PROGRAMME STRUCTURE

AND

SYLLABI OF

DIPLOMA PROGRAMME IN

COMPUTER ENGINEERING

(III & IV Semester)

UNDER RATIONALISED SEMESTER SYSTEM

(IMPLEMENTATIONFROM ACADEMIC YEAR 2020-21)

BOARD OF TECHNICAL EDUCATION, GOA STATE

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FOREWORD

I take this opportunity to putforth before you the Revised Curriculum for Second Year(SEM III & IV) Diplomain Computer Engineeringunder Rationalised Semester System to be implemented from academic year 2020-21.

Dr.VivekB. Kamat, Director,Directorate of Technical Education triggered the idea of revision in Curriculum for various Diploma Programmes under 03/04 years Diploma Programmes. Director was instrumental in motivating the teaching faculties, offering technical guidance on continual basis for timely completion of said endeavour.

Dr. Krupashankara M.S. Chairman, BTE inspired the members of various Committees with NBA guidelines, January 2019. As per directives of Chairman BTE, Committees could execute CO-PO mapping, define the various levels as per Bloom's taxonomy and thus can generate balanced question papers for internal/Board Examination.

I would like to appreciate Chairman of Courses committees alongwith sub-committee members, for having carried out the work, within the given schedule. I take this opportunity to thank Dr. V.N. Shet, Ex-Chairman, Board of Technical Education- Goa, Ms. Anjali Sardessai, Ms. Seema Naik, Mr. Rama Subhaji and all others who have directly/indirectly helped Board in achieving the goal.

This improvised Curriculum shall be beneficial to students Community at large, with updated knowledge database and can offer them better opportunities to seek employment in their relevant fields.

Thanking you,

(Shri.N.V.T.Pednekar)
Secretary
Board of Technical Education,Goa

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13. Ms. Radhika Prabhu, Lecturer in Computer Engineering, Agnel Polytechnic, Verna
14. Mr. SwatejDessai, Lecturer in Computer Engineering (Contract), Government Polytechnic Curchorem

DIPLOMA IN COMPUTER ENGINEERING CURRICULUM STRUCTURE											
Semester	**Code**	**Subjects**	**L**	**T**	**P**	**H**	**TH**	**TM**	**PR**	**TW**	**TOT**
FIRST	GC102	Engineering Mathematics-I	4	2	–	6	75	25	–	25	125
	GC103	Applied Physics-I	3	–	2	5	75	25	–	25	125
	GC104	Applied Chemistry	3	–	2	5	75	25	–	25	125
	GC106	Basic Engineering Practice (Mech & Elect)	–	–	5	5	–	–	50	75	125
	GC204	Engineering Drawing	–	–	5	5	–	–	50	50	100
			10	2	14	26	225	75	100	200	600
SECOND	GC101	Communication Skills	–	–	2	2	–	–	25	25	50
	GC105	Basic Engineering Practice (Electronics & Computer)	–	–	4	4	–	–	50	50	100
	GC201	Engineering Mathematics-II	4	2	–	6	75	25	–	25	125
	GC202	Applied Physics-II	3	–	2	5	75	25	–	25	125
	GC203	Environmental Studies	4	–	–	4	75	25	–	–	100
	GC205	Engineering Materials	3	–	–	3	75	25	–	–	100
			14	2	8	24	300	100	75	125	600
THIRD	CM301	Computer Organization	4	–	–	4	75	25	–	–	100
	CM302	Operating System	3	–	2	5	75	25	–	25	125
	CM303	Computer Programming	3	1	2	6	75	25	25	25	150
	CM304	Web Designing	3	1	2	6	75	25	25	25	150
	CM305	Computer Laboratory-I	–	1	2	3	–	–	50	25	75
	CC309	Digital Electronics	3	–	2	5	75	25	25	25	150
			16	3	10	29	375	125	125	125	750
FOURTH	CM401	Microprocessors	3	–	2	5	75	25	–	25	125
	CM402	Introduction to Database Management Systems	3	1	2	6	75	25	25	25	150
	CM403	Object Oriented Programming	3	1	2	6	75	25	25	25	150
	CM404	Internet Technologies	3	–	2	5	75	25	25	–	125
	CM405	Data Communication & Computer Networks	3	–	2	5	75	25	–	25	125
	CM40	Computer Laboratory-II	–	–	2	2	–	–	50	25	75

	6										
			15	2	12	29	375	125	125	125	750
FIFTH	TR501	Industrial Training	–	–	4	4	–	–	30	70	GRADE
	CM501	Computer Security	3	–	2	5	75	25	25	–	125
	CC501	Entrepreneurship Development	–	–	2	2	–	–	–	25	25
	CC601	Industrial Organization & Management	3	–	–	3	75	25	–	–	100
		Elective -I	3	–	2	5	75	25	25	25	150
			9	–	10	19	225	75	80	120	400
SIXTH	CM601	Network Management	3	–	2	5	75	25	25	–	125
	CM602	Software Engineering &Testing	3	–	2	5	75	25	–	–	100
	CM603	Computer Engineering Project	–	–	8	8	–	–	50	100	150
	CC602	Business Communication	–	–	2	2	–	–	25	25	50
		Elective - II	3	–	2	5	75	25	25	25	150
		Elective -III	3	–	2	5	75	25	25	25	150
			12	–	18	30	300	100	150	175	725
L- Lectures T – Tutorials P – PracticalsH-Hours TH – Theory Marks TM – Test Marks PR – Practical Marks TW- Term Work Marks											

LIST OF ELECTIVES(AS PER CAREER OPTIONALS/VERTICALS)

Core Programming		**Web Technologies & Multimedia**	
Sub Code	**Elective–I / Elective–II / Elective–III**	**Sub Code**	**Elective–I / Elective–II / Elective–III**
CM611	Data Structures	CM615	E-Commerce
CM612	Design and Analysis of Algorithms	CM616	Principles of Multimedia
CM613	Advanced Object-Oriented Programming	CM617	Server Programming
CM614	Mobile Application Development	CM618	Computer Graphics
Systems		**Data & IT Infrastructure Management**	
Sub Code	**Elective–I / Elective–II / Elective–III**	**Sub Code**	**Elective–I / Elective–II / Elective–III**
EX403	8051 Microcontrollers	CM621	Information Storage and Management
CM619	Embedded System Design	CM622	Cyber Law and Computer Forensics
EX612	Autonomous Robots	CM623	Internet of Things
CM620	Distributed Operating Systems	CM624	ERP and Supply Chain Management

VISION

To develop globally competent Engineers with professional attitudes, sound ethical values and foster entrepreneurship

DEPARTMENT MISSION

M1: To practice global standards of teaching learning processes with state of art laboratories and infrastructure.

M2: To enhance knowledge and skills of faculty and staff in Computer Engineering through continuous education.

M3: To provide career guidance and placement assistance to the students of Computer Engineering through industry-institute interaction.

M4: To develop a professional and ethical work culture among students of Computer Engineering with concern for environmental issues and sustainability.

M5: To stimulate innovative thinking and foster entrepreneurship.

PROGRAM OUTCOMES (POs)

PO1. Basic and Discipline specific knowledge: Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems.

PO2. Problem analysis: Identify and analyse well-defined engineering problems using codified standard methods.

PO3. **Design/ development of solutions:** Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.

PO4. Engineering Tools, Experimentation and Testing: Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.

PO5. Engineering practices for society, sustainability and environment: Apply appropriate technology in context of society, sustainability, environment and ethical practices.

PO6. Project Management: Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities.

PO7. Life-long learning: Ability to analyse individual needs and engage in updating in the context of technological changes.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Design, develop, install and maintain hardware and software-based systems.

PSO2: Gain knowledge in diverse areas of Computer Engineering for successful career, entrepreneurship and higher studies.

SEMESTER III

Semester	Code	Subjects	L	T	P	H	TH	TM	PR	TW	TOT
THIRD	CM301	Computer Organization	4	–	–	4	75	25	–	–	100
	CM302	Operating System	3	–	2	5	75	25	–	25	125
	CM303	Computer Programming	3	1	2	6	75	25	25	25	150
	CM304	Web Designing	3	1	2	6	75	25	25	25	150
	CM305	Computer Laboratory-I	–	1	2	3	–	–	50	25	75
	CC309	Digital Electronics	3	–	2	5	75	25	25	25	150
			16	3	10	29	375	125	125	125	750

L- Lecturers T – Tutorials P – PracticalsH- Hours TH – Theory Marks TM – Test Marks PR – Practical Marks TW- Term Work Marks

(CM301) COMPUTER ORGANIZATION

1. COURSE OBJECTIVES: In this course thestudents will be able to describe the structure, function and characteristics of computer systems. Learn the basic concepts of CPU and Input/output (I/O) organization.Classify computer memory; learn the functioning of DMA and IOP.

