

**INFORMATION TECHNOLOGY**  
**SEMESTER – III**

Shri Vile Parle Kelavani Mandal's  
**SHRI BHAGUBHAI MAFATLAL POLYTECHNIC**

**TEACHING AND EXAMINATION SCHEME**

**PROGRAM: INFORMATION TECHNOLOGY**

With effect from batch admitted June, 2022 (Progressively)

SEMESTER: III

Duration: 16 Weeks

SR. No.	Course Name	Code	SCHEME OF INSTRUCTIONS AND PERIODS PER WEEK					THEORY PAPER DURATION AND MARKS (ESE)			Examination Scheme and Maximum Marks							Gr	SCHEME L/P/Cr
			L	P	D	T	Cr (L+P+D+T)	Hrs	Mks	SSL	TA	TH	TW	PR	OR	TOTAL			
1	Programming in Java	PRJ228914	2	4	--	--	6	3	70	20	10	70	25	50	--	175	C	246	
2	Data Structure	DST228915	4	2	--	--	6	3	70	20	10	70	25	50	--	175	C	426	
3	Database Management System	DBS228917	3	2	--	--	5	3	70	20	10	70	25	25	--	150	C	325	
4	Data Communication & Networking	DCN220902	3	2	--	--	5	3	70	20	10	70	25	--	25	150	C	325	
5	Human Computer Interface	HCI228919	3	2	--	--	5	3	70	20	10	70	25	--	25	150	A	325	
6	Open Source Technology	OST220903	--	4	--	--	4	--	--	--	--	--	25	25	--	50	A	044	
TOTAL			15	16	0	0	31	No. of papers = 5		100	50	350	150	150	50	850		15/16/31	
TOTAL PERIODS=							31						TOTAL MARKS				850		

Theory, Practical, Drawing and Tutorial of 1 Hour duration each equal to 1 Credit, # Award Winning, @Online Examination  
L- Lecture, P- Practical, D-Drawing Practice, T- Tutorial, Cr- Credit, ESE-End Semester Examination, SSL- Sessional, TA-Teachers assessment, TH-Theory, TW- Term Work, PR- Practical, OR- Oral, Gr- Group, B - Basic, C - Core, A - Application, M - Management  
PR/OR- Assessed by Internal and External Examiners Jointly, TW- Assessed by Internal Examiner Only

  
Head of Department

  
Controller of Examination

  
Secretary CDC



  
Principal

## 1. COURSE DETAILS

<b>Programme: CSE / IT</b>	<b>Semester: III</b>
<b>Course: Programming in Java</b>	<b>Group: C</b>
<b>Course Code: PRJ228914</b>	<b>Duration: 16 Weeks</b>

## 2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and marks (ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
2	4	-	-	6	3	70	20	10	70	25	50	-	175

## 3. COURSE OBJECTIVE

Java is one of the most powerful object-oriented programming languages. It supports development of secured, portable, concurrent and distributed applications. From laptops to datacenters, game consoles to scientific supercomputers, cell phones to the Internet, Java is everywhere! This course is designed to provide overview of Java Language.

## 4. SKILL COMPETENCY

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences.

- Write Java programs using Inheritance, Exception Handling and Multithreading
- Develop desktop GUI applications

## 5. COURSE OUTCOMES (COs): At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME
CO1	Solve object-oriented problems using Java programming language
CO2	Implement programs based on Inheritance and Packages
CO3	Handle built-in and user defined Exceptions
CO4	Write Multithreaded programs.
CO5	Design GUI applications using AWT and SWING controls



### 6. CO-PO, CO- PSO MAPPING TABLE: Computer Engineering

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Programming in Java (PRJ228914)	CO1	2	2	1	2	--	2	2	3	--
	CO2	2	2	2	2	--	2	2	3	--
	CO3	2	1	1	2	--	2	2	3	--
	CO4	2	2	2	2	--	2	2	3	--
	CO5	2	2	3	2	--	3	3	3	--
	CO Avg.	2	1.8	1.8	2	--	2.2	2.2	3	--

### CO-PO, CO- PSO MAPPING TABLE: Information Technology

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Programming in Java (PRJ228914)	CO1	2	2	1	2	--	2	2	3	--
	CO2	2	2	2	2	--	2	2	3	--
	CO3	2	1	1	2	--	2	2	3	--
	CO4	2	2	2	2	--	2	2	3	--
	CO5	2	2	3	2	--	3	3	3	--
	CO Avg.	2	1.8	1.8	2	--	2.2	2.2	3	--



## 7. COURSE CONTENTS

UNIT NO.	TOPIC/Sub-topic	CO
I	<p><b>Introduction to object-oriented programming</b></p> <p>1.1 Creation of java, java byte code, java characteristics</p> <p>1.2 Abstraction, OOP Principles. -Encapsulation, Inheritance and Polymorphism</p> <p>1.3 Constant, Variables and Data Types, Type casting</p> <p>1.4 Operator and Expression, arithmetic operators, relational operators, logical operators, assignment operator, increment and decrement operator, bitwise operator, special operator</p> <p>1.5 Decision making with simple if, if... else, else if ladder statements, The switch statement, The conditional operator</p> <p>1.6 Decision Making with Loops i.e., while, do and for statement, Jumps in Loops, Labeled Loops</p> <p>1.7 Class Fundamentals, The General Form of a class, A simple class</p> <p>1.8 Declaring Objects, A Closer Look at new, Assigning Object Reference Variables</p> <p>1.9 Introducing methods, adding a method to the class, returning a value, adding a method that takes parameters</p> <p>1.10 Constructors, parameterized constructors</p> <p>1.11 The 'this' keyword</p> <p>1.12 Static data, method and blocks</p> <p>1.13 String class and its methods</p>	CO1
II	<p><b>Inheritance, Interfaces and Packages</b></p> <p>2.1 Inheritance basics</p> <p>2.2 Member access and Inheritance</p> <p>2.3 A superclass variable can reference a subclass object</p> <p>2.4 Use of super keyword</p> <p>2.5 Creating a multilevel hierarchy</p> <p>2.6 Method overriding, Dynamic Method Dispatch, abstract methods &amp; classes</p> <p>2.7 Defining an Interface, implementing Interfaces, and applying interfaces variables in interfaces</p> <p>2.8 Implementing multiple Inheritance, interfaces can be extended</p> <p>2.9 Packages, defining a package, finding packages and CLASSPATH</p> <p>2.10 Access protection, importing packages</p>	CO2
III	<p><b>Exception Handling</b></p> <p>3.1 Exception-Handling Fundamentals, Exception class hierarchy</p> <p>3.2 Uncaught Exceptions, try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally clauses</p> <p>3.3 Java's Built-in Exceptions - Checked and Unchecked Exceptions</p> <p>3.4 Creating Your Own Exception Subclasses using Exceptions</p>	CO3
IV	<p><b>Multithreading</b></p> <p>4.1 The Java Thread Model, The Thread Life Cycle, Thread class methods</p> <p>4.2 The Thread Class and the Runnable Interface</p> <p>4.3 The Main Thread, creating a Thread, Extending Thread, Implementing Runnable</p> <p>4.4 Creating Multiple Threads, using isAlive () and join ()</p> <p>4.5 Thread Priorities, Synchronization, Using Synchronized Methods, The synchronized Statement</p> <p>4.6 Interthread Communication</p> <p>4.7 Introduction to Executer Framework</p>	CO4



