1. COURSE DETAILS

Programme: Computer Engineering	**Semester: III**
Course: Fundamentals of computer Network	**Group: C***
Course Code: FCN190803	**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							
4	2	--	--	6	03	70	20	10	70	25	--	25	150

3. COURSE OBJECTIVES

This course will enable students to learn computer networks and concentrates on building a firm foundation for understanding Data Communications and Computer Networks. It is based around the OSI Reference Model that deals with the major issues in the bottom three (Physical, Data Link and Network) layers of the model. This course provides the student with fundamental knowledge of the various aspects of computer networking and enables students to appreciate recent developments in the area.

4. SKILL COMPETENCY

The student will be able to:

- Identify the components required to build different types of networks.
- Trace the flow of information from one node to another node in the network.
- Identify the addressing schemes of IPv4 and IPV6 from the given IP address.

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

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	Build an understanding of the fundamental concepts of computer networking.	Remember, Understand
CO2	Familiarize the students with the basic taxonomy and terminology OSI and TCP/IP protocol suit.	Remember, Understand
CO3	Introduce the student to various protocols in different networking models, routing and congestion control algorithm.	Remember, Understand
CO4	Allow the student to gain expertise in some specific areas of networking such as the design, maintenance of individual networks and various applications.	Understand, Apply

6. COURSE CONTENTS

Sr. No.	TOPIC / Sub-Topics	Hours	Marks	COs
1	**Introduction** 1.1 Data communication 1.1.1 Components, Data flow 1.1.2 Network criteria 1.1.3 Components, Data flow. 1.2 Classification of network 1.2.1 LAN, WAN, MAN 1.2.2 The Internet 1.3 Network Devices 1.3.1 Hub, Bridge, Repeater, Router, Gateway, switch 1.4 Network Model 1.4.1 Protocol and Standards 1.4.2 OSI and TCP/IP Model 1.4.3 Layered Architecture 1.4.4 Function of each Layers of OSI and TCP/IP Model 1.4.5 Peer to Peer process	6	8	CO1, CO2
2	**The Physical Layer** 2.1. Data and signals 2.1.1 Analog and Digital signals 2.1.2 Transmission Impairments 2.1.3 Data Rate Limits 2.1.4 Performance 2.1.5 ASK, PSK, FSK, Modulation- Am, FM, PM 2.1.6 Multiplexing – FDM, TDM, WDM 2.2. Guided Transmission Media 2.2.1 Twisted – pair cable 2.2.2 Co-axial cable 2.2.3 Fibre Optic Cable 2.3 Switched Network 2.3.1 Circuit Switched Network 2.3.2 Packet switching – Datagram Network	10	10	CO1, CO2
3	**The Data Link Layer** 3.1. Data Link Layer Design Issues 3.1.1 Nodes and Links 3.1.2 Services 3.1.3 Framing 3.1.4 Flow and error Control 3.2. Error Detection and Correction 3.2.1 Types of errors, Redundancy 3.2.2 Parity code , hamming code 3.2.3 Cyclic redundancy code, Checksum 3.3. Elementary Data Link Protocols 3.3.1 Simplest Protocol 3.3.2 Stop – and-wait protocol 3.4. Sliding Window Protocols 3.4.1 Stop- and-wait ARQ 3.4.2 Go-back-N ARQ 3.4.3 Selective repeat ARQ 3.5. Data Link Protocols 3.5.1 HDLC 3.5.2 Point to Point Protocol	12	16	CO2, CO3

4	**The Medium Access Control Sub layer** 4.1. The Channel Allocation Problem 4.1.1 Random Access, ALOHA 4.2. Multiple Access Protocols 4.2.1 CSMA, CSMA/CD,CSMA/CA 4.2.2 Controlled Access 4.2.3 Channelization 4.3. Ethernet 4.3.1 IEEE Standards 4.3.2 Standard Ethernet 4.4. Bluetooth	8	8	CO2, CO3
5	**The Network Layer** 5.1. Network Layer Design Issues 5.1.1 Network Layer Services 5.1.2 Performance 5.1.3 IPv4 Addresses header format 5.1.4 IPv6 Addresses header format 5.2. Routing Algorithms 5.2.1 Forwarding of IP Packets, Delivery 5.2.2 Address mapping – ARP, RARP, BOOTP 5.3. Congestion Control 5.3.1 ICMPv4 5.3.2 IGMPv4 5.3.3 Open loop and closed loop congestion control 5.4. Quality of Service 5.4.1 Flow characteristic 5.4.2 Flow classes 5.5. Internetworking 5.5.1 Internet as a Datagram Network 5.5.2 Internet as a Connectionless network 5.6. The Network Layer in the Internet	12	10	CO2, CO3, CO4
6	**The Transport Layer** 6.1. The Transport Service 6.1.1 Connectionless and Connection oriented 6.1.2 Client – server paradigm 6.1.3 Reliable verses unreliable 6.2 Elements of Transport Protocols 6.2.1 Port Number 6.2.2 Socket Address -Multiplexing and DE multiplexing 6.3. A Simple Transport Protocol 6.4. The Internet Transport Protocols: UDP 6.4.1 Ports for UDP 6.4.2 User Datagram 6.4.3. UDP operation, Services 6.4.4 UDP application 6.5. The Internet Transport Protocols: TCP 6.5.1 TCP services, features 6.5.2 TCP operation 6.5.3 Segment 6.5.4 Flow control and Error control in TCP	08	10	CO1, CO3