2. PRE-REQUISITES:NIL

3. TEACHING AND EXAMINATION SCHEME

Semester III	Periods/Week (in hours)			Total Hours	Examination Scheme				
Course code & course title					Theory Marks		Practical Marks		Total Marks
CM301 Computer Organization	L	T	P	H	TH	TM	TW	PR/OR	
	4	-	-	4	75	25	-	-	100

4. COURSE OUTCOMES: On successful completion of the course, the students will be able to:

CM301.CO1: List the functional and organizational units of basic computer system.

CM301.CO2: Explain CPU, Memory and Input/output organization.

CM301.CO3: Classify various functional components of a computer system.

CM301.CO4: Comparevarious functional components of a computer system.

5. MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
	Basic & Discipline Specific Knowledge	Problem Analysis	Design and Development of Solutions	Engg. Tools, Experimentation& Testing	Engg. Practices for Society, Sustainability & Environment	Project Management	Life-long Learning
CO1	2	1	0	0	0	0	0
CO2	2	1	0	0	0	0	0
CO3	2	1	1	0	1	0	1
CO4	2	1	1	0	1	0	1

Relationship:Low-1 Medium-2 High-3

	PSO1	PSO2
CO1	2	2
CO2	2	2
CO3	1	1

CO4	1	1

6. DETAILED COURSE CONTENTS / MICRO-LESSON PLAN

M=Marks	Thr= Teaching hours	CO = Course Outcomes		
UNIT		**M**	**Thr**	**CO**
UNIT I	**1 BASIC ORGANIZATION OF COMPUTER** 1.1 Basic organization of Computer (Von Neumann Machine) - Input Unit, Memory unit, Arithmetic and Logic Unit, Output unit, Control Unit 1.2 Features of Von Neumann Model and Von Neumann Bottleneck 1.3 Basic Operational Concepts 1.3.1 Connections between the processor and the main memory 1.3.2 Functions of different registers Program Counter (PC), Instruction Register (IR), Memory Address Register (MAR), Memory Data Register (MDR), General purpose Registers. 1.3.3 Execution of a program (Steps taking place while execution of a program) 1.3.4 Concepts of Interrupt and Interrupt Service Routine(ISR) 1.4 Introduction to Buses-Concept of a bus, Data bus, Address Bus and Control Bus, System bus. 1.4.1 Bus Structures- Single bus structure, multiple bus structure, Traditional bus configuration, High speed bus configuration 1.4.2 Definitions of Bus Design Parameters-Bus Types – Dedicated and Multiplexed, Method of Arbitration – Centralized and Distributed, Bus Timings, Bus width, Data transfer types	15	13	CO1, CO2, CO3, CO4
UNIT II	**2BASIC CPU ORGANIZATION** 2.1 Internal Structure of CPU 2.1.1 Major Components of CPU – control, Register set, ALU 2.1.2 CPU Operation (flowchart showing major functions of Processor) 2.2 Accumulator Based CPU Organization 2.3 Typical CPU with general purpose register organization. 2.4 Stack Organization- Register Stack, Memory Stack 2.5 Instruction Cycle 2.5.1 Instruction Fetch Cycle 2.5.2 Instruction Decode/Execute Cycle 2.6 Control Unit 2.6.1 Hardwired Control Unit	15	12	CO1, CO2, CO3, CO4

	2.6.2 Micro programmed/Soft-Wired Control Unit 2.7 Characteristics of Complex Instruction Set Computers (CISC) & Reduced Instruction SetComputers (RISC)			
UNIT III	**3 MEMORY ORGANIZATION** 3.1 Introduction to memory and memory parameters 3.2 Classification of memory 3.2.1 Primary/Semiconductor Memorybased on: Principal of operation, Physical Characteristics, Mode of access, Terminology used for fabrication 3.2.2 Secondary memory based on Sequential and Random-access methods. 3.3 Memory Hierarchy- two, three and four levels 3.4 Main Memory 3.4.1 RAM- Definition of Static RAM (SRAM), Definition of Dynamic RAM(DRAM), Comparison between SRAM &DRAM, Definition of Synchronous DRAM (SDRAM), Definition of Double-Data-Rate Series (DDRAM), Comparison between DRAMs &SDRAMs 3.4.2 ROM-Overview of PROM, EPROM, EEPROM 3.5 Cache memory 3.5.1 Introduction Cache memory 3.5.2 Cache memory Terminology-Hit rate, Cache Miss, Program locality, Locality of reference, Block fetch 3.5.3 Cache organizations-Look-aside, Look-through 3.5.4 Elements of cache design: Cache size, Mapping Function, Replacementalgorithms-Least- Recently –Used (LRU), First-In-First-Out (FIFO), Least-Frequency-Used (LFU), Random	15	13	CO1, CO2, CO3, CO4
UNIT IV	**4 INPUT & OUTPUT ORGANIZATION** 4.1 Input Output (I/O) Systems 4.1.1 Requirements of input output (I/O) systems 4.1.2 Input Output (I/O) interfacing techniques: Memory mapped I/O, I/O mapped I/O 4.2 Types of Data Transfer techniques 4.2.1 Program controlled I/O or polling control 4.2.2 Interrupt program controlled I/O or interrupt driven I/O 4.2.3 Hardware controlled I/O 4.2.4 I/O control by handshake signals	15	13	CO1, CO2, CO3, CO4

	4.3 Interrupt driven I/O 4.3.1 Interrupt Hardware / Hardware interrupt 4.3.2 Enabling and disabling interrupts, Vectored interrupts, Interrupt Nesting, Interrupt priority 4.3.3 Flowchart of Interrupt and response to interrupt 4.4 Comparison between Programmed I/O and Interrupt Driven I/O			
UNIT V	**5 DMA ORGANIZATION AND I/O PROCESSOR** 5.1 Direct memory Access 5.1.1 Introduction to DMA 5.1.2 Drawbacks in Programmed I/O and Interrupt Driven I/O 5.1.3 DMA operation with flowchart of Interaction of CPU and DMA 5.1.4 Comparison of I/O program Controlled Transfer and DMA transfer. 5.1.5 Use of DMA in a Computer system 5.1.6 Bus Arbitration 5.1.7 Types of Bus Arbitration: Centralized and Distributed 5.1.8 Centralized Arbitration: Daisy Chaining, Polling method and Independent Request 5.2 I/O Processor 5.2.1 Features and functions of IOP 5.2.2 Block diagram of IOP	15	13	CO1, CO2, CO3, CO4
	Total	75	64	

7. COURSE DELIVERY:

The Course will be delivered through lectures, class room interactions and exercises.

8. SPECIFICATION TABLE FOR THEORY/ MACRO-LESSON PLAN

Unit No	Unit	Number of lectures	Marks
I	**1. BASIC STRUCTURE/ORGANIZATION OF COMPUTER** 1.1 Basic organization of Computer (Von Neumann Machine) 1.2 Features of Von Neumann Model and Von Neumann Bottleneck 1.3 Basic Operational Concepts 1.4 Introduction to Buses-Concept of a bus, Data bus, Address Bus and Control Bus, System bus.	13	15
II	**2. BASIC CPU ORGANIZATION** 2.1 Internal Structure of CPU 2.2 Accumulator Based CPU Organization 2.3 Typical CPU with general purpose register organization.	12	15

	2.4 Stack Organization- Register Stack, Memory Stack 2.5 Instruction Cycle 2.6 Control Unit 2.7 Characteristics of Complex Instruction Set Computers (CISC) & Reduced Instruction Set Computers (RISC)		
III	**3. MEMORY ORGANIZATION** 23.1 Introduction to memory and memory parameters 23.2 Classification of memory 23.3 Memory Hierarchy- two, three and four levels 23.4 Main Memory 23.5 Cache memory	13	15
IV	**4. INPUT & OUTPUT ORGANIZATION** 14.1 Input Output (I/O) Systems 14.2 Types of Data Transfer techniques 14.3 Interrupt driven I/O 14.4 Comparison between Programmed I/O and Interrupt Driven I/O	13	15
V	**5. DMA ORGANIZATION** 15.1 Direct memory Access 15.2 I/O Processor	13	15
	Total	64	75

9. SPECIFICATION TABLE FOR TERM WORK & PRACTICALS HOURS

There are no practical in this course and hence it is not applicable.

10. LEARNING RESOURCES

Text Books

S. No.	Author	Title of Books	Publishers
1	A.P. Godse and D.A. Godse	Computer Organisation and Architecture/ Computer Architecture and Organisation	Technical Publication
2	William Stallings	Computer Organisation and Architecture	Prentice Hall

Reference Books for further study

S. No.	Author	Title of Books	Publishers
1	Morris Mano	Computer System and Architecture	Pearson publication

Internet and Web Resources

S. No.	Description
1	https://nptel.ac.in/courses/106106092/
2	http://www.ddegjust.ac.in/studymaterial/msc-cs/ms-07.pdf

Videos and Multimedia Tutorials

S. No.	Description
1	https://youtube.com/watch?v=MIWTxHbPBA0

(CM302) OPERATING SYSTEM

1. COURSE OBJECTIVES: In this course the students will learn the basic concepts of operating system, its functions, types and structure. They will understand about process and how the operating system manages the processes and memory of a computer. They will familiarize with deadlocks and various deadlock strategies. They will also study security management in operating system.