<b>V</b>	<b>AWT and SWING Controls</b> 5.1 Abstract Window toolkit, AWT classes 5.2 Event handling, Delegation event model, Event model, Event classes, source of events, event listener interface, 5.3 windows fundamentals, creating a frame window, working with frame window, working with graphics, 5.4 Introduction to AWT controls, inserting user interfaces like buttons, checkbox, list, scrollbar, text field and text areas, layout managers. 5.5 Introduction to SWING GUI Controls	CO5
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## 8. LIST OF PRACTICALS/ASSIGNMENTS/ TUTORIALS/DRAWINGS

Term Work consists of Journal containing minimum no of –12 Experiments/assignments/drawings.

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx. Hrs required	CO
1	To Install and Set up Jdk1.8 on Windows OS to write, compile, and execute a sample Program.	2	CO1
2	To test various data types and typecasting concept available in Java	2	CO1
3	To define a class having overloaded constructors and instantiating objects of the same class.	2	CO1
4	To verify the concept of array of objects in Java (2 problems)	6	CO1
5	To take user inputs through command line arguments.	2	CO1
6	To implement single and multi-level inheritance	6	CO2
7	To apply the concept of interface in achieving multiple Inheritance and Dynamic Method Dispatch in Java.	4	CO2
8	To create packages with access controls and importing them in appropriate classes.	4	CO2
9	To handle exceptions generated in Java	4	CO3
10	To create a user defined exception class.	2	CO3
11	To create user defined threads to achieve multitasking.	6	CO4
12	To achieve synchronization among multiple threads.	2	CO4
13	To develop GUI application using AWT controls and handling events.	6	CO5
14	To develop GUI application using SWING controls and handling events.	6	CO5
15	Mini Project	10	All COs
<b>TOTAL</b>		64	

**9. TEACHERS ASSESSMENT (TA):** Assessment to be based on one of the following tools and rubrics for evaluation of TA to be well defined by course teacher.

1. Micro-Project
2. Seminar/ Presentation
3. Model/Chart making
4. Surveys
5. Case Study
6. Quiz



## 10. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Minimum no of practical/assignments.
3. Industry visit
4. Guest/Expert lectures
5. Demonstrations
6. Slides
7. Self-Learning Online Resources

## 11. SUGGESTED LEARNING RESOURCES

Sr.No.	Title of Book	Author	Publication
1	Java The Complete Reference	Herbert Schildt	Tata McGraw Hill
2	Core Java™ Volume I Fundamentals	Cay S. Horstmann, Gary Cornel	Prantice Hall
3	Java How to Program	Paul Deitel, Harvey Deitel	Pearson
4	Effective Java	Joshua Bloch	Addison Wesley

## 12. WEB REFERENCES

1. <https://beginnersbook.com/java-tutorial-for-beginners-with-examples/>
2. <https://www.javatpoint.com/java-tutorial>
3. <https://www.guru99.com/java-tutorial.html>
4. <http://tutorials.jenkov.com/java/index.html>
5. <http://java.meritcampus.com/core-java-topics>

## 13. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction to object-oriented programming	8	5	7	6	18
II	Inheritance, Interfaces and Packages	9	4	8	8	20
III	Exception Handling	4	2	4	4	10
IV	Multithreading	5	2	4	4	10
V	AWT and SWING Controls	6	2	4	6	12
	<b>TOTAL</b>	<b>32</b>	<b>15</b>	<b>27</b>	<b>28</b>	<b>70</b>

**R Remember, U Understand, A Apply and above, (Bloom's revised taxonomy levels)**

NOTE: This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of COs. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.



#### 14. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Mrs. Geetha S.
2	Internal	Mr. Manish Solanki
3	External	Mr. Prasad Wadkar
		Organization: Lead Consultant, Infosys





## 1. COURSE DETAILS

<b>Programme: CSE/IT</b>	<b>Semester: III</b>
<b>Course: Data Structure</b>	<b>Group: C</b>
<b>Course Code:DST228915</b>	<b>Duration:16 Weeks</b>

## 2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
4	2	-	-	6	3	70	20	10	70	25	50	-	175

## 3. COURSE OBJECTIVE

This subject intends to teach the students the core requisites of Computer programming which is storing and analyzing data in various structures like stacks, queues, linked lists, trees, graphs etc.

## 4. SKILL COMPETENCY

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences.

