



K L Deemed to be University
Department of Computer Science and Engineering-Honors -- KLVZA
Course Handout
2022-2023, Odd Sem

Course Title	:ADVANCED OBJECT ORIENTED PROGRAMMING
Course Code	:21CS2116AA
L-T-P-S Structure	: 3-0-4-4
Pre-requisite	:
Credits	: 6
Course Coordinator	:Nagalakshmi Thirunavukkarasu
Team of Instructors	:
Teaching Associates	:

Syllabus : Design Patterns: Introduction to design patterns, Structural, Creational & Behavioural patterns. Decorator, Bridge, adapter and facade patterns, Singleton, factory method, abstract factory patterns, observer, command, state, iterator, chain of responsibility patterns, dependency injection. Clean Coding Techniques: Introduction to code smells - bloaters, Object-oriented abusers, change preventers, dispensables and couplers. Refactoring techniques to remove the code smells. Test Driven Development (TDD): Introduction to TTD, Introduction to Unit Testing & JUnit. Generics & Collections Framework: Introduction to generics, usage of generics with interfaces, building stacks, queues, and Priority Queues, applying the comparator, comparable, cloneable & iterator interfaces, Introduction to Sets and Maps and their Java API. Building BST, AVL trees and graphs-based algorithms. Graph visualization, traversal, DFS and BFS. Case studies related to trees and graphs. Multi-threading & Parallel programming: Introduction to Multithreading and Parallel Programming, Thread Concepts & its States, Creating Tasks & Threads, Thread Classes, Thread Pools, Thread Synchronization & Locks, Cooperation among Threads, Case Study: Producer/Consumer, Blocking Queues, Semaphores, Deadlock Avoidance, Synchronized Collections & Parallel Programming. JDBC: API, Components, Architecture (2 Tier & 3 Tier), Divers & Its Types, Packages for JDBC Connection, Steps to connect to Databases (PostgreSQL). Servlets: Overview, Life Cycle of Servlet, Attributes in Servlets, Interaction between Client & Servlet, Servlet demo Application development with Sessions, JSP: JSP & Advantages over servlets, Features, syntax, Life Cycle of JSP, Environmental Setup for JSP, Interaction between client, JSP & server, JSP demo Application Development,

Text Books : 1. Eric Freeman, Elisabeth Robson, Bert Bates, Kathy Sierra, Head First Design Patterns, O'Reilly Media, Inc., October 2004. 2. Y Daniel Lian, Introduction to Java Programming, Pearson, 10th Edition, 2011. 3. Sahaan, V., Sianipar, R.H., Step by Step Database Programming, 2019, SPARTA Publishing. 4. Kathy Sierra, Bryan Basham, Bert Bates, Head First Servlets and JSP, O'Reilly Media, Inc., 2nd Edition, 2008.

Reference Books : 1. Gamma, E., Helm, R., Johnson, R., Johnson, R. E., & Vlissides, J. (1995). Design patterns: elements of reusable object-oriented software. Pearson Deutschland GmbH. 2. Kent Beck, (2002). Test-Driven Development – by Example. Pearson publication. 3. Naftalin, Maurice, and Philip Wadler. (2005). Generics and Collections in Java. O'reilly Media Inc. 4. Brian Goetz. (2006). Java Concurrency in Practice. Bible Inc. 5. Tittel, E., Dykes, L. (2011). XML For Dummies. Germany: Wiley. 6. Santosh Kumar K. , Kogent Solutions Inc., Santosh Kumar K. And Kogent Solutions Inc. (2008). JDBC, Servlets, And JSP Black Book. Dreamtech Press.

Web Links : 1. <https://www.javatpoint.com/design-patterns-in-java> 2. <https://github.com/JuanCrg90/Clean-Code-Notes> 3. <https://www.geeksforgeeks.org/dynamic-programming>

MOOCS : 1. <https://www.coursera.org/learn/design-patterns> 2. <https://www.coursera.org/learn/test-and-behavior-driven-development-tdd-bdd> 3. <https://www.coursera.org/learn/object-oriented-programming-with-java> 4. <https://www.coursera.org/learn/java-servlet-pages>

Course Rationale : If we try to identify those contributions of Computer Science, which will be long

lasting, surely one of these will be the refinement of the concept called Design Patterns with respect to object oriented programming. Design patterns help promote easier program changes and object reusability. Loosely coupled objects are easier to reuse and change. Through Test Driven Development, the early and frequent nature of the testing helps to catch defects early in the development cycle, preventing them from becoming endemic and expensive problems. Generics allow us to provide the type of Object that a collection can contain, so if you try to add any element of other type it throws compile time error. The Collection in Java is a framework that provides an architecture to store and manipulate the group of objects. The Combination of OOP with concurrency mechanisms like threads, the phrase "concurrent object-oriented programming" primarily refers to systems where objects themselves are a concurrency primitive, such as when objects are combined with the actor model. This study has led to the discovery of many important design patterns, Generics & Collection frameworks, Concurrent programming and JDBC, Servlet & JSP. The purpose of this course is to learn these concepts to devise and analyze new applications with respect to Object Oriented Programming by their own.

Course Objectives : The objective of this course is to study paradigms and approaches used to apply the design patterns, TDD Techniques and develop applications with the concept of Generics & Concurrent programming and to appreciate the impact of Improved Object Oriented Programming in practice.

COURSE OUTCOMES (COs):

CO NO	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
CO1	Apply Design Patterns & Test-Driven Development with Clean coding Techniques.	PO1	3
CO2	Understand the Collections & Generics over Object-oriented Programming.	PO2,PO5	4
CO3	Apply the various Concurrent Programming methodologies in Object-oriented Programming	PO2,PO5	4
CO4	Develop the applications using JDBC, Servlets, JSP	PSO2,PO2,PO5	4
CO5	Analyze the various design techniques to solve any real-world problems.	PSO1,PO2,PO5	4

COURSE OUTCOME INDICATORS (COIs)::