2. PRE-REQUISITES: Knowledge of Computer Hardware.

3. TEACHING AND EXAMINATION SCHEME

Semester	**III**	**Periods/Week (in hours)**			**Total Hours**	**Examination Scheme**				
Course code & course title						**Theory Marks**		**Practical Marks**		**Total Marks**
CM302		**L**	**T**	**P**	**H**	**TH**	**TM**	**TW**	**PR/OR**	
Operating System		3	-	2	5	75	25	25	-	125

4. COURSE OUTCOMES: Student will be able to:

CM302.CO1: Explain the basic concepts of operating systems.
CM302.CO2:Use various concepts of an Operating System.
CM302.CO3:Classify various concepts of an Operating System.
CM302.CO4:Comparevarious concepts of an Operating System.

5. MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
	Basic & Discipline Specific Knowledge	Problem Analysis	Design and Development of Solutions	Engg. Tools, Experimentation& Testing	Engg. Practices for Society, Sustainability & Environment	Project Management	Life-long Learning
CO1	2	1	1	0	0	0	1
CO2	2	1	1	0	0	0	1
CO3	2	1	2	1	0	0	1
CO4	2	1	2	1	0	0	1

Relationship:Low-1 Medium-2 High-3

	PSO1	PSO2
CO1	2	2
CO2	2	2
CO3	2	2
CO4	2	2

6. DETAILED COURSE CONTENTS / MICRO-LESSON PLAN

M=Marks	Thr= Teaching hours	CO = Course Outcomes			
UNIT			M	Thr	CO
UNIT I	**1. INTRODUCTION** 1.1 Definition of Operating System 1.2 Functions of Operating System 1.3 Types of Operating System and their features 1.3.1 Batch Processing 1.3.2 Multiprogramming 1.3.3 Real time System 1.3.4 Time Sharing 1.3.5 Distributed 1.3.6 Multimedia 1.4 Definitions: Assembler, Compiler, interpreter, linker, loader and editor 1.5 OS Structure 1.5.1 Layered 1.5.2 Monolithic 1.5.3 Micro Kernel		15	8	CO1, CO2, CO3, CO4
UNIT II	**2. PROCESS MANAGEMENT** 2.1 Definition of Process 2.2 Concept of Context Switching 2.3 Process States 2.4 Process Transition Diagram 2.5 Process Control Block 2.6 Process Scheduling 2.6.1 Scheduling Objectives 2.6.2 Scheduling Philosophies 2.6.3 Scheduling Levels 2.6.4 Scheduling Algorithms: First Come First Serve (FCFS), Round Robin (RR), Priority Based, Priority Class		15	10	CO1, CO2, CO3, CO4
UNIT III	**3. DEADLOCKS AND INFORMATION MANAGEMENT** 3.1 Deadlocks 3.1.1 Concept 3.1.2 Graphical Representation Deadlock 3.1.3 Deadlock Pre-requisite 3.1.4 Concepts of deadlock Strategies: Deadlock Ignorance, Deadlock Detection, Deadlock Recovery, Deadlock Prevention, Deadlock Avoidance 3.2. Information management 3.2.1 Simple File System: File Attributes 3.2.2 File Access Methods: Sequential File Access, Direct/Random/Relative Access, Indexed Sequential Access 3.2.3 Directory Structure: Hierarchical Directory Systems, Access Paths, Directory Operations 3.2.4 File Protection: Access Control		15	9	CO1, CO2, CO3, CO4
UNIT IV	**4. MEMORY MANAGEMENT**		15	11	CO1,

	4.1 Functions 4.1.1 Issues in memory management scheme: Relocation and address translation, Protection and sharing, Evaluation 4.2 Contiguous Real Memory Management Techniques 4.2.1 Single Contiguous Memory Management 4.2.2 Fixed Partitioned Memory Management 4.2.3 Variable Partitioned Memory Management 4.2.4 Fragmentation –Internal and External 4.3 Non-Contiguous Real Memory Management 4.3.1 Paging: Introduction, Relocation and address Translation, General Methodology, Implementation of PMT (Software Method) 4.3.2 Segmentation: Introduction, Relocation and address Translation 4.4 Concept of Virtual Memory 4.4.1 Introduction 4.4.2 Definitions: Locality of Reference, Page Fault, Working set, Page Replacement Policy (FIFO, NRU, and LRU), Dirty Page/Dirty Bit, Demand Paging.			CO2, CO3, CO4
UNIT V	**5. SECURITY MANAGEMENT** 5.1 Security Management 5.1.1 Introduction 5.1.2 Security Threats 5.1.3 Attacks on Security 5.1.4 Computer Worm: Mode of Operation, Safeguard against worm\ 5.1.5 Computer virus: Types of viruses, Infection Methods, Mode of Operation, Virus Detection, Removal and Prevention 5.1.6 Security Design Principles 5.1.7 Authentication: Password, Artifact, Biometrics	15	10	CO1, CO2, CO3, CO4
	Total	75	48	

7. COURSE DELIVERY:

The Course will be delivered through lectures, class room interactions, exercises and case studies

8. SPECIFICATION TABLE FOR THEORY/ MACRO-LESSON PLAN

Unit No	Unit	Number of	Marks

		lectures	
I	**1. INTRODUCTION** 1.1 Definition of Operating System 1.2 Functions of Operating System 1.3 Types of Operating System and their features 1.4 Definitions: Assembler, Compiler, interpreter, linker, loader and editor 1.5 OS Structure	8	15
II	**2. PROCESS MANAGEMENT** 2.1 Definition of Process 2.2 Concept of Context Switching 2.3 Process States 2.4 Process Transition Diagram 2.5 Process Control Block 2.6 Process Scheduling	10	15
III	**3. DEADLOCKS AND INFORMATION MANAGEMENT** 3.1 Deadlocks 3.2 Information management	9	15
IV	**4. MEMORY MANAGEMENT** 4.1 Functions 4.2 Contiguous Real Memory Management Techniques 4.3 Non-Contiguous Real Memory Management 4.4 Concept of Virtual Memory	11	15
V	**5. SECURITY MANAGEMENT** 5.1 Security Management	10	15
	Total	48	75

9. SPECIFICATION TABLE FOR TERM WORK & PRACTICALS HOURS

No	Practical
1	Study of Disk Operating System(Internal and External commands)
2	Installation of Windows Operating System
3	Study of Windows Operating System: (Architecture and functionality)
4	Installation of Linux Operating System
5	Study of Linux Operating System: (Architecture and functionality)
6	Study of Linux Commands
7	Study of Linux shell programming
8	Study of process scheduling algorithms.
9	Study of Antivirus: Types of Antiviruses, installation and usage.
10	Case Study on Android and IOS7

10. LEARNING RESOURCES

Text Books

S. No.	Author	Title of Books	Publishers
1	Achyut S. Godbole	Operating System	Tata Mc-Graw Hill
2	Silberschatz Galvin John Wiley and Sons	Operating System Concepts	John Wiley & Sons
3	William Stallings	Operating System	Pearson
4	Sumitabha Das	Unix Concept and Programming	Tata Mc-GrawHill

Reference Books for further study

S. No.	Author	Title of Books	Publishers
1	Andrew Tanenbaum	Modern Operating systems	PHI
2	Kumar Saurabh	UNIX Programming	Wiley India

Internet and Web Resources

S. No.	Description
1	https://nptel.ac.in/courses/106108101/
2	https://nptel.ac.in/downloads/106108101/

Videos and Multimedia Tutorials

S. No.	Description
1	https://www.youtube.com/watch?v=MaA0vFKt-ew

(CM303) COMPUTER PROGRAMMING

1. COURSE OBJECTIVES: In this course thestudents will study the syntax of C programming language. Develop, execute, test and debug programs using C programming language.

2. PRE-REQUISITES: Knowledge of computer programming terminology.

3. TEACHING AND EXAMINATION SCHEME

Semester III	Periods/Week (in hours)			Total Hours	Examination Scheme				
Course code & course title					Theory Marks		Practical Marks		Total Marks
CM303 Computer Programming	L	T	P	H	TH	TM	TW	PR/OR	
	3	1	2	6	75	25	25	25	150

4.COURSE OUTCOMES: Student will be able to:

CM303.CO1: Explain the elements of C programming language.

CM303.CO2:Write C programs using modular programming concepts.

CM303.CO3: Compare various C language constructs.

CM303.CO4: Develop simple applications using C.

