

1. COURSE DETAILS

Programme: Information Technology	Semester: III
Course: Programming In Java	Group: C*
Course Code: PRJ190901	Duration: 16 Weeks

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

- 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	Bloom's LEVEL
CO1	Solve object oriented problems using the fundamental syntax and semantics of the Java programming language.	Remember, Understand, Apply
CO2	Design and execute programs on the basis of Inheritance.	Remember, Understand, Apply
CO3	Use the knowledge of packages, exceptions, Strings and I/O handling.	Remember, Understand, Apply
CO4	Write multithreading Programs.	Remember, Understand, Apply
CO5	Develop GUI applications using Applet, AWT and SWING controls.	Remember, Understand, Apply



6. COURSE CONTENTS

Sr.N.	TOPIC/Sub-Topics	Hour	Marks	CO
1	Introduction to object oriented programming 1.1 Creation of java, java byte code, java characteristics 1.2 Abstraction, OOP Principles.-Encapsulation, Inheritance and Polymorphism 1.3 Constant, Variables and Data Types, Type casting 1.4 Operator and Expression, Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operator, Increment and Decrement Operator, Bit wise Operator, Special Operator 1.5 Decision making with simple if, if... else, else if ladder statements, The switch statement, The conditional operator 1.6 Decision Making with Loops i.e. while , do and for statement, Jumps in Loops, Labeled Loops	2	5	CO1
2	Classes, Objects and Methods 2.1 Class Fundamentals, The General Form of a Class, A Simple Class 2.2 Declaring Objects, A Closer Look at new, Assigning Object Reference Variables 2.3 Introducing Methods, Adding a Method to the Class, Returning a Value, Adding a Method That Takes Parameters 2.4 Constructors, Parameterized Constructors 2.5 The this Keyword 2.6 Static data, method and blocks	4	10	CO1
3	Inheritance 3.1 Inheritance Basics , 3.2 Member Access and Inheritance, 3.3 A Superclass Variable Can Reference a Subclass Object 3.4 Use of super keyword 3.5 Creating a Multilevel Hierarchy , 3.6 Method Overriding , Dynamic Method Dispatch, Abstract classes	6	10	CO2
4	Interfaces and Packages 4.1 Defining an Interface, Implementing Interfaces, and Applying interfaces Variables in Interfaces, 4.2 Implementing Multiple Inheritance(Multiple Inheritance), Interfaces Can Be Extended 4.3 Packages, Defining a Package, Finding Packages and CLASSPATH, 4.4 Access Protection, Importing Packages	4	10	CO3



5	Exception Handling 5.1 Exception-Handling Fundamentals, Exception class hierarchy 5.2 Uncaught Exceptions, try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally clauses 5.3 Java's Built-in Exceptions - Checked and Unchecked Exceptions 5.4 Creating Your Own Exception Subclasses using Exceptions	4	10	CO3
6	Multithreading 6.1 The Java Thread Model, The Thread Life Cycle, Thread class methods 6.2 The Thread Class and the Runnable Interface 6.3 The Main Thread, Creating a Thread, Extending Thread, Implementing Runnable 6.4 Creating Multiple Threads, Using isAlive() and join() 6.5 Thread Priorities, Synchronization, Using Synchronized Methods, The synchronized Statement 6.6 Interthread Communication, Deadlock 6.7 Executer Framework	4	10	CO4
7	I/O and String Handling 7.1 String class and its functions, Mutable v/s Immutable String, StringBuffer, StringBuilder class 7.2 File Handling, BufferedInputStream, BufferedOutputStream 7.3 Character Oriented File Handling- FileReader, FileWriter and methods 7.4 Byte Oriented File Handling- FileInputStream, FileOutputStream and methods 7.5 File nio package	3	5	CO3
8	Applets, AWT and SWING 8.1 Applet class architecture skeleton, repeat method, inserting image and audio clips on the applet 8.2 Abstract Window toolkit, AWT classes 8.3 Event handling, Delegation event model, Event model, Event classes, source of events, event listener interface, 8.4 windows fundamentals, creating a frame window, working with frame window, working with graphics, 8.5 Introduction to AWT controls, inserting user interfaces like buttons, checkbox, list, scrollbar, text field and text areas, layout managers. 8.6 Introduction to SWING GUI Controls	5	10	CO5
TOTAL				



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

Term Work consists of Journal containing minimum 12 experiments/assignments with approx. no of hours required and corresponding CO attained are specified here:

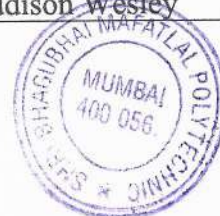
Sr. No.	Title/Aim	Approx. Hrs required	COs
01	To Install and Set up Jdk1.8 on Windows Os to write, compile, and execute a sample Program.	2	CO1
02	To test various data types and typecasting concept available in Java	2	CO1
03	To define a class having overloaded constructors and instantiating objects of the same class.	2	CO1
04	To verify the concept pass-by-reference and array of objects in Java	6	CO1
05	To take user inputs through command line arguments and Scanner class.	2	CO1
06	To implement single and multi-level inheritance	4	CO2
07	To apply the concept of interface in achieving multiple Inheritance and Dynamic Method Dispatch in Java.	4	CO2
08	To create packages with access controls and importing them in appropriate classes.	4	CO3
09	To handle exceptions generated in Java and to create a User Defined Exception class.	6	CO3
10	To create multiple threads and to achieve synchronization among them.	8	CO4
11	To Write a file copy program using byte and character I/O streams.	4	CO3
12	To demonstrate the skeleton (life cycle) of an Applet and to draw different graphical objects	4	CO5
13	To develop GUI application using AWT/SWING controls and handling events.	4	CO5
14	To develop GUI application using SWING controls and handling events.	6	CO5
15	Mini Project	6	All COs
	Total	64	

8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan/Tutorials
2. Minimum no of practical/assignments/drawings etc.
3. Guest/Expert lectures
4. Demonstrations/Simulations
5. Slides
6. Group discussions
7. Self-Learning Online Resources

9. 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 Cornell	Prantice Hall
3.	Java How To Program	Paul Deitel, Harvey Deitel	Pearson
4.	Effective Java	Joshua Bloch	Addison Wesley



10.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>



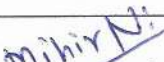

11.SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Sr. No.	TOPIC	Distribution of Theory Marks			Total Marks
		R Level	U Level	A Level	
1.	Introduction to object oriented programming	2	3	-	5
2.	Classes, Objects and Methods	2	4	4	10
3.	Inheritance	-	4	6	10
4.	Packages and interfaces	4	6	-	10
5.	Exception Handling	2	4	4	10
6.	Multithreading	2	4	4	10
7.	I/O and String Handling	2	3	-	5
8.	AWT and Applets	2	4	4	10
TOTAL		16	32	22	70

R Remembering, U Understanding, A Applying, (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.

12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	SIGNATURE
1	Internal	Mrs.Geetha S	
2	Internal	Mr. Manish R Solanki	
3	Internal	Mrs.Priti Bokariya	
4	External	Mr. Mihir Nanavati Organization: Software Engineer II, Microsoft, Hyderabad	



1. COURSE DETAILS

Programme: CSE/IT
Course: Data Structure
Course Code: DST198915

Semester: III
Group: C*
Duration: 16 Weeks

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 requirement of Computer programming which is storing and analyzing data in various structures like stacks, queues, linked lists, trees, graphs etc.

4. SKILL COMPETENCY

The students will be able to

- Understand linear /non linear data structures.
- Write and implement algorithms to store and manipulate data in various data structures.
- To implement and compare various searching –sorting algorithms.
- To analyze the complexity of algorithms.

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

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	Use primary and secondary data structure	Understand, apply
CO2	Apply linear data structure	Understand, apply
CO3	Describe non-linear data structure	Remember, Understand
CO4	Implement searching and sorting techniques	Understand, Apply



6. COURSE CONTENTS

Sr.	Topics/Sub-Topics	Hours	Marks	COs
1	Introduction to data structure and classification 1.1 Linear & Non linear 1.2 Algorithm Basic Concepts 1.3 Definition of Complexity with example 1.4 Definition, implementation and notation of Array 1.5 Basic operation such as addition, deletion etc.	4	4	CO1
2	Stacks 2.1 Introduction to Stacks 2.2 Stacks as an Abstract Data Type 2.3 Primitive operations of stacks 2.4 Representation of Stacks through Arrays 2.5 Representation of Stacks through Linked List 2.6 Application of Stacks 2.7 Stack and Recursion	8	10	CO2
3	Queues 3.1 Introduction •Queues as an abstract data type 3.2 Representation of a Queue as an array 3.3 Representation of a Queue as linked list 3.4 Types of Queue 3.4.1 Circular Queue 3.4.2 Double Ended Queue 3.4.3 Priority Queue 3.5 Applications of Queue	6	10	CO2
4	Linked List 4.1 Introduction •Terminologies: node, Address, Pointer, Information, Next, Null Pointer, Empty list etc 4.2 Representation of Linked list in memory 4.3 Operations on a singly linked list (only algorithm) •Traversing a singly linked list •Searching a linked list •Inserting a new node in a linked list •Deleting a node from a linked list • Header Linked list	12	13	CO2
5	Trees 5.1 Introduction •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 Tree Types and Traversal Methods(•In order traversal Preorder traversal •Post order traversal Expression tree) 5.4 Type of Trees •General tree •Binary tree •Binary search tree (BST).Searching ,Inserting ,Deleting 5.5 Height Balanced ,Weight Balanced Trees	12	13	CO3



6	Graphs 6.1 Terminologies: graph, node (Vertices), arcs (edge), directed graph, in-degree, out-degree, adjacent, successor, predecessor, relation, weight, path, length 6.2 Representations of a graph Sequential Representation (Adjacency Matrix, Path Matrix) Linked Representation 6.3 Operations on Graphs (Insertion, Deletion, Search) 6.4 Graph Traversal (BFS, DFS)	10	9	CO3
7	Sorting and Searching 7.1 Sorting Techniques Selection sort, bubble sort, insertion sort, radix sort, radix exchange sort, Quick sort Heap Sort, Address calculation sort. 7.2 Searching : Linear searching Binary searching, 7.3 Complexity and Big 'O' notations for each sorting algorithm 7.4 Hash search	12	11	CO4
TOTAL		64	70	

7. LIST OF PRACTICALS

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

8. IMPLEMENTATION STRATEGY (PLANNING)

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



9. 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

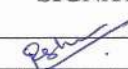



10. WEB REFERENCES

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

11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER SETTING

Sr. No.	TOPIC	Distribution of Theory Marks			Total Marks
		R Level	U Level	A Level	
1	Introduction to data structure and classification	2	2		4
2	Stacks	3	3	4	10
3	Queues	3	3	4	10
4	Linked List	3	7	3	13
5	Trees	3	5	5	13
6	Graphs	2	2	5	9
7	Sorting and Searching		4	7	11
TOTAL		16	26	28	70

12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	SIGNATURE
1	Internal	Mrs. Radhika Patwardhan	
2	Internal	Mrs. Priti Bokhariya	
3	Internal	Mr. Pankaj Rathod	
	External	Ekta Shah, BNP Paribas	



1. COURSE DETAILS

Programme: IT/CSE
Course: DATABASE
MANAGEMENT SYSTEM
Course Code:DBS198917

Semester: III/IV
Group: C*

Duration:16 Weeks

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	50	-	175

3. COURSE OBJECTIVE

This subject will enable the students to comprehend the Database concepts at practical level as well as theoretical level. The aim of this subject is to get broad understanding of the basic concepts of database system in general and relational database system in particular. The students will have theoretical foundation required for working with different types of relational database

4. SKILL COMPETENCY

1. Have a broad understanding of database concepts and database management system software
2. Have a high-level understanding of major DBMS components and their function ,be able to model an application's data requirements using conceptual modeling tools like ER diagrams and design database schemas based on the conceptual model.
3. Gain the capability to write SQL commands to create tables insert/update/delete data, and query data in a relational DBMS.
4. Have a broad understanding of database concepts such as transactions, concurrency ,backup recovery ,query processing and optimization.