7	**The Application Layer** 7.1. DNS—The Domain Name System 7.1.1 Label, Domain Name, Domain 7.1.2 Namespace 7.2. Electronic Mail 7.2.1 Architecture 7.2.2 Web based mail 7.3. The World Wide Web 7.3.1 Client, Server, URL, Cookies 7.3.2 Static Document, Dynamic Document 7.3.3 HTTP, FTP	08	8	CO1, CO4
	TOTAL	**64**	**70**	

7. LIST OF PRACTICALS

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

Sr. No.	Title of Experiments	Approx.Hrs required	COs
1.	To design a network according to given case study. 1) college 2) company	04	CO1
2.	To perform various networking commands in windows.	04	CO3
3.	To add computer to LAN and share files and folders to the existing network.	02	CO4
4.	To perform sharing of printer to an existing network.	02	CO4
5.	To configure a network topology (via switch) using network simulator software.	02	CO1
6.	To Perform an Initial Switch Configuration.	02	CO4
7.	To Perform an Initial Router Configuration.	02	CO4
8	To troubleshoot small network in network simulator.	02	CO4
9.	To design a network with concept of IP addressing, subnet and super netting.	02	CO4
10.	To configure TCP/IP Protocols in Windows and Linux.	04	CO4
11.	To Installation of ftp server and client.	02	CO4
12.	To capture a packet and header analysis by Wireshark (TCP,UDP,IP)	04	CO3, CO4
	TOTAL	**32**	

8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Practical/assignments
3. Guest/Expert lectures
4. Slides
5. Seminar
6. Case Study
7. Self-Learning Online Resources

9. LEARNING RESOURCES

Sr. No.	Title Of Book	Author	Publication
1.	Data Communication and Networking, 4th	Behrouz A. Forouzan,	McGrawHill
2.	Data and Computer Communication, 8th Edition	William Stallings	Pearson Prentice Hall India.
3.	Computer Networks, 8th Edition	Andrew S. Tanenbaum	Pearson New International Edition
4	Internetworking with TCP/IP, Volume 1, 6th Edition	Douglas Comer,	Prentice Hall of India.
5	Data Communications and Networks	Achyut S. Godbole	Tata McGraw Hill

10. WEB REFERENCES

1 http://brweb.haltonrc.edu.on.ca/202204/ICE4/Networks/NetworkingConcepts.pdf
2. http://www.techiwarehouse.com/cms/engine.php?page_id=d9e99072
3. https://www.computernetworkingnotes.com/
4. http://intronetworks.cs.luc.edu/current/ComputerNetworks.pdf

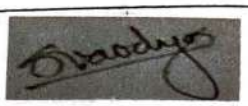
11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Sr. No.	TOPIC	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1.	Introduction	04	04	-	08
2.	The Physical Layer	04	06	-	10
3.	The Data Link Layer	04	04	08	16
4.	The Medium Access Control Sub layer	04	04	-	08
5.	The Network Layer	-	04	06	10
6.	The Transport Layer	04	06	-	10
7.	The Application Layer	04	04	-	08
TOTAL		**24**	**32**	**14**	**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.Prachi Arora	
2	Internal	Mrs. Rupali Pawar	
3	Internal	Mr.Siddhesh Masurkar	
4	External	Mr. Siddhesh Vaidya	

1. COURSE DETAILS

Programme: CSE/IT	**Semester: III/II**
Course: Digital Electronics	**Group: C***
Course Code: DEX198913	**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 Course will help students to learn fundamental concepts of digital electronics, which will help in designing sequential and combinational circuits.

4. SKILL COMPETENCY

1) Apply logic techniques to solve basic digital electronics problem.

2) Design combinational and sequential circuits

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

CO No.	COURSE OUTCOME	Bloom's LEVEL
1	Recognize number systems, simplify Boolean expression using basic Boolean laws, rules of Boolean algebra, Logic gates.	**Remember, Understand**
2	Realize combinational logic circuits using Boolean algebra, K maps, MSI circuits	**Apply**
3	Analyze characteristics, compare logic families and classify semiconductor memories.	**Remember, Understand**
4	Use sequential circuits- Flip Flops, Registers, Counters.	Apply

6. COURSE CONTENTS

Sr. No.	TOPIC/Sub-topic	Hours	Marks	COs
1	**Number systems and Codes** 1.1. Introduction to number systems 1.2. Binary No. Systems 1.2.1 binary arithmetic (addition, subtraction, multiplication, division) 1.2.2 1's complement & 2's complement 1.3. Octal No. System, Hexadecimal System, 1.4. Codes: 1.4.1 Excess – 3 1.4.2 Conversion of binary to Gray and Gray to binary 1.4.3 ASCII code, 1.4.4 BCD 1.4.5 BCD addition – 9's and 10's complement	6	8	CO1
2	**Logic Gates And Boolean Algebra** 2.1 Boolean laws, De Morgan's theorem. 2.2 Simplification of Boolean expression 2.3 Logic Gates and Families: 2.3.1 Logical symbol, logical expression and truth table of AND, OR, NOT, NAND, NOR, EX-OR and EX-NOR gates. 2.3.2 Universal gates –Realization of all gates using Universal Gates.	7	10	CO1
3	**Combinational Logic Design / Circuits** 3.1Compare combinational and sequential circuit. 3.2 Construction of logical circuits from Boolean expressions 3.3 Boolean expressions using SOP,POS 3.3.1 Min ,Max term representation of logical functions 3.3.2 K-map representations of logical functions 3.3.3 Minimization using K-map for 2, 3, 4 variables, Don't care conditions, various problems. 3.4 Binary half & full adder, Binary Half & Full subtractor	7	12	CO2
4	**Logic Families** 4.1 Introduction to digital ICs, 4.1.1 Classification of Digital IC 4.2 Characteristics of digital ICs 4.2.1 Voltage and current parameter 4.2.2 Noise margin 4.2.3 Fan-out and Fan-in 4.2.4 Speed, power dissipation, Figure of Merit 4.3 DTL and TTL 4.3.1 Working principle 4.3.2 Advantages and Disadvantages 4.3.3 Comparison of DTL, TTL and CMOS	4	6	CO3
5	**MSI Circuits** 5.1 Block diagram, Truth table, Logical expression and logic diagram 5.1.1Multiplexers (4:1 and 8:1,16:1) 5.1.2 Demultiplexers(1:4; 1:8; 1:16) 5.1.3 74 series Multiplexers and Demultiplexer IC's, 5.2 Multiplexer tree(4:1 using 2:1mux, 8:1 Mux using 2:1, 4:1 Mux) 5.3 Encoder 5.3.1 Decimal to BCD encoder (IC 74147) 5.3.2 Decoders - BCD to seven segment decoder (IC 7447	7	10	CO2