Outcome No.	Highest BTL	COI-1	COI-2	COI-3	COI-4
CO1	3	Btl-1 Remembering the basic ideas of Coding and its performance analysis	Btl-2 Understanding the concepts of Design Patterns	Btl-3 Apply various Clean Coding Techniques and Test Driven Development Methodologies to augment the code	
CO2	4	Btl-1 Remembering the concepts of basic data structures	Btl-2 Understanding the concepts of Generics & Interfaces	Btl-3 Apply the concept of stacks and queues with respective to Generics and collections	Btl-4 Analyze the problems that can be solved by Sets and Maps and their Java API along with Trees.
CO3	4	Btl-1 Remembering graph	Btl-2 Understanding dynamic	Btl-3 Apply dynamic	Btl-4 Analyze state space tree for the problems

		traversal algorithms: BFS, DFS	programming and backtracking	Programming to solve problems.	that can be solved by using backtracking method.
CO4	4	Btl-1 Remembering the basic concepts of multi-threading and parallel programming	Btl-2 Understanding the concepts of Threads & Its states.	Btl-3 Apply various multithreading mechanisms like pools, synchronizations, lock and semaphores along with deadlock avoidance	Btl-4 Analyze the problems with Synchronized Collections & Parallel Programming.
CO5	4				Btl-4 Student will be able to analyze and apply suitable design technique to implement given real world problems.

PROGRAM OUTCOMES & PROGRAM SPECIFIC OUTCOMES (POs/PSOs)

Po No.	Program Outcome
PO1	Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences
PO3	Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
PO4	Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions for complex problems that cannot be solved by straightforward application of knowledge, theories and techniques applicable to the engineering discipline.
PO5	Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
PO9	Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

PO11	Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.				
PO12	Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.				
PSO1	An ability to design and develop software projects as well as Analyze and test user requirements.				
PSO2	An Ability to gain working Knowledge on emerging software tools and technologies.				

Lecture Course DELIVERY Plan:

Sess.No.	CO	COI	Topic	Book No[CH No][Page No]	Teaching-Learning Methods	Evaluation Components
1	CO1	COI-1	Course Handout, Introduction to design patterns.	T BOOK [1],CH 1 Page no 1-4, 5-13	Chalk,LTC,PPT,Talk	Continuous Evaluation - Lab Exercise,End Semester Exam,Global Challenges,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM1,Skill Sem-End Exam,Skilling Continuous Evaluation
2	CO1	COI-2	Structural & Creational Patterns	Web Link [1]	Chalk,LTC,PPT,Talk	Continuous Evaluation - Lab Exercise,End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM1,Skillling Continuous Evaluation
3	CO1	COI-2	Behavioural patterns	Web Link [1]	Chalk,LTC,PPT,Talk	Continuous Evaluation - Lab Exercise,End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM1,Skill Sem-End Exam,Skilling Continuous Evaluation

Sess.No.	CO	COI	Topic	Book No[CH No][Page No]	Teaching-Learning Methods	Evaluation Components
4	CO1	COI-2	Decorator, Bridge, adapter and facade patterns	T BOOK [1],CH 12, Page no 501-545.	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM1,Skill Sem-End Exam,Skilling Continuous Evaluation
5	CO1	COI-2	Singleton, factory method, abstract factory patterns and Observer patterns.	T BOOK [1],CH 5, Page no 170-188	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM1,Skill Sem-End Exam,Skilling Continuous Evaluation
6	CO1	COI-2	Command, State, iterator, chain of responsibility patterns and dependency injection.	T BOOK [2],CH 14, Page no 612-616	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM1,Skill Sem-End Exam,Skilling Continuous Evaluation
7	CO1	COI-3	Clean Coding Techniques	Web Link [2]	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM1,Skill Sem-End Exam,Skilling Continuous Evaluation

Sess.No.	CO	COI	Topic	Book No[CH No][Page No]	Teaching-Learning Methods	Evaluation Components
8	CO1	COI-3	Test Driven Development (TDD)	Web Link [2]	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM1,Skill Sem-End Exam,Skilling Continuous Evaluation
9	CO2	COI-1	Introduction to Generics, usage of generics with interfaces.	T BOOK [1], CH 21, pages 708-719	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM1,Skill Sem-End Exam,Skilling Continuous Evaluation
10	CO2	COI-2	Building stacks queues, and Priority Queues	T BOOK [1], CH 22, pages 748-751	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM1,Skill Sem-End Exam,Skilling Continuous Evaluation
11	CO2	COI-2	Applying the comparator, comparable, cloneable & iterator interfaces	T BOOK [1], CH 22, pages 728-738	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM1,Skill Sem-End Exam,Skilling Continuous Evaluation

Sess.No.	CO	COI	Topic	Book No[CH No][Page No]	Teaching-Learning Methods	Evaluation Components
12	CO2	COI-2	Introduction to Sets and Maps and their Java API	T BOOK [1], CH 22, pages 730-756	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM1,Skill Sem-End Exam,Skilling Continuous Evaluation
13	CO2	COI-3	Building BST, AVL Trees	T BOOK [1], CH 45	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM1,Skill Sem-End Exam,Skilling Continuous Evaluation
14	CO2	COI-3	Graph based Algorithms	T BOOK [1], CH 27, pages 892-898	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM1,Skill Sem-End Exam,Skilling Continuous Evaluation
15	CO2	COI-3	Graph Visualization	T BOOK [1], CH 27, pages 909-911	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM1,Skill Sem-End Exam,Skilling Continuous Evaluation

Sess.No.	CO	COI	Topic	Book No[CH No][Page No]	Teaching-Learning Methods	Evaluation Components
16	CO2	COI-4	Traversal – DFS & BFS	T BOOK [1], CH 27, pages 911-916	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM1,Skill Sem-End Exam,Skilling Continuous Evaluation
17	CO2	COI-4	Case Study related to trees	T BOOK [1], CH 27, pages 919-922	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM1,Skill Sem-End Exam,Skilling Continuous Evaluation
18	CO2	COI-4	Case Study related to graph	T BOOK [1], CH 27, pages 923-938	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM1,Skill Sem-End Exam,Skilling Continuous Evaluation
19	CO3	COI-1	Introduction to Multithreading and Parallel Programming	Web link[3]	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM1,Skill Sem-End Exam,Skilling Continuous Evaluation