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

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	Extrapolate the fundamental elements of relational database management systems	Remember, Understand
CO2	Construct a real world database using SQL.	Understand, Apply
CO3	Analyze ,database storage and normalize database to meet business requirements	Remember, Understand
CO4	Conceptualize query processing, transactions, concurrency control, backup and recovery.	Understand

6. **COURSE CONTENTS**

Sr.	TOPIC / Sub-Topics	Hour	Marks	COs
1	Introduction 1.1. Introduction: file processing disadvantages, data abstraction, data independence, 1.2. Data Models: Entity Relationship model, Network Model, DBTG proposal, Hierarchical Model, Relational Model, 1.3. Database administrator and database users, 1.4. Database system structure	08	12	CO1
2	Data definitions and Data Manipulation languages, operations 2.1. Data definitions and Data Manipulation languages, 2.2. Different SQL operations (Retrieving Data, sorting data, grouping data, constraints, aggregate functions, character functions, set operations, views, joins, subqueries)	08	12	CO2
3	Storage Organization for Relations 3.1. Storage Organization for relations: overview of physical storage media, magnetic disks, 3.2. File organization, fixed length records and variable length records, sequential and clustering file organization.	08	12	CO3
4	Relational Database Design 4.1. Relational database design: functional dependencies, pitfalls in relational database design, 4.2. Decomposition, normalization and different normal forms.	07	10	CO3
5	Query Processor and Optimizer, Transactions 5.1. Query processor and optimizer 5.2. Transaction: transaction concept, transaction state, 5.3. Implementation of atomicity and durability, concurrent executions, serializability. Dependencies	08	12	CO4
6	Concurrency Control, Recovery system 6.1. Concurrency control: lock-based protocols, timestamp-based protocols, validation protocols, deadlock handling 6.2. Recovery system: Failure classification, storage structure, log-based recovery, shadow paging, checkpoints.	09	12	CO4
TOTAL		48	70	



7. LIST OF PRACTICALS/ASSIGNMENTS

Term Work consists of Journal containing minimum no of 10 experiments with approx.no of hours required and corresponding CO attained are specified here. Term Work consists of Journal containing minimum no of --

Sr. No.	Title of Experiment	Approx.Hrs required	COs
1	Draw an E-R model for college database.	2	CO1
2	Creation of table with constraints and insertion of data	2	CO2
3	Running simple SQL queries (select, distinct, desc, where)	4	CO2
4	Execution of Alter, Update, Delete and drop	4	CO2
5	Implementation of aggregate and character functions	4	CO2
6	Implementation of various clauses in SQL.	4	CO2
7	Execution of string, comparison and set operations	2	CO2
8	Implementation of various types of joins	2	CO2
9	Implementation of views.	2	CO2
10	Implement Normalization on a table-show decomposition from 1NF,2NF,3NF	2	CO3
11	Using the case study of a Banking system apply the concept of transaction processing and recovery to the system.	4	CO4
	TOTAL	32	

8.IMPLEMENTATION STRATEGY(PLANNING)

In depth study and understanding of the subject will be implemented by adoption of the following strategy:

1. Conducting lectures as per the teaching plan and conduction tutorials.
2. Use of Power Point presentations during theory class and practical periods
3. Guest/Expert lectures
4. Demonstrations/Simulations
5. Self Learning Online Resources

9.LEARNING RESOURCES

Sr. No.	Title Of Book	Author	Publication
1.	Principles of Database Management,	James Martin	MCGraw Hill Publication
2.	An Introduction to Database systems by date C.J. Volumes I	Date C.J.	MCGraw Hill Publication
3	Database System	Silberschatz, Korth, Sudarshan	MCGraw Hill Publication
4	Data Base system Engineering	Whittington R.P.,	Calvender
5	Database Systems Management and Design.	by Pratt. P	. Boyd and Frasser Publ Comp. 1987.
6	Database Processing: Fundamentals, Design, Implementation	Kroenke, D.M. 2nd Edn.,	Galgotia Publ. Pvt. Ltd.
7	Database Design	Wiederhold,	(McGraw Hill Book Comp.)



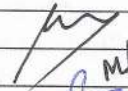



10. WEB REFERENCES

1. www.w3schools.com
2. www.tutorialpoint.com/dbms
3. www.technontshenet.com/access/tutorial
4. www.beginnersbook.com

11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Sr No	TOPIC	Distribution of Theory marks			
		R Level	U Level	A Level	Total Marks
1	Introduction	4	8	-	12
2	Data definitions and Data Manipulation languages, operations	-	4	8	12
3	Storage Organization for Relations	8	4	-	12
4	Relational Database Design	2	4	4	10
5	Query Processor and Optimizer, Transactions	4	4	4	12
6	Concurrency Control, Recovery system	4	4	4	12
		22	28	20	70

12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.	NAME	SIGNATURE
1	Mrs. Swapna Naik	
2	Mr Manish Solanki	
3	Mr Abhijit Dongaonkar	
	Expert: Dr Nadini Chaudhary	



1. COURSE DETAILS

Programme: Information Technology Course: Data Communication & Networking Course Code:DCN190902	Semester: III Group: C* Duration:16 Weeks
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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 Course will help the students to comprehend the fundamentals of data communication and networking. This course will familiarize students in details of all logical and physical layers of networking.

4. SKILL COMPETENCY

The aim of the course is to help students to identify the network architectures and use of networking devices, cables. Students will be able to design network using simulator. They will be able to learn sharing of networking devices, files and folders. They will be fortified to deal with networking troubleshooting using tool.

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

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	Recognise network architecture, devices and physical media	Remember, Understand, Apply
CO2	Analyse functioning of data communication	Remember, Understand, Apply
CO3	Familiarize with TCP/IP protocol suit	Remember, Understand
CO4	Describe ISO OSI reference model – logical and physical layers	Remember, Understand
CO5	Design computer network (topology)	Remember, Understand, Apply



6. COURSE CONTENTS

Sr.No.	Sub-Topics	Hour	Marks	COs
1	Introduction to network 1.1 Network architecture 1.2 Types of network, Network topologies 1.3 Network Hardware, wireless repeater, bridge, switch. 1.4 Uses of Computer Networks	06	10	CO1
2	Digital Transmission 2.1. Types of communications 2.2. Digital transmission, analog transmission 2.3. Multiplexing, switching 2.4. Telephone Network, Dial-UP Modems 2.5 Digital Subscriber Line 2.6 Cable TV networks,	10	12	CO2
3	Concepts of Layer Protocols 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, Service Access Points Encapsulation of PDUs. 3.5 Addition of headers on Transmission 3.6 Removal on reception	08	12	CO3



4	OSI Reference Model physical layers 4.1 Introduction, Need of layering 4.2 Physical Layer – design issues 4.3 Data Link Layer 4.3.1 Introduction 4.3.2 Error detection and Correction-block coding, linear block codes, cyclic codes, checksum 4.3.3 Data link control-Framing-fixed size& variable size 4.3.4 Flow and Error control, protocols, noiseless channels hdlc, point to point protocol 4.3.5 Multiple access- CSMA/CD, CSMA/CA4.3.6 Controlled access- Reservation , Polling, Token Passing4.3.7 channelization-FDMA, TDMA, CDMA 4.4 Network Layer 4.4.1 Logical addressing-IPV4 addresses, Address space, Notation, Class full addressing, Classless addressing 4.4.2 IPv6 ADDRESSES- Introduction to IPv6,comparison with IPV4 4.4.3 Internetworking-Need for network layer, Internet as connectionless network, Datagram, Fragmentation, Checksum, Options 4.4.4 Address mapping-Mapping logical to physical addresses ARP, Mapping physical to logical address: RARP , BOOTP and DHCP,ICMP-Types of messages ,Message format, Error reporting, Query ,Debugging tools 4.4.5 Delivery-Direct versus indirect delivery, Forwarding techniques, process, Routing table	12	18	CO3
5	OSI Reference Model- logical layers 5.1 Transport Layer 5.1.1 Process to process delivery: UDP—Well known ports, congestion control and quality of service. 5.1.2 TCP- service, segment, comparison with UDP 5.2 Presentation Layer and Session layer – Services 5.3 Application Layer 5.3.1 Name space, Flat name space, Hierarchical name space, Domain name space, Label, domain name, Remote logging(TELNET) , electronic mail(message transfer agent SMTP), Message access agent-POP & IMAP,FTP , 5.3.2 WWW & HTTP—Architecture client and server, URL, cookies, WEB document—static & dynamic, proxy server, SNMP	12	18	CO3
TOTAL		48	70	



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

Term Work consists of Journal containing minimum no of experiments/exercises/tutorials/drawings with approx.no of hours required and corresponding CO attained should be specified here.