- Write and implement algorithms to store and manipulate data in various data structure
- To implement and compare various searching –sorting algorithms and analyze the complexities

## 5. COURSE OUTCOMES (COs): At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME
CO1	Perform operations on an array and analyze an algorithm for its time and space complexity.
CO2	Implement searching and sorting techniques
CO3	Implement the static linear data structure
CO4	Apply the dynamic linear data structure
CO5	Describe non-linear data structure



### 6. CO-PO, CO- PSO MAPPING TABLE: Computer Engineering

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Data Structure (DST228915)	CO1	3	2	2	1	-	-	2	3	-
	CO2	3	2	2	2	-	-	2	3	-
	CO3	2	1	2	1	-	-	2	3	-
	CO4	2	1	2	1	-	-	2	3	-
	CO5	1	-	1	1	-	-	2	3	-
	CO Avg.	2.2	1.5	1.8	1.2	-	-	2	3	-

### CO-PO, CO- PSO MAPPING TABLE: Information Technology

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Data Structure (DST228915)	CO1	3	2	2	1	-	-	2	3	-
	CO2	3	2	2	2	-	-	2	3	-
	CO3	2	1	2	1	-	-	2	3	-
	CO4	2	1	2	1	-	-	2	3	-
	CO5	1	-	1	1	-	-	2	3	-
	CO Avg.	2.2	1.5	1.8	1.2	-	-	2	3	-



## 7. COURSE CONTENTS

UNIT NO.	Topics/Sub-Topics	COs
I	<b>Introduction to data structure</b> 1.1 Linear & Non linear 1.2 Algorithm Basic Concepts 1.3 Time and Space complexity of algorithms, Big O Notation and theta notations 1.4 Definition, implementation and notation of Array 1.5 Basic operation such as addition, deletion	CO1
II	<b>Sorting and Searching</b> 2.1 Sorting Techniques 2.1.1 Selection sort 2.1.2 Bubble sort 2.1.3 Insertion sort 2.1.4 Quick sort 2.1.5 Heap Sort 2.2 Searching 2.2.1 Linear search 2.2.2 Binary searching 2.3 Complexity and Big 'O' notations for each sorting algorithm	CO2
III	<b>Static Linear Data Structure: Stacks and Queues</b> 3.1 Introduction to Stacks 3.2 Stacks as an Abstract Data Type 3.3 Primitive operations of stacks 3.4 Representation of Stacks through Arrays 3.5 Application of Stack 3.6 Stack and Recursion 3.7 Introduction to Queues 3.8 Queue as an abstract data type 3.9 Representation of a Queue as an array 3.10 Types of Queue 3.10.1 Circular Queue 3.10.2 Double Ended Queue 3.10.3 Priority Queue 3.11 Applications of Queue	CO3
IV	<b>Dynamic Linear Data Structure: Linked List</b> 4.1 Terminologies 4.1.1 Node 4.1.2 Address, Pointer 4.1.3 Information 4.1.4 Next, NULL Pointer 4.1.5 Empty list 4.2 Representation of Linked list in memory 4.3 Operations on a singly linked list (only algorithm) 4.3.1 Traversing a singly linked list 4.3.2 Searching a linked list 4.3.3 Inserting a new node in a linked list 4.3.4 Deleting a node from a linked list 4.3.5 Header Linked list 4.4 Doubly linked list and its operations	CO4



<b>V</b>	<b>Non-Linear Data Structure</b>	<b>CO5</b>
	5.1 Trees Terminologies: Tree, Degree of a node, Degree of a tree, level of a node, leaf node, Depth / Height of a tree, In-degree & Out-Degree, Directed edge, Path Ancestor & descendant nodes	
	5.2 Storage representation of binary tree	
	5.3 Type of Trees	
	5.3.1 General tree	
	5.3.2 Binary tree	
	5.3.3 Binary search tree (BST): Searching, Inserting, Deleting	
	5.4 Binary Tree Traversal Methods	
	5.4.1 In order traversal	
	5.4.2 Preorder traversal	
5.4.3 Post order traversal		
5.5 Height Balanced: AVL Tree		
5.6 Weight Balanced Trees: Heap Tree		
5.7 Graphs Terminologies: graph, node (Vertices), arcs (edge), directed graph, in-degree, out-degree, adjacent, successor, predecessor, relation, weight, path, length		
5.8 Representations of a graph		
5.8.1 Sequential Representation (Adjacency Matrix, Path Matrix)		
5.8.2 Linked Representation		
5.9 Operations on Graphs		
6.3.1 Insertion		
6.3.2 Deletion		
6.3.3 Search		
5.10 Graph Traversal: BFS, DFS		

### 8. LIST OF PRACTICALS/ASSIGNMENTS/ TUTORIALS/DRAWINGS

Term Work consists of Journal containing minimum no of –10 Experiments/assignments/drawings.

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx. Hrs required	CO
1	A program for inserting and deleting an element in an array.	2	CO1
2	A program for Linear Search	2	CO2
3	A program for Binary Search	4	CO2
4	A program for selection sort.	2	CO2
5	A program for quick sort.	2	CO2
6	A program for Insertion Sort	4	CO2
7	A program for pushing and popping an element into a STACK	2	CO3
8	A program for inserting and deleting an element in a circular queue.	2	CO3
9	A program for converting an infix expression to postfix using STACK	2	CO3
10	A program for creating and traversing a linked list.	4	CO4
11	A program for various operations on a linked list	2	CO4
12	A program to perform traversing of a binary tree.	4	CO5
<b>TOTAL</b>		<b>32</b>	



**9. TEACHERS ASSESSMENT (TA):** Assessment to be based on one of the following tools and rubrics for evaluation of TA to be well defined by course teacher.