6	**Flip –Flops** 6.1. A 1-bit memory cell, clock signal 6.2 Types of FLIP FLOP 6.2.1 SR- Block Diagram, Truth table, Logic diagram using NAND and NOR, working 6.2.2 JK, D, T- Block diagram, Truth table, Logic diagram using NAND 6.2.3Race around condition in JK FF, Timing diagram 6.2.4 Master slave JK FF - Truth table, Logic diagram, working, Timing diagram 6.3 Application of Flip Flop	**8**	**12**	**CO4**
7	**Registers and counters** 7.1. Introduction to Registers. 7.2 Shift registers 7.2.1 Classification- SISO, SIPO, PISO, PIPO -circuit diagram, TT and working. 7.3 Application of shift registers. 7.4 Counters: basic concept of counters 7.4.1 Classification -Synchronous and Asynchronous counters, Up down counters. 7.4.2 Ring counter, Johnson counter.	**5**	**6**	**CO4**
8	**Semiconductor Memories** 8.1. Introduction, Memory organization and operation 8.2. Classification of memories 8.2.1 ROM, PROM, EPROM, E2PROM, RAM (static & dynamic)	**4**	**6**	**CO3**
	Total	**48**	**70**	

7. LIST OF PRACTICALS

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

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx.Hrs required	COs
1	Realize truth table of all Logic gates using IC	2	CO1
2	Verify Demorgan's theorem	2	CO1
3	Realize NAND as Universal Gate	4	CO1
4	Realize NOR as Universal Gate	4	CO1
5	Design Half Adder and Full Adder	2	CO2
6	Design Half Subtractor and full Subtractor	2	CO2
7	Design Combinational Circuit	2	CO2
8	Verify truth table of Multiplexer IC74151,IC74157	2	CO2
9	Verify BCD to seven segment decoder	2	CO2
10	Implement decoder using IC 7442	2	CO2
11	Implement D FlipFlop using IC7474	2	CO4
12	Implement MS JK Flip Flop	2	CO4
13	Assignment 1- Logic Families	2	CO3
14	Assignment 1- Semiconductor memories	2	CO3
	TOTAL	**32**	

8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Minimum no of practical/assignments.
3. Video lectures
4. Guest/Expert lectures
5. Demonstrations and Simulations

9. LEARNING RESOURCES

Sr. No	Title of Book	Author	Publication
1	Modern Digital Electronics	R. P Jain	Tata McGraw Hills
2	Digital Electronics	G. K Kharate	OXFORD
3	Digital techniques and Application	J . S Katre	Tech Max Publication
4	Digital Elecronics	Anil K. Maini	Wiley

10. WEB REFERENCES

1. https://www.geeksforgeeks.org/digital-logic-logic-gates/
2. http://www.learnabout-electronics.org/index.php
3. http://www.electrical4u.com/digital-electronics/

11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Sr. No.	TOPIC	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Number systems and Codes	4	4	-	08
2	Logic Gates And Boolean Algebra	6	4	-	10
3	Combinational Logic Design / Circuits	2	4	6	12
4	Logic Families	4	2	-	6
5	MSI Circuits	2	4	4	10
6	Flip –Flops	-	4	8	12
7	Registers and counters	-	-	6	6
8	Semiconductor Memories	2	4	-	6
	TOTAL	20	26	24	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	Prachi Arora	
2	Internal	Pankaj Rathod	
3	Internal	Abijit Dongaokar	
4	External	Omang Patel	
		Organisation K.J. Somaiya College of Engg	

1. COURSE DETAILS

Programme: IT/CSE	**Semester: II/III**
Course: Programming In C++	**Group: C***
Course Code:CPP198914	**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 **	Tutorial Hrs *	Credits (L+P+D+T)	Theory Paper Duration and Hours	Marks	SSL	TA	TH	TW	PR	OR	TOTAL
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 object-oriented programming (OOP). Large programs are complex and prone to error. Software errors can be expensive and even life-threatening. Object-oriented programming offers a new and powerful way to cope with this complexity. Its goal is to develop more reliable and more easily maintained programs. This course will act as a backbone for all other courses that are based on Object Oriented concept.