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx. Hrs required	COs
1.	Understand types of network architecture and topology	04	CO1

2.	Demonstrate Network interface card and its types	04	CO2
3.	To identify and understand the Transmission media used to establish computer networks	04	CO1
4.	Understand the different types of network devices & configure switch and router using network simulation software	04	CO2
5.	Design of Computer Network using network simulation software	04	CO4
6.	Demonstrate Printer sharing in the network	04	CO2
7.	Demonstrate file and folder sharing in the network	04	CO2
8.	Use Network sniffing tool and capture TCP,UDP, IP, ARP, ICMP, Telnet, FTP packets	04	CO5
Total		32	

8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan/Tutorials
2. Minimum of practical/assignments/drawings etc.
3. Demonstrations
4. Power point presentation slides
5. Self-Learning Online Resources

9. 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

10. WEB REFERENCES

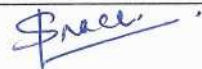


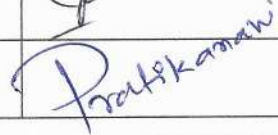
1. [http:// www.idc-online.com/resources/technical-references/data-communications-technical-references.html](http://www.idc-online.com/resources/technical-references/data-communications-technical-references.html)
2. [http:// www.crectirupati.com/sites/default/files/lecture_notes/DCN%20NOTES.pdf](http://www.crectirupati.com/sites/default/files/lecture_notes/DCN%20NOTES.pdf)
3. [http:// www.filehorse.com/download-cisco-packet-tracer-64/](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](http://www.engpaper.com/computer-network-2019.htm)
6. <http://www.onlinetutorials.com>



11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Sr. No	TOPIC	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1.	Introduction to network	4	4	2	10
2.	Digital Transmission	4	6	2	12
3.	Concepts of Layer Protocols	4	6	2	12
4.	OSI Reference Model- physical layers	6	8	4	18
5.	OSI Reference Model- logical layers	6	8	4	18
TOTAL		24	32	14	70

12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	SIGNATURE
1	Internal	Mrs. Prachi Arora	
2	Internal	Mrs. Krishna Bhatt	
3	Internal	Mrs. Rupali Pawar	
4	External	Mr. Pratik Kanani	

1. COURSE DETAILS

Programme: IT/CSE	Semester: III/IV
Course: Computer Graphics	Group: A*/A
Course Code: CGR198920	Duration: 16 Weeks

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	50	-	175

3. COURSE OBJECTIVE:-

This subject intends to teach the students the basic graphics primitives, graphics utilities. Shading algorithms, transformations, clipping algorithms.

4. SKILL COMPETENCY:-

The students will be able to



- 4 Initialize Graphics mode and use different graphics primitive functions
 5 Develop programs using core graphical concepts.

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

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	Conceptualize various display devices with its usage .	Remember ,Understand
CO2	Implement the algorithms namely line drawing , circle drawing , ellipse drawing and area filling .	Understand , apply
CO3	Transform 2D and 3D objects.	Understand , apply
CO4	Implement Line / Polygon Clipping algorithms	Understand ,apply
CO5	Appraise the advanced graphics topics.	Remember , Understand

6. COURSE CONTENTS

Sr.	Topics/Sub-Topics	Hours	Marks	CO's
1	Introduction to computer graphics 1.1 Overview of Computer Graphics –Introduction to opengl 1.2 Advantages of interactive computer graphics 1.3 Applications of computer graphics 1.4 Graphics Devices 1.4.1 Touch Panels 1.4.2 Light Pens 1.4.3 Joystick, Stylus 1.4.4 Cathode Ray Tube 1.4.5 Colour CRT Monitors(Beam Penetration, Shadow Mask Technique) 1.4.6 Direct View Storage Tube 1.4.7 Plasma Panel Display 1.4.8 Flat panel Display 1.5 Vector Scan and Random Scan Display 1.5.1 Raster Scan Display 1.5.2 Frame Buffer Organization-types of Frame Buffers 1.5.3 Display File Interpreter	06	06	CO2



2	Raster Graphics Algorithms for 2D Primitives 2.1 Basics of Line drawing 2.2 Line drawing Algorithms 2.2.1 Digital Differential Analyzer Algorithm 2.2.2 Bresenham's Algorithm 2.3 Aliasing and Anti-aliasing 2.3.1 Methods of Anti-aliasing 2.4 Basics of Circle Drawing 2.5 Circle drawing Algorithms 2.5.1 Digital Differential Analyzer Algorithm 2.5.2 Bresenham's Algorithm 2.5.3 Midpoint Algorithm 2.6 Basics of Ellipse Drawing 2.6.1 Midpoint Ellipse Drawing Algorithm 2.7 Character Generation 2.7.1 Stoke Method 2.7.2 Starbust Method 2.7.3 Bitmap Method	10	16	CO2
3	Area Filling 3.1 Polygon Filling 3.1.1 Seed Fill 3.1.1.1 Boundary Fill Algorithm 3.1.1.2 Flood Fill Algorithm 3.1.2 Scan Line Algorithm	04	06	CO2
4	2D-3D transformation 4.1 2D Transformation 4.1.1 Translation 4.1.2 Rotation 4.1.3 Scaling 4.2 Homogenous Coordinates 4.3 Composition of 2D Transformation 4.3.1 Rotation about an arbitrary point 4.4 Other Transformation 4.4.1 Reflection 4.4.2 Shear 4.5 Introduction to 3D transformation 4.5.1 3D Translation 4.5.2 3D Rotation 4.5.3 3D Scaling	08	13	CO3
5	Clipping and Windowing 5.1 Viewing transformations. 5.1.1 Normalization Transformation 5.1.2 Workstation Transformation 5.2 Line Clipping 5.2.1 Sutherland Cohen Line clipping algorithm 5.2.2. Midpoint subdivision line clipping 5.3 Sutherland Hodgeman Polygon clipping	06	13	CO4



6	Hidden Surfaces and Shading 6.1 Hidden Surfaces and Lines 6.1.1 Depth Comparisons 6.1.2 Back-face removal algorithm 6.1.3 Z buffers 6.1.4 Scan-line 6.1.5 Painter's algorithm 6.1.6 Warnock's algorithm 6.2 Light Shading 6.2.1 Illumination Model 6.2.2 Gouraud Shading 6.2.3 Phong Shading 6.2.4 Half Tone Shading and dithering 6.2.5 Transparency 6.3 Color models –RGB,CMY,HSV		10	10	CO5
7	Segments and Curves 7.1 Introduction to segmentation- Segment Table 7.2 Functions of Segmentation 7.2.1 Creation of Segment 7.2.2 Closing of Segment 7.2.3 Deletion of Segment 7.2.4 Renaming of Segment 7.3 Introduction to curves 7.3.1 Interpolation 7.3.2 Bezier curve and its properties 7.3.3 B-Spline curves and its properties		04	06	CO5
		TOTAL	48	70	

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx.Hrs required	COs
1	Program for Pixel Drawing {processing Tool OS}	2	CO2
2	Program for Line drawing by DDA	2	CO2
3	Program for Line drawing by Bresenham's	2	CO2
4	Program for Circle Drawing by DDA	2	CO2
5	Program for Circle Drawing by Bresenham's	2	CO2
6	Program for Circle Drawing by midpoint	4	CO2
7	Program for Ellipse Drawing (midpoint)	4	CO2
8	Program for Transformation (2D)	4	CO3
9	Program for polygon filling using boundary fill algorithm	2	CO2
10	Program for Line Clipping by Sutherland-Cohen	4	CO4
11	Program for Line Clipping by midpoint subdivision	2	CO4
12	Program for Text Generation	2	CO2
	Total	32	



7.LIST OF PRACTICALS

Term Work consists of Journal containing the following experiments:-

8. IMPLEMENTATION STRATEGY (PLANNING)

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

9. LEARNING RESOURCES

Sr. No.	Title Of Book	Author	Publication
1.	Computer Graphics	Hearn, Baker	Pearson Education
2.	Principles of Interactive Computer Graphics	William Newman	Mc Graw Hill Education.
3	Computer Graphics	A.P. Godse.	Technical Publication.

10. WEB REFERENCES

- 1) www.insidecg.com
- 2) www.graphics.standard.edu
- 3) www.opengl.org
- 4) www.includehelp.com

11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER SETTING

Sr. No.	TOPIC	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Introduction to computer graphics	4	2		6
2	Raster Graphics Algorithms for 2D Primitives	4	4	8	16
3	Area Filling	2	4		6
4	2D-3D transformation	3	3	7	13
5	Clipping and Windowing	3	3	7	13
6	Hidden Surfaces and	6	4		10

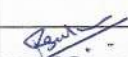





	Shading				
7	Segments and Curves	3	3		6
TOTAL		25	23	22	70

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.

12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	SIGNATURE
1	Internal	Mrs. Radhika Patwardhan	
2	Internal	Mrs. Priti Bokhariya	
3	Internal	Mr. Pankaj Rathod	
4	External	Mr Manish Salve	

1. COURSE DETAILS

Programme: Information Technology Course: Multimedia And Animation Course Code:MSA190903	Semester: III Group: A Duration:16 Weeks
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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	-	-	-	-	-	50	50	-	100

3. COURSE OBJECTIVE



One picture speaks thousand words & animated multimedia picture can speak a lot more. Animation has given a boost to various areas like film production, e-learning & animated web-site etc. This subject will enable the students to implement their creative imagination to produce animated text & images. It is a practical oriented subject which deals with various fonts, audio & video formats, and basic shapes, images to the controls, tools & animation.

4. SKILL COMPETENCY

The course should be taught and implemented with the aim to develop the required course outcomes (Cos) so that student will acquire following competency.

- 1) To create animation independently and integrate multimedia object.
- 2) To edit an images with various effects.

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

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	Describe the multimedia system architecture and classify it's applications.	Remember
CO2	Create animated picture like forest and give raining effect in addition to lightening, thundering effect. And Integrate Audio & video in created multimedia using FLASH tool	Understand,Apply
CO3	Develop the skill of Images Editing using Tool box, various colour effect, soft focus effect, background changing, watermark effect	Understand,Apply
CO4	Design banners, logos, pamphlets using corel draw tool.	Understand,Apply
CO5	create 3D modelling, rendering and imaging, pipeline integration and 3D animation	Understand,Apply
CO6	Describe the multimedia Authoring and interface	Remember

6. COURSE CONTENTS

Sr No.	TOPIC/Sub-Topics	Hours	Marks	Cos
1	Multimedia Elements Multimedia Application 1.1. I/P, O/P devices, 1.2. Evaluation of Multimedia systems, Storage media, 1.3. Multimedia System Architecture, Distributed Multimedia	04	-	CO1



2	Flash Multimedia Tool 2.1. Introduction to Flash tool – Creating & Modifying elements, 2.2. Line tool, fill/attributes, different shapes, text tools & pen tool, Selecting lines fill with arrow tool, selecting shapes, 2.3. using lasso tool performing basic editing tools, selecting & deselecting elements, modifying created objects. 2.4 create animated picture like forest and give raining effect in addition to lightening, thundering effect. 2.5 Publish on the web		20	-	CO2
3	Photoshop Multimedia Tool 3.1. Introduction to Photoshop tool – 3.2. Basic of Photoshop, layer concept, Tool box, 3.3. Basic image editing, drawing and selection tool, various colour effect, soft focus effect, background changing, watermark effect		12	-	CO3
4	Coral draw Multimedia Tool 4.1. Introduction to Photoshop tool – window of coral draw, tool box, 4.2. how to setup layers, creating various shapes and text, Drawing boundaries, 4.3. Interactive Blend Tool, Interactive Contour Tool, creating maps		12	-	CO4
5	3D Maya Multimedia Tool 5.1. Introduction to 3D Maya tool 5.2. 3D modelling, rendering and imaging, pipeline integration , 5.3. 3D animation – 5.3.1. Understanding the animation interface . 5.3.2. Animating objects. 5.3.3. Copying and adjusting keys. 5.3.4. Animating objects along paths. 5.3.5. Creating motion trails		12	-	CO5
6	Multimedia Authoring and User Interface 6.1. Multi Media Authoring System and its type, 6.2. Hypermedia Application Design considerations, 6.3. User Interface Design, Information Access, Object Display / Playback Issues		04	-	CO6
		TOTAL	64		



7. LIST OF PRACTICALS/ASSIGNMENTS/EXERCISES

Term Work consists of Journal containing minimum no of 10 experiments/assignments with approx.no of hours required and corresponding CO attained are specified here.