1. Micro-Project
2. Seminar/ Presentation
3. Model/Chart making
4. Surveys
5. Case Study
6. Quiz

**10. IMPLEMENTATION STRATEGY (PLANNING)**

1. Teaching Plan/Tutorials
2. Minimum 10 no. of practical/assignments etc.
3. Slides
4. Self-Learning Online Resources

**11. SUGGESTED LEARNING RESOURCES**

Sr. No.	Title of Book	Author	Publication
1	Data Structures with C	Lipschutz	Schaum's series
2	Algorithms in C	Robert Sedgewick	Addison-Wesley Professional
3	Data structures using C	Reema Thareja	Oxford Publication

**12. WEB REFERENCES**

1. [www.csbd.edu.in/econtent/datastructures](http://www.csbd.edu.in/econtent/datastructures)
2. [www.nptel.iitm.ac.in/courses.php](http://www.nptel.iitm.ac.in/courses.php)
3. [www.gatesit.org/gitdownloads/c&ds.pdf](http://www.gatesit.org/gitdownloads/c&ds.pdf)
4. [www.opendatastructure.org/ods-cpp.pdf](http://www.opendatastructure.org/ods-cpp.pdf)

**13. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN**

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction to data structure and classification	8	4	6	-	10
II	Sorting and Searching	14	-	6	8	14
III	Static Linear Data Structure	16	4	6	8	18
IV	Dynamic Linear Data Structure	14	4	4	8	16
V	Non Linear Data Structure	12	4	4	4	12
<b>TOTAL</b>		<b>64</b>	<b>16</b>	<b>26</b>	<b>28</b>	<b>70</b>

**R Remember, U Understand, A Apply and above, (Bloom's revised taxonomy levels)**

NOTE: This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of COs. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.



#### 14. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Ms. Priti P. Bokariya
2	Internal	Mrs. Swapna Naik
3	External	Mr. Rohit Rathod
		Organisation: Architect, Xebia



## 1. COURSE DETAILS

<b>Programme: IT/CSE</b>	<b>Semester: III/IV</b>
<b>Course: Database Management System</b>	<b>Group: C</b>
<b>Course Code: DBS228917</b>	<b>Duration:16 Weeks</b>

## 2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
3	2	-	-	5	3	70	20	10	70	25	25	-	150

## 3. COURSE OBJECTIVE

This subject will enable the students to comprehend the Database concepts at both practical and theoretical levels. The aim of this subject is to understand the use of Structured Query Language (SQL) and learn SQL syntax. The students will understand the needs of database processing and learn techniques for controlling the consequences of concurrent data access.

## 4. SKILL COMPETENCY

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- **Perform data modelling using ER diagram**
- **Apply database management concept using SQL to manipulate the data in database and to query the database.**

## 5. COURSE OUTCOMES (COs): At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME
CO1	Describe core concepts of database models
CO2	Create and manage data tables using SQL commands.
CO3	Understand the architecture of NoSQL and distinguish the different types of NoSQL database
CO4	Apply concepts of normalization to relational database design
CO5	Conceptualize query processing and transaction management
CO6	Explain the importance of concurrency and recovery in database management system



## 6. CO-PO, CO- PSO MAPPING TABLE – Information Technology

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Database Management System (DBS228917)	CO1	3		1				1	3	
	CO2	3	2	2	2			2	3	
	CO3	2	2	1					3	
	CO4	2	3	2				2	3	
	CO5	2	2					1	3	
	CO6	2						1	3	
	CO Avg.	2.33	2.25	1.5	2			1.4	3	

## CO-PO, CO- PSO MAPPING TABLE – Computer Engineering

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Database Management System (DBS228917)	CO1	3		1				1	3	
	CO2	3	2	2	2			2	3	
	CO3	2	2	1					3	
	CO4	2	3	2				2	3	
	CO5	2	2					1	3	
	CO6	2						1	3	
	CO Avg.	2.33	2.25	1.5	2			1.4	3	





## 7. COURSE CONTENTS

UNIT NO.	TOPIC / Sub-Topics	COs
I	<b>Introduction to DBMS</b> 1.1 Introduction to database management system: 1.1.1 Concept of data, database and DBMS 1.1.2 Advantages of DBMS over file processing, 1.1.3 Data abstraction, data independence 1.2 Data Models: 1.2.1 Entity Relationship model, 1.2.2 Relational Model, 1.3 Database Users and Administrators 1.4.Database system structure	CO1
II	<b>Overview of SQL</b> 2.1. SQL Data Definition 2.1.1 Basics structure of SQL queries (DDL, DML, DCL, TCL) 2.1.2 Additional Basic Operations 2.1.3 Modification of the database (Update, Delete, Alter Drop) 2.2 Set Operations and Aggregate functions 2.3 Date, Time and String Functions 2.4 Sub Queries and Views 2.5 JOINS 2.5.1 INNER JOIN 2.5.2 OUTER JOIN: left, right and outer join	CO2
III	<b>NoSQL Databases</b> 3.1 Overview of NoSQL 3.1.1 Features of NoSQL 3.1.2 Advantages and disadvantages of NoSQL 3.1.3 Difference between RDBMS and NoSQL databases 3.1.4 Types of NoSQL 3.2 MongoDB: 3.2.1 Key features, 3.2.2 MongoDB Query Language: Data type, create database Collections and Documents, Updating and querying database, Querying through Indexes, 3.3 Cassandra: Overview, 3.3.1 CQL: Shell commands, 3.3.2 Cassandra Data types 3.3.3 CRUD operations	CO3
IV	<b>Relational Database Design</b> 4.1. Relational database design: 4.1.1 Functional Dependencies 4.1.2 Features of good relational database design 4.2 Decomposition: properties of decomposition 4.3 Normalization 4.3.1 Types of anomalies in database 4.3.2 First Normal Form, Second Normal Form, Third Normal Form and 3.5 Normal Form	CO4



<b>V</b>	<p><b>Query Processor and Optimizer, Transactions</b></p> <p>5.1. Overview of query processing.  5.1.1 Relational algebra operations: Select, project, Union, Set difference, Cartesian product, rename</p> <p>5.2 Query optimization: Cost of query</p> <p>5.3 Transaction:  5.3.1 Concept of transaction,  5.3.2 Transaction Model  5.3.3 ACID Properties of transaction</p> <p>5.4 Serializability  5.4.1 Conflict Serializability  5.4.2 View Serializability  5.4.3 Recoverability of schedules</p>	CO5
<b>VI</b>	<p><b>Concurrency Control and Recovery system</b></p> <p>6.1. Lock-based protocols  6.1.1 Shared lock and exclusive lock  6.1.2 Compatibility function  6.1.3 Starvation</p> <p>6.2 Deadlock Handling</p> <p>6.3 Two-Phase locking protocol: Growing and Shrinking Phase</p> <p>6.4 Timestamp-Based protocols</p> <p>6.5 Validation-Based protocols</p> <p>6.6 Recovery System  6.6.1 Failure classification  6.6.2 Storage structure  6.6.3 Log-Based recovery shadow paging and checkpoints</p>	CO6