5.MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
	Basic & Discipline Specific Knowledge	Problem Analysis	Design and Development of Solutions	Engg. Tools, Experimentation& Testing	Engg. Practices for Society, Sustainability & Environment	Project Management	Life-long Learning
CO1	2	2	1	0	0	0	1
CO2	2	3	3	1	0	1	1
CO3	2	2	1	0	0	0	1
CO4	2	3	3	1	1	2	1

Relationship:Low-1 Medium-2 High-3

	PSO1	PSO2
CO1	2	2
CO2	3	3
CO3	2	2
CO4	3	3

6. DETAILED COURSE CONTENTS / MICRO-LESSON PLAN

M=Marks	Thr= Teaching hours	CO = Course Outcomes		
UNIT		M	Thr	CO
UNIT I	1. INTRODUCTION TO C 1.1 Basic Elements of C 1.1.1 History of C 1.1.2 Characteristics of C 1.1.3 Simple C programs	15	9	CO1, CO2, CO3, CO4

	1.1.4 Structure of a C Program 1.1.5 The character set of C 1.1.6 C Tokens: Identifiers, Keywords, Constants, Basic data types and sizes, Variables, Variable declarations 1.2 Operators and Expressions 1.2.1 Arithmetic operators 1.2.2 Relational Operators 1.2.3 Logical operators 1.2.4 Assignment operators 1.2.5 Unary operators 1.2.6 Conditional expressions 1.2.7 Bitwise operators 1.2.8 Operator precedence and associativity 1.3 Standard Input and Output in C 1.3.1 I/O Functions 1.3.2 Formatted output – The printf function 1.3.3 Unformatted output – putchar and puts function 1.3.4 Formatted input – The scanf function 1.3.5 Unformatted input – getchar and gets functions			
UNIT II	**2. CONDITIONAL PROGRAM EXECUTION, PROGRAM LOOPS AND ITERATIONS** 2.1 Branching: The if-else statement 2.2 Nested if statement 2.3 Dangling else problem 2.4 The if-else-if ladder 2.5 The switch statement 2.6 The goto statements and labels 2.7 Loops 2.7.1 The while statement 2.7.2 The do while statement 2.7.3 The for statement 2.7.4 Nested for statement 2.8 The break statement 2.9 The continue statement	15	10	CO1, CO2, CO3, CO4
UNIT III	**3. ARRAYS AND STRINGS** 3.1 Arrays 3.1.1 Array notation and representation 3.1.2 Array declaration and defining 3.1.3 Storing elements in array 3.1.4 Manipulating array elements 3.1.5 Two-dimensional and multi-dimensional arrays 3.2 Strings and String handling functions 3.2.1 String length 3.2.2 Using strcpy to copy strings 3.2.3 Concatenating strings using strcat 3.2.4 String compare	15	10	CO1, CO2, CO3, CO4

UNIT IV	**4. STRUCTURES, POINTERS AND FILE MANAGEMENT** 4.1 Structures 4.1.1 Introduction 4.1.2 Defining a structure 4.1.3 Initializing of a structure 4.1.4 Accessing and processing a structure 4.1.5 Array of Structures 4.2 Pointers 4.2.1 Pointer concept 4.2.2 Pointer declaration 4.2.3 Initializing pointer variable 4.2.4 Accessing variable through pointer 4.3 File Management 4.3.1 Introduction to file management 4.3.2 Defining and opening a file 4.3.3 Closing a file, input/output operations Onfiles	15	10	CO1, CO2, CO3, CO4
UNIT V	**5 MODULAR PROGRAMMING** 5.1 Introduction 5.2 User-defined functions in C 5.3 Function – Basics 5.4 General form of a function 5.4.1 Declaring function/function prototype 5.4.2 Accessing a function 5.5 Scope rules 5.6 Function arguments 5.6.1 Call by value 5.6.2 Call by reference 5.7 Return statements 5.7.1 Returning from a function 5.7.2 Return values 5.7.3 Functions of type void 5.8 Recursive functions 5.9 Standard Library functions	15	09	CO1, CO2, CO3, CO4
	Total	75	48	

7. COURSE DELIVERY:

The Course will be delivered through lectures, class room interactions, exercises and case studies

8. SPECIFICATION TABLE FOR THEORY/ MACRO-LESSON PLAN

Unit No	Unit	Number of lectures	Marks
I	**1 INTRODUCTION TO C** 1.1 Basic Elements of C 1.2 Operators and Expressions 1.3 Standard Input and Output in C	9	15
II	**2 CONDITIONAL PROGRAM EXECUTION, PROGRAM**	10	15

	LOOPS AND ITERATIONS 2.1 Branching: The if-else statement 2.2 Nested if statement 2.3 Dangling else problem 2.4 The if-else-if ladder 2.5 The switch statement 2.6 The goto statements and labels 2.7 Loops 2.8 The break statement 2.9 The continue statement		
III	**3 ARRAYS AND STRINGS** 3.1 Arrays 3.2 Strings and String handling functions	10	15
IV	**4 STRUCTURES, POINTERS AND FILEMANAGEMENT** 4.1 Structures 4.2 Pointers 4.3 File Management	10	15
V	**5 MODULAR PROGRAMMING** 5.1 Introduction 5.2 User-defined functions in C 5.3 Function – Basics 5.4 General form of a function 5.5 Scope rules 5.6 Function arguments 5.7 Return statements 5.8 Recursive functions 5.9 Standard Library functions	9	15
	Total	48	75

9. SPECIFICATION TABLE FOR TERM WORK & PRACTICALS HOURS

No	Practical
1.	Write a C program to implement Input / Output Functions
2.	Write a C program to implement Operators and Expression
3.	Write a C program to implement Conditional statements
4.	Write a C program to implement Loops
5.	Write a C program to implement Arrays
6.	Write a C program to implement Strings
7.	Write a C program to implement Structures
8.	Write a C program to implement Pointers
9.	Write a C program to implement Functions
10.	Write a C program to implement File Management
No	**Tutorial Exercise**
1	At least 2 problems on each unit given above

10. LEARNING RESOURCES

Text Books

S. No.	Author	Title of Books	Publishers
1	E. Balagurusamy	Programming in ANSI C	Tata McGraw Hill.
2	YeshavantKanetkar	Let us C	BPB Publication

Reference Books for further study

S. No.	Author	Title of Books	Publishers
1	J. S. Katre, Deitel, Deitel	C- How to program	Deitel Publication.
2	P Godse, D. A. Godse	Computer Programming using C	Technical Publication

Internet and Web Resources

S. No.	Description
1	Introduction to C Programming Language, http://www.learnconline.com/2010/03/introduction.html
2	Comp.lang.C Frequently Asked Questions, http://www.c-faq.com
3	C Tutorial, http://www.cprogramming.com/tutorial/c-tutorial.html

Videos and Multimedia Tutorials

S. No.	Description
1	https://nptel.ac.in/courses/106105085/4
2	https://nptel.ac.in/courses/106104128/

(CM304) WEB DESIGNING

1. COURSE OBJECTIVES: In this course students will learn the basic concepts of World Wide Web and protocols of Internet Technology. They will also learn HTML, CSS and JavaScript and create webpagesand develop website.

2. PRE-REQUISITES: Basic Engineering Practice (Comp.)

3. TEACHING AND EXAMINATION SCHEME

Semester III	Periods/Week (in hours)			Total Hours	Examination Scheme				
Course code & course title					Theory Marks		Practical Marks		Total Marks
CM304 Web Designing	L	T	P	H	TH	TM	TW	PR/OR	
	3	1	2	6	75	25	25	25	150

4. COURSE OUTCOMES: On successful completion of the course, the students will be able to:

CM304.CO1: Explain basics of World Wide Web.

CM304.CO2:Write HTML, CSS and JavaScript code.

CM304.CO3:Compare various web technologies for web designing.

CM304.CO4: Design simple web applications.

5. MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
	Basic & Discipline Specific Knowledge	Problem Analysis	Design and Development of Solutions	Engg. Tools, Experimentation & Testing	Engg. Practices for Society, Sustainability & Environment	Project Management	Life-long Learning
CO1	2	0	0	0	1	0	1
CO2	2	2	2	2	1	2	0
CO3	2	1	1	1	0	0	1
CO4	2	2	2	2	1	2	1

Relationship: Low-1 Medium-2 High-3

	PSO1	PSO2
CO1	2	2
CO2	3	3
CO3	2	2
CO4	3	3

6. DETAILED COURSE CONTENTS / MICRO-LESSON PLAN

M=Marks	**Thr= Teaching hours**	**CO = Course Outcomes**		
UNIT		**M**	**Thr**	**CO**
UNIT I	**1 INTRODUCTION TO WORLD WIDE WEB** 1.1 Basics of world wide web 1.2 The Internet and its applications 1.3 Secure Connections 1.4 The Web Browser 1.5 Search Engine 1.6 The concept of a tier 1.6.1 One-tier application 1.6.2 Two-tier application 1.6.3 Three-tier application: Presentation tier,business tier, database tier 1.7 Web Pages 1.7.1 Static Web Pages: Introduction, Advantages and Disadvantages 1.7.2 Dynamic Web Pages: Introduction, Advantages and Disadvantages 1.7.3 Active Web Pages: Introduction, Advantages and Disadvantage	15	9	CO1, CO2, CO3, CO4

