						
36		Local Variable Type Inference,	L3						
37		Switch Expressions, Records, Sealed Classes	L3						
38		Yield Keyword, TextBlocks,	L2						
39		**Tutorial 6**							
40	IV	Java Collections Framework: Collection in Java, Collection Framework in Java,	L2						
41		Hierarchy of Collection Framework, Iterator Interface,	L2						
42		Collection Interface, List Interface, ArrayList, LinkedList,	L4						

43		Vector, Stack, Queue Interface, Set Interface	L4						
44		**Tutorial 7**							
45		HashSet, LinkedHashSet, SortedSet Interface,TreeSet,	L4						
46		Map Interface, HashMap Class, LinkedHashMap Class,	L4						
47		TreeMap Class, Hashtable Class, Sorting,	L4						
48		Comparable Interface, Comparator Interface, Properties Class in Java	L4						
49		**Tutorial 8**							
50	V	Spring Core Basics-Spring Dependency Injection concepts	L2						
51		Spring Inversion of Control, AOP, Bean Scopes- Singleton	L2						
52		Prototype, Request, Session, Application, Web Socket,	L2						
53		Autowiring, Annotations, Life Cycle Call backs, Bean Configuration styles	L2						
54		**Tutorial 9**							
55		Spring Boot: Spring Boot Build Systems, Spring Boot Code Structure	L2						
56		Spring Boot Runners, Logger,	L2						
57		BUILDING RESTFUL WEB SERVICES, Rest Controller,	L2						

58		Request Mapping, Request Body, Path Variable, Request Parameter,	L2						
59		GET, POST, PUT, DELETE APIs, Build Web Applications	L2						
60		**Tutorial 10**							
61									
62									
63									
64									
65									
66									

Class Test	**Syllabus**
CT-01	
PRE-AKTU	

***Revised Bloom's Taxonomy (RBT) Levels:**
L1 – Remembering; L2 – Understanding; L3 – Applying; L4 – Analysing; L5 – Evaluating; L6 - Creating

References:

Text books: (As per University / Board syllabus)

T1. Herbert Schildt, "Java The complete reference", McGraw Hill Education.
T2. Craig Walls, "Spring Boot in Action", Manning Publication.

Faculty Sign **Program Head's Sign**

LESSON PLAN DETAILS

Semester: IV	Section: D	Course Code: BCC402	Contact Hours /week**: 4**
Course Name: Python Programming			# of credits:2
Faculty name: Mr. Shashank Kumar Srivastava			Designation: Assistant Professor
Sessional Marks:30		End Semester Examination Marks:70	University Exam Hours: 3

Prerequisites if any:
Basic Knowledge of Algorithm Design, Pseudocode, flowchart.

Content delivery methods:	Marker and Board, PPT and Video Lectures

COURSE SYLLABUS (as prescribed by University / Board)

Module No	UNIT Contents	Hours	COs
1	**Introduction to Python:** Python variables, Python basic Operators, Understanding python blocks. Python Data Types, Declaring and using Numeric data types: int, float etc.	**07**	**CO1**
2	**Python Program Flow Control Conditional blocks:** if, else and else if, Simple for loops in python, For loop using ranges, string, list and dictionaries. Use of while loops in python, Loop manipulation using pass, continue, break and else. Programming using Python conditional and loop blocks.	**09**	**CO2**
3	**Python Complex data types:** Using string data type and string operations, Defining list and list slicing, Use of Tuple data type. String, List and Dictionary, Manipulations Building blocks of python programs, string manipulation	**20**	**CO3**

	methods, List manipulation. Dictionary manipulation, Programming using string, list and dictionary in-built functions. Python Functions, Organizing python codes using functions.		
4	**Python File Operations:** Reading files, Writing files in python, Understanding read functions, read(), readline(), readlines(). Understanding write functions, write() and writelines() Manipulating file pointer using seek Programming, using file operations	**12**	**CO4**
5	**Python packages:** Simple programs using the built-in functions of packages matplotlib, numpy, pandas etc. GUI Programming: Tkinter introduction, Tkinter and PythonProgramming, Tk Widgets, Tkinter examples. Python programming with IDE.	**12**	**CO5**

COURSE OUTCOMES: At the end of the Course, the Student will be able to:

CO1	Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.
CO2	Express proficiency in the handling of strings and functions
CO3	Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets.
CO4	Identify the commonly used operations involving file systems and regular expressions.
CO5	Develop simple Python applications using built-in functions of standard libraries such as NumPy, Pandas, and Matplotlib, and design basic GUI-based programs using Tkinter and a Python IDE.