Sess.No.	CO	COI	Topic	Book No[CH No][Page No]	Teaching-Learning Methods	Evaluation Components
20	CO3	COI-2	Thread Concepts & its States	T BOOK [1], CH 26, pages 858-881	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM1,Skill Sem-End Exam,Skilling Continuous Evaluation
21	CO3	COI-2	Creating Tasks & Threads, Thread Classes, Thread Pools.	T BOOK [1], CH 29, pages 971-972	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM1,Skill Sem-End Exam,Skilling Continuous Evaluation
22	CO3	COI-2	Thread Synchronization	T BOOK [1], CH 29, pages 972,1002	Chalk,LTC,PPT,Talk	Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM1,Skill Sem-End Exam,Skilling Continuous Evaluation
23	CO3	COI-2	Thread Locks	T BOOK [1], CH 29, pages 972-983	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM2,Skill Sem-End Exam,Skilling Continuous Evaluation

Sess.No.	CO	COI	Topic	Book No[CH No][Page No]	Teaching-Learning Methods	Evaluation Components
24	CO3	COI-3	Cooperation among Threads, Case Study: Producer/Consumer	T BOOK [1], CH 29, pages 985-989	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM2,Skill Sem-End Exam,Skilling Continuous Evaluation
25	CO3	COI-3	Blocking Queues	T BOOK [1], CH 29, pages 991-997	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM2,Skill Sem-End Exam,Skilling Continuous Evaluation
26	CO3	COI-3	Semaphores,	T BOOK [1], CH 29, pages 998-1000	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM2,Skill Sem-End Exam,Skilling Continuous Evaluation
27	CO3	COI-3	Deadlock Avoidance	T BOOK [1], CH 29, pages 1001	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM2,Skill Sem-End Exam,Skilling Continuous Evaluation

Sess.No.	CO	COI	Topic	Book No[CH No][Page No]	Teaching-Learning Methods	Evaluation Components
28	CO3	COI-4	Synchronized Collections & Parallel Programming	T BOOK [1], CH 29, pages 1002-1004	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM2,Skill Sem-End Exam,Skilling Continuous Evaluation
29	CO4	COI-1	JDBC - API, Component Architecture (2 Tier & 3 Tier)	T BOOK [1], CH 37, pages 1273-1286	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM2,Skill Sem-End Exam,Skilling Continuous Evaluation
30	CO4	COI-2	Drivers & Its Types, Packages of JDBC Connections	T BOOK [1], CH 38	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM2,Skill Sem-End Exam,Skilling Continuous Evaluation
31	CO4	COI-3	Steps to connect to Databases (PostgreSQL).	T BOOK [1], CH 38	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM2,Skill Sem-End Exam,Skilling Continuous Evaluation

Sess.No.	CO	COI	Topic	Book No[CH No][Page No]	Teaching-Learning Methods	Evaluation Components
32	CO4	COI-3	Overview & Life Cycle of Servlet	T BOOK [1], CH 39	Chalk,LTC,PPT,Talk	End Semester Exam,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM- EXAM2,Skill Sem-End Exam,Skilling Continuous Evaluation
33	CO4	COI-3	Attributes in Servlets, Interaction between Client & Servlet	T BOOK [1], CH 39	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM- EXAM2,Skill Sem-End Exam,Skilling Continuous Evaluation
34	CO4	COI-3	Servlet demo Application development with Sessions	T BOOK [1], CH 39	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM- EXAM2,Skill Sem-End Exam,Skilling Continuous Evaluation
35	CO4	COI-4	JSP & Advantages over servlets, Features, syntax, Life Cycle of JSP, Environmental Setup for JSP	T BOOK [1], CH 40	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM- EXAM2,Skill Sem-End Exam,Skilling Continuous Evaluation

Sess.No.	CO	COI	Topic	Book No[CH No][Page No]	Teaching-Learning Methods	Evaluation Components
36	CO4	COI-4	Interaction between client, JSP & server, JSP demo Application Development	T BOOK [1], CH 40	Chalk,LTC,PPT,Talk	End Semester Exam,Global Challenges,Lab End Semester Exam,Lab In Semester Exam,LCE,MOOCs Review,SEM-EXAM2,Skill Sem-End Exam,Skilling Continuous Evaluation

Lecture Session wise Teaching – Learning Plan

SESSION NUMBER : 1

Session Outcome: 1 Students will be able to understand the details of the course and able to understand the introduction of design patterns

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
10	Explanation about course hand out.	2	Chalk	--- NOT APPLICABLE ---
10	Introduction to Design Patterns	2	Chalk	--- NOT APPLICABLE ---
20	Real time Example & Scenario Discussion	2	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	2	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 2

Session Outcome: 2 Students will be able to understand the concepts of Structural & Creational Patterns

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
10	Structural Patterns	2	Chalk	--- NOT APPLICABLE

10	Creational Patterns	2	Chalk	--- NOT APPLICABLE ---
20	Builder patterns	2	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 3

Session Outcome: 2 Students will be able to find complexities of Behavioural patterns

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
10	Behavioural patterns	2	Chalk	--- NOT APPLICABLE ---
10	Chain of Responsibility Pattern and Interpreter Pattern	2	Chalk	--- NOT APPLICABLE ---
20	Iterator Pattern and Mediator Pattern	2	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 4

Session Outcome: 4 Students will be able to apply Decorator, Bridge, adapter and facade patterns

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
20	Decorator patterns	2	Chalk	--- NOT APPLICABLE ---
10	Bridge and adapter pattern	2	Chalk	--- NOT APPLICABLE ---
10	Façade pattern	2	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Talk	--- NOT

			APPLICABLE ---
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SESSION NUMBER : 5

Session Outcome: 2 Students will be able to apply Singleton, factory method, abstract factory patterns and Observer patterns.

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
20	Singleton and factory method	2	Chalk	--- NOT APPLICABLE ---
10	Abstract factory patterns.	2	Chalk	--- NOT APPLICABLE ---
10	Observer patterns	2	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 6

Session Outcome: 2 Students will be able to understand State, iterator, chain of responsibility patterns and dependency injection.