UNIT II	**2 DNS, FTP, HTTP AND EMAIL** 2.1 Domain Name System 2.1.1 Name Space: Flat Name Space, Hierarchical Name Space 2.1.2 Domain Name Space: Label, Domain Name, Domain 2.1.3 Distribution of Name Space: Hierarchy of Name Servers, Zone, Root server, Primary and Secondary Servers 2.1.4 DNS in the Internet: Generic Domain, Country Domain, Inverse Domain 2.2 File transfer and Access Using FTP and TFTP 2.2.1 Understanding FTP 2.2.2 FTP Process Model 2.2.3 Trivial File Transfer Protocol 2.3 Hypertext Transfer Protocol 2.3.1 Understanding Uniform Resource Locator(URL) 2.3.2 Understanding HTTP commands: GET, HEAD, PUT, POST, DELETE, LINK, UNLINK 2.4 Electronic Mail 2.4.1 Conceptual Components of an E-mail System 2.4.2 Email address format 2.4.3 Email Services Protocols: Simple Mail Transfer Protocol, Post Office Protocol, Internet Message Access Protocol	15	10	CO1, CO2, CO3, CO4
UNIT III	**3 HTML** 3.1 Introduction to HTML 3.1.1 HTML Tags: Container tag, Standalone tag 3.1.2 HTML Page Structure: Head and Body 3.1.3 Document Structure Tags: <HTML>,<HEAD>, <BASE>, <META>, <LINK>, <SCRIPT>, <TITLE>, <BODY> 3.2 Formatting Tags 3.2.1 Text Formatting Tags: <B>, <BASEFONT>, <BIG>, <FONT>, <I>, <STRIKE>, <SMALL>, <SUB>, <SUP>, <U> 3.2.2 Block Formatting Tags: , <DIV>, <HR>, <H1>….<H6>, <P> 3.3 List Tags 3.3.1 List Item - <LI> 3.3.2 Ordered List - <OL> 3.3.3 Unordered List - <UL> 3.3.4 Definition List - <DL>	15	10	CO1, CO2, CO3, CO4

	3.4 Hyperlink - <A> (Attributes -href, Name, Target) 3.5 Image -<IMG> (Attributes -src, Alt, Width, Height, Border) 3.6 Table 3.6.1 The Table tags: <TABLE>, <CAPTION>, <THEAD>, <TFOOT>, <TBODY>, <COLGROUP>, <COL>, <TR>, <TD>, <TH> 3.6.2 Attributes of <TABLE>tag : border,bordercolor, cellpadding, cellspacing, width, height, bgcolor, background, align, hspace, vspace 3.6.3 Attributes of <TR>tag : align, valign, bgcolor, background, bordercolor 3.6.4 Attributes of <TD>tag : align, valign, width, height, colspan, rowspan, bgcolor, background, bordercolor 3.6.5 Spanning multiple rows and columns :colspan,androwspan 3.7 Frames 3.7.1 Application of frames 3.7.2 The <FRAMESET> tag 3.7.3 Nesting <FRAMESET> tag 3.7.4 Placing content in frames with the <FRAME> tag (Attributes - src, name, scrolling, noresize, frameborder, bordercolor, marginwidth, marginheight) 3.7.5 Targeting named frames 3.7.6 Creating Floating Frames - <IFRAME> tag (Attributes - align, height, width, name, src, frameborder) 3.8 Forms 3.8.1 Creating Forms- The <FORM> tag (Attributes - url, method, name, target, onSubmit,onReset) 3.8.2 Form Elements: The Input Tag (Attributes – type, name, value, size, maxlength, checked, disabled, readonly), Single line text field, text area (multiline input - <textarea>), password, submit button, reset button, radio-buttons, checkboxes, list boxes (<select> and <option>tags) 3.8.3 Grouping Related Fields (<fieldset> and <legend>tags) 3.8.4 Passing form data (method and action attribute of <form>tag) 3.9 Multimedia (<embed>tag) 3.10 HTML 5 3.10.1 New Input Types in HTML5 - color, date, datetime, datetime-local, email, month, number, range, search, tel, time, url, week			

UNIT IV	**4 CSS** 4.1 Basics of CSS 4.1.1 Understanding the Syntax of CSS 4.1.2 Inserting CSS in an HTML Document: Inline style, Internal style sheet, External style sheet 4.2 CSS Selectors - universal selector, type selector, class selector, id selector, attribute selector 4.3 Font properties in CSS (font-family, font-size, font-size-adjust, font-stretch, font- style, font-variant, font-weight) 4.4 Introducing Web Font 4.5 Text formatting properties, border properties 4.6 Aesthetics with CSS 4.6.1 Using the text shadow property 4.6.2 Gradient Properties 4.6.3 Background of a Web Page 4.6.4 Definitions of CSS Transitions,Transformations, Animations	15	10	CO1, CO2, CO3, CO4
UNIT V	**5 JAVASCRIPT** 5.1 Origin of JavaScript, Advantages of java script, Java script syntax. 5.2 Variables, Data Types, Operators, Literals 5.3 JavaScript Control Statements 5.4 Arrays and Functions 5.5 Dialog Boxes 5.6 Introduction to Objects: object definition, properties, methods 5.7 Core JavaScript built-in objects 5.7.1 Date object: getDate(),setDate() 5.7.2 Math object: max(x,y,z,....,n), min(x,y,z,....,n), pow(x,y), round(x), sqrt(x) 5.7.3 String object:charAt(), concat(), indexOf(), lastIndexOf(), slice(), toUpperCase(), toLowerCase() 5.8 Events and Event Handlers 5.8.1 General information about events 5.8.2 Defining event handlers onclick (), onload(), onsubmit(), onreset())	15	9	CO1, CO2, CO3, CO4
	Total	75	48	

7. COURSE DELIVERY:

The Course will be delivered through lectures, class room interactions and exercises.

8. SPECIFICATION TABLE FOR THEORY/ MACRO-LESSON PLAN

Unit No	Unit	Number of lectures	Marks

I	**1 INTRODUCTION TO WORLD WIDE WEB** 1.1 Basics of world wide web 1.2 The internet and its applications 1.3 Secure Connections 1.4 The Web Browser 1.5 Search Engine 1.6 The concept of a tier 1.7 Web Pages	9	15
II	**2 DNS, FTP, HTTP AND EMAIL** 2.1 Domain Name System 2.2 File transfer and Access Using FTP and TFTP 2.3 Hypertext Transfer Protocol 2.4 Electronic Mail	10	15
III	**3 HTML** 3.1 Introduction to HTML 3.2 Formatting Tags 3.3 List Tags 3.4 Hyperlink - <A> (Attributes - href, Name, Target) 3.5 Image - <IMG> (Attributes - src, Alt, Width, Height, Border) 3.6 Table 3.7 Frames 3.8 Forms 3.9 Multimedia (<embed>tag) 3.10 HTML 5	10	15
IV	**4 CSS** 4.1 Basics of CSS 4.2 CSS Selectors 4.3 Font properties in CSS 4.4 Introducing Web Font 4.5 Text formatting properties, border properties 4.6 CSS color Modes 4.7 Aesthetics with CSS	10	15
V	**5 JAVASCRIPT** 5.1 Origin of JavaScript, Advantages of java script, Java script syntax. 5.2 Variables, Data Types, Operators, Literals 5.3 JavaScript Control Statements 5.4 Arrays and Functions 5.5 Dialog Boxes 5.6 Introduction to Objects 5.7 Core JavaScript built-in objects 5.8 Events and Event Handlers	9	15
	Total	48	75

9. SPECIFICATION TABLE FOR TERM WORK & PRACTICALS HOURS

S. No	Practical

1	Study of Web Browser and Search Engine
2	Study of Web pages, HTTP and its commands
3	Implement image, hyperlinks and lists tags in HTML
4	Implement table tag in HTML
5	Implement frame and frameset in HTML
6	Design form using HTML
7	Implement inline, internal and external CSS
8	Implement HTML5 tags
9	Implement in-built and event handling JavaScript functions
10	Mini project: Develop Website using HTML, CSS and JavaScript
No	**Tutorial Exercise**
1	At least 2 problems on each unit given above

10. LEARNING RESOURCES

Text Books

S. No.	Author	Title of Books	Publishers
1	Achyut Godbole	Web Technologies	Wesley Publishing Co
2	Behrouz.A.Forouzan	Data Communication and Networking	Mc Graw Hill
3	Kogent Learning Solutions Inc	Web Technologies: HTML, JAVASCRIPT,PHP, JAVA,JSP, ASP.NET, XML and Ajax	Dreamtech Press

Reference Books for further study

S. No.	Author	Title of Books	Publishers
1	Duckett, Jon	Beginning Web Programming with HTML, XHTML, and CSS	Wrox
2	Bhumika S. Zalavadia	Static and Dynamic Webpage Development with HTML, CSS, JavaScript, jQuery, PHP, MySQL and AJAX	Penram International Publishing (India) Pvt.Ltd.