## 8. LIST OF PRACTICALS/ASSIGNMENTS

Term Work consists of Journal containing minimum no of 10 experiments

Sr. No.	Title of Experiment	Approx. Hrs required	COs
1.	Design an ER model for statement of problem	2	CO1
2.	Creation of table with constraints and insertion of data	4	CO2
3.	Running simple SQL queries	4	CO2
4.	Execution of Alter, Update, Delete and drop	2	CO2
5.	Implementation of aggregate and character functions	2	CO2
6.	Implementation of various clauses (Where, Group by and Having) in SQL.	2	CO2
7.	Execution of string, comparison and set operations	2	CO2
8.	Implementation of various types of joins	4	CO2
9.	Implementation of views.	2	CO2
10.	Perform CRUD operations in MongoDB	2	CO3
11.	Using case study of a banking system – apply the concept of transaction processing and recovery to the system	2	CO5
12.	Assignment 1: Normalization of a sample database – Show decomposition from 1NF,2NF and 3NF	2	CO4
13.	Assignment 2: Concurrency control	2	CO6
	<b>TOTAL</b>	<b>32</b>	



**9. TEACHERS ASSESSMENT (TA):** Assessment to be based on one of the following tools and rubrics for evaluation of TA to be well defined by course teacher.

1. Seminar/ Presentation
2. Case Study
3. Quiz

**10. IMPLEMENTATION STRATEGY (PLANNING)**

1. Teaching Plan
2. Minimum 10 no. of practical/assignments
3. Guest/Expert lectures
4. Demonstrations
5. Slides
6. Self-Learning Online Resources

**11. LEARNING RESOURCES**

Sr. No.	Title Of Book	Author	Publication
1.	Database System Concepts	Silberschatz, Korth	McGraw hill, Sixth Edition
2.	Introduction to Database Management	Mark L. Gillenson Paulraj Ponniah	Wiley, India
3.	Database Management Systems	Ramakrishnan, Gehrke	McGraw hill, Third Edition
4.	NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence	Pramod J. Sadalage, Martin Fowler	Addison-Wesley Professional

**12. WEB REFERENCES**

1. [www.w3schools.com/sql](http://www.w3schools.com/sql)
2. [www.tutorialpoint.com/dbms](http://www.tutorialpoint.com/dbms)
3. [www.khanacademy.org/computing/computer-programming/sql](http://www.khanacademy.org/computing/computer-programming/sql)
4. [www.techonthenet.com/sql](http://www.techonthenet.com/sql)
5. [www.beginnersbook.com](http://www.beginnersbook.com)

**13. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN**

UNIT NO.	TOPIC	Teaching Hours	Distribution of Theory marks			
			R Level	U Level	A Level	Total Marks
I	Introduction to DBMS	8	2	4	6	12
II	Overview of SQL	8	2	4	6	12
III	NoSQL Databases	8	4	4	4	12
IV	Relational Database Design	7	2	4	4	10
V	Query Processor and Optimizer, Transactions	8	4	8	-	12
VI	Concurrency Control and Recovery system	9	6	6	-	12
	<b>TOTAL</b>	<b>48</b>	<b>20</b>	<b>30</b>	<b>20</b>	<b>70</b>



#### 14. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Mr. Pankaj Rathod
2	Internal	Mr. Siddhesh Masurkar
3	External	Dr. Chetashri Bhadane
		Organization: Assistant Professor, D. J. Sanghvi College of engineering



## 1. COURSE DETAILS

<b>Programme: Information Technology</b>	<b>Semester: III</b>
<b>Course: Data Communication &amp; Networking</b>	<b>Group: C</b>
<b>Course Code: DCN220902</b>	<b>Duration: 16 Weeks</b>

## 2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and marks (ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
3	2	–	–	5	3	70	20	10	70	25	--	25	150

## 3. COURSE OBJECTIVE

This Course will help the students to comprehend the fundamentals of data communication and networking. The subject will also familiarize the students in details of logical and physical layers of the TCP/IP and ISO-OSI reference model.

## 4. SKILL COMPETENCY

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences.

- **Identify the network architectures and use of networking devices, transmission media and protocols.**
- **Design network using simulator and learn the sharing of networking devices, files and folders.**
- **Fortified to deal with network troubleshooting using tool.**

**5. COURSE OUTCOMES (COs):** at the end of the semester student will be able to: -

CO No.	COURSE OUTCOME
CO1	Identify network architecture, devices, physical media and design network topology
CO2	Describe functioning of data communication and sharing of devices in the network
CO3	Conceptualize TCP/IP protocol suite
CO4	Explain ISO-OSI reference model – Physical Layers
CO5	Explain ISO-OSI reference model – Logical layers



## 6. CO-PO, CO- PSO MAPPING TABLE: Information Technology

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Data Communication & Networking (DCN220902)	CO1	3	2	2	1			2		2
	CO2	2						1		2
	CO3	3						2		2
	CO4	3		1	1			2		2
	CO5	3		1	1			2		2
	CO Avg.	2.8	2	1.33	1			1.8		2