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Students will be able to understand State, iterator, chain of responsibility patterns and dependency injection.	1	Talk	--- NOT APPLICABLE ---
20	State, iterator	2	Chalk	--- NOT APPLICABLE ---
10	Chain of responsibility patterns.	2	Chalk	--- NOT APPLICABLE ---
10	Dependency injection.	2	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 7

Session Outcome: 3 Students will be able to apply Clean Coding Techniques

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
20	Clean Coding Techniques introduction	2	Chalk	--- NOT APPLICABLE ---
10	Source file structure	2	Chalk	--- NOT APPLICABLE ---
10	Naming conventions	2	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 8

Session Outcome: 3 Students can be able to understand the Test Driven Development (TDD)

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
10	Introduction Test Driven Development (TDD)	2	Chalk	--- NOT APPLICABLE ---
10	Motto of TDD	2	Chalk	--- NOT APPLICABLE ---
10	Practical examples on TDD	3	Chalk	--- NOT APPLICABLE ---
10	Sorting numbers using Merge sort	4	Chalk	--- NOT APPLICABLE ---
5	Conclusion&Summary	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 9

Session Outcome: 2 Students will be able to apply Introduction to Generics, usage of generics with interfaces

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT

				APPLICABLE ---
10	Introduction to Generics	2	Chalk	--- NOT APPLICABLE ---
20	Usage of generics with interfaces	2	Chalk	--- NOT APPLICABLE ---
10	Sample programs	3	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 10

Session Outcome: 2 Students will be able to understand the concept of Building stacks queues, and Priority Queues

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
10	Building stacks	2	Chalk	--- NOT APPLICABLE ---
10	Building queues	2	Chalk	--- NOT APPLICABLE ---
20	Priority Queues	2	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 11

Session Outcome: 2 Students will be able to apply the comparator, comparable, cloneable & iterator interfaces

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
10	Comparator and comparable interfaces	2	Chalk	--- NOT APPLICABLE ---
10	Cloneable interfaces	2	Chalk	--- NOT

				APPLICABLE ---
20	Iterator interfaces	2	Talk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 12

Session Outcome: 2 Students will be able to understand Sets and Maps and their Java API

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
10	Introduction to Sets	2	Chalk	--- NOT APPLICABLE ---
20	Introduction to Maps	2	Chalk	--- NOT APPLICABLE ---
10	Sets and Maps Java API	2	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 13

Session Outcome: 3 Students will be able to understand AVL Trees

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
10	AVL Trees introduction	2	Chalk	--- NOT APPLICABLE ---
20	Rotations	2	Chalk	--- NOT APPLICABLE ---
10	Sample program on AVL trees	3	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 14

Session Outcome: 3 Students will be able to apply Graph based Algorithms

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
10	Graph based Algorithms introduction	2	Talk	--- NOT APPLICABLE ---
10	Dijkstra's algorithm	3	Chalk	--- NOT APPLICABLE ---
20	Prims algorithm	3	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 15

Session Outcome: 3 Students will be able to analyze Graph Visualization

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Students will be able to analyze Graph Visualization	1	Talk	--- NOT APPLICABLE ---
10	Graph Visualization	2	Chalk	--- NOT APPLICABLE ---
10	Large scale Graph Visualization	2	Chalk	--- NOT APPLICABLE ---
20	Practical examples and solutions 3	3	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 16

Session Outcome: 3 Students will be able to analyze Traversal – DFS & BFS

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE

10	Graph traversals	2	Chalk	--- NOT APPLICABLE ---
20	BFS	4	Chalk	--- NOT APPLICABLE ---
10	DFS	4	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary 1	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 17

Session Outcome: 4 Students will be able to perform Case Study related to trees

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
10	Splay trees	4	Chalk	--- NOT APPLICABLE ---
10	Red black trees	4	Chalk	--- NOT APPLICABLE ---
20	Other trees	4	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 18

Session Outcome: 4 Students will be able to understand a Case Study related to graphs

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Chalk	--- NOT APPLICABLE ---
10	Types of graph	2	Talk	--- NOT APPLICABLE ---
10	Floyd warshall algorithm	2	Talk	--- NOT APPLICABLE ---
20	Java programs on graph	4	Chalk	--- NOT

				APPLICABLE ---
5	Conclusion & Summary	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 19

Session Outcome: 1 Students will be able to apply Introduction to Multithreading and Parallel Programming

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
20	Introduction to Multithreading	2	Chalk	--- NOT APPLICABLE ---
10	Multiprocessing vs. Multithreading	2	Chalk	--- NOT APPLICABLE ---
10	Parallel Programming	2	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 20

Session Outcome: 2 Students will be able to apply Thread Concepts & its States

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
10	Thread Concepts	2	Chalk	--- NOT APPLICABLE ---
10	Thread States	2	Chalk	--- NOT APPLICABLE ---
20	Thread programs on java	3	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 21

Session Outcome: 2 Students will be able to Create Tasks & Threads, Thread Classes, Thread Pools.

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
10	Creating Tasks & Threads.	2	Chalk	--- NOT APPLICABLE ---
10	Thread Classes	2	Chalk	--- NOT APPLICABLE ---
20	Thread Pools.	2	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 22

Session Outcome: 2 Students will be able to understand Thread Synchronization

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
10	Why Synchronization?	2	Chalk	--- NOT APPLICABLE ---
10	Thread Synchronization	2	Chalk	--- NOT APPLICABLE ---
20	Synchonization problems in Java	3	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 23

Session Outcome: 2 Students will be able to understand Thread Locks

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
10	Locks	2	Chalk	--- NOT APPLICABLE

10	Types of Locks	2	Chalk	--- NOT APPLICABLE ---
20	Problems in Locks	3	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 24

Session Outcome: 3 Students will be able to understand Cooperation among Threads & Case st

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
10	Cooperation among Threads	2	Chalk	--- NOT APPLICABLE ---
10	Case Study: Producer/Consumer	2	Chalk	--- NOT APPLICABLE ---
20	Producer/Consumer java program	3	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 25

Session Outcome: 3 Students will be able to analyze Blocking Queues

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
10	Blocking Queues	2	Chalk	--- NOT APPLICABLE ---
20	Blocking Queue Implementation	3	Chalk	--- NOT APPLICABLE ---
10	Blocking Queue problems	2	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Chalk	--- NOT

				APPLICABLE ---
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SESSION NUMBER : 26**Session Outcome: 3** Students will be able to analyze Semaphores

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
10	Semaphores	2	Chalk	--- NOT APPLICABLE ---
10	Semaphore Implementation	3	Chalk	--- NOT APPLICABLE ---
20	Semaphores program	3	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 27**Session Outcome: 3** Students will be able to analyze Deadlock Avoidance.