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx.Hrs required	CO Mapping
1	Create a cycle & name each part of cycle using different styles & format & animate text.	04	CO2
2	Draw seed & create small plant with use of at least 4 frames.	06	CO2

3	Create a forest of tree with flowers & fruits from a small plant using different layers & frame transition time.	06	CO2
4	Create a forest of trees using the object created earlier. Also add lighting and rain effect.	02	CO2
5	Insert audio to relevant frames that has lighting & rain effect.	02	CO2
6	Convert created work into file format which can be publish on web	02	CO2
7	Interfacing digital-web-cam, capturing live image & editing using web-cam software.	02	CO3
8	Importing & exporting images, apply different image editing tools.	04	CO3
9	Apply different types of filters in photoshop	04	CO3
10	Apply watermark effect on image in photoshop.	02	CO3
11	Performs different types of tools in corel draw.	06	CO4
12	Designing of banner, logo, pamphlets in corel draw	04	CO4
13	Character animation in 3d maya	06	CO5
14	Apply lighting and rendering effect in 3D maya	02	CO5
15	Mini Project: Students should create a movie of minimum 2 minutes playtime using either Flash or 3D-MAX or MAYA or Open Source Multimedia tool.	12	CO2,3,4,5
	Total	64	

8. IMPLEMENTATION STRATEGY(PLANNING)

1. Teaching Plan/Tutorials
2. Guest/Expert lectures
3. Hands on Practice on the laboratory
4. Mini project



9. LEARNING RESOURCES





Sr.No.	Title Of Book	Author	Publication
1.	Multimedia Systems Design	Prabhat K. Andheigh, Kiran Thakrar, John F	Prentice Hall of India
2.	Multimedia Systems	Koegel Buford	Pearson Education

3.	Multimedia Communication Directions and Innovations	J.D. GIBSON	Academic Press, Hardcourt India
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10. WEB REFERENCES

1. <http://www.baycongroup.com/>
2. <http://www.flashtutorials.us/flash-tutorials/2/2>
3. www.onlinewebtutorial.com
4. www.codetutorial.com
5. www.udemy.com

11. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	SIGNATURE
1	Internal	Mr. Pratik. H. Shah	
2	Internal	Mrs. Neeta G. Kadukar	
3	Internal	Mrs. Sharyu R. Kadam	
4.	External	Mrs vashali Rane	



1. COURSE DETAILS

Programme: Information Technology
Course: Open Source Technology
Course Code: OST190904

Semester: III
Group: A
Duration: 16 Weeks

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	2	-	-	4	-	-	-	-	-	50	-	50	100

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

- Install Linux and execute commands and shell scripts.
- Hands on practice with Open Source Tools.

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

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	Acquire knowledge of open source technologies in comparison with licensed technologies.	Remember, Understand
CO2	Install Linux operating system to execute system, utility, network commands and shell scripts.	Remember, Understand, Apply
CO3	Configure MySQL Server, working with MySQL Databases to create database related applications.	Remember, Understand, Apply
CO4	Use various open source softwares.	Remember, Understand, Apply



6. COURSE CONTENTS

Sr.No.	TOPIC/Sub-Topics	Hours	Marks	CO
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1	<p>Open source fundamentals</p> <p>1.1. Open Source History, Initiatives, Principle and methodologies.</p> <p>1.2. Philosophy: Software Freedom, Open Source Development Model Licenses and Patents: What Is A License, Important FOSS Licenses (Apache, BSD, GPL, LGPL), copyrights and copyleft,</p> <p>1.3. Free Software vs. Open Source software, Public Domain Software, FOSS does not mean no cost. The Free Software Foundation and the GNU Project. GNU General Public License, Open source ethics. Social and Financial impacts of open source technology, Shared software, Shared source</p> <p>1.4. Overview of popular Linux distributions</p> <p>1.5. Running Linux in a virtual machine</p>	5	-	CO1
2	<p>Linux operating system</p> <p>2.1. Operating System Organization: OS basics, processes, Filesystem layout, File permissions Commands: chmod, find, locate, Super user powers, Installing applications, Commands: make, apt-get, Overview of Linux Operating System, Linux Distribution, Filesystem Hierarchy, kernel, factory sites, Graphical Environment and Terminal Windows, GNOME Basics. Changing the desktop background, adding menu items, plugins. Changing the screen resolution, File System Concepts, Managing File with Graphical Utilities. Multiboot Environment, Hard disk Partitioning</p> <p>2.2. The command-line Using the Command Line, Accessing remote servers and files, Editing and manipulating files Piping commands and saving output, Searching in command line history, Commands: mkdir, nano, cat, head, tail, less, clear, grep, sort, uniq, man, >, , cd, df, find, locate, nano & vi text editor, man page, Adding users, groups, su - becoming the root user, sudo - to run processes as another user., Changing users passwords with the passwd command, Installing new software with yum (if Fedora) or YaST (if SUSE) rpm</p> <p>2.3. Networking Tools ping - check if a host is online, traceroute - see your hops between hosts, telnet - diagnostics, nmap - seeing what ports are open on a host, xinetd - the "internet super server". TCP/IP service manager, lsof - list open ports and files, ethereal - Packet Sniffer Extraordinaire</p> <p>2.4 Shell Scripting: Writing script & executing basic script, Debugging script, Making interactive scripts, Variables (default variables), Mathematical Expressions, Conditional Statements, Loops</p>	6	-	CO2



3	MySQL Server and Application 3.1. Introduction to Web server, Installing Apache on Linux: httpd service Installation, 3.2. Configuration and administration under Windows and Linux environment: of Apache, Apache Tomcat the Apache webserver. 3.3. MySQL database engine. 3.4. MySQL : Configuring MySQL Server, working with MySQL Databases, MySQL Tables, SQL 3.5. Commands – INSERT, SELECT, UPDATE, REPLACE, DELETE. Date and Time functions	4	-	CO3
4	Metabase Installation, getting insights, Visualization with charts, Reporting, data warehouses, and ETL, Building a sample report	2	-	CO4
5	Scratch Programming using MIT Introduction, Starting Scratch, Basic Interface, Writing Single scripts, Expanding a script, Rearranging a script, Running multiple scripts, Controlling execution of a script, cleaning up scripts, conditional decision making statements, visual enhancement.	5	-	CO4
6	Latex Installation, Building a Latex document, Adding Text, Adding and referencing Mathematical Equations, Document structure (sections and paragraphs), Adding pictures, Table of contents, Bibliography, Footnotes, Tables, Hyperlinks, Lists.	5	-	CO4
7	Git Hub Introduction to Github, advantages of Github for software developers, usage Environment setup Github repository and Git Server, Example of version control, Benefits of version control systems, Branches in Git, Git commands, Using Github for projects, Git v/s Mercurial v/s SVN	5	-	CO4
	TOTAL	32	-	

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

Term Work consists of Journal containing minimum 10 experiments/assignments with approx. 400 hours required and corresponding CO attained are specified here:



Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx.Hrs required	COs
1	To install Linux(Ubuntu) physically on Windows based machine.	2	CO2
2.	To install Linux(Ubuntu) virtually on Windows based machine.	1	CO2
3.	To explore Linux (Ubuntu) desktop functionalities.	1	CO2
4.	To traverse through the file structure of Linux OS.	1	CO2
5.	To Execute System, Utility, File Processing and Networking Commands in Linux.	6	CO2
6.	To get hands on with Vi, Nano and Gedit editors.	1	CO2
7.	To Run Shell Scripts in Linux.	4	CO2
8.	To install, configure MySQL Database on Ubuntu and to execute INSERT, UPDATE, SELECT, DELETE, etc. commands on MySQL database.	4	CO3
9.	To perform analytics on a csv file and displaying charts using Metabase.	2	CO4
10.	To create a basic story/animation using scratch programming.	4	CO4

11.	To design a document using Latex.	4	CO4
12.	To create project related documents and controlling their versions using Git Hub.	2	CO4
	TOTAL	32	

8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan/Tutorials
2. Minimum no of practical/assignments/drawings etc.
3. Guest/Expert lectures
4. Demonstrations/Simulations
5. Slides
6. Group discussions
7. Self-Learning Online Resources


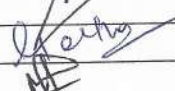

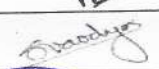
9. LEARNING RESOURCES

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	https://dev.mysql.com/
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
4. <https://product.hubspot.com/blog/git-and-github-tutorial-for-beginners>

11. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	SIGNATURE
1	Internal	Mrs. Swapna Naik	
2	Internal	Mrs. Geetha S	
3	Internal	Mr. Manish R Solanki	
4	External	Mr. Siddhesh Vaidya Organization: Vidyalankar Polytechnic.	



1. COURSE DETAILS

Programme: Information Technology Course: Software Engineering Course Code: SWE190905	Semester: IV Group: C* Duration:16 Weeks
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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	--	50	175

3. COURSE OBJECTIVE

This Course will help the students to understand the essentials of software development. The subject will also familiarize the students in details of software quality control and assurance.

4. SKILL COMPETENCY

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

- Aid students to distinguish the software development paradigms.
- Understand and apply the use of CASE tools to construct system representation diagram.
- Fortified to deal with analysis and design of the system.