Mapping of CO v/s PO:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	-	-	-	-	-	-	-	2
CO2	2	2	2	2	-	-	-	-	-	-	-	2
CO3	2	2	2	2	-	-	-	-	-	-	-	2
CO4	2	2	2	2	-	-	-	-	-	-	-	2
CO5	2	2	2	2	-	-	-	-	-	-	-	2
Average	2	2	2	2	-	-	-	-	-	-	-	2

Mapping of CO v/s PSO:

	PSO1	PSO2	PSO3
CO1	2	2	1
CO2	2	2	1
CO3	2	2	1
CO4	2	2	1
CO5	2	2	1
Average	2	2	1

Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)

Topics to be covered beyond syllabus	NA

LESSON PLAN

L	M	Scheduled	Conducted

		Topic	*RBT Levels	C O Mapping	Date	Topic	Date	No. Of Students	Faculty Sign
1	I	Introduction about COs & POs related to the course and Introduction to subject							
2		Python variables	L2						
3		Python basic Operators	L2						
4		Understanding python blocks	L2						
5		Elements of Python, Type Conversion	L2						
6		Python Data Types	L2						
7		Declaring and using Numeric data types: int, float.	L2						
8	II	if, else and else if	L2						
9		Simple for loops in python	L2						
10		For loop using ranges	L2						
11		string, list and dictionaries	L2						

12		Use of while loops in python	L2						
13		Loop manipulation using pass	L2						
14		continue	L2						
15		break and else	L2						
16		Programming using Python conditional and loop blocks	L2						
17	III	String	L2						
18		String	L2						
19		String	L2						
20		Strings : Length of the string	L2						
21		Perform Concatenation and Repeat operations in it	L2						
22		Indexing and Slicing of Strings	L2						
23		List and Dictionary	L2						
24		Manipulations Building blocks of python programs	L2						
25		string manipulation methods.	L2						
26		List manipulation	L2						
27		Dictionary manipulation	L2						

28		Programming using string	L2						
29		list and dictionary in-built functions	L2						
30		Python Functions	L2						
31		Organizing python codes using functions	L2						
32	IV	Reading files	L2						
33		Writing files in python, Understanding read functions	L2						
34		read(), readline(), readlines()	L2						
35		Understanding write functions	L2						
36		write() and writelines() Manipulating file pointer using seek Programming	L2						
37		using file operations	L2						
38	V	Simple programs using the built-in functions of packages matplotlib	L2						
39		numpy, pandas etc	L2						
40		GUI Programming:	L2						
41		Tkinter introduction	L2						
42		Tkinter and PythonProgramming	L2						

43		Tk Widgets	L2						
44		Tkinter examples	L2						
45		Python programming with IDE	L2						

Class Test	**Syllabus**
CT-01	Class 1-Class 23
PRE-AKTU/CT-2	Full Syllabus

***Revised Bloom's Taxonomy (RBT) Levels:**
L1 – Remembering; L2 – Understanding; L3 – Applying; L4 – Analysing; L5 – Evaluating; L6 - Creating

TextBooks:
T1. Ashok Namdev Kamthane, Amit Ashok Kamthane- Programming and Problem Solving with PYTHON, Mc Graw Hill, 2019.
T2. Guido van Rossum and Fred L. Drake Jr, ―An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

Faculty Sign **Program Head's Sign**

LESSON PLAN

Semester: **I**	Section:	Course Code: **BAS401**	Contact Hours / week**: 2**
Course Name: **Technical Communication**			# of credits: **3**
Teacher's Name: **Mr. Ashutosh Srivastava**			Designation: **Assistant Professor**
Sessional Marks: **30**		End Semester Examination Marks:**70**	University Exam Hours: **3**

Prerequisites if any:
NA

Content delivery methods:	By Face to face delivery, Presentation, Tutorial etc.