4. SKILL COMPETENCY

1. Differentiate between Procedure Oriented and Object Oriented Programming languages
2. Develop object oriented programs using C++

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

CO No.	COURSE OUTCOME	Bloom's LEVEL
1	Apply Data Hiding and Data Abstraction concepts in programs.	Remember, Understand, Apply
2	Implement the concept of code reusability.	Remember, Understand, Apply
3	Execute Compile time and Runtime polymorphism	Remember, Understand
4	Use pointers for dynamic programming	Remember, Understand, Apply
5	Demonstrate File Handling operations	Remember, Understand

6. COURSE CONTENTS

Sr. No	TOPIC /Sub-Topics	Hours	Marks	COs
1	**Principles of Object Oriented Programming** 1.1. Basic concepts of OOP, Comparison of procedural programming and OOP, Advantages of OOP,OOP Languages, 1.2. Definitions, Class, objects, Concepts of inheritance and encapsulation, Polymorphism 1.3 Basic program construction: main and functions, Program statements, Class declaration , Comments , C++ compilation	2	04	CO1
2	**Elements of C++ Language** 2.1. Tokens and identifiers, Character set and symbols, Keywords, C++ identifiers 2.2. Variables and constants, Integers & characters, symbolic constants 2.3. Dynamic initialisation of variables, Reference variables, Enumerated variables 2.4. Data Types, Basic data types, Derived data types-Arrays and strings, User defined data types, 2.5. Operators, Arithmetic, relational, logical operators and operator precedence, Manipulators, Type conversions and type cast operators, 2.6. console I/O : cin, cout functions, 2.7. Control statements, The if statement I-else; else...if: 2.8. switch statements, Loops: for and While-do statements, break, continue, go to	3	04	CO1
3	**Functions** 3.1. Simple functions, Declaration of functions, Calling functions, Function definition 3.2. Passing arguments and returning values, Passing by value, 3.3. Return statement, Void functions, Reference variables and arguments, 3.4. Overloaded functions, Inline functions, Comparison of macros and inline function ,Default arguments	4	08	CO2, CO3
4	**Classes and objects** 4.1. Declaration of classes and objects in C++, Class definition, Declaration of members, 4.2. Objects as data types, Objects as function arguments, Array of objects, Returning objects form function, Structures and classes	4	10	CO1
5	**Constructors and Destructors** 5.1. Constructors, default constructor, Parameterised constructors 5.2. Dynamic initialisation of objects , Copy constructors, Use of copy constructor, Shallow copying and deep copying, Destructors, Constraints on constructors and destructors	4	08	CO1
6	**Operator Overloading** 6.1. Overloading unary operators, operator keyword, Arguments and return values, Laminations of increment operators, 6.2. Overloading binary operators, Arithmetic operators, Examples: Addition of polar coordinates and concatenation of strings, 6.3. Multiple overloading, comparison operators, Arithmetic assignment operators,	3	08	CO3

7	**Derived Classes and Inheritance** 7.1. Derived classes and base class, Defining a derived class, Accessing the base class members, Access specifier: private, public and protected 7.2. Derived class constructors, Overriding the member functions, Class hierarchies, Abstract base class, 7.3. Constructors and member functions, Inheritance, Public and private and protected inheritance, 7.4. Access combinations and usage of access specifier, 7.5.Multiple inheritance, Member functions in multiple inheritance , Constructors in multiple inheritance, Ambiguity in multiple inheritance	3	08	CO2
8	**Pointers** 8.1. Addresses and pointers, The address of Pointer variables, 8.2. Accessing the variable pointed to 8.3. Pointers and Arrays, Pointers and functions, Passing simple variables, Passing arrays, 8.4. Pointers and strings, Pointers to string constants, strings as function arguments, 8.5. Arrays of pointers ,Memory management using new and delete operators, Pointers to objects,	3	10	CO4
9	**Virtual & Generic Functions** 9.1. Virtual functions and polymorphism, Friend functions, Static functions, 9.2. Generic classes and functions, function templates, Class templates	3	06	CO3
10	**File Handling** 10.1 C++ streams, File stream classes 10.2 creating, opening, closing, deleting files 10.3 File modes, File pointers and manipulators	3	04	CO5
	TOTAL	32	70	

7. LIST OF PRACTICALS/ASSIGNMENTS/EXERCISES

Term Work consists of Journal containing minimum no. of 12 experiments 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 implement inline and overload functions	4	CO3
2.	To develop a C++ program using class and object	4	CO1
3.	To implement passing and returning objects to and from a function. (Two problem statements)	4	CO1
4.	To implement an array of objects. (Two problem statements)	6	CO1
5.	To demonstrate constructors and destructors	2	CO1
6.	To overload unary and binary operators (Two problems for each concept)	4	CO3
7.	To implement types of Inheritance	8	CO2
8.	To achieve call-by-reference concept using reference and pointer variables	2	CO4
9.	To create a pointer to an array.	4	CO4
10.	To allocate memory dynamically to the objects	2	CO4
11.	To achieve run time polymorphism using virtual function.	6	CO3

12.	To implement static and friend functions.	4	CO1
13	To handle file related operations in C++.	6	CO1
14.	Mini Project	8	All
	Total	64	

8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan/Tutorials
2. Practical/Assignments etc.
3. Demonstrations/Simulations
4. Slides
5. Mini Project
6. Self-Learning Online Resources

9. LEARNING RESOURSES

Sr.No.	Title Of Book	Author	Publication
1.	Object Oriented Programming in C++	Robert Lafore	SAMS.2001
2.	Object Oriented Programming with C++	E.Balagurusamy	Tata McGraw Hill
3.	The Complete Reference C++	Herbert Schildt	Tata McGraw-Hill
4.	Mastering C++	K.R. Venugopal	Tata McGraw-Hill
5.	The C++ Programming Language	Bjarne Stroustrup	Addison-Wesley
6.	C++ How to Program	Paul Deitel, Harvey Deitel	DEITEL

10. WEB REFERENCES

1. https://www.w3schools.in/cplusplus-tutorial
2. https://www.javatpoint.com/cpp-tutorial
3. http://www.cplusplus.com/doc/tutorial
4. https://www.studytonight.com/cpp