## 7. COURSE CONTENTS

UNIT No.	Topic / Sub-Topics	COs
I	<b>Introduction to network</b> 1.1. Network architecture 1.2 Classification of networks, Network topologies 1.3 Network Hardware, Transmission media 1.4 Case study on design of network topology 1.5 Applications of computer network 1.6 SDN – Introduction and functional overview	CO1
II	<b>Digital Transmission</b> 2.1 Types of communication 2.2 Digital & Analog transmission – Signaling, Data rate limits, Impairments 2.3 Multiplexing, Switching 2.4 Telephone Network, Dial-UP Modems 2.5 Digital Subscriber Line 2.6 Cable TV networks	CO2
III	<b>Concepts of Layer Protocols</b> 3.1 Introduction, Layer interfaces, TCP/IP reference model 3.2 Comparison of TCP/IP and OSI reference Model 3.3 Communications between layers, Protocols 3.4 Peer to Peer Communication between Remote Layers 3.5 Encapsulation of PDUs 3.6 Addition of headers on Transmission & Removal on reception 3.7 Segmentation & reassembly by protocol layers	CO3



<p style="text-align: center;"><b>IV</b></p>	<p><b>OSI Reference Model- Physical layers</b></p> <p>4.1 Physical Layer – design issues</p> <p>4.2 Data Link Layer</p> <p>4.2.1 Framing - Fixed size &amp; variable size</p> <p>4.2.2 Error detection and Correction – Types of errors, redundancy, parity code, hamming code, cyclic redundancy, checksum</p> <p>4.2.3 Elementary data link protocols – Simplest , Stop and wait</p> <p>4.2.4 Sliding window protocols – Stop and wait ARQ, Go-back-N-ARQ, Selective repeat ARQ</p> <p>4.2.5 Data link protocols – HDLC, point to point</p> <p>4.2.6 Multiple access- CSMA/CD, CSMA/CA</p> <p>4.2.7 Controlled access- Reservation , Polling, Token Passing</p> <p>4.3 Network Layer</p> <p>4.3.1 Logical addressing-IPV4 addresses, Address space, Notation, Classfull addressing, Classless addressing</p> <p>4.3.2 Introduction to IPv6 - Structure, Address space</p> <p>4.3.2 Routing – Forwarding of IP packets &amp; delivery, Routing table</p> <p>4.3.3 Address mapping – ARP, RARP, BOOTP</p> <p>4.3.4 Congestion control - ICMP</p>	<p style="text-align: center;">CO4</p>
<p style="text-align: center;"><b>V</b></p>	<p><b>OSI Reference Model- Logical layers</b></p> <p>5.1 Transport Layer</p> <p>5.1.1 Transport service – Connectionless and connection-oriented, client-server paradigm, reliable versus unreliable</p> <p>5.1.2 Elements of transport protocols – Port number, Use of Socket address</p> <p>5.1.3 UDP - User datagram, operations, services, applications</p> <p>5.1.4 TCP - Segment, operations, services, applications, flow &amp; error control</p> <p>5.2 Presentation Layer and Session Layer – Introduction and functional overview</p> <p>5.3 Application Layer</p> <p>5.3.1 DNS – Label, domain name, domain, namespace</p> <p>5.3.2 Electronic Mail – Architecture, web based mail</p> <p>5.3.3 WWW – client, server, URL, cookies, static &amp; dynamic document, HTTP, FTP</p>	<p style="text-align: center;">CO5</p>



## 8. LIST OF PRACTICALS/ASSIGNMENTS/ TUTORIALS/DRAWINGS

Term Work consists of Journal containing minimum no of - 10 experiments

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx. Hrs required	COs
1.	To Perform various networking commands in Windows	02	CO1
2.	To Identify different types of network devices and configure hub using network simulation tool	02	CO1
3.	To configure initial switch using network simulation tool	02	CO1
4.	To configure router using network simulation tool	02	CO1
5.	To design Computer Network topology ( any one ) using network simulation tool	02	CO1
6.	To design a network according to given case study – college, small office, company	02	CO4
7.	To design a network using IP addressing, subnetting and supernetting	04	CO3,CO4
8.	To add computer to LAN and share files and folders to the existing network	02	CO2
9.	To perform Printer sharing in the network	02	CO2
10.	Use Network sniffing tool and capture TCP,UDP, IP, ARP, ICMP, Telnet, FTP packets	04	CO4
11.	To configure FTP using simulation tool	04	CO3,CO5
12.	To configure Email protocol using simulation tool	04	CO3,CO5
<b>Total</b>		<b>32Hrs</b>	

**9. TEACHERS ASSESSMENT (TA):** Assessment to be based on one of the following tools and rubrics for evaluation of TA to be well defined by course teacher.

1. Seminar/ Presentation
2. Model/Chart making
3. Surveys
4. Case Study
5. Quiz

## 10. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Minimum no of practical/assignments.
3. Industry visit
4. Guest/Expert lectures
5. Demonstrations
6. Slides
7. Self-Learning Online Resources





## 11. SUGGESTED LEARNING RESOURCES

Sr. No.	Title Of Book	Author	Publication
1.	Computer Network	A.S.Tanenbaum	Pearson, Prentice Hall
2.	Data communication and Networking	Behrouz A. Forouzan	Tata McGraw-Hill
3.	Data and Computer Communication	William Stallings	Prentice Hall
4.	Data communications and distributed networks	U.D.Black	Prentice Hall

## 12. WEB REFERENCES

1. <http://www.idc-online.com/resources/technical-references/data-communications-technical-references.html>
2. [http://www.crectirupati.com/sites/default/files/lecture\\_notes/DCN%20NOTES.pdf](http://www.crectirupati.com/sites/default/files/lecture_notes/DCN%20NOTES.pdf)
3. <http://www.filehorse.com/download-cisco-packet-tracer-64/>
4. [http://www.wireshark.org/docs/wsug\\_html\\_chunked/ChapterIntroduction.html](http://www.wireshark.org/docs/wsug_html_chunked/ChapterIntroduction.html)
5. <http://www.engpaper.com/computer-network-2019.htm>
6. <http://www.onlinetutorials.com>

## 13. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction to network	08	4	4	2	10
II	Digital Transmission	08	4	6	2	12
III	Concepts of Layer Protocols	08	4	6	2	12
IV	OSI Reference Model- Physical layers	12	6	8	4	18
V	OSI Reference Model- Logical layers	12	6	8	4	18
<b>TOTAL</b>		<b>48</b>	<b>24</b>	<b>32</b>	<b>14</b>	<b>70</b>

**R Remember, U Understand, A Apply and above, (Bloom's revised taxonomy levels)**

NOTE: This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of COs. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.