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

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	To Learn software development paradigms	Remember, Understand,
CO2	To Analyse & design the system	Understand, Apply
CO3	To Learn programming standard & testing techniques.	Remember, Understand, Apply
CO4	To Classify CASE tools and construct system representation diagrams	Understand, Apply
CO5	To Explain software quality assurance	Remember, Understand, Apply



6. COURSE CONTENTS

Sr.No.	Sub-Topics	Hours	Marks	COs
1	1. Software Engineering Fundamentals 1.1. Definition of software products, Software Engineering 1.2. Software development Paradigms 1.3 Introduction to Agile model 1.4. Knowledge Engineering 1.5. End-user development approaches	04	08	CO1
2	2. System Analysis 2.1. Abstraction, Partitioning 2.2. SRS standards 2.3. Formal Specification method 2.4. Specification Tools 2.5 Flow based analysis 2.6 Data based analysis 2.7 Object-Oriented Analysis 2.8 Projection	07	08	CO2
3	3. System Design 3.1. Process-Oriented Design 3.2 Data Oriented design 3.3 Object-Oriented Design 3.4 Cohesion 3.5 Coupling 3.6 Design Metrics 3.7 Design Document Standards	07	08	CO2
4	4. Coding and Programming 4.1 Choice of Programming Languages 4.2 Call Semantics 4.3 Coding standards 4.4 Mixed Language Programming 4.5 Re-engineering Legacy system 4.6 Reverse Engineering	06	06	CO3
5	5. Introduction of CASE tools 5.1 Relevance of CASE tools, 5.2 Central Data Dictionary 5.3 High end CASE tools 5.4 Low end CASE tools 5.5 Integrated CASE tools 5.6 Different examples of CASE tools	04	06	CO4
6	6. Diagramming 6.1 Diagram specific description 6.2 System flow chart 6.3 ER Diagram 6.4 Decomposition diagram 6.5 Data flow diagram 6.6 Structure chart 6.7 Software tools for creating diagrams	06	10	CO4



7	7. Software Testing 7.1 Software Testing Fundamentals 7.2 Testing Objectives 7.3 Testing Principles 7.4 Software Testing Strategy 7.5 Unit testing 7.6 Integration testing 7.7 Regression testing 7.8 Black box & white box testing concepts 7.9 Validation testing using alpha & beta testing	07	12	CO3
8	8. Software Quality assurance 8.1 Software Quality assurance 8.2 Reliability analysis 8.3 Program Complexity analysis 8.4 Software Quality and metrics 8.5 Capability Maturity Model-Integrated 8.6 COCOMO model	07	12	CO5
TOTAL		48	70	

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

Term Work consists of Journal containing minimum 10 no of experiments

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx. Hrs required	COs
1.	Construct Flow Chart, ER Diagram for different system	04	CO1
2.	Construct DFD, Structure chart for different system	04	CO4
3.	Develop SRS using online documentation tool	04	CO2
4.	Develop Time line chart / Gantt chart to track the progress of the project.	02	CO2
5.	Estimate cost of the project using COCOMO/ COCOCMO II approach	02	CO5
6.	Program for Student Information System	04	CO2,CO3
7.	Program for Railway Reservation System	04	CO2,CO3
8.	Program for Payroll System	04	CO2,CO3
9.	Write Test cases to validate requirements of project from SRS document	02	CO3
10.	Generate Bug Report using Bug tracking tool (Bugzilla, Bugit etc)	02	CO3
Total		32	



8. IMPLEMENTATION STRATEGY (PLANNING)

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

9. LEARNING RESOURCES

Sr.No.	Title Of Book	Author	Publication
1.	Software Engineering : A practitioners approach	Pressman Roger	Tata Mc Graw Hill
2.	An Integrated Approach to software Engineering	Jalota Pankaj,	Narosa , Publication

10. WEB REFERENCES

1. [http:// www.idc-online.com/resources/technical-references/information-technology-technical-references.html](http://www.idc-online.com/resources/technical-references/information-technology-technical-references.html)
2. [http:// www.minigranth.com/software-engineering-tutorial/case-tools/](http://www.minigranth.com/software-engineering-tutorial/case-tools/)
3. [http:// examupdates.in/software-engineering-notes/](http://examupdates.in/software-engineering-notes/)
4. [http:// www.onlinetutorials.com](http://www.onlinetutorials.com)
5. [http:// www.rspa.com](http://www.rspa.com)

11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Sr.No.	TOPIC	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1.	Software Engineering Fundamentals	4	4	-	8
2.	System Analysis	-	4	4	8
3.	System Design	-	4	4	8
4.	Coding and Programming	2	2	2	6
5.	Introduction of CASE tools	-	2	4	6
6.	Diagramming	-	2	8	10
7.	Software Testing	4	6	2	12
8.	Software Quality assurance	4	6	2	12
TOTAL		16	32	22	70

R Remembering, U Understanding, A Applying, (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.

12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.	Faculty	NAME	SIGNATURE
1	Internal	Mrs. Krishna Bhatt	
2	Internal	Mrs. Geetha S	
3	Internal	Mrs. Sharyu kadam	
4	External	Ms. Ekta Shah Organization:BNP PARIBAS/GENERAL MILLS	



Handwritten signatures of the committee members: Krishna Bhatt, Geetha S, Sharyu kadam, and Ekta Shah.

1. COURSE DETAILS

Programme: Computer Engineering /Information Technology Course: Fundamentals of Operating System Course Code: FOS198916	Semester: IV Group: C* Duration:16 Weeks
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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

The study of operating system is not only the basic understanding of system software but also it provide an insight for developing application software This course primarily focuses on design and data structures used for managing the resources . It also covers multiprocessing and distributed operating system

4. SKILL COMPETENCY

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

- Implement various algorithms for managing the processes ,process synchronizations and deadlocks
- Implement various memory management schemes and page replacement strategies.
- Describe the distributed operating system and multiprocessor operating systems

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

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	To implement process scheduling algorithms.	Remember, Understand
CO2	To implement process synchronization and dead lock prevention algorithms,	Understand, Apply
CO3	To implement memory management algorithms.	Understand, Apply
CO4	To implement file management algorithms	Remember, Understand
CO5	To describe concepts of multiprocessor and distributed operating systems.	Remember, Understand



6. COURSE CONTENTS

Sr.No.	TOPIC Sub-Topics	Hours	Marks	COs
1	Processes 1.1 The process concept, systems programmer's view of processes, 1.2 Operating system view of processes, Operating system services for process management, 1.3 Scheduling algorithms, Performance evaluation.	10	12	CO1
2	Inter process Communication and Synchronization 2.1. The need for inter process communication and synchronization, mutual exclusion, semaphores, Hardware support for mutual exclusion, 2.2. Queuing implementation of semaphores, Classical problems in concurrent programming, 2.3. Critical region and conditional critical region, monitors, messages, deadlocks.	12	14	CO2
3	Memory Management 3.1. Contiguous allocation, Single process monitor, Partitioned memory allocation static, partitioned memory allocation – Dynamic, segmentation. 3.2. Non-contiguous allocation- Paging, virtual memory (allocation policies and page replacement policies).	12	14	CO3
4	File Management 4.1. Command language user's view of the file system disk organization, disk controller and driver 4.2. Operating system's view of file management, 4.3. Disk caches and Unix Buffer cache, a generalization of file services.	12	12	CO4
5	Multi-processor Systems 5.1. Motivation and classification, multi-processor interconnection, types of multi-processor operating system, 5.2. Multi-processor OS functions and requirements introduction to parallel computing, 5.3. Multi-processor synchronization	10	10	CO5



6	Distributed Operating Systems: algorithms 6.1 Rationale for distributed systems 6.2 Computer networks algorithms for distributed process coping with failures		8	8	CO5
		TOTAL	64	70	

7. LIST OF PRACTICALS/ASSIGNMENTS

Term Work consists of Journal containing minimum 9 no of experiments and a mini project with approx.no 32 of hours required.

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx.Hrs required	COs
1	Program for implementing System calls for file manipulation	4	CO1
2	Program for implementing scheduling algorithm FCFS	4	CO1
3	Program for round robin scheduling	4	CO1
4	Program for round Shortest Job First scheduling	4	CO1
5	Program for Static partitioning – Memory Management	4	CO3
6	Program for Dynamic partitioning – Memory Management	4	CO3
7	Program for page replacement strategies i) FIFO ii) LRU .	6	CO3
8	Program for implementation of dead lock avoidance mechanism	4	CO2
9	Program for implementation Producer – Consumer problem	4	CO2
10	Program for implementation following file organization Technique i) Single level directory ii) two level directory	4	CO2
11	To implement basic commands of Linux	4	CO1,2,3
12	To implement basic programs of shell scripting	4	CO1,2,3
13	Mini Project on Windows or Linux Operating system architecture covering process management Memory Management.	4	CO1to 5
		TOTAL	32

8. IMPLEMENTATION STRATEGY(PLANNING)

1. Teaching Plan/Tutorials
2. Guest/Expert lectures
3. Slides
4. Case Study
5. Self-learning resources



9. LEARNING RESOURCES

Sr.No.	Title Of Book	Author	Publication
1.	Operating systems – Concepts and Design	Milan Milenkovic	McGraw-Hill international Edition
2.	An introduction to operating Systems	Harvey M. Deitel	Addison- Welley Publishing Company
3.	Operating System Concepts	James L Peterson, Abraham Silberschatz	Addison – Wesley Publishing Company
4.	Operating Systems	Dhananjay Dhamdhare	McGraw-Hill Publishing

10. WEB REFERENCES

1. https://en.wikiversity.org/wiki/IT_Fundamentals/Operating_Systems
2. <http://www.interaction-design.org>
3. https://www.tutorialspoint.com/unix/shell_scripting.htm

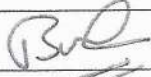
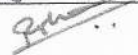


11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Sr No	TOPIC	Distribution of Theory Marks			Total Marks
		R Level	U Level	A Level	
1	Processes	8	4		12
2	Inter process Communication and Synchronization		8	6	14
3	Memory Management		10	4	14
4	File Management	4	8	-	12
5	Multi-processor Systems	6	4	-	10
6	Distributed Operating Systems: algorithms	4	4	-	8
	Total	22	38	10	70

R: Remembering U: Understanding A: Applying (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 question paper may vary from above table.



12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.	Faculty	NAME	SIGNATURE
1	Internal	Mr. J. S. Kulkarni	
2	Internal	Mrs. Radhika Patwardhan	
3	Internal	Mrs. Swapna Naik	
4.	External	Mr. Sanjay Deshmukh Organization : MPSTME , Mumbai	



1. COURSE DETAILS

Programme: IT/CSE Course: Programming in Python Course Code: PRP198918	Semester: IV Group: C* Duration: 16 Weeks
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2. TEACHING AND EXAMINATION SCHEME

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

3. COURSE OBJECTIVE

This course intends to teach the student the basic concepts of Python programming. Python is a multi-paradigm programming language that has primarily been developed as a more concise, straightforward, and easy-to-understand. Python is used for developing desktop GUI applications, gaming, web applications, embedded applications and data analytics. This course is designed to give basic knowledge of Python Programming to the students.