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
10	Deadlocks	2	Chalk	--- NOT APPLICABLE ---
10	Deadlock Avoidance	2	Chalk	--- NOT APPLICABLE ---
20	Deadlock Avoidance	2	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 28**Session Outcome: 4** Students will be able to analyze Synchronized Collections & Parallel Programming

Time(min)	Topic	BTL	Teaching-Learning	Active Learning
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			Methods	Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
10	Synchronized Collections	2	Chalk	--- NOT APPLICABLE ---
10	Parallel Programming	2	Chalk	--- NOT APPLICABLE ---
20	Synchronized methods programs in java	3	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 29

Session Outcome: 1 Students will be able to understand JDBC - API, Component Architecture (2 Tier & 3 Tier)

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
10	JDBC introduction	2	Chalk	--- NOT APPLICABLE ---
20	JDBC - API	2	Chalk	--- NOT APPLICABLE ---
10	Component Architecture of JDBC(2 Tier & 3 Tier)	2	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 30

Session Outcome: 2 Students will be able to apply Drivers & Its Types, Packages of JDBC Connections.

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
10	Drivers.	2	Chalk	--- NOT APPLICABLE ---

10	Types of drivers	2	Chalk	--- NOT APPLICABLE ---
20	Packages of JDBC Connections.	2	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 31

Session Outcome: 2 Students will be able to understand Steps to connect to Databases (PostgreSQL)

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
10	PostgreSQL	2	Chalk	--- NOT APPLICABLE ---
20	Steps to connect to Databases	3	Chalk	--- NOT APPLICABLE ---
10	Demo on JDBC connection	4	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 32

Session Outcome: 3 Students will be able to apply Overview & Life Cycle of Servlet

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
10	Overview Servlet	2	Chalk	--- NOT APPLICABLE ---
10	Life Cycle of Servlet	2	Chalk	--- NOT APPLICABLE ---
20	Servlet program	3	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Chalk	--- NOT APPLICABLE

SESSION NUMBER : 33

Session Outcome: 3 Students will be able to understand the classes Attributes in Servlets, Interaction between Client & Servlet

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Chalk	--- NOT APPLICABLE ---
10	Attributes in Servlets	2	Talk	--- NOT APPLICABLE ---
10	Interaction between Client & Servlet	2	Talk	--- NOT APPLICABLE ---
20	Interaction between Client & Servlet demo	3	Talk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 34

Session Outcome: 3 Students will be able to analyze Servlet demo Application development with Sessions

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
10	Servlet demo Application	4	Talk	--- NOT APPLICABLE ---
20	Sessions	2	Chalk	--- NOT APPLICABLE ---
10	Cookies	2	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 35

Session Outcome: 4 Students will be able to analyze java server pages(JSP)

Time(min)	Topic	BTL	Teaching-Learning	Active Learning

			Methods	Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
10	JSP & Advantages over servlets	2	Chalk	--- NOT APPLICABLE ---
20	Features, syntax, Life Cycle of JSP	3	Chalk	--- NOT APPLICABLE ---
10	Environmental Setup for JSP.	4	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 36

Session Outcome: 4 Students will be able to analyze the Interaction between client, JSP & server, JSP demo Application Development

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance/ Recap /Poll/Pop Question	1	Talk	--- NOT APPLICABLE ---
10	Interaction between client, JSP & server	1	Chalk	--- NOT APPLICABLE ---
10	JSP demo Application Development	2	Chalk	--- NOT APPLICABLE ---
20	Deploy the app. and analyze it	4	Chalk	--- NOT APPLICABLE ---
5	Conclusion & Summary	1	Talk	--- NOT APPLICABLE ---

Tutorial Course DELIVERY Plan: NO Delivery Plan Exists

Tutorial Session wise Teaching – Learning Plan

No Session Plans Exists

Practical Course DELIVERY Plan:

Tutorial Session no	Topics	CO-Mapping
1	Structural patterns	CO5

Tutorial Session no	Topics	CO-Mapping
2	Structural patterns	CO5
3	Test driven development	CO5
4	Test driven development	CO5
5	Implementation of Clean coding techniques	CO5
6	Implementation of Clean coding techniques	CO5
7	Stacks and queues application	CO5
8	Stacks and queues application	CO5
9	AVL Trees Rotations	CO5
10	AVL Trees Rotations	CO5
11	Applications of BFS, DFS methods	CO5
12	Applications of BFS, DFS methods	CO5
13	Searching for a number using Binary Search Trees	CO5
14	Searching for a number using Binary Search Trees	CO5
15	Multithreading applications	CO5
16	Multithreading applications	CO5
17	Deadlock detection & avoidance	CO5
18	Deadlock detection & avoidance	CO5
19	Database handling with JDBC connectivity	CO5
20	Database handling with JDBC connectivity	CO5
21	Servlet problems	CO5
22	Servlet problems	CO5
23	Applications of JSP	CO5
24	Applications of JSP	CO5

Practical Session wise Teaching – Learning Plan

SESSION NUMBER : 1

Session Outcome: 4 Analyze programs on structural design patterns

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Structural patterns	4	Chalk	--- NOT APPLICABLE ---
50	Structural patterns	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 2

Session Outcome: 4 Analyze programs on structural design patterns

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Structural patterns	4	Chalk	--- NOT APPLICABLE ---
50	Structural patterns	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 3

Session Outcome: 4 Analyze programs on test driven development

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Test Driven Development (TDD)	4	Chalk	--- NOT APPLICABLE ---
50	Test Driven Development (TDD)	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 4

Session Outcome: 4 Analyze programs on test driven development

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Test driven development	4	Chalk	--- NOT APPLICABLE ---
50	Test Driven Development (TDD)	4	Chalk	--- NOT APPLICABLE

SESSION NUMBER : 5

Session Outcome: 4 Analyze programs on Clean coding techniques

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Clean Coding Techniques	4	Chalk	--- NOT APPLICABLE ---
50	Clean Coding Techniques	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 6

Session Outcome: 4 Analyze programs on Clean coding techniques

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Clean coding technique	4	Chalk	--- NOT APPLICABLE ---
50	Clean Coding Techniques	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 7

Session Outcome: 4 Analyze programs on stacks and queues

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Stacks and queues	4	Chalk	--- NOT APPLICABLE ---
50	Stacks and queues	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 8

Session Outcome: 4 Analyze programs on stacks and queues

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Stacks and queues	4	Chalk	--- NOT APPLICABLE ---
50	Stacks and queues	4	Chalk	--- NOT

			APPLICABLE ---
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SESSION NUMBER : 9**Session Outcome:** 4 Analyze programs on AVL Trees