#### 14. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Mrs. Krishna Bhatt
2	Internal	Mrs. Prachi Arora
3	External	Mr. A. K. Shah
		Organization : Senior Consultant, Deloitte



## 1. COURSE DETAILS

<b>Programme: CSE /IT</b>	<b>Semester: V/III</b>
<b>Course: Human Computer Interface</b>	<b>Group: A</b>
<b>Course Code: HCI228919</b>	<b>Duration:16 Weeks</b>

## 2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D +T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
3	2	-	-	5	3	70	20	10	70	25	-	25	150

## 3. COURSE OBJECTIVE

Advancement in hardware and software, the use of computer becomes everywhere .HCI will be fundamental to make the products more successful, safe and functional. The study of HCI focuses on users, computers and models theories for user friendly interface

## 4. SKILL COMPETENCY

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences.

- **Design an effective interface between human and computers**
- **Acquire skills to design commonly used interfaces**

## 5. COURSE OUTCOMES (COs): At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME
CO1	Correlate HCI concepts with human and computer
CO2	Create prototype applicable to various domains
CO3	Create a visually impactful screen which is easy to navigate
CO4	Describe cognitive and collaboration models
CO5	Design interactive mobile interfaces



### 6. CO-PO, CO- PSO MAPPING TABLE: Computer Engineering

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Human Computer Interface (HCI228919)	CO1	3	-	-	-	-	-	1	3	-
	CO2	2	1	2	1	-	-	1	3	-
	CO3	2	1	3	2	-	-	1	3	-
	CO4	2	-	-	-	-	-	1	3	-
	CO5	2	2	3	2	-	-	2	3	-
	CO Avg.	2.2	1.33	2.67	1.67	-	-	1.2	3	-

### CO-PO, CO- PSO MAPPING TABLE: Information Technology

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Human Computer Interface (HCI228919)	CO1	3	-	-	-	-	-	1	3	-
	CO2	2	1	2	1	-	-	1	3	-
	CO3	2	1	3	2	-	-	1	3	-
	CO4	2	-	-	-	-	-	1	3	-
	CO5	2	2	3	2	-	-	2	3	-
	CO Avg.	2.2	1.33	2.67	1.67	-	-	1.2	3	-

### 7. COURSE CONTENTS

UNIT NO.	TOPIC/Sub-topic	CO
I	<b>Foundations of HCI</b> 1.1 A Brief History of HCI 1.2 Overview of .Net Framework 1.3 The Human: I/O channels ,Memory, Reasoning and problem solving 1.4 The computer: Devices, Memory, processing and networks. 1.5 Interaction: Models, frameworks, Ergonomics, styles, elements, interactivity, Paradigms.	CO1



<p style="text-align: center;"><b>II</b></p>	<p><b>Design Process</b></p> <p>2.1 Human interaction with computers  2.2 Importance of human characteristics  2.3 Human consideration, Human interaction speeds  2.4 Understanding business junctions.</p>	<p style="text-align: center;">CO2</p>
<p style="text-align: center;"><b>III</b></p>	<p><b>Screen Designing</b></p> <p>3.1 Design goals, Screen planning and purpose  3.2 Organizing screen elements, ordering of screen data and content  3.3 Screen navigation and flow  3.4 Visually pleasing composition, amount of information ,focus and emphasis, presentation information simply and meaningfully  3.5 Information retrieval on web  3.6 Statistical graphics, Technological consideration in interface design</p>	<p style="text-align: center;">CO3</p>
<p style="text-align: center;"><b>IV</b></p>	<p><b>Models and Theories</b></p> <p>4.1 Cognitive models  4.2 Socio-Organizational issues and stake holder requirements  4.3 Communication and collaboration models  4.4 Hypertext, Multimedia and WWW.</p>	<p style="text-align: center;">CO4</p>
<p style="text-align: center;"><b>V</b></p>	<p><b>Mobile HCI</b></p> <p>5.1 Mobile Ecosystem: Platforms, Application frameworks  5.2. Types of Mobile Applications: Widgets, Applications, Games  5.3 Mobile Information Architecture  5.4 Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools</p>	<p style="text-align: center;">CO5</p>



## 8. LIST OF PRACTICALS/ASSIGNMENTS/ TUTORIALS/DRAWINGS

Term Work consists of Journal containing minimum no of –10 Experiments/assignments/drawings.

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx. Hrs required	CO
1	Survey of various user interfaces for application, website and mobile applications	2	CO1
2	To create a design prototype for commercial websites	2	CO2
3	To design mobile app / webpage for sales	4	CO3
4	To describe cognitive and collaboration models with suitable examples.	2	CO4
5	To design mobile app / webpage for Interactive system eg ATM	2	CO5
6	To design mobile app / webpage for passengers for updating the status	2	CO5
7	To design mobile app / webpage for organizing educational event	2	CO5
8	To design mobile app / webpage for demonstrating various interactions styles	4	CO5
9	To design mobile app / webpage for creating reports	2	CO5
10	To design mobile app / webpage for e-learning at school level	2	CO5
11	To design mobile app / webpage for user's feedback	2	CO5
12	To design mobile app / webpage for comparison websites	2	CO5
13	To design mobile app / webpage for cab booking	2	CO5
14	To design mobile app / webpage for blind people	2	CO5
	<b>TOTAL</b>	<b>32</b>	

**9. TEACHERS ASSESSMENT (TA):** Assessment to be based on one of the following tools and rubrics for evaluation of TA to be well defined by course teacher.