11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Sr. No.	TOPIC	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1.	Principles of Object Oriented Programming	4			4
2.	Elements of C++ Language			4	4
3.	Functions		2	6	8
4.	Classes and objects	2	4	4	10
5.	Constructors and Destructors	4	4		8
6.	Operator Overloading	2	6		8
7.	Derived Classes and Inheritance	2	3	3	8
8.	Pointers	2	4	4	10
9.	Virtual & Generic Functions	2	4		6
10.	File Handling	2	2		4
	TOTAL	20	29	21	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.Manish R Solanki**	
2	Internal	**Mr. Pratik H. Shah**	
3	Internal	**Mrs. Priti Bokariya**	
4	External	**Mr. Siddhesh Vaidya** Organisation: Vidyalankar Polytechnic, Wadala(E)	

Mr. Harinder Sulwan
Tricom Multimedia Pvt Ltd,

SHRI BHAUBHAI MAFATLAL POLYTECHNIC MUMBAI 400056

1. COURSE DETAILS

Programme: CSE/IT	**Semester: III**
Course: Data Structure	**Group: C***
Course Code: DST198915	**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) Hours	Marks	SSL	TA	TH	TW	PR	OR	TOTAL
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 2.4Representation 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 3.4.3Priority Queue 3.5 Applications of Queue	6	10	CO2
4	**Linked List** 4.1Introduction •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) 5.4Type 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** 6.1Terminologies: 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 6.3Operations on Graphs (Insertion,Deletion,Search) 6.4Graph 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, 7.3Complexity 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 RESOURSES

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.csbdu.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			
		R Level	U Level	A Level	Total Marks
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	

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC * MUMBAI 400 056.

1. COURSE DETAILS

Programme: Computer Engineering	**Semester: III**
Course: System Programming	**Group: C**
Course Code: SPR190804	**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							
03	02	--	--	05	03	70	20	10	70	25	50	--	175

3. COURSE OBJECTIVE

This course is intended to give an insight to the software required to utilise the hardware resources. It describes the general structure of IBM 360 machine and its components. It helps the students to understand the structure and design of Assemblers, linkers, loaders, parser and compilers.

4. SKILL COMPETENCY

1. Explain the components of IBM 360 machine.
2. Describe the functions of Assembler, Linker, Loader, Parser and Compiler.

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

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	Conceptualize the terminologies of system programming.	Remember
CO2	Explain components and instructions of IBM 360/370	Understand
CO3	Describe the working of Assemblers, Parser and Compiler	Understand
CO4	Describe the working of Linker & Loader	Understand

6. COURSE CONTENTS

Sr.No.	Topic/Sub-Topics	Hours	Marks	COs
1	**Introduction to system programming** 1.1. Assemblers, Loaders, macros, Compilers, Formal system, 1.2. Evolution of operation system, operating system functions and facilities 1.3 Introduction to system software Examples of system software: Utility software • System servers • Device drivers • Operating system (OS) • Windows/graphical user interface (GUI) systems	04	5	CO1
2	**General machine structure** 2.1. For a typical Von-Neumann, machine such as IBM 360/370 formats (RX, RR, SS, SI) and types of data and instruction, 2.2. Instructions in Load, Store, Add, Subtract, Compare, Multiply, divide and shift groups for IBM 360/370, 2.3. Machine language and Assembly language programs, Assembler directives and pseudo-ops.	10	15	CO2
3	**Assembler & Macros** 3.1 Design of the Assembler, Assembler Design Criteria, Types of Assemblers, One-Pass Assemblers, Two-Pass Assemblers 3.2 Macro processors: Macro instruction, features of macro facility and design with a pass one and pass2 macro processor.	10	15	CO3
4	**Linkers & Loaders** 4.1 Introduction 4.2Relocation and linking concept 4.3. "Compile-and Go" loaders, General loader scheme, Absolute loaders, Relocating loaders, Design of an absolute loaders. 4.4. Other loader scheme: Binder linkage editor overlay structure, Dynamic loading, and Dynamic linking.	10	15	CO4
5	**Parser** 5.1Programming Language Grammars 5.1.1 Classification of Grammar 5.1.2 Ambiguity in Grammatical Specification 5.2Scanning 5.3Parsing 5.3.1 Top Down Parsing 5.3.2 Bottom up Parsing 5.4 Language Processor Development Tools -LEX, YACC	05	06	CO3

6	**Compiler** 6.1. General model of a compiler phases of a compiler, Lexical phase, syntax phase Interpretation phase optimisation, 6.2. Storage assignment and Code generation assembly phase.	09	14	CO3
	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.

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx. Hrs. required	COs
1	Draw the architecture of IBM360/370 and illustrate the components of it.	02	CO2
2	WAP to demonstrate the loading, storing and arithmetic operations using IBM 360 instructions.	02	CO2
3	Demonstrate the use of device drivers.	02	CO1
4	WAP to demonstrate macro of C language.(at least 2 programs)	04	CO3
5	Demonstration of Language Processor Development Tools -LEX, YACC	02	CO4
6	To draw flowchart for pass 1 and Pass 2 for assembler and format of its database	04	CO3
7	To draw flowchart for pass 1 and Pass 2 for loader and format of its database	04	CO4
8	Create a menu driven interface for a) Displaying contents of a file page wise b) Counting vowels, characters, and lines in a file. c) Copying a file	04	CO3
9	WAP for token generation and token identification.	04	CO3
10	Write a program to implement the lexical analyser.	04	CO4
	TOTAL	32	

8. IMPLEMENTATION STRATEGY (PLANNING)

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

9. LEARNING RESOURCES

Sr. No.	Title Of Book	Author	Publication
1.	System Programming	John Donovan	Tata McGraw Hill publication
2.	Systems Programming	D M Dhamdhere	Tata McGraw Hill publication