COURSE SYLLABUS (as prescribed by University / Board)

Module No	UNIT Contents	Hours	COs
1	**Fundamentals of Technical Communication:** Technical Communication: Features; Distinction between General and Technical Communication; Language as a tool of Communication; Dimensions of Communication: Reading & comprehension; Technical writing: sentences; Paragraph; Technical style: Definition, types & Methods; The flow of Communication: Downward; upward, Lateral or Horizontal; Barriers to Communication.	**5**	**CO1**
2	**Forms of Technical Communication:** Technical Report: Definition & importance; Thesis/Project writing: structure & importance; synopsis writing: Methods; Technical research Paper writing: Methods & style; Seminar & Conference paper writing; Expert Technical Lecture: Theme clarity; Analysis & Findings; 7 Cs of effective business writing: concreteness, completeness, clarity, conciseness, courtesy, correctness, consideration, C.V./Resume writing; Technical Proposal: Types, Structure & Draft.	**6**	**CO2**

3	**Technical Presentation:** Strategies & Techniques Presentation: Forms; interpersonal Communication; Class room presentation; style; method; Individual conferencing: essentials: Public Speaking: method; Techniques: Clarity of substance; emotion; Humour; Modes of Presentation; Overcoming Stage Fear; Audience Analysis & retention of audience interest; Methods of Presentation: Interpersonal; Impersonal; Audience Participation: Quizzes & Interjections.	**7**	**CO3**
4	**Technical Communication Skills:** Interview skills; Group Discussion: Objective & Method; Seminar/Conferences Presentation skills: Focus; Content; Style; Argumentation skills: Devices: Analysis; Cohesion & Emphasis; Critical thinking; Nuances: Exposition narration & Description; effective business communication competence: Grammatical; Discourse competence: combination of expression & conclusion; Socio-linguistic competence: Strategic competence: Solution of communication problems with verbal and non verbal means.	**8**	**CO4**
5	**Dimensions of Oral Communication & Voice Dynamics:** Code and Content; Stimulus & Response; Encoding process; Decoding process; Pronunciation Etiquette; Syllables; Vowel sounds; Consonant sounds; Tone: Rising tone; Falling Tone; Flow in Speaking; Speaking with a purpose; Speech & personality; Professional Personality Attributes: Empathy; Considerateness; Leadership; Competence.	**4**	**CO5**

COURSE OUTCOMES: At the end of the Course, the student will be able to:

CO1	Understand the nature and objective of Technical Communication relevant for the work place as Engineers.
CO2	Utilize the technical writing for the purposes of Technical Communication and its exposure in various dimensions.
CO3	Imbibe inputs by presentation skills to enhance confidence in face of diverse audience.
CO4	Create a vast know-how of the application of the learning to promote their technical competence.
CO5	Evaluate their efficacy as fluent & efficient communicators by learning the voice-dynamics.

Mapping of CO v/s PO:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-

CO5	-	-	-	-	-	-	-	-	-	-	-	-
Average	-	-	-	-	-	-	-	-	-	-	-	-

	PSO1	PSO2	PSO3
CO1	-	-	-
CO2	-	-	-
CO3	-	-	-
CO4	-	-	-
CO5	-	-	-
Average	-	-	-

Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)