Internet and Web Resources

S. No.	Description
1	https://www.w3schools.com/html/default.asp
2	https://www.tutorialspoint.com/

Videos and Multimedia Tutorials

S. No.	Description
1	https://nptel.ac.in/courses/124107002/18
2	http://www.nptelvideos.in/2012/11/internet-technologies.html

(CM305) COMPUTER LABORATORY-I

1. COURSE OBJECTIVES: In this course thestudents will learn to design and setup a computer/server room, installation and configuration of computer systems and to diagnose the faults and troubleshoot the computer system.

2. PRE-REQUISITES:NIL

3. TEACHING AND EXAMINATION SCHEME

Semester	**III**	**Periods/Week (in hours)**			**Total Hours**	**Examination Scheme**				
Course code & course title						**Theory Marks**		**Practical Marks**		**Total Marks**
CM305 COMPUTER LABORATORY-I		**L**	**T**	**P**	**H**	**TH**	**TM**	**TW**	**PR/OR**	
		-	1	2	3	-	-	25	50	75

4. COURSE OUTCOMES: Student will be able to:

CM305.CO1: Identify various parts of a computer system.

CM305.CO2:Use various components to assemble a computer system.

CM305.CO3: Devise specification for computer systems.

CM305.CO4: Manage a computer system and its peripherals.

5. MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
	Basic & Discipline Specific Knowledge	Problem Analysis	Design and Development of Solutions	Engg. Tools, Experimentation& Testing	Engg. Practices for Society, Sustainability & Environment	Project Management	Life-long Learning
CO1	2	1	1	0	0	0	1
CO2	2	1	2	2	0	1	1
CO3	2	2	2	2	1	2	1
CO4	2	2	2	2	1	2	1

Relationship:Low-1 Medium-2 High-3

	PSO1	PSO2
CO1	2	1
CO2	3	2
CO3	3	2
CO4	3	2

6. DETAILED COURSE CONTENTS / MICRO-LESSON PLAN

M=Marks	Thr= Teaching hours	CO = Course Outcomes		
UNIT		**M**	**Thr**	**CO**
UNIT I	**1 PRE-INSTALLATION PLANNING AND INSTALLATION** 1.1 Design of computer room considering factors:Location, Earthing, Computer Room Pollution, Air Room Conditioning, False Flooring and False Ceiling, temperature, humidity, Fire Protection Systems. 1.2 Power Supply: Clean Power Supply, Power Supply Problems, Power Conditioning, Power Supply Characteristics (noise level, Ripple, Efficiency, Rated wattage) 1.2.1 UPS: Types of UPS and working principle 1.2.2 SMPS: working principle, Power Connectors (24-pin ATX, NLX, adapter cables) and color codes	10	6	CO1, CO2, CO3, CO4
UNIT II	**2 PC SYSTEM** 2.1 System Unit 2.1.1 Front Panel Controls 2.1.2 Motherboard: Different Forms of Motherboard, Motherboard and its Components, Rear side Connectors of Motherboard, Motherboard Selection criteria, Form Factors, Expansion Slots: PCI, PCI-E, PCI-Express, PCMCIA 2.2 Display Unit 2.2.1 Types of Displays 2.2.2 Working Principle of Displays 2.3 Input Devices 2.3.1 Keyboard: Types of keyboards, Working Principle 2.3.2 Mouse: Working principle of mice, Different types of mice 2.4 Ports, Cables, Connectors 2.5 USB Connectors and Features	10	8	CO1, CO2, CO3, CO4
UNIT III	**3 UNDERSTANDING MEMORY AND DRIVES** 3.1 Memory: DRAM, SRAM, DIMM DDR1, DDR2, DDR3 3.2 Hard Disk Drive: 3.2.1 Construction: Hard Disk Drive, Sub-assemblies, Tracks, Sectors, Clusters, Sector Interleaving , Landing Zone	10	6	CO1, CO2, CO3, CO4

	3.2.2 Working of HDD: Reading and Writing operation 3.2.3 Interfaces, Installation 3.3 Types of Optical Drives, Optical Disk 3.4 Installing and Configuring an Optical Drive			
UNIT IV	**4 OTHER PERIPHERAL DEVICES** 4.1 Printers 4.1.1 Types of Printers: Impact and Non-impact printers 4.1.2 Ink-Jet Printer: Working Principle, Advantages and Disadvantages 4.1.3 Laser Printer: Working Principle, Advantages and Disadvantages 4.1.4 Dot Matrix Printer: Working Principle, Advantages and Disadvantages 4.2 Scanner: Working Principle of Scanners 4.3 Modem: Types of Modem	10	6	CO1, CO2, CO3, CO4
UNIT V	**5 MAINTENANCE AND TROUBLESHOOTING** 5.1 Maintenance- Preventive and remedial maintenance 5.1.1 Preventive maintenance –Problem causes, Problem Source, Effects and actions taken for printers, keyboards 5.1.2 General Precautions 5.1.3 Computer faults-Nature –Solid or Intermittent, hardware and Software fault. Customer provided information and its synthesis. 5.2 Troubleshooting 5.2.1 Classical steps to successful troubleshooting 5.2.2 Understanding how components fail 5.2.3 Disk drives failures and troubleshooting 5.2.4 Safety precautions in trouble shooting. 5.2.5 Equipment used in trouble shooting. 5.2.6 Diagnostic software. 5.2.7 POST	10	6	CO1, CO2, CO3, CO4
	Total	50	32	

7. COURSE DELIVERY

The Course will be delivered through practical and exercises.

8. SPECIFICATION TABLE FOR THEORY/ MACRO-LESSON PLAN

Unit No	Unit	Number of lectures	Marks
I	**1 PRE-INSTALLATION PLANNING AND INSTALLATION** 1.1 Design of computer room considering factors 1.2 Power Supply problems, Characteristics	6	10
II	**2 PC SYSTEM** 2.1 System Unit 2.2 Display Unit 2.3 Input Devices 2.4 Ports, Cables, Connectors 2.5 USB Connectors and Features	8	10
III	**3 UNDERSTANDING MEMORY AND DRIVES** 3.1 Memory:DRAM, SRAM, DIMM DDR1,DDR2,DDR3 3.2 Hard Disk Drive 3.3 Types of Optical Drives, Optical Disk 3.4 Installing and Configuring an Optical Drive	6	10
IV	**4 OTHER PERIPHERAL DEVICES** 4.1 Printers 4.2 Scanner 4.3 Modem: Types of Modem	6	10
V	**5 MAINTENANCE AND TROUBLESHOOTING** 5.1 Maintenance- Preventive and remedial maintenance 5.2 Troubleshooting	6	10
	Total	32	50

9. SPECIFICATION TABLE FOR TERM WORK & PRACTICALS HOURS

No	Practical
1	Case study of a computer lab and a server room.
2	Design a computer room for a given need.
3	Study of various types of UPS.
4	Study of SMPS and identifying various voltage levels.
5	Identifying front and rear panel indicators, switches and connectors/ports of a computer system.
6	Study of motherboard.
7	Study of different types of Computer Memory
8	Installation of HDD and CD ROM Drive.
9	Study of different types of Printers.
10	Study of Maintenance of a computer system.
11	Study of different types of computer faults and troubleshooting mechanism.
12	Assembling of a computer system
No	**Tutorial Exercise**
1	At least 2 problems on each unit given above

10. LEARNING RESOURCES

Text Books

S. No.	Author	Title of Books	Publishers
1	B. Govindrajalu	IBM PC and Clones, Hardware, Troubleshooting and Maintenance	Tata McGraw-Hill
2	D Balasubramanian	Computer Installation and Servicing	McGraw-Hill

Reference Books for further study

S. No.	Author	Title of Books	Publishers
1	Robert Bruce Thompson and Barbara Bruce Thompson	Repairing and Upgrading your PC	O'Reilly
2	K. L. James	Computer Hardware: Installation, Interfacing, Troubleshooting and Maintenance	PHI Learning

Internet and Web Resources

S. No.	Description
1	https://www.tutorialspoint.com/computer_fundamentals/computer_hardware.html
2	Nji.gov.ng/images/Workshop_Papers/2017/IT_Workshop/s3.pdf

Videos and Multimedia Tutorials

S. No.	Description
1	Computer Basics Hardware – https://www.youtube.com/watch?v=ctAVC2JwEwl

(CC309) DIGITAL ELECTRONICS

1. COURSE OBJECTIVES:

The students need to learn basic concepts of digital circuits and system which leads to design of complex digital system such as microprocessors.
The students need to know combinational and sequential circuits using digital logic fundamentals.
This is the first course by which students get exposure to digital electronics world.
The students will able to

1. To understand various number representations and conversion between different representation in digital electronic circuits.
2. To introduce the students to various logic gates, SOP, POS and their minimization techniques.
3. To analyze logic processes and implementation of logical operations using combinational logic circuits.
4. To understand, analyze and design sequential circuits

2. TEACHING AND EXAMINATION SCHEME

Semester	**III**								
Course code & course title		**Periods/Week (in hours)**			**Total Hours**	**Examination Scheme**			
						Theory Marks		**Practical Marks**	**Total Marks**
Digital Electronics CC309		**L**	**T**	**P**	**C**	**TH**	**TM**	**TW**	**PR/OR**
		03	**-**	**02**	**05**	**75**	**25**	**25**	**25**	**150**

3. COURSE OUTCOMES:

On successful completion of the course, the student will be able to:
CO1: Relate the knowledge of Number Systems in Digital Applications.
CO2: Build different Sequential and Combinational Circuits.
CO3: Simplify logical problems using digital circuits.
CO4: Develop basic digitalelectronics circuits.