4. SKILL COMPETENCY

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

1. Use Python data structures appropriately.
2. Develop GUI desktop application.

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

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	Use basic fundamentals and control statements.	Remember, Understand
CO2	Apply String, List, Tuple, Dictionary and Sets appropriately in Python Scripts.	Remember, Understand, Apply
CO3	Implement functions, modules and packages.	Remember, Understand, Apply
CO4	Write robust code with OOP, Exception Handling, Multithreading, Regular Expressions and File Handling.	Remember, Understand, Apply
CO5	Develop GUI desktop application with database connectivity.	Remember, Understand, Apply



6. COURSE CONTENTS

Sr.No.	TOPIC/Sub-Topics	Hour	Marks	COs
1	Python Basics 1.1 Introduction: History of Python ,Python Features , Advantages and Disadvantage, Python Installation and Environment Setup ,Program structure ,Interactive Shell ,User Interface or IDE-,Introduction to PIP 1.2 Fundamentals: Python Keywords, Identifiers, Variables and Indentation ,Comments and document interlude in Python ,Command line arguments ,Getting User Input 1.3 Python Data Types: Numbers, Strings, Lists, Tuples ,Dictionary ,Set ,Frozenset , Bool ,Mutable and Immutable types 1.4 Operators: Arithmetic Operators , Relational Operators, Logical Operators , Membership Operators , Identity Operators, Bitwise Operators , Assignment Operators , Operators Precedence, Evaluating Expression , Type Conversion	05	07	CO1
2	Control Flow 2.1 Conditional Statements: The if Statement ,The if-else Statement ,The if-else if Statement ,Nested if Statements ,Python Indentation 2.2 Looping and Iteration: The For Loop, The While Loop ,Loop else Statement ,Nested Loops ,Pass, Break and Continue, Loop using range() function ,Types of range() function	03	07	CO1
3	String, List, Tuple, and Dictionary and Set Manipulations 3.1 String: Introduction to Python String, Accessing Individual Elements, String Operators, String Slices, String Functions and Methods 3.2 List: Introduction to Python List, Creating List, Accessing List, Joining List, Replicating List , List Slicing 3.3 Tuple: Introduction to Tuple, Creating Tuples, Accessing Tuples, Joining Tuples, Replicating Tuples, Tuple Slicing 3.4 Dictionary: Introduction to Dictionary, Accessing values in dictionaries, working with dictionaries, Properties 3.5 Set: Introduction to Set, Iteration over Sets, Set Methods, Set Operations, Union of sets, Built-in Functions with Set, Frozenset	05	13	CO2



4	Functions, Modules And Packages 4.1 Functions: Built-In Functions ,Python Function Types ,Structure of Python Functions ,E.g – map(), reduce(), filter(), any(), chr(), ord(), sorted(), globals(), locals(), all(), etc. , Defining User Defined Functions- Invoking User Defined Function ,Flow of Execution ,Arguments and Parameters ,Default Arguments, Named Arguments ,Scope of Variables ,Lambda function- Recursion Function 4.2 Modules: Built-in Modules ,Importing Modules in Python Programs ,Working with Random Modules ,e.g. - built-ins, os, time, date time, calendar, sys, etc.- Organizing python projects into modules - Importing own module as well as external modules- 4.3 Packages: package concept, package initialization, importing	04	8	CO3
5	OOP , Exception Handling and Multithreading 5.1 OOP: Creating a Class, Self-Variables, Constructors, Access Modifiers, Inner Classes, Inheritance, Polymorphism, The super() Method, Method Resolution Order (MRO), Operator Overloading, Method Overloading & Overriding, Interfaces in Python. 5.2 Exceptions: Default Exception and Errors, Catching Exceptions, Raise an exception, try.... except statement, Raise, Assert, Finally blocks, User defined exception 5.3 Multithreading: Thread and Process, Starting a thread,	05	15	CO4
6	Regular Expression and File Processing 6.1 Regular Expressions: Pattern matching and searching, Real time parsing of networking or system data using regex, Password, email, url validation using regular expression -Pattern finding programs using regular expression 6.2 File Processing: Reading config files in python , Writing log files in python, Understanding read functions, read(), readline() and readlines() , write functions, write() and writelines(), Manipulating file pointer using seek, Programming using file operations	05	8	CO4
7	GUI Programming with Database Connectivity 7.1 GUI Programming: Writing a GUI with Python: GUI Programming Toolkits, Creating GUI Widgets with Tkinter, Creating Layouts, Frames, Labels, Radio Buttons and Checkboxes, Dialog Boxes. 7.2 Database Connectivity: Python's Database Connectivity, Types of Databases Used with Python, Mysql database Connectivity with Python, Performing Insert, Deleting & Update operations on database.	05	12	CO5
	TOTAL	32	70	



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

Term Work consists of Journal containing minimum 14 experiments/assignments with approx. no of hours required and corresponding CO attained are specified here:

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx.Hrs required	COs
1	To install python and to run a Hello World script	2	CO1
2.	To test the functionality of various data types and type conversion of python.	2	CO1
3.	To execute programs related to conditional statements i.e. simple if, ..elif, nested if and switch case statements (Two problem statements)	4	CO1
4.	To execute programs related to iterative statements i.e. for and while (Two problem statements)	4	CO1
5.	To implement String, List, Tuple, Dictionary and Set oriented Programs.	8	CO2
6.	To apply library functions of python and to develop a user defined function (Two problem statements)	2	CO3
7.	To import and test the functionality of OS, Sys, Math and Statistics modules.	2	CO3
8.	To create and import user defined package.	2	CO3
9.	To Develop an object oriented script using array of objects concept.	2	CO4
10	To Implement Inheritance in Python.	4	CO4
11.	To handle exception in a Python script.	2	CO4
12.	To execute a complex task by creating multiple threads.	4	CO4
13.	To validate username, password and url using regular expressions.	2	CO4
14	To perform create, open, read, write, append and close operations on a data file.	4	CO4
15	To develop a desktop application using GUI controls.	4	CO5
16	To connect database with a desktop application to perform CRUD operations	4	CO5
17	Mini Project	12	All COs
	Total	64	

8. IMPLEMENTATIONSTRATEGY (PLANNING)

1. Teaching Plan/Tutorials
2. Minimum no of practical/assignments/drawings etc.
3. Guest/Expert lectures
4. Demonstrations/Simulations
5. Slides
6. Group discussions
7. Self-Learning Online Resources



9. LEARNING RESOURCES

Sr. No.	Title Of Book	Author	Publication
1.	Introducing Python	Bill Lubanovic	O'Reilly
2.	Learning Python	Mark Lutz	O'Reilly
3.	Python Essential Reference	David Beazley	Addison-Wesley Professional
4.	Fundamentals of Python Programming	Richard L. Halterman	Southern Adventist University

10. WEB REFERENCES

1. <https://www.guru99.com/python-tutorials.html>
2. <https://www.tutorialspoint.com/python/>
3. <https://www.tutorialsteacher.com/python>
4. <https://realpython.com/>

11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

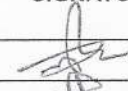


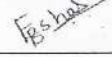
Sr. No.	TOPIC	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1.	Python Basics	3	4		7
2.	Control Flow	3	-	4	7
3.	String, List, Tuple, and Dictionary and Set Manipulations	4	-	9	13
4.	Functions, Modules And Packages	2	2	4	8
5.	OOP, Exception Handling and Multithreading and	2	2	11	15
6.	Regular Expression and File Processing	2	2	4	8
7.	GUI Programming with Database Connectivity	3	2	7	12
TOTAL		19	12	39	70

R Remembering, U Understanding, A Applying, (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.



12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	SIGNATURE
1	Internal	Mr.AbhijitDongaonkar	
2	Internal	Mr. Manish R Solanki	
3	Internal	Mrs.PritiBokariya	
4	External	Miss. Ekta Shah Organization:BNP PARIBAS/GENERAL MILLS	



1. COURSE DETAILS

Programme: Information Technology
Course: Object Oriented Modelling & Design
Course Code: OOD190906

Semester: IV
Group: A*
Duration:16 Weeks

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 enable students to learn various diagrams which will help them to make a powerful documentation during the whole life cycle of the system.

4. SKILL COMPETENCY: -

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

- Understand the need of documentation
- Draw and implement various diagrams like class diagrams, use case diagrams, sequence diagrams, component diagrams etc. theoretically and practically.

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

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	Interpret the meaning of Object-Oriented concepts and Differentiate between different modelling methodologies	Remember, Understand and Apply
CO2	Design and implement Structural diagrams.	Remember, Understand and Apply
CO3	Design and implement Behavioural diagrams.	Remember, Understand and Apply
CO4	Design and implement Architectural diagrams.	Remember, Understand and Apply



6. COURSE CONTENTS

Sr.No.	Topics/Sub-Topics	Hours	Marks	CO
1	Importance of Modelling 1.1. Brief overview of Object Modelling Technology (OMT) by Ram Baugh, 1.2. Booch Methodology, Use Case driven approach (OOSE) by Jacobson, 1.3. Overview of CRC card method by Cunningham.	8	10	CO1
2	Object Modelling 2.1. Objects and Classes (Object Diagrams, Attributes, Operations and Methods), 2.2. Links, Associations and Advanced Concepts (General Concepts, Multiplicity, Link Attributes, 2.3. Association as a Class, Roll names, Ordering, Qualification, Aggregation), 2.4. Generalizations and Inheritance, Grouping Constructs, Aggregation verses Association and Generalization, Recursive Aggregates, and Propagation of Operations, 2.5. Abstract Classes, Multiple Inheritance, Metadata, Candidate Keys, Constraints, 2.6. Introduction to Dynamic and Functional Modelling. 2.7 Introduction to UML Diagrams overview, conceptual model, architecture, software development lifecycle	10	15	CO1
3	UML – Structural Modelling 3.1. Class Diagrams: -Classes and Relationships, 3.2 Designing Classes-Refining attributes, attribute types, designing methods and interfaces 3.2. Interfaces, Types and Roles, Packages, Instances. Object Diagrams, 3.3. Component Diagrams: Terms and Concepts, Common modelling techniques. 3.4. Deployment Diagrams: Terms and Concepts, Common modelling techniques.	10	15	CO2
4	UML Behavioral Modelling 4.1. Use case diagram: Terms and Concepts, Modelling techniques, 4.2. Interaction diagram (Sequence and collaboration diagram): Terms and Concepts, Model ling techniques, 4.3. State chart diagram: Terms and Concepts, 4.4. Modelling techniques, Activity diagram: Terms and Concepts, Modelling techniques.	10	15	CO3



5	Architectural Modelling 5.1. Component Diagram 5.1.1 Elements of component diagram 5.1.2 Difference between components and classes 5.1.3 Relation between component and interface 5.2 Deployment Diagram 5.2.1 Elements of deployment diagram 5.2.2 Relation between deployment diagram and component diagram		10	15	CO4
		TOTAL	48	70	

7. LIST OF PRACTICALS

Term Work consists of Journal containing the following experiments: -

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx.Hrs required	COs
	Case Study 1:-		
1	Design and draw use case and class diagram.	6	CO1,CO2
2	Design and draw Sequence and Collaboration Diagram	6	CO1,CO3
3	Design and draw State Chart and Activity Diagram	4	CO3
4	Design and draw Component Diagram	4	CO4
5	Design and draw Deployment Diagram	4	CO4
	Case Study 2:-		
6	Design and draw use case and class diagram.	6	CO1,CO2
7	Design and draw Sequence and Collaboration Diagram	6	CO1,CO3
8	Design and draw State Chart and Activity Diagram	4	CO3
9	Design and draw Component Diagram	4	CO4
10	Design and draw Deployment Diagram	4	CO4
	Total	32	

8. IMPLEMENTATION STRATEGY(PLANNING)

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

9. LEARNING RESOURCES

Sr. No.	Title Of Book	Author	Publication
1.	The UML User Guide	Booch, Jacobson, Rumbaugh	McGraw Hill Education
2.	Object Oriented Modeling and Design	James Rumbaugh, Michel Blaha	Paperback Publication
3	Software Engineering A Practitioners approach	Roger Pressman	BPB Publication.