Gap in the syllabus	NA

Topics to be covered beyond syllabus	NA

LESSON PLAN

Le M	Scheduled	Conducted

		Topic	*RBT Levels	C O Mapping	Date	Topic	Date	No. Of Students	Faculty Sign
1	I	**Technical Communication: Features; Distinction between General and Technical Communication; Language as a tool of Communication**	L2	CO 1					
2		**Dimensions of Communication; Reading & Comprehension**	L2						
3		**Technical writing: Sentences; Paragraph; Technical style: Definition, Types & Methods**	L2						
4		**The Flow of Communication: Downward; Upward, Lateral or Horizontal**	L2						
5		**Barriers to Communication**	L2						
6	II	**Technical Report: Definition & importance; Thesis/Project Writing: Structure & Importance**	L2	CO 2					
7		**Synopsis Writing: Methods; Technical Research Paper Writing: Methods & Style**	L2						
8		**Seminar & Conference Paper Writing**	L2						
9		**Key-Note Speech: Introduction & Summarization**	L2						
10		**Expert Technical Lecture: Theme Clarity; Analysis & Findings**	L2						
11		**7 Cs of Effective Business Writing: Concreteness, Completeness, Clarity, Conciseness, Courtesy, Correctness, Consideration.**	L2						

12	III	**Presentation: Forms; Interpersonal Communication; Class Room Presentation; Style; Method**	L2	CO 3					
13		**Individual conferencing: Essentials**	L2						
14		**Public Speaking: Method**	L2						
15		**Techniques: Clarity of Substance;**	L2						
16		**Modes of Presentation; Overcoming Stage Fear: Confident Speaking**							
17		**Audience Analysis & Retention of Audience Interest; Methods of Presentation: Interpersonal**	L2						
18		**Methods of Presentation: Impersonal; Audience Participation: Quizzes & Interjections.**	L2						
19	IV	**Interview Skills**	L2	CO 4					
20		**Group Discussion: Objective & Method**	L2						
21		**Seminar/Conferences Presentation Skills: Focus; Content; Style**	L2						
22		**Argumentation skills: Devices: Analysis**	L2						
23		**Cohesion & Emphasis; Critical Thinking; Nuances: Exposition narration & Description**	L2						
24		**Discourse Competence: combination of expression & conclusion; Socio-linguistic Competence**	L2						
25		**Strategic Competence: Solution of communication problems with verbal and non verbal means**	L2						
26		**Kinesics: Definitions; Importance; Features of Body Language.**	L2						

27	V	**Voice Modulation: Quality, Pitch**	L2	CO 5					
28		**Rhythm; intonation; Pronunciation; Articulation**	L2						
29		**Stress & Accent**	L2						
30		**Linguistic Features Of Voice Control: Vowel & Consonant Sounds.**	L2						

Class Test	**Syllabus**
CT – 01	**Class 1 – Class 7**
CT – 02	**Class 8 – Class 18**
PRE – AKTU	**Full Syllabus**

***Revised Bloom's Taxonomy (RBT) Levels:**
L1 – Remembering; L2 – Understanding; L3 – Applying; L4 – Analysing; L5 – Evaluating; L6 - Creating

Literature

Text Books:

T1) Technical Communication: Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2007, New Delhi.
T2) Personality Development and Soft Skills by Barun K. Mitra, OUP, 2012, New Delhi.
T3) Spoken English- A Manual of Speech and Phonetics by R.K.Bansal & J.B.Harrison, Orient Blackswan, 2013, New Delhi.
T4) Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.

Reference Books:

R1) Practical Communication: Process and Practice by L.U.B. Pandey; A.I.T.B.S. Publications India Ltd.; Krishan Nagar, 2014, Delhi.
R2) Modern Technical Writing by Sherman, Theodore A (et.al); Apprentice Hall; New Jersey; U.S.

R3) A Text Book of Scientific and Technical Writing by S.D. Sharma; Vikas Publication, Delhi.
R4) Skills for Effective Business Communication by Michael Murphy, Harward University, U.S.
R5) Business Communication for Managers by Payal Mehra, Pearson Publication, Delhi

Faculty Sign **Program Head's Sign**

LESSON PLAN

Semester: IV	Section: B	Course Code: BOE 404	Contact Hours /week**: 5**
Course name: Energy science & Engineering			# of credits: 3
Teacher's name: Mr. Nitin Tripathi			Designation: AP
Sessional Marks:30		End Semester Examination Marks:70	University Exam Hours: 3

Prerequisites if any:
Mathematics, Basic Thermodynamics, Fluid Mechanics

Content delivery methods:	By Face to face delivery, Presentation, Tutorial etc.