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4. Mapping Course Outcomes with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
	Basic& Discipline Specific Knowledge	Problem Analysis	Design and Development of Solutions	Engg. Tools, Experimentation & Testing	Engg. Practices for Society, Sustainability & Environment	Project Management	Life-long Learning
CO1	3	2	3	3	0	0	3
CO2	3	3	3	3	3	3	3
CO3	3	3	3	3	3	0	3
CO4	3	3	3	3	2	2	3

Relationship: Low-1 Medium-2 High-3

	PSO1	PSO2

CO1	3	2
CO2	3	2
CO3	3	2
CO4	3	2

5. DETAILED COURSE CONTENTS / MICRO-LESSON PLAN

M = Marks	**Thr = Teaching hours**	**CO = Course Objectives**	

Unit	**M**	**Thr**	**CO**
1 Number System	**14**	**09**	**CO1**
1.1 **Digital and Analog Signals**. Definition of digital and analog signals,Comparison between Analog and Digital signals			
1.**2 Number System**:- Decimal, Binary, Hexadecimal. Introduction to Decimal,Binary and Hexadecimal Number Systems. Counting in each system. Conversion from one system to other.			
1.3Codes:- introduction and importance of Codes.BCD code, GRAY code conversion of Gray to Binary, Binary to Gray, BCD to binary and Binary to BCD. Represent Decimal Numbers in BCD and Gray codes. ASCII code and its importance.			
1.4 Binary Addition (upto 4 bits), 1's complement of a Binary number, 2's complement of a Binary number. Binary Subtraction using 2's complement method. Addition of signed decimal numbers.			
2Combinational Circuits	**19**	**12**	**CO1,CO2,CO3**
2.1 Logic Gates:- Symbol, Expression and Truth Tables of Basic gates(AND,OR,NOT) and Combinational gates(NOR,NAND,EXOR,EXNOR).			
2.2 Boolean Algebra:- DeMorgan's Theorems, Laws of Boolean Algebra ,Duality Theorem,			
2.3Simplification of Boolean Expressions using Boolean Algebraic laws and by using K-Maps Techniques(upto 4 Variables in SOP Form),			
2.4 Universal Gates:- Implementation of NOT,OR,AND,EXOR gates using NOR and NAND Gates			
2.5Adders:- Half Adder circuit using logic gates , Full Adder circuit using logic gates, block diagram of 4 bit parallel adder. Subtractors:- Half subtractor circuit using logic gates, Full Subtractor using logic gates			
2.6Combinational circuits:- Block diagram and Implementation using basic gates:- Multiplexers(4 to 1), Demultiplexer(1 to 4), Encoder (4 to			

2), Decoder(2 to 4). BCD to 7 segment Decoder driver (Common Cathode).			
3 Flip Flops	**12**	**08**	**CO1,CO2,**
3.1 Definition of FlipFlop. Applications. Symbol, Truth Tables, Operation and timing diagrams of RS F/F using NAND gates. ,			
3.2 Symbol, Truth Tables, Operation and timing diagrams of clocked RS F/F using NAND Gates, Concept of Asynchronous inputs(Preset and Clear)			
3.3 Symbol, Truth Tables, Operation of Clocked D F/F			
3.4 Symbol, Truth Tables, Operation of Clocked JK F/F, Excitation table of JK flip flop			
3.5 Race around condition in JK F/F. Symbol, Truth Tables, Operation of JK master slave F/F.			
3.6 Symbol, Truth Tables, Operation of T F/F,			
4 Registers And Counters	**19**	**12**	**CO1,CO2,CO4**
4.1 Registers: Definition of Shift Registers, Applications of Registers Symbols and Logic block diagram of SISO,SIPO,PISO and PIPO Registers,			
4.2 Serial IN Serial Out Register (size of the register 4 bits) Logic Diagram and Operation of SISO Register usingnegative edge triggered D F/F along with the Truth Table and Timing diagrams			
4.3 Serial IN Parallel Out Register (size of the register 4 bits) Logic Diagram and Operation of SIPO Register using negative edge triggered D F/F along with the Truth Table and Timing diagrams.			
4.4 Parallel IN Serial Out Register (size of the register 4 bits) Logic Diagram and Operation of PISO Register using negative edge triggered D F/F along with the Truth Table and Timing diagrams			
4.5 Parallel In Parallel Out Register (size of the register 4 bits) Logic Diagram and Operation of PISO Register using negative edge triggered D F/F along with the Truth Table and Timing diagrams . Concept of Shift right, Shift left, Ring Counter.			
4.6 Counters: Introduction to counters, Modulus of counters. Count sequence, No of Flip Flops required for Specified counters			
4.7 Asynchronous Counters:- 4 bit UP counter using JK Flip Flops only and 4 bit DOWN counter using JK Flip Flops only.			

4.8 Synchronous Counters:- 4 bit UP counter using JK Flip Flops only and 4 bit DOWN counter using JK Flip Flops only, Decade (Mod 10) using JK Flip Flops only			
4.9 Design of Synchronous counters(upto 4 bit) using only JK Flip Flops			
5 DAC and ADC and Memories	**11**	**7**	**CO1,CO4**
5.1 Definitions, Types of DAC and ADC(noDescription),Applications		1	
5.2 Binary Ladder Network for DAC:- Logic circuit and operation. Simple numerical problems Successive Approximation ADC .:- Logic circuit and operation. Simple numerical problems.		4	
5.3Memories: Introduction, Semiconductor memories and its types –ROM,RAM,PROM, EPROM,EEPROM(only definition and applications)		2	
Total	**75**	**48**	

6. COURSE DELIVERY:

The Course will be delivered through lectures, class room interactions, exercises and case studies

7. SPECIFICATION TABLE FOR THEORY/ MACRO-LESSON PLAN

Unit No	Unit	Number of lectures	Marks
1	**Number System**	09	14
2	**Combinational Circuits**	12	19
3	**Flip FLops**	08	12
4	**Registers And Counters**	12	19
5	**DAC and ADC**	07	11
	Total	48	75

8. SPECIFICATION TABLE FOR TERM WORK & PRACTICALS HOURS

No	Practical (Perform any 8)	Marks
1.	Verification of Logic gates and Demorgan's Theorems	
2.	Universal gates (NAND and NOR)	
3.	Verification of Boolean Expression	
4.	Half Adder and Full Adder using logic gates	
5.	Half Subtractor and Full Subtractor using logic gates	
6.	MUX and D-MUX	
7.	RS F/F, D F/F and JK F/F	
8.	Assemble and Test Binary Counter/Decade counter	
9.	Assemble and test DAC using DAC0808	

10.	Assemble and test ADC using ADC0808	
	Total	25
...		
No	Class room Assignments	
	At least 2 assignments	
No	**Tutorial Exercise**	**Marks**
1	NIL	
...	Total	

9. LEARNING RESOURCES

Text Books

S. No.	Author	Title of Books	Publishers
1	R.P.Jain,	Modern Digital Electronics	Fourth Edition, Tata McGraw-Hill Education.
2	Malvino& Leach,	Digital Principles and Applications	Seventh Edition, McGraw-Hill Education

Reference Books for further study

S. No.	Author	Title of Books	Publishers
1	Thomas L. Floyd,	Digital Fundamentals	10th Edition, Pearson Education Inc, 2011
2	. By A.K. Maini,	Digital Electronics: Principles and Integrated Circuits	Wiley India Publications

SEMESTER IV

Semester	Code	Subjects	L	T	P	H	TH	TM	PR	TW	TOT
FOURTH	CM401	Microprocessors	3	–	2	5	75	25	–	25	125
	CM402	Introduction to Database Management Systems	3	1	2	6	75	25	25	25	150
	CM403	Object Oriented Programming	3	1	2	6	75	25	25	25	150
	CM404	Internet Technologies	3	–	2	5	75	25	25	–	125
	CM405	Data Communication & Computer Networks	3	–	2	5	75	25	–	25	125
	CM406	Computer Laboratory-II	–	-	2	2	–	–	50	25	75
			15	2	12	29	375	125	125	125	750

L- Lecturers T – Tutorials P – PracticalsH- Hours TH – Theory Marks TM – Test Marks PR – Practical Marks TW- Term Work Marks

(CM401) MICROPROCESSORS

1. AIM: To provide basic knowledge of Microprocessor, Assembly Language Programming and Microcontrollers.

2. COURSE OBJECTIVES: In this course thestudents will learn the following:
1. Architecture of 8086 microprocessor
2. Addressing modes and instruction set of Microprocessor.
3. 8086 interrupt types, interrupt handling process.
4. Differentiate between Microprocessor and Microcontroller.