10. WEB REFERENCES

1. <https://www.tutorialspoint.com/uml/>
2. <https://modeling-languages.com>
3. <https://www.smartdraw.com/uml-diagram/>


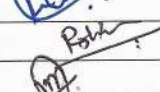

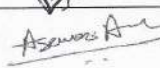
11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER SETTING

Sr. No.	TOPIC	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Importance of Modelling	4	6	-	10
2	Object Modelling	5	6	4	15
3	UML – Structural Modelling	4	5	6	15
4	UML Behavioural Modelling	4	5	6	15
5	Architectural Modelling	4	5	6	15
TOTAL		21	27	22	70

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.

12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.	Faculty	NAME	SIGNATURE
1	Internal	Mrs. Neeta Kadukar	
2	Internal	Mrs. Radhika Patwardhan	
3	Internal	Mrs. Abhilasha More	
4	External	Mrs. Asawari Arote SNDT University	



1. COURSE DETAILS

Programme: Computer Engineering/Information Technology	Semester: IV
Course: Data Warehousing & Mining	Group: A
Course Code: DWM198925	Duration: 16 Weeks

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	50	-	50	200

3. COURSE OBJECTIVE

This course will introduce the concepts of data ware house and data mining. The student will be able to identify the scope and essentiality of Data Warehousing and Mining. It covers Data Warehouse fundamentals, Data Mining Principles.

4. SKILL COMPETENCY

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

- Perform Data warehouse administration which includes use of ETL tools to create refined data.
- Analyse data using mining tools.

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

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	Summarize the features of Data ware house and classify metadata component.	Remember, Understand.
CO2	Install and use various ETL tools for DWH operations	Remember, Understand. Apply
CO3	Design OLAP cube using the concepts of Dimensional Modelling.	Remember, Understand. Apply
CO4	Prepare a report on Data mining and Web mining	Remember, Understand.



6. COURSE CONTENTS

Sr No.	Topic/Sub-Topics	Hours	Marks	CO
1	Introduction to Data Warehousing 1.1 Need of Data warehousing. 1.1.1 Features of Data Warehousing 1.1.2 Data warehouse and Data Marts 1.1.3 Data warehouse design approaches. 1.2 Architecture Components of data warehouse. 1.2.1 Source data component 1.2.2 Data staging Component 1.2.3 Data storage Component 1.2.4 Information Delivery Component 1.2.5 Metadata Component 1.3 Benefits of data warehousing.	4	08	CO1
2	Data Extraction, Transformation, and Loading 2.1 ETL Overview 2.2 Data Extraction 2.2.1 Source Identification 2.2.2 Data Extraction techniques 2.2.3 Evaluation of the Techniques 2.3 Data Transformation 2.3.1 Data Transformation: Basic tasks 2.3.2 Major Transformation Types 2.3.3 Data Integration and Consolidation 2.3.4 Transformation for Dimension Attributes 2.4 Data Loading 2.4.1 Applying Data: Techniques and Processes 2.4.2 Data Refresh Versus Update	5	12	CO2
3	Principles of Dimensional Modeling 3.1 ER Modelling Versus Dimensional Modelling. 3.2 The STAR Schema and SNOWFLAKE Schema 3.2.1 Inside a Dimensional table 3.2.2 Inside the Fact Table 3.2.3 The Factless Fact table 3.2.4 Data Granularity 3.2.5 STAR Schema Keys 3.2.6 Compare Star and Snowflake Schema models. 3.3 Updates to the Dimension Tables 3.3.1 Slowly Changing the Dimensions 3.3.2 Type 1 Changes: Correction of Errors 3.3.3 Type 2 Changes: Preservation of History 3.3.4 Type 3 Changes: Tentative Soft Revisions	6	14	CO3



4	Online Analytical Processing 4.1 Introduction to Data Cube and OLAP 4.1.1 Demands for Online Analytical Processing 4.1.2 Need for Multidimensional Analysis 4.1.3 Introduction to hypercubes 4.2 OLAP operations 4.2.1 Drill-Down and Roll-Up 4.2.2 Slice- and-Dice or rotation 4.3 OLAP Models 4.3.1 The MOLAP Model 4.3.2 The ROLAP Model 4.3.3 Compare OLAP and OLTP tools. 4.3.4 Comparison of OLAP models		5	12	CO3
5	Significant Role Of Metadata 5.1 Why Metadata Is Important 5.2 Metadata Types by Functional Areas 5.3 Business Metadata and Technical Metadata 5.4 Metadata Requirements 5.4.1 Sources Of Metadata 5.4.2 Metadata Repository		4	8	CO1
6.	Introduction to Data Mining 6.1 Basics of data mining. 6.1.1 Data mining techniques. 6.1.2 The KDD process. 6.1.3 Data Mining and the Data Warehouse 6.3 Major issues in data mining. 6.4 Applications of Data Mining 6.4.1 Applications in Retail Industry 6.4.2 Applications in Telecommunications Industry 6.4.3 Applications in Banking and Finance 6.5. Social Impacts of Data Mining		5	10	CO4
7	Web Mining: 7.1 Introduction to Web mining. 7.2 Types of Web Mining 7.2.1 Web Content Mining, 7.2.2 Web Structure Mining, 7.2.3 Web Usage mining		3	6	CO4
		TOTAL	32	70	



7. LIST OF PRACTICALS/ASSIGNMENTS/EXERCISES

Term Work consists of Journal containing minimum 8 experiments/assignments.

Sr. No.	Title of Assignment/Experiment	Approx.Hrs required	COs
1	Overview of Data Warehouse Architecture	04	CO1
2	Features of ETL tools	04	CO2
3	Data Extraction using ETL tool	08	CO2
4	Data Transformation using ETL tool	08	CO2
5	Data Loading using ETL tool	08	CO2
6	Data analysis using open source ETL tool	08	CO2
7	Design a report using report designer	08	CO2
8	Creation of OLAP cube report	08	CO3
9	Understand the concepts of Data Mining.	04	CO4
10	Understand the concepts of Web mining	04	CO4
TOTAL		64	

8. IMPLEMENTATION STRATEGY (PLANNING)

1. Conducting lectures as per teaching plan/ scheme
2. Minimum no of practical/assignments etc
3. Guest/Expert Lecture
4. Self-Learning Online Resources

9. LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1.	Data Mining: Introductory and Advanced Topics	M.H.Dunham	Pearson Education
2.	Data Mining Concepts & Techniques	Jiawei Han, Micheline Kamber	Elsevier
3.	Data Warehousing in the Real World : A Practical Guide for Building Decision Support Systems	Sam Anahory, Dennis Murray,	Pearson Education
4.	Data Warehousing System	Mallach	McGraw –Hill
5	Data Warehousing Fundamentals	Paulraj Ponniah	WILEY



10. WEB REFERENCES

1. <http://www.1keydata.com/datawarehousing/datawarehouse.html>
2. <http://www.redbooks.ibm.com/redbooks/pdfs/sg242238.pdf>
3. <https://www.educba.com/datawarehouse>
4. <https://www.toptal.com/data-science/data-warehouse-concepts-principles>


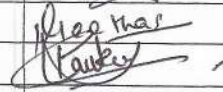

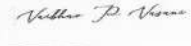
11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Sr. No.	TOPIC	Distribution of Theory Marks			Total Marks
		R Level	U Level	A Level	
1	Introduction to Data Warehousing	4	4	-	08
2	Data Extraction, Transformation, and Loading	4	4	4	12
3	Principles of Dimensional Modelling	4	4	6	14
4	Online Analytical Processing	2	4	6	12
5	Significant Role Of Metadata	4	4	-	8
6	Introduction to Data Mining	6	4	-	10
7	Web Mining	4	2	-	6
TOTAL		28	26	16	70

R Remembering, U Understanding, A Applying, (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.

12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.	Faculty	NAME	SIGNATURE
1	Internal	Mr. Abhijit Dongaonkar	
2	Internal	Mrs. Geetha. S	
3	Internal	Mr. Pankaj D.Rathod	
4	External	Mr. Vaibhav Vasani	

K. J. Somaiya College of Engineering



1. COURSE DETAILS

Programme: Computer Engineering/ Information Technology Course: Human Computer interface Course Code: HCI198919	Semester: IV Group: A Duration:16 Weeks
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2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per Week					Examination Scheme and Maximum Marks								
Theory Hrs	Practical Hrs	Drawing Hrs	Tutorial Hrs	Credits (L+P+D+T)	Theory Paper Duration and marks (ESE)		SS L	TA	TH	TW	PR	OR	TOTAL
L	P	D	T		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 students to attain the following industry identified competency through various teaching learning experiences:

- Design an effective interface between human and computers.
- Acquire skills to evaluate and reengineer commonly used interfaces

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

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	To describe HCI concepts to correlate human with computer	Remember,Understand
CO2	To create prototype applicable to various domains	Understand, Apply
CO3	To create a visually impactful screen which is easy to navigate	Understand, Apply
CO4	To redesign interactive web /mobile interfaces	Understand, Apply



6. COURSE CONTENTS

Sr.No.	TOPIC Sub-Topics	Hour	Marks	COs
1	FOUNDATIONS OF HCI A Brief History of HCI The Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms.	8	12	CO1
2	DESIGN PROCESS Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, and Understanding business junctions.	8	12	CO2
3	Screen Designing Screen Designing:- Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design	10	14	CO3
4	MODELS AND THEORIES Cognitive models –Socio-Organizational issues and stake holder requirements –Communication and collaboration models-Hypertext, Multimedia and WWW.	12	18	CO4
5	MOBILE HCI Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools	10	14	CO4
		total	48	70



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

Term Work consists of Journal containing minimum 10 experiments/assignments.