COURSE SYLLABUS (as prescribed by University / Board)

Module No	UNIT Contents	Hours	COs
1	ENERGY AND ITS USAGE: Units and scales of energy use, Mechanical energy and transport, Heat energy: Conversion between heat and mechanical energy, Electromagnetic energy: Storage, conversion, transmission and radiation, Introduction to the quantum, energy quantization, Energy in chemical systems and processes, flow of CO2, Entropy and temperature, carnot and Stirling heat engines, Phase change energy conversion, refrigeration and heat pumps, Internal combustion engines, Steam and gas power cycles, the physics of power plants. Solid-state phenomena including photo, thermal and electrical aspects	19	CO1
2	NUCLEAR ENERGY: Fundamental forces in the universe, Quantum mechanics relevant for nuclear physics, Nuclear forces, energy scales and structure, Nuclear binding energy systematic, reactions and decays, Nuclear fusion, Nuclear fission and fission reactor physics, Nuclear fission reactor design, safety, operation and fuel cycles	12	CO2
3	SOLAR ENERGY: Introduction to solar energy, fundamentals of solar radiation and its measurement aspects, Basic physics of semiconductors, Carrier transport, generation and recombination in semiconductors, Semiconductor junctions: metal-semiconductor junction & p-n junction, Essential characteristics of solar photovoltaic devices, First Generation Solar Cells, Second Generation Solar Cells, Third Generation Solar Cells	12	CO3

4	CONVENTIONAL & NON-CONVENTIONAL ENERGY SOURCE: Biological energy sources and fossil fuels, Fluid dynamics and power in the wind, available resources, fluids, viscosity, types of fluid flow, lift, Wind turbine dynamics and design, wind farms, Geothermal power and ocean thermal energy conversion, Tidal/wave/hydro power	13	CO4
5	SYSTEMS AND SYNTHESIS: Overview of World Energy Scenario, Nuclear radiation, fuel cycles, waste and proliferation, Climate change, Energy storage, Energy conservation. Engineering for Energy conservation: Concept of Green Building and Green Architecture; Green building concepts, LEED ratings; Identification of energy related enterprises that represent the breath of the industry and prioritizing these as candidates; Embodied energy analysis and use as a tool for measuring sustainability. Energy Audit of Facilities and optimization of energy consumption	15	CO5

COURSE OUTCOMES: At the end of the Course, the Student will be able to:

CO1	Understand the Units and scales of energy use, Mechanical energy and transport, Heat energy and Solid-state phenomena including photo, thermal and electrical aspects
CO2	Understand the Fundamental forces in the universe, Quantum mechanics relevant for nuclear science
CO3	Understand the Introduction to solar energy, fundamentals of solar radiation and its measurement aspects, Basic physics of semiconductors, first Generation Solar Cells, Second Generation Solar Cells, Third Generation Solar Cells
CO4	Understand the Conventional & non-conventional energy source
CO5	Understand the Systems and Synthesis, concept of Green Building and Green Architecture, Energy Audit of Facilities and optimization of energy consumption

Mapping of CO v/s PO:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	–	–	–	–	–	–	–	2	–
CO2	3	2	3	–	–	–	–	–	–	–	2	–
CO3	3	2	3	–	–	–	–	–	–	–	2	–
CO4	3	2	3	–	–	–	–	–	–	–	2	–
CO5	3	2	3	–	–	–	–	–	–	–	2	–
Average	3	2	3					-			2	

	PSO1	PSO2	PSO3
CO1	2	1	-
CO2	2	1	-

CO3	2	1	-
CO4	2	1	-
CO5	2	1	-
Average	2	1	

Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)

Gap in the syllabus	NA

Topics to be covered beyond syllabus	NA

LESSON PLAN

Lecture	Module	Scheduled				Conducted			
		Topic	*RBT Levels	C O Mapping	Date	Topic	Date	No. Of Students	Faculty Sign
1	I	**Energy and its Usage:** Units and scales of energy use	L2	CO1					
2		Mechanical energy and transport	L2						
3		Heat Energy	L2						
4		Electromagnetic energy: Storage	L2						
5		conversion, transmission and radiation	L2						
6		Introduction to the quantum, energy quantization	L2						
7		Energy in chemical systems and processes	L2						
8		flow of CO2, Entropy and temperature	L2						
9		**Tutorial- 1**							
10		Carnot and Stirling heat engines	L3						
11		Phase change energy conversion	L3						
12		refrigeration and heat pumps	L3						
13		Internal combustion engines	L3						
14		Steam and gas power cycles	L3						