1. Seminar/ Presentation
2. Quiz

## 10. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Minimum no of practical/assignments.
3. Guest/Expert lectures
4. Demonstrations
5. Slides
6. Self-Learning Online Resources
7. Case Study



## 11. SUGGESTED LEARNING RESOURCES

Sr.No.	Title of Book	Author	Publication
1	About Face3: Essentials of Interaction design	Alan Cooper, Robert Reimann, David Cronin	Wiley publication
2	Human Computer Interaction	Alan Dix, J. E. Finlay, G. D. Abowd, R. Beale	Prentice Hall
3	The Essential Guide to User Interface Design	Wilbert O. Galitz	Wiley publication
4	Galitz's Human Machine Interaction	KalbandeDhananjay R, Kanade P., Iyer S	Wiley publication

## 12. WEB REFERENCES

1. <http://hcibooks.com>
2. <http://www.interaction-design.org>
3. <http://www.hcibib.org>

## 13. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Foundations of HCI	8	2	4	6	12
II	Design Process	8	2	2	8	12
III	Screen Designing	10	2	4	8	14
IV	Models and Theories	12	4	8	6	18
V	Mobile HCI	10	4	4	6	14
	<b>TOTAL</b>	<b>48</b>	<b>14</b>	<b>22</b>	<b>34</b>	<b>70</b>

**R Remember, U Understand, A Apply and above, (Bloom's revised taxonomy levels)**

NOTE: This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of COs. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.



#### 14. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Mrs. Swapna Naik
2	Internal	Mrs.Rupali Pawar
3	External	Dr. Kranti Ghag
		Organization: Associate Professor. D. J. Sanghvi .College of Engineering





## 1. COURSE DETAILS

<b>Programme: Information Technology</b>	<b>Semester: III</b>
<b>Course: Open Source Technology</b>	<b>Group: A</b>
<b>Course Code: OST220903</b>	<b>Duration:16 Weeks</b>

## 2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D +T)	Theory Paper Duration and marks (ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
-	4	-	-	4	-	-	-	-	-	25	25	-	50

## 3. COURSE OBJECTIVE

This course will explore the philosophy of open source software and the various issues in open source development. It enables students to understand various open source licenses and its' implications for users, developers, and the software community in general. Students mainly learn Linux Operating System and industry proven open source softwares

## 4. SKILL COMPETENCY

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences.

- **Install Linux and execute commands and shell scripts.**
- **Use Open Source Tools.**

**5. COURSE OUTCOMES (COs):** At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME
CO1	Acquire knowledge of open source technologies in comparison with licensed technologies
CO2	Install Linux operating system to execute system, utility, network commands and shell scripts
CO3	Configure MySQL server to execute SQL statements
CO4	Create interactive visualization reports using Metabase
CO5	Apply scratch programming to create stories, games and animations
CO6	Use documentation and version control tools



## 6. CO-PO, CO- PSO MAPPING TABLE

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Open Source Technology (OST220903)	CO1	1	--	--	--	--	--	1	2	--
	CO2	1	1	1	2	--	--	2	3	--
	CO3	1	2	1	2	--	--	2	3	--
	CO4	1	2	1	3	--	--	2	2	--
	CO5	1	1	2	3	--	--	1	2	--
	CO6	1	1	1	3	--	--	3	3	--
	CO Avg.	1	1.4	1.2	2.6	--	--	1.83	2.5	--

## 7. LIST OF PRACTICALS/ASSIGNMENTS/ TUTORIALS/DRAWINGS

Term Work consists of Journal containing minimum no of –12 Experiments/assignments/drawings

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx. Hrs required	CO
1	To compare closed (proprietary) and open source softwares with their licenses.	2	CO1
2	To install Linux (Ubuntu) physically on Windows based machine.	2	CO2
3	To install Linux (Ubuntu) virtually on Windows based machine.	2	CO2
4	To explore Linux (Ubuntu) desktop functionalities.	2	CO2
5	To traverse through Linux File Structure.	2	
6	To Execute System, Utility, File Processing and Networking Commands in Linux.	10	CO2
7	To get hands on with Vi and Nano editors.	2	CO2
8	To Run Shell Scripts in Linux.	6	CO2
9	To install, configure MySQL Database on Ubuntu and to execute INSERT, UPDATE, SELECT, DELETE, etc. commands on MySQL database.	4	CO3
10	To get hands on with PhpMyAdmin (GUI interface for MySQL)	2	
11	To perform analytics on a data table and displaying charts using Metabase.	6	CO4
12	To create a basic story/animation using MIT scratch programming.	8	CO5
13	To design a micro project document using Latex.	8	CO6
14	To get hands on with various Git commands.	4	CO6
15	To create micro project related directories and controlling their versions using Git and Git Hub.	4	CO6
<b>TOTAL</b>		64	



## 8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Minimum no of practical/assignments.
3. Industry visit
4. Guest/Expert lectures
5. Demonstrations
6. Slides
7. Self-Learning Online Resources

## 9. SUGGESTED LEARNING RESOURCES

Sr.No.	Title of Book	Author	Publication
1	Understanding Open Source and Free Software Licensing	Andrew M. St. Laurent	O'Reilly Media, Inc.
2	The Official Ubuntu Book	Matthew Helmke Amber Graner	Prentice Hall
3	MySQL 8.0 Reference Manual	MySQL	<a href="https://dev.mysql.com/">https://dev.mysql.com/</a>
4	LaTeX Beginner's Guide	Stefan Kottwitz	PACKT Publishing

## 10. WEB REFERENCES

1. <https://www.howtogeek.com/412055/37-important-linux-commands-you-should-know/>
2. <https://www.javatpoint.com/mysql-tutorial>
3. [https://en.scratch-wiki.info/wiki/Getting\\_Started\\_with\\_Scratch#Online\\_Editor](https://en.scratch-wiki.info/wiki/Getting_Started_with_Scratch#Online_Editor)
4. <https://product.hubspot.com/blog/git-and-github-tutorial-for-beginners>
5. <https://bellard.org/jslinux/>

## 11. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Mr. M.R. Solanki
2	Internal	Mrs. Radhika Patwardhan
3	External	Mr. Rejo Mathew
		Organization: Assistant Professor, MPSTME Mumbai