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	AVL Trees	4	Chalk	--- NOT APPLICABLE ---
50	AVL Trees	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 10**Session Outcome:** 4 Analyze programs on AVL Trees

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	AVL Trees	4	Chalk	--- NOT APPLICABLE ---
50	AVL Trees	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 11**Session Outcome:** 4 Analyze programs on BFS, DFS

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	BFS, DFS	4	Chalk	--- NOT APPLICABLE ---
50	BFS, DFS	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 12**Session Outcome:** 4 Analyze programs on BFS, DFS

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	BFS, DFS	4	Chalk	--- NOT APPLICABLE ---

50	BFS, DFS	4	Chalk	--- NOT APPLICABLE ---
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SESSION NUMBER : 13**Session Outcome:** 4 1 Analyze programs on binary search trees

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Binary search trees	4	Chalk	--- NOT APPLICABLE ---
50	Binary search trees	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 14**Session Outcome:** 4 1 Analyze programs on binary search trees

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Binary search trees	4	Chalk	--- NOT APPLICABLE ---
50	Binary search trees	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 15**Session Outcome:** 4 Analyze programs on multithreading

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Multithreading	4	Chalk	--- NOT APPLICABLE ---
50	Multithreading	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 16**Session Outcome:** 4 Analyze programs on multithreading

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Multithreading	4	Chalk	--- NOT APPLICABLE ---

50	Multithreading	4	Chalk	--- NOT APPLICABLE ---
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SESSION NUMBER : 17**Session Outcome:** 4 Analyze programs on deadlocks

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Deadlock	4	Chalk	--- NOT APPLICABLE ---
50	Deadlock	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 18**Session Outcome:** 4 Analyze programs on deadlocks

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Deadlock	4	Chalk	--- NOT APPLICABLE ---
50	Deadlock	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 19**Session Outcome:** 4 Analyze programs on JDBC connectivity

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	JDBC connectivity	4	Chalk	--- NOT APPLICABLE ---
50	JDBC connectivity	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 20**Session Outcome:** 4 Analyze programs on JDBC connectivity

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	JDBC connectivity	4	Chalk	--- NOT APPLICABLE ---

50	JDBC connectivity	4	Chalk	--- NOT APPLICABLE ---
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SESSION NUMBER : 21

Session Outcome: 4 Analyze programs on servlets

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Servlet	4	Chalk	--- NOT APPLICABLE ---
50	Servlet	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 22

Session Outcome: 4 Analyze programs on servlets

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Servlet	4	Chalk	--- NOT APPLICABLE ---
50	Servlet	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 23

Session Outcome: 4 Analyze programs on JSP

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	JSP	4	Chalk	--- NOT APPLICABLE ---
50	JSP	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 24

Session Outcome: 4 Analyze programs on JSP

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	JSP	4	Chalk	--- NOT APPLICABLE

50	JSP	4	Chalk	---
				--- NOT APPLICABLE

Skilling Course DELIVERY Plan:

Skilling session no	Topics/Experiments	CO-Mapping
1	Behavioral patterns	CO5
2	Behavioral patterns	CO5
3	Usage of Java Generics	CO5
4	Usage of Java Generics	CO5
5	Applications of Priority queue	CO5
6	Applications of Priority queue	CO5
7	Implement Comparable interfaces	CO5
8	Implement Comparable interfaces	CO5
9	Applications of Sets and Maps in Java	CO5
10	Applications of Sets and Maps in Java	CO5
11	Graph algorithm applications	CO5
12	Graph algorithm applications	CO5
13	Implement Graph Visualization techniques	CO5
14	Implement Graph Visualization techniques	CO5
15	Implementation of Threads	CO5
16	Implementation of Threads	CO5
17	Simulate Producer Consumer problem	CO5
18	Simulate Producer Consumer problem	CO5
19	Implement Semaphores	CO5
20	Implement Semaphores	CO5

Skilling session no	Topics/Experiments	CO-Mapping
21	Problems in Java Synchronized collections	CO5
22	Problems in Java Synchronized collections	CO5
23	Usage of JDBC Drivers and packages	CO5
24	Usage of JDBC Drivers and packages	CO5

Skilling Session wise Teaching – Learning Plan

SESSION NUMBER : 1

Session Outcome: 4 Analyze programs on behavioral patterns

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Behavioral patterns	4	Chalk	--- NOT APPLICABLE ---
50	Behavioral patterns	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 2

Session Outcome: 4 Analyze programs on behavioral patterns

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Behavioral patterns	4	Chalk	--- NOT APPLICABLE ---
50	Behavioral patterns	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 3

Session Outcome: 4 Analyze programs on generics

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Generics	4	Chalk	--- NOT APPLICABLE ---
50	Generics	4	Chalk	--- NOT APPLICABLE

SESSION NUMBER : 4**Session Outcome:** 4 Analyze programs on generics

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Generics	4	Chalk	--- NOT APPLICABLE ---
50	Generics	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 5**Session Outcome:** 4 Analyze programs on Priority queues

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Priority queues	4	Chalk	--- NOT APPLICABLE ---
50	Priority queues	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 6**Session Outcome:** 4 Analyze programs on Priority queues

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Priority queues	4	Chalk	--- NOT APPLICABLE ---
50	Priority queues	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 7**Session Outcome:** 4 Analyze programs on comparable interface

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Comparable interfaces	4	Chalk	--- NOT APPLICABLE ---
50	Comparable interfaces	4	Chalk	--- NOT

				APPLICABLE ---
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SESSION NUMBER : 8**Session Outcome:** 4 Analyze programs on comparable interface

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Comparable interfaces	4	Chalk	--- NOT APPLICABLE ---
50	Comparable interfaces	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 9**Session Outcome:** 4 Analyze programs on sets and maps

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Sets and maps	4	Chalk	--- NOT APPLICABLE ---
50	Sets and maps	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 10**Session Outcome:** 4 Analyze programs on sets and maps

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Sets and maps	4	Chalk	--- NOT APPLICABLE ---
50	Sets and maps	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 11**Session Outcome:** 4 Analyze programs on graph algorithms

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Graph algorithms	4	Chalk	--- NOT APPLICABLE ---

50	Graph algorithms	4	Chalk	--- NOT APPLICABLE ---
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SESSION NUMBER : 12**Session Outcome:** 4 Analyze programs on graph algorithms