10. WEB REFERENCES

1. http://www.columbia.edu/cu/computinghistory/36091.html
2. https://cs.lmu.edu/~ray/notes/sysprog/
3. https://www.win.tue.nl/~mvdbrand/courses/GLT/0910/papers/notes.pdf
4. http://www.csie.ntnu.edu.tw/~ghhwang/course_slices/system_software/Chapter3.pdf

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 system programming	3	2	-	5
2	General machine structure	10	5	-	15
3	Assembler	3	4	8	15
4	Linker & Loaders	6	5	4	15
5	Scanner & Parser	3	3	-	06
6	Compiler	6	4	4	14
TOTAL		31	23	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.		NAME	SIGNATURE
1	Internal	Mrs Abhilasha More	
2	Internal	Mrs Neha More	
3	Internal	Mrs Sharyu Kadam	
4	External	Prof. Bhavesh Panchal	
		Organization: RGIT, Mumbai	

20/11/2020

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC MUMBAI 400 056.

1. COURSE DETAILS

Programme: Computer Engineering	**Semester: III**
Course: Event Driven &UI Programming	**Group: C**
Course Code: EUP190805	**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

Event Driven Programming based on object oriented concepts can be used to develop GUI based applications. These applications includes various user friendly controls to accept and display data in a customized manner. This course will give the students an in depth understanding of the concepts used in Event Driven Programming and necessary skills to use programming techniques to develop GUI applications and deploy the same.

4. SKILL COMPETENCY

- Demonstrate knowledge of visual programming.
- Understand modern Integrated Development Environment (IDE).
- Develop user friendly graphical interfaces.
- Design programs using visual development tools

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

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	Demonstrate familiarity with Integrated development environment.	Remember, Understand, Apply
CO2	Develop GUI application using form controls and events	Understand
CO3	Apply object oriented programming concepts in GUI application	Understand
CO4	Use of Data Access Controls for data store and data retrieval	Apply
CO5	Apply data binding techniques for GUI application	Apply

6. COURSE CONTENTS

Sr. No.	TOPIC/Sub-Topic	Hours	Marks	COs
1	**Overview of GUI Programming** 1.1Introduction to .Net Framework 1.2Overview of .Net Framework 1.3Common Language Runtime Program element in VB.Net IDE (CLR). 1.4Microsoft Intermediate Namespace in VB.net application, MSIL. 1.5. Introduction to Event handlers and Events. 1.6Just-In-Time Compiler. 1.7Exploring VB.Net IDE 1.8System Namespaces in VB.Net Events and Event handling	6	14	CO1
2	**Visual Basic .NET Language** 2.1Introduction to Visual Basic .NET 2.2 An Example of Visual Basic .NET Program 2.3 Difference between VB and VB.Net 2.4 Identifiers, keywords, literals, variables, Namespaces, operators and Expressions, Conditional Statements and loops 2.5 Classes, Structures, Enumerations 2.6 Interfaces, Delegates, Events, exceptions	5	12	CO3
3	**Windows Forms I: Developing Desktop Applications** 3.1 Creating a Form 3.2 Handling Form Events 3.3 Relationships Between Forms 3.4 MDI Applications	5	7	CO2
4	**Windows Forms II: Controls, Common Dialog Boxes, and Menus** 4.1 Common Controls Form Controls in VB.Net and Its Properties - Button, Text box, Label, Radio button, Check Box, List Box, Combo Box, Picture Box, Panel, Tab Control, Timer. 4.2 Control Events 4.3 Form and Control Layout 4.4 Common Dialog Boxes 4.5 Menus 4.6 Creating a Control	6	14	CO2

5	**ADO.NET: Developing Database Applications** 5.1 A Brief History of Universal Data Access Providers 5.2. Architecture of ADO.Net. 5.3 Connecting to a SQL Server Database 5.4 Connecting to an OLE DB Data Source 5.5 Reading Data into a Dataset 5.6 Relations Between Data Tables in a Dataset 5.7 Binding a dataset to a Windows Forms Data Grid 5.8 Reading Data Using a Data Reader 5.9 Executing Stored Procedures Through a SQL Command Object	5	14	CO4
6	**Data Binding and Deployment** 6.1.Use Simple Data binding for setting Properties of the given form control at run time using text box, Check box and Label 6.2. Complex Data Binding using Combo box and List box. 6.3. Navigating Database. 6.4. Deploying Vb.Net Applications	5	9	CO5
	TOTAL	**32**	**70**	

7. LIST OF PRACTICALS/ASSIGNMENTS/EXERCISES

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

Sr. No.	Title of experiment	Approx.Hrs required	COs
1	Introduction to Visual studio and IIS server	2	CO1
2	VB Statements, Syntax & Style	4	CO2
3	Using Variables and Constants	4	CO2
4	Methods, Properties, & Events	6	CO2
5	Data Types and Operators	6	CO2
6	Decision/Selection Structures	6	CO2
7	Repetition Structures	6	CO2
8	Designing Applications – Creating User Interfaces	6	CO2
9	Programs using functions	6	CO2
10	Programs using object oriented concepts (object overloading,inheritance etc)	6	CO3
11	Programs to store and retrieve data from database table	6	CO4
12	Data binding using combo box	6	CO5
	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.	Visual basic net in 60 minutes a day	Bruce	Wiley
2.	Complete Reference, Visual basic.net	Jeffrey R Shapiro	McGraw-Hill
3.	Programming in Visual basic.net	Jjulia Case Bradley	McGraw-Hill/
4.	Object-oriented programming languages and event-driven programming	Yeager, Dorian P	Mercury publication.