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx.Hrs required	COs
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 design mobile app / webpage for Interactive system e.g ATM	4	CO3,4
5	To design mobile app / webpage for passengers for updating the status	4	CO3,4
6	To design mobile app / webpage for organizing educational event	2	CO3,4
7	To design mobile app / webpage for demonstrating various interactions styles	4	CO4
8	To design mobile app / webpage for creating reports	4	CO3,4
9	To design mobile app / webpage for e-learning at school level	4	CO3,4
10	To design mobile app / webpage for user's feedback	4	CO3,4
11	To design mobile app / webpage for comparison websites	4	CO3,4
12	To design mobile app / webpage for cab booking	4	CO3,4
13	To design mobile app / webpage for blind people	4	CO3,4
TOTAL		32	

8. IMPLEMENTATION STRATEGY(PLANNING)

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

9. 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
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10. WEB REFERENCES

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



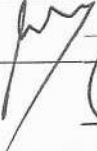
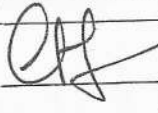
11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Sr No	TOPIC	Distribution of Theory Marks			Total Marks
		R Level	U Level	A Level	
1	FOUNDATIONS OF HCI	6	6	-	12
2	DESIGN PROCESS	-	8	4	12
3	SCREEN DESIGNING		8	6	14
4	MODELS AND THEORIES.	4	8	6	18
5	MOBILE HCI	4	6	4	14
	TOTAL	14	36	20	70

R : Remembering U : Understanding A Applying (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 question paper may vary from above table.

12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.	FACULTY	NAME	SIGNATURE
1	Internal	Mr. J. S. Kulkarni	
2	Internal	Mrs. Radhika Patwardhan	
3	Internal	Mrs. Swapna Naik	
4	Extenal	Mr. M. Dhangar Organization : R.G.I.T. Mumbai	



1. COURSE DETAILS

Programme: Information Technology/Computer Engineering	Semester: IV/VI
Course: Game Design and Development	Group: A
Course Code: GDD198926	Duration:16 Weeks

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 subject will enable the students to comprehend the Game design and development concepts at practical level as well as theoretical level. The aim of this subject is to get broad perspective of game development engines, prototyping .It also introduces the basic game coding patterns and basics of physics engine.

4. SKILL COMPETENCY: -

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

- **Implement basic game development concepts using C++(produce, test and present a beta version of a game of your own design)**
- **Apply the fundamentals of 2D and 3D graphics, shaders, physics, animation to game development**
- **Classify the game development process into its various stages.**

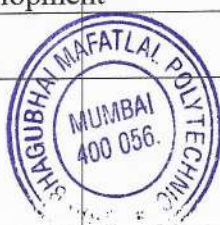
5. COURSE OUTCOMES(COs) AT THE END OF THE SEMESTER STUDENT WILL BE ABLE TO: -

COs	COURSE OUTCOME	Bloom's LEVEL
CO1	Conceptualize and critique the fundamental elements of Game development.	Remember, Understand
CO2	Construct a prototype and convert it to a game	Understand, Apply
CO3	Create basic games to prove clarity of concepts in programming Languages	Understand, Apply
CO4	Demonstrate basic understanding of Game Engine Architecture and working	Understand, Apply



6. COURSE CONTENTS

Sr.No.	Topics/Sub-Topics	Hours	Marks	COs
1	<p>Basics of game design & Brainstorming an Idea A practical introduction to game design and game design concepts, emphasizing the basic tools of game design: paper and digital prototyping, design iteration, and user testing.</p> <p>Brainstorming games- history of games and critique writing, games start out as ideas, brainstorming on ideas about game's concept, mechanics, setting, characters</p>	12	12	CO1
2	<p>Rapid prototyping: Involves using engines like unreal or unity to create a basic prototype of the game idea a team comes up with to see if their idea is actually enjoyable while playing or it looked good only in their heads.</p> <p>As game developers, you need to be able to create. how to handle Unity3D game projects</p>	06	12	CO2
3	<p>Unity Game Engine Basics of handling Unity3D game projects intermediate learners unity developing familiarity with practices and tools of game development.</p>	07	12	CO3
4	<p>Basic game coding patterns vectors to linked lists to trees and graphs , an understanding of the 4 paradigms of OOP (Abstraction, Encapsulation, Inheritance, Polymorphism),concept of data-oriented programming, cache favoring memory allocation, memory alignment and SIMD vectors. Discussing algorithmic complexity.</p> <p>Understanding of static, stack and heap memory, intro to multi-threading, discussing how to write fast compiling code, which is both flexible and extendable</p>	07	10	CO3
5	<p>Introduction to Game Engines introduction to engines ,Architecting & Creating a framework for running the game loop which communicates with the different subsystems of the game like Event Management, Audio, Physics, Input, Renderer, etc based on the concept learned in game programming.</p>	08	12	CO4
6	<p>Basics of game Physics and Graphics</p> <p>Introduction to Physics Engine and graphics fundamentals in game development</p>	08	12	CO4
	TOTAL	48	70	



7. LIST OF PRACTICALS

Term Work consists of Journal containing the following experiments:-

Sr. No.	Title of Experiment	Approx. Hrs required	COs
1	Modelling games using programming Language.	4	CO1
2	Using unity game Engine create any two games.	12	CO2
3	Analyze Game Development Performance Indicators and complexity of games.	4	CO3
4	Explore 2D and 3D Game Engines Performance	4	CO3, CO4
5	Utilize Graphical User Interface (GUI)	4	CO2
6	Apply Animation to Game Assets	4	CO4
7	Utilize the Physics Engine to demonstrate how physics is applied to make games more relevant to physics Laws.	4	CO4
TOTAL		32	

8. IMPLEMENTATION STRATEGY(PLANNING)

In depth study and understanding of the subject will be implemented by adoption of the following strategy:

1. Conducting lectures as per the teaching plan and conduction tutorials.
2. Use of powerpoint presentations during theory class and practical periods
3. Guest/Expert lectures
4. Demonstrations/Simulations
5. Implementing above mentioned experiments in the laboratory.

9. LEARNING RESOURCES

Sr. No.	Title Of Book	Author	Publication
1.	Game Coding	Mike McShaffry	Google Books
2.	Game Development Essentials_ an Introduction	Jeannie Novak	Google Books
3	Game Engine Architecture	Jason Gregory.	Google Books
4	Game Programming Patterns	Robert Nystrom	Google Books
5	Game Design Workshop: A Playcentric Approach to Creating Innovative Games	Tracy Fullerton	CMP Books ,Third Edition, 2014



10. WEB REFERENCES

1. www.w3schools.com
2. https://en.wikipedia.org/wiki/Game_engine
3. <https://books.google.com/books>
4. <http://www.xboxlivecommunitygames.org/>

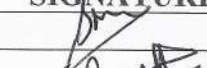



11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER SETTING

Sr No	TOPIC	Distribution of Theory marks				
		R Level	U Level	A Level	Total Marks	
1	Basics of game design & Brainstorming an Idea	4	8	-	12	
2	Rapid prototyping	-	4	8	12	
3	Unity Game Engine		4	8	12	
4	Basic game coding patterns		4	6	10	
5	Introduction to Game Engines		4	8	12	
6	Basics of game Physics and Graphics		4	8	12	
		TOTAL	04	28	38	70

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.

12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.	Faculty Type	NAME	SIGNATURE
1	Internal	Mrs. Swapna Naik	
2	Internal	Mr Manish Solanki	
3	Internal	Mr Abhijit Dongaonkar	
4	External	Dr Nandini Chaudhary Principal, J. T. Mahajan College of Engineering	



1. COURSE DETAILS

Programme: Information Technology Course: Summer Inplant Training/Internship Course Code: SPT190919	Semester: IV Group: A* Duration: 4 – 6 weeks
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2. TEACHING AND EXAMINATION SCHEME

Sr No	Course Name (code)	Pre. Sub code	Training Duration	Credit		TW		Oral		Total
						Weekly Report	Quiz Test Marks	Dissertation (Report)	Oral/ Viva	
1.	Summer Inplant Training/Internship (SPT190919)	---	4-6weeks	6	Maximum Marks	25	25	25	25	100
					Minimum Marks	10	10	10	10	40

The oral examination will be conducted after successful completion of inplant training, in the next i.e V semester.

3. COURSE OBJECTIVE

The objective of the course is to provide a platform where students can identify the core and soft skills to be acquired for computer professional. The courses allow students to expose to the industrial processes, document and present.

4. SKILL COMPETENCY

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

- Identify skill set to be acquired in latest technology and trends to increase the employability
- Develop the communication skills, time management and team work.
- Increase self confidence in finding own proficiency

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

CO No.	COURSE OUTCOME	Bloom's LEVEL
1	Apply engineering skills to solve a problem	Apply
2	Prepare reports, charts and presentation	Apply
3	Evolve as a ready for industry personnel	Apply
4	Demonstrate social, cultural and environmental responsibility as a professional	Remember



6. SUGGESTED GUIDELINES FOR ASSESSMENT OF TERM WORK AND ORAL

Students will maintain a dairy to document the activities /projects assigned etc daily . The dairy will be assessed by industry supervisor and supervisor assigned by the TPO/Department preferably biweekly ,

A supervisor from the Department along with industry supervisors assess the term work with quiz or other instruments . The student has to appear for quiz every week and each quiz will have atleast 10 questions. Minimum 4 Quiz will be conducted . The marks obtained in the quiz will converted out of 25 marks.

The student will submit the a brief report on training and present the skill / knowledge acquired during training . 25 marks will be awarded to the students based on the report and performance the the presentation by Internal and external examiners . Both examiner will conduct the oral examination of 25 marks on the same day


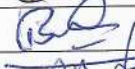
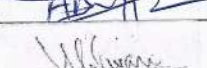
7. IMPLEMENTATION

The students will be placed for inplant training after the summer term examinations of third semester . The company allocation to the student will be done by TPO/Department

TPO will organize a briefing session to describe work culture , the dos and do not , safety norms, necessary rules and regulations, code of conduct etc during the training period. This session shall be addressed by industry personnel .

Two supervisors one from industry and one from the institute will be assigned the the student(s) by the TPO/department .The supervisor will visit the company every 16 days to monitor the progress of the students .

8. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.	Faculty Type	NAME	SIGNATURE
1	Internal	Mrs Neeta Kadukar	
2	Internal	Mr. J. S. Kulkarni	
3	Internal	Mr Abhijit Dongaonkar	
4.	External	Mr. Harinder Salwan Organization : Tricom Multimedia Pvt Ltd.	