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Graph algorithms	4	Chalk	--- NOT APPLICABLE ---
50	Graph algorithms	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 13**Session Outcome:** 4 Analyze programs on Graph Visualization

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Graph Visualization	4	Chalk	--- NOT APPLICABLE ---
50	Graph Visualization	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 14**Session Outcome:** 4 Analyze programs on Graph Visualization

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Graph Visualization	4	Chalk	--- NOT APPLICABLE ---
50	Graph Visualization	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 15**Session Outcome:** 4 Analyze programs on threads

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Threads	4	Chalk	--- NOT APPLICABLE ---

50	Threads	4	Chalk	--- NOT APPLICABLE ---
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SESSION NUMBER : 16

Session Outcome: 4 Analyze programs on threads

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Threads	4	Chalk	--- NOT APPLICABLE ---
50	Threads	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 17

Session Outcome: 4 Analyze programs on producer consumer problem

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Producer Consumer problem	4	Chalk	--- NOT APPLICABLE ---
50	Producer Consumer problem	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 18

Session Outcome: 4 Analyze programs on producer consumer problem

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Producer Consumer problem	4	Chalk	--- NOT APPLICABLE ---
50	Producer Consumer problem	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 19

Session Outcome: 4 Analyze programs on semaphores

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Semaphores	4	Chalk	--- NOT APPLICABLE ---

50	Semaphores	4	Chalk	--- NOT APPLICABLE ---
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SESSION NUMBER : 20

Session Outcome: 4 Analyze programs on semaphores

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Semaphores	4	Chalk	--- NOT APPLICABLE ---
50	Semaphores	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 21

Session Outcome: 4 Analyze programs on synchronized collections

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Synchronized collections	4	Chalk	--- NOT APPLICABLE ---
50	Synchronized collections	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 22

Session Outcome: 4 Analyze programs on synchronized collections

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Synchronized collections	4	Chalk	--- NOT APPLICABLE ---
50	Synchronized collections	4	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 23

Session Outcome: 4 Analyze programs on drivers and packages of JDBC

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Drivers and packages of JDBC	4	Chalk	--- NOT APPLICABLE

50	Drivers and packages of JDBC	4	Chalk	---	--- NOT APPLICABLE
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SESSION NUMBER : 24

Session Outcome: 4 Analyze programs on drivers and packages of JDBC

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Drivers and packages of JDBC	4	Chalk	--- NOT APPLICABLE ---
50	Drivers and packages of JDBC	4	Chalk	--- NOT APPLICABLE ---

WEEKLY HOMEWORK ASSIGNMENTS/ PROBLEM SETS/OPEN ENDED PROBLEM-SOLVING EXERCISES etc:

Week	Assignment Type	Assignment No	Topic	Details	co
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COURSE TIME TABLE:

	Hour	1	2	3	4	5	6	7	8	9
Day	Component									
Mon	Theory	V-S1,V-S2,V-S3,V-S4,V-S5,V-S6,V-S7	V-S1,V-S2,V-S3,V-S4,V-S5,V-S6,V-S7	--	--	---	---	- - -	- - -	- - -
	Tutorial	--	--	--	--	---	---	- - -	- - -	- - -
	Lab	--	--	V-S1,V-S2,V-S3,V-S4,V-S5,V-S6,V-S7	V-S1,V-S2,V-S3,V-S4,V-S5,V-S6,V-S7	---	---	- - -	- - -	- - -
	Skilling	--	--	--	--	---	---	- - -	- - -	- - -
Tue	Theory	---	---	---	---	--	--	- - -	- - -	- - -
	Tutorial	---	---	---	---	--	--	- - -	- - -	- - -

	Lab	---	---	---	---	V-S8,V-S9,V-S10,V-S11,V-S12,V-S13,V-S14	V-S8,V-S9,V-S10,V-S11,V-S12,V-S13,V-S14	- - -	- - -
	Skilling	---	---	---	---	--	--	- - -	- - -
Wed	Theory	---	---	V-S8,V-S9,V-S10,V-S11,V-S12,V-S13,V-S14	V-S8,V-S9,V-S10,V-S11,V-S12,V-S13,V-S14	--	--	- - -	- - -
	Tutorial	---	---	--	--	--	--	- - -	- - -
	Lab	---	---	--	--	--	--	- - -	- - -
	Skilling	---	---	--	--	V-S1,V-S2,V-S3,V-S4,V-S5,V-S6,V-S7	V-S1,V-S2,V-S3,V-S4,V-S5,V-S6,V-S7	- - -	- - -
Thu	Theory	---	---	--	--	--	--	- - -	- - -
	Tutorial	---	---	--	--	--	--	- - -	- - -
	Lab	---	---	--	--	V-S15,V-S16,V-S17,V-S18,V-S19,V-S20,V-S21	V-S15,V-S16,V-S17,V-S18,V-S19,V-S20,V-S21	- - -	- - -
	Skilling	---	---	V-S1,V-S2,V-S3,V-S4,V-S5,V-S6,V-S7	V-S1,V-S2,V-S3,V-S4,V-S5,V-S6,V-S7	--	--	- - -	- - -
Fri	Theory	---	---	--	--	---	---	- - -	- - -
	Tutorial	---	---	--	--	---	---	- - -	- - -
	Lab	---	---	--	--	---	---	- - -	- - -
	Skilling	---	---	V-S8,V-S9,V-S10,V-S11,V-S12,V-S13,V-S14	V-S8,V-S9,V-S10,V-S11,V-S12,V-S13,V-S14	---	---	- - -	- - -
Sat	Theory	---	---	V-S15,V-	V-S15,V-	--	--	- - -	- - -

			S16,V- S17,V- S18,V- S19,V- S20,V-S21	S16,V- S17,V- S18,V- S19,V- S20,V-S21			- - -
Tutorial	---	---	--	--	--	--	- - -
Lab	---	---	--	--	--	--	- - -
Skilling	---	---	--	--	V-S15,V- S16,V- S17,V- S18,V- S19,V- S20,V-S21	V-S15,V- S16,V- S17,V- S18,V- S19,V- S20,V-S21	- - -
Sun	Theory	--	--	--	--	--	- - -
	Tutorial	--	--	--	--	--	- - -
	Lab	--	--	--	--	--	- - -
	Skilling	--	--	--	--	--	- - -

REMEDIAL CLASSES:

Supplement course handout, which may perhaps include special lectures and discussions that would be planned, and schedule notified according

SELF-LEARNING:

Assignments to promote self-learning, survey of contents from multiple sources.