10. WEB REFERENCES

1. http://www.onlinewebtutorials.com
2. http://www.w3school.com.
3. https://docs.microsoft.com/en-us/dotnet/visual-basic/
4. https://visualstudio.microsoft.com/vs/features/net-development/

11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Sr. No.	TOPIC	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Overview of GUI Programming	6	6	2	14
2	Visual Basic .NET Language	4	4	4	12
3	Windows Forms I: Developing Desktop Applications	2	2	3	7
4	Windows Forms II: Controls, Common Dialog Boxes, and Menus	4	5	5	14
5	ADO.NET: Developing Database Applications	4	5	5	14
6	Data Binding and Deployment	2	3	4	9
TOTAL		22	25	23	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	Radhika Patwardhan	
2	Internal	Geetha. S	
3	Internal	Rupali Pawar	
4	External	Vinod More Organization: Manager, Zee Entertainment enterprises ltd, Mumbai	

1. COURSE DETAILS

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

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 RESOURSES

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

Programme: Computer Engineering	**Semester: IV**
Course: Microprocessor based systems	**Group: A***
Course Code:MBS190806	**Duration:16 Weeks**

2. TEACHINGAND EXAMINATIONSCHEME

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 :

A microprocessor is an integrated circuit which incorporates core functions of a computer's central processing unit. This course provides exposure architecture and instruction set of 8086 microprocessor. It introduces the programming and interfacing techniques of 8086 with other peripherals.

4. SKILL COMPENTENCY :

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

1. Implement 8086 assembly language programs.
2. Interface 8086 with other peripheral devices.

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

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	Describe the architecture of 8086 microprocessor and write programs using 8086 instructions	Remember, Understand, Apply
CO2	Draw and explain bus structure and interrupt structure of 8086	Remember, Understand
CO3	Interface 8086 microprocessor with the other peripheral devices.	Remember, Understand, Apply
CO4	Describe the architecture and pipelining mechanism of Pentium processor.	Understand

6. COURSE CONTENTS

Sr.No.	TOPIC/Sub-Topics	Hours	Marks	COs
1	**The 8086 microprocessor** 1.1. Introduction to Microprocessors 1.2. Features of 8086 1.3 Architecture of 8086 – BIU and EU, 1.4.Pin diagram of 8086 1.5 Instruction Queue 1.6. Memory of 8086 – Memory segmentation, memory Bank	08	14	CO1
2	**Instruction set & timing diagram of 8086** 2.1 Addressing modes of 8086 2.2 Instruction types – Data transfer group 2.3 Arithmetic group 2.4 Bit manipulation, program transfer instructions 2.5 String instructions, Stack instruction 2.6 Process control instructions. 2.7 Timing diagram : T- state , Machine cycle, Instruction cycle, Signals, Timing diagram of 8086 instructions	08	12	CO1
3	**8086 system bus structure** 3.1 Signals for modes of 8086 3.2 Clock generator 8284 – block diagram and working 3.3 Bus controller 8288 working 3.4 Modes of 8086 – minimum and maximum 3.5 Coprocessor 8087 3.6 Multiprocessor system - Bus arbitration - 3.7 Closely coupled and loosely coupled 3.8 IO programming	06	10	CO2
4	**Interrupt structure of 8086** 4.1 Introduction to Interrupts 4.2 Types of interrupts- H/W v/s S/W, maskable v/s non maskable , vectored v/s non vectored, internal v/s external 4.3 ISR(Interrupt Service Routine) & IVT(Interrupt Vector Table) 4.4 8086 interrupt structure, interrupt control instruction 4.5 Interrupt priority structure 4.6 features of 8259, pin diagram, functional blocks	08	10	CO2
5	**Programmable devices** 5.1The 8255 programmable peripheral interface – pin diagram , functional block diagram, operating modes, programming 5.3 The 8237 Direct memory access controller (DMAC) - pin diagram , functional block diagram, Registers, operating modes	08	10	CO3

6	**Microprocessor application programs** 6.1 Interfacing of 7 Segment display device 6.2 Interfacing of A/D converter and D/A converter 6.3 Temperature Controller 6.4 Traffic Light Control 6.5 Stepper Motor Control	06	06	CO3
7	**Introduction to Intel Pentium Architecture** 7.1 Features of Pentium processor. 7.2 Pentium Superscalar architecture. 7.3 Pipelining. 7.4 Branch Prediction. 7.5 Instruction and Data cache.	04	08	CO4
	Total	48	70	

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

Term Work consists of Journal containing minimum 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	COs
1.	To perform commands of X-PO 86 tool kit	02	CO1
2.	To perform arithmetic operations on 8 bit and 16 bit data	02	CO1
3.	Converting packed BCD to ASCII and ASCII to packed BCD.	02	CO1
4.	To find 2's complement using logical instructions of 8086.	02	CO1
5.	To calculate sum and average of an array.	02	CO1
6.	To search a number and its index from an array.	02	CO1
7.	To sort an array in ascending/descending order.	04	CO1
8.	To separate even and odd numbers from given array.	02	CO1
9.	To perform string instruction of 8086.	04	CO1
10.	To exchange the data of two blocks using string instructions.	02	CO1
11.	Draw and explain interfacing of 8086 with 8059 interrupt controller.	02	CO2
12.	To interface seven segment display with 8086	02	CO3
13.	To control stepper motor operation with 8086	02	CO3
14.	Draw and Describe the pipeline architecture of Pentium processors.	02	CO4
	Total	32	

8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan/Tutorials
2. Minimum no of practical
3. Assignments.
4. Slides with animation
5. Self-Learning Online Resources