15		The physics of power plants. Solid-state phenomena including photo	L2						
16		Carnot and Stirling heat engines	L3						
17		Phase change energy conversion	L2						
18		thermal and electrical aspects	L2						
19		**Tutorial-2**							
20		**Nuclear Energy:** Fundamental forces in the universe	L2						
21		Quantum mechanics relevant for nuclear physics	L2						
22		Nuclear forces	L2						
23		energy scales and structure	L2						
24		**Tutorial-3**	L2						
25	II	Nuclear binding energy systematic	L2	CO2					
26		reactions and decays, Nuclear fusion	L2						
27		Nuclear fission and fission reactor physics	L3						
28		Nuclear fission reactor design, safety operation and fuel cycles	L2						
29		Nuclear fission reactor design	L3						
30		safety, operation and fuel cycles	L2						
31		**Tutorial-4**							

32	III	**Solar Energy:** Introduction to solar energy	L2	CO3					
33		fundamentals of solar radiation and its measurement aspects	L2						
34		Basic physics of semiconductors	L2						
35		Carrier transport	L2						
36		generation and recombination in semiconductors							
37		**Tutorial-5**	L2						
38		Semiconductor junctions: metal-semiconductor junction & p-n junction	L2						
39		Essential characteristics of solar photovoltaic devices	L2						
40		First Generation Solar Cells	L2						
41		Second Generation Solar Cells	L2						
42		Third Generation Solar Cells	L2						
43		**Tutorial-6**	L2						
44	IV	**Conventional & non-conventional energy source:** Biological energy sources and	L2	CO4					
45		Fossil fuels, Fluid dynamics	L3						
46		power in the wind	L2						
47		available resources, fluids, viscosity	L2						
48		types of fluid flow, lift	L3						
49		**Tutorial-7**	L2						

50		Wind turbine dynamics and design	L2						
51		wind farms, Geothermal power	L2						
52		ocean thermal energy conversion	L2						
53		Tidal/wave energy	L2						
54		hydro power	L2						
55		hydro power significance	L2						
56		**Tutorial-8**							
57	V	**Systems and Synthesis:** Overview of World Energy Scenario	L2	CO5					
58		Nuclear radiation, fuel cycles	L2						
59		Nuclear radiation, fuel cycles	L2						
60		waste and proliferation	L2						
61		Climate change	L2						
62		Energy storage	L2						
63		Energy conservation. Engineering for Energy conservation	L2						
64		**Tutorial-9**	L2						
65		Concept of Green Building and Green Architecture							
66		Green building concepts, LEED ratings	L2						
67		Identification of energy related enterprises that represent the breath of the industry and prioritizing these as candidates	L2						

68		Embodied energy analysis	L2						
69		use as a tool for measuring sustainability	L2						
70		Energy Audit of Facilities	L2						
71		**Tutorial-10**	L2						

Class Test	**Syllabus**
CT	**Class 1-Class 30**
PRE-AKTU	**Full Syllabus**

***Revised Bloom's Taxonomy (RBT) Levels:**
L1 – Remembering; L2 – Understanding; L3 – Applying; L4 – Analysing; L5 – Evaluating; L6 - Creating

Text Book:

1. Energy Science and Engineering- VEI Latest Edition 2023.

2. Energy and the Challenge of Sustainability, World Energy Assessment, New York, (2000).

Reference Books: (As per University / Board syllabus)

R1- Energy Science and Engineering- Dr. Umesh Rathore, S.K. Kataria & Sons.

R2- Energy Science and Engineering- Bhukya Laxman, LAP LAMBERT Academic Publishing.

Faculty Sign **Program Head's**