S.no	Topics	CO	ALM	References/MOOCs

DELIVERY DETAILS OF CONTENT BEYOND SYLLABUS:

Content beyond syllabus covered (if any) should be delivered to all students that would be planned, and schedule notified accordingly.

S.no	Advanced Topics, Additional Reading, Research papers and any	CO	ALM	References/MOOCs

EVALUATION PLAN:

Evaluation Type	Evaluation Component	Weightage/Marks		Assessment Dates	Duration (Hours)	CO1	CO2	CO3	CO4	CO5
End Semester Summative	End Semester Exam	Weightage	20		180	5	5	5	5	
		Max Marks	100			25	25	25	25	

Evaluation Total= 40 %	Lab End Semester Exam	Weightage	10		90					10
		Max Marks	50							
	Skill Sem-End Exam	Weightage	10		90					10
		Max Marks	50							
In Semester Formative Evaluation Total= 35 %	Global Challenges	Weightage	10		120					10
		Max Marks	40							
	Continuous Evaluation - Lab Exercise	Weightage	10		120					10
		Max Marks	50							
	MOOCs Review	Weightage	10		120		2.5	2.5	2.5	2.5
		Max Marks	40				10	10	10	10
In Semester Summative Evaluation Total= 25 %	Skilling Continuous Evaluation	Weightage	5		120					5
		Max Marks	50							
	Semester in Exam-I	Weightage	7.5		90		3.75	3.75		
		Max Marks	50				25	25		
	Semester in Exam-II	Weightage	7.5		90			3.75	3.75	
		Max Marks	50						25	25
	Lab In Semester Exam	Weightage	10		90					10
		Max Marks	50							

ATTENDANCE POLICY:

Every student is expected to be responsible for regularity of his/her attendance in class rooms and laboratories, to appear in scheduled tests and examinations and fulfill all other tasks assigned to him/her in every course

In every course, student has to maintain a minimum of 85% attendance to be eligible for appearing in Semester end examination of the course, for cases of medical issues and other unavoidable circumstances the students will be condoned if their attendance is between 75% to 85% in every course, subjected to submission of medical certificates, medical case file and other needful documental proof to the concerned departments

DETENTION POLICY :

In any course, a student has to maintain a minimum of 85% attendance and In-Semester Examinations to be eligible for appearing to the Semester End Examination, failing to fulfill these conditions will deem such student to have been detained in that course.

PLAGIARISM POLICY :

Supplement course handout, which may perhaps include special lectures and discussions

COURSE TEAM MEMBERS, CHAMBER CONSULTATION HOURS AND CHAMBER VENUE DETAILS:

Supplement course handout, which may perhaps include special lectures and discussions

Name of Faculty	Delivery Component of Faculty	Sections of Faculty	Chamber Consultation Day (s)	Chamber Consultation Timings for each day	Chamber Consultation Room No:	Signature of Course faculty:
Ravi Tata	S	8-MA	-	-	-	-
HARI VEGE	L	8-	-	-	-	-

		MA,1- MA,15- MA				
DINESH ANGURAJ	L	4-MA	-	-	-	-
DINESH ANGURAJ	P	4-MA	-	-	-	-
DINESH ANGURAJ	S	15- MA,4- MA	-	-	-	-
SRIHARI GOLE	L	16- MA,5- MA	-	-	-	-
SRIHARI GOLE	P	5- MA,16- MA	-	-	-	-
SRIHARI GOLE	S	16- MA,5- MA	-	-	-	-
RAMA GARIGIPATI	L	17- MA,6- MA	-	-	-	-
RAMA GARIGIPATI	P	6- MA,17- MA	-	-	-	-
RAMA GARIGIPATI	S	6- MA,17- MA	-	-	-	-
Nagalakshmi Thirunavukkarasu	L	7-MA	-	-	-	-
Nagalakshmi Thirunavukkarasu	P	7- MA,15- MA,8- MA	-	-	-	-
Nagalakshmi Thirunavukkarasu	S	7- MA,15- MA	-	-	-	-
SURESH DODDI	L	3- MA,13- MA	-	-	-	-
SURESH DODDI	P	3- MA,13- MA	-	-	-	-
SURESH DODDI	S	13- MA,3- MA	-	-	-	-
Anusha Ponnuru	L	12- MA,21- MA	-	-	-	-
Anusha Ponnuru	P	12- MA,21- MA	-	-	-	-
Anusha Ponnuru	S	21-	-	-	-	-

		MA,12- MA				
BURADA SREEDHAR	L	9- MA,19- MA	-	-	-	-
BURADA SREEDHAR	P	19- MA,9- MA	-	-	-	-
BURADA SREEDHAR	S	9- MA,19- MA	-	-	-	-
ASESH TRIPATHI	L	11- MA,20- MA	-	-	-	-
ASESH TRIPATHI	P	11- MA,20- MA	-	-	-	-
ASESH TRIPATHI	S	20- MA,11- MA	-	-	-	-
S GOPAL PATRO	L	10- MA,18- MA	-	-	-	-
S GOPAL PATRO	P	10- MA,18- MA	-	-	-	-
S GOPAL PATRO	S	10- MA,18- MA	-	-	-	-
PALTHIYA RAO	L	2- MA,14- MA	-	-	-	-
PALTHIYA RAO	P	14- MA,2- MA	-	-	-	-
PALTHIYA RAO	S	14- MA,2- MA	-	-	-	-
Jagadish Gurrala	P	1-MA	-	-	-	-
ADAPA GOPI	S	8- MA,1- MA	-	-	-	-

GENERAL INSTRUCTIONS

Students should come prepared for classes and carry the text book(s) or material(s) as prescribed by the Course Faculty to the class.

NOTICES

Most of the notices are available on the LMS platform.

All notices will be communicated through the institution email.

All notices concerning the course will be displayed on the respective Notice Boards.

Signature of COURSE COORDINATOR

(Nagalakshmi Thirunavukkarasu)

Signature of Department Prof. Incharge Academics & Vetting Team Member

Department Of CSE-Honors

HEAD OF DEPARTMENT:**Approval from: DEAN-ACADEMICS**

(Sign with Office Seal) [object HTMLDivElement]