9. LEARNING RESOURCES

Sr. no.	Title of book	Author	Publication
1.	Microprocessor and Interfacing, Programming & Hardware	Douglas V Hall	Tata McGraw Hill
2.	8086 Microprocessor Programming and Interfacing the PC	Kenneth Ayala	West Publication
3.	Microcomputer Systems: 8086/8088 family Architecture, Programming and Design	Liu, Gibson	PHI Publication
4.	The 8088 and 8086 Microprocessors	Triebel, Walter A.,Singh, Avtar	Pearson Publications
5.	Pentium Processor System Architecture	Don Anderson, Tom Shanley	Addison-Wesley
6.	The INTEL Microprocessors, Architecture, Programming and Interfacing	Barry B. Brey	Pearson Publishers

10. WEB REFERENCES

1. www.intel.com
2. www.pcguide.com/ref/CPU
3. www.CPU-World.com/Arch/

11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Sr. No.	TOPIC	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	The 8086 microprocessor	6	8	-	14
2	Instruction set & timing diagram of 8086	-	4	8	12
3	8086 system bus structure	4	6	-	10
4	Interrupt structure of 8086	4	4	2	10
5	Programmable devices	2	4	4	10
6	Microprocessor application programs	-	2	4	06
7	Introduction to Intel Pentium Architecture	4	4	-	08
	TOTAL	20	32	18	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**	Ms.Sharyu Kadam	
2	**Internal**	Mr.Manish Solanki	
3	**Internal**	Mrs.Krishna Bhatt	
4	**External**	**Dr. Prasad S. Joshi**	
		Organization: D.J.Sanghvi, College of Engineering	

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1. COURSEDETAILS

Programme : IT/CSE	**Semester: III/IV**
Course: DATABASE MANAGEMENT SYSTEM	**Group: C***
Course Code:DBS198917	**Duration:16 Weeks**

2. TEACHINGAND EXAMINATIONSCHEME

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

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

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, sub queries)	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.

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 and triggers	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 RESOURSES

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 FrasserPubl Comp.
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.comaccess/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.	Faculty	NAME	SIGNATURE
1	Internal	Mrs. Swapna Naik	
2	Internal	Mr. Manish Solanki	
3	Internal	Mr. Abhijit Dongaonkar	
4	External	Dr. Nandini Chaudahary Organization: J. T. Mahajan college of engineering	

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MUMBAI
400 056.

1. COURSEDETAILS

Programme: IT/CSE	**Semester: IV**
Course: Programming in Python	**Group: C***
Course Code:PRP198918	**Duration:16 Weeks**

2. TEACHINGAND EXAMINATIONSCHEME

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

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, gamming, 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 attained 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 RESOURSES

Sr. No.	Title Of Book	Author	Publication
1.	Introducing Pytohn	BillLubanovic	O'Reilly
2.	Learning Python	Mark Lutz	O'Reilly
3.	Python Essential Reference	David Beazley	Addison-Wesley Professional
4.	Fundamentals of Python Programming	RichardL. 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: Computer Engineering/ Information Technology | **Semester: IV**

Course: Human Computer interface | **Group: A**

Course Code: HCI198919 | **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

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 RESOURSES

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

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. COURSEDETAILS

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

2. TEACHINGAND EXAMINATIONSCHEME

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

1. Initialize Graphics mode and use different graphics primitive functions
2. 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	CO1
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**	

7. LIST OF PRACTICALS

Term Work consists of Journal containing minimum 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	COs
1	Identify, Review and Compare various display devices	2	CO1
2	Program for Pixel Drawing {processing Tool OS}	2	CO2
3	Program for Line drawing by DDA	2	CO2
4	Program for Line drawing by Bresenham's	2	CO2
5	Program for Circle Drawing by DDA	2	CO2
6	Program for Circle Drawing by Bresenham's	2	CO2
7	Program for Circle Drawing by midpoint	4	CO2
8	Program for Ellipse Drawing (midpoint)	4	CO2
9	Program for Transformation (2D)	4	CO3
10	Program for polygon filling using boundary fill algorithm	2	CO2,CO5
11	Program for Line Clipping by Sutherland-Cohen	4	CO4
12	Program for Line Clipping by midpoint subdivision	2	CO4
13	Program for Text Generation	2	CO2
	Total	32	

8. IMPLEMENTATION STRATEGY (PLANNING)

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

9. LEARNING RESOURSES

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.comd
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 Shading	6	4		10
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 Bokariya	
3	Internal	Mr. Pankaj Rathod	
4	External	Mr. Manish Salve Thakur Polytechnic	

1. COURSEDETAILS

Programme: Computer Engineering	**Semester: IV**
Course: Summer Inplant Training/Internship	**Group: A***
Course Code:SPT190819	**Duration:4 – 6 weeks**

2. TEACHINGAND EXAMINATIONSCHEME

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 (SPT190819)	---	4-6weeks	6	**Maximum Marks**	25	25	25	25	100
					Minimum Marks	10	10	10	10	40

The oral/viva 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. SKILLCOMPETENCY

The aim of this course is to help the students to attained 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'sLEVEL
CO1	Apply engineering skills to solve a problem	**Apply**
CO2	Prepare the reports, charts and presentation	**Apply**
CO3	Evolve as a ready for industry personnel	**Apply**
CO4	Demonstrate social, cultural and environmental responsibility as an 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 access 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 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 donot , 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	NAME	SIGNATURE
1	Internal	Mr. J. S. Kulkarni	
2	Internal	Mrs. P S Arora	
3	Internal	Mr S U Masurkar	
4.	External	Mr. Harinder Salwan Organization : Tricom Multimedia Pvt Ltd.	

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC MUMBAI 400 056.