3. PRE-REQUISITES: Knowledge of Digital Electronics and Computer Organization.

4. TEACHING AND EXAMINATION SCHEME

Semester	**IV**	**Periods/Week (in hours)**			**Total Hours**		
Course code & course title						**Theory Marks**	
CM401 Microprocessors and Applications		**L**	**T**	**P**	**H**	**TH**	**TM**
		3	-	2	5	75	25

5.COURSE OUTCOMES: Student will be able to:

CM401.CO1: Explain basic concepts of Microprocessor and Microcontroller.
CM401.CO2: Use 8086 Microprocessor instructions.
CM401.CO3: Select appropriate addressing mode.
CM401.CO4: Develop assembly language programs.

6.MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
	Basic & Discipline Specific Knowledge	Problem Analysis	Design and Development of Solutions	Engg. Tools, Experimentation& Testing	Engg. Practices for Society, Sustainability & Environment	Project Management	Life-long Learning
CO1	1	1	0	0	1	0	1
CO2	2	2	1	0	0	0	1
CO3	2	2	1	0	0	0	1
CO4	2	2	2	2	0	2	1

Relationship:Low-1 Medium-2 High-3

	PSO1	PSO2
CO1	1	1
CO2	1	1
CO3	1	1
CO4	2	1

7. DETAILED COURSE CONTENTS / MICRO-LESSON PLAN

M=Marks	Thr= Teaching hours	CO = Course Outcomes		
UNIT		**M**	**Thr**	**CO**
UNIT I	**1. 8086 – INTRODUCTION AND ARCHITECTURE** 1.1 Organization of a Microprocessor-Based System (Microprocessor, Memory, Input/Output, System Bus) 1.2 Introduction to 8086 1.2.1 Salient features of 8086 1.2.2 8086 Internal Block Diagram 1.2.3 Bus Interface Unit: Segment registers, Instruction Queue, Instruction pointer 1.2.4 Execution Unit: General purpose Registers, Flag register,Control Unit, Pointer registers, Base and IndexRegisters 1.3 Pin diagram and signal description 1.3.1 Pins used in minimum mode and its description 1.3.2 Pins used in maximum mode and its description 1.3.3 Pins common in both the modes 1.4 Memory Organization of 8086 1.4.1 Memory Segmentation 1.4.2 Generation of 20-bit physical address	15	10	CO1, CO2, CO3, CO4
UNIT II	**2. ADDRESSING MODES AND INSTRUCTION SET OF 8086** 2.1 Classification of addressing Modes 2.1.1 Immediate addressing Mode 2.1.2 Register addressing Mode 2.1.3 Memory addressing Mode**:** Direct**,** Register Indirect**,** Indexed**,** Based**,** Based-Indexed 2.1.4 Relative addressing Mode**:** Register Relative**,** Relative Based Indexed 2.1.5 Implied addressing Mode 2.1.6 Port addressing Mode 2.2 Assembler Directives- Segment, db, dw, ends, endp, endm, assume, start, end, proc, equ, dup 2.3 Instruction set and Programming 2.3.1 Data Transfer Instructions- MOV, IN, OUT, PUSH, POP, PUSHF, POPF, XCHG 2.3.2 Arithmetic Instructions- ADD, ADC, INC, DAA, SUB, SBB, DEC, CMP, MUL, DIV, CBW, CWD 2.3.3 Bit Manipulation Instructions- AND, OR, NOT, XOR, SHL, SHR, SAL, SAR, ROR, ROL, RCR, RCL 2.3.4 String Instructions- MOVSB/W, CMPSB/W, LODSB/W,	15	10	CO1, CO2, CO3, CO4

	SCASB/W, STOSB/W String prefix: REP, REPE/REPZ 2.3.5 Processor Control Instructions -STC, CLC, CMC, STD, CLD, STI, CLI, NOP			
UNIT III	**3.ASSEMBLY LANGUAGE PROGRAMMING CONCEPTS** 3.1 Branch Instructions 3.1.1 Unconditional: CALL-NEAR and FAR, RET,JMP-NEAR and FAR 3.1.2 Conditional: JC, JNC, JZ, JNZ, JP, JNP, JO, JNO, JS, JNS 3.1.3 Structures: If - then, if - then - else, multiple if – then – else, Repeat - Until 3.1 Overview of Stack 3.2.1 Stack operations (PUSH, POP) 3.2.2 Stack pointer 3.3 Overview of Procedures 3.3.1 Types of procedures: Reentrant and Recursive 3.3.2 Brief overview of CALL and RET instructions for implementing procedure 3.4 Overview of Macros 3.5 Comparison between Macros and Procedures 3.6 Assembly Language Program Development Tools 3.6.1 Editor 3.6.2 Assembler 3.6.3 Linker 3.6.4 Loader 3.6.5 Debugger 3.6.6 Emulator	15	10	CO1, CO2, CO3, CO4
UNIT IV	**4. INTERRUPTS AND BUS OPERATIONS** 4.1 Interrupt Instructions - INTO, INT, IRET 4.2 Types of 8086 interrupts 4.2.1 Hardware interrupts, software interrupts and interrupts due to error conditions 4.2.2 Interrupt response with diagram 4.2.3 Interrupt pointer table 4.2.4 Priority of interrupts 4.3 8259 Interrupt Controller - Block Diagram & its description 4.4 8086 Bus operations 4.4.1 Timing diagram of 8086 read machine cycle 4.4.2 Timing diagram of 8086 write machine cycle	15	9	CO1, CO2, CO3, CO4
UNIT V	**5. ADVANCED MICROPROCESSORS AND MICROCONTROLLERS** 5.1 Salient features of 80286, 80386 and 80486 processors	15	9	CO1, CO2, CO3, CO4

	5.2 Architectural features of Pentium Processor 5.3 Salient features of latest processors 5.3.1 Dual core 5.3.2 Core 2 duo 5.3.3 i3, i5, i7 processors 5.4 Introduction to Microcontroller 5.4.1 Definition of a Microcontroller 5.4.2 Microprocessor vs Microcontroller 5.4.3 Microcontroller features: On-chip Oscillator, Large number of special purpose registers, Harvard architecture, On-chip program memory, On-chip data memory, On-chip I/O ports, Powerful Interrupt structure, Built-in ADC 5.4.4 Applications of Microcontroller			
	Total	75	48	

8. COURSE DELIVERY:

The Course will be delivered through lectures, class room interactions, exercises and case studies

9. SPECIFICATION TABLE FOR THEORY/ MACRO-LESSON PLAN

Unit No	Unit	Number of lectures	Marks
1	**1. 8086 – INTRODUCTION AND ARCHITECTURE** 1.1 Organization of a Microprocessor-Based System 1.2 Introduction to 8086 1.3 Pin diagram and signal description 1.4 Memory Organization of 8086	10	15
2	**2. ADDRESSING MODES AND INSTRUCTION SET OF 8086** 2.1 Classification of addressing Modes 2.2 Assembler Directives 2.3 Instruction set and programming	10	15
3	**3.ASSEMBLY LANGUAGE PROGRAMMING CONCEPTS** 3.1 Branch Instructions 3.2 Overview of Stack 3.3 Overview of Procedures 3.4 Overview of Macros 3.5 Comparison between Macros and Procedures 3.6 Assembly Language Program Development Tools	10	15
4	**4. INTERRUPTS AND BUS OPERATIONS** 4.1 Interrupt Instructions - INTO, INT, IRET 4.2 Types of 8086 interrupts 4.3 8259 Interrupt Controller -Block Diagram & its description 4.4 8086 Bus operations	9	15
5	**5. ADVANCED MICROPROCESSORS AND MICROCONTROLLERS** 5.1 Salient features of 80286, 80386 and 80486 processors	9	15

	5.2 Architectural features of Pentium Processor 5.3 Salient features of latest processors 5.4 Introduction to Microcontrollers		
	Total	48	75

10. SPECIFICATION TABLE FOR TERM WORK & PRACTICALS HOURS

No	Practical
1	Study of 8086 Microprocessor- Registers, Memory, Flags, Instruction classification.
2	Study of Assembly Language Program Development Tools.
3	Assembly Language Program on Data transfer instructions.
4	Assembly Language Program on basic Arithmetic Operations
5	Assembly Language Program on Logical Instructions.
6	Assembly Language Program on Rotate and Shift Instructions.
7	Assembly Language Program on String instructions.
8	Assembly Language Program on Branch Instructions.
9	Assembly Language Program on Processor control instructions.
10	Comparative study of Microprocessor and Microcontroller
11	Microprocessor based mini project.

11. LEARNING RESOURCES

Text Books

S. No.	Author	Title of Books	Publishers
1	Douglas V. Hall	Microprocessors and Interfacing: Programming and Hardware	Tata McGraw-Hill Education
2	A. K. Ray and K. M.Bhurchandi	Advanced Microprocessors and Peripherals	Tata McGraw-Hill Education
3	Ajit Pal	Microcontrollers-Principles and Applications	Asoke K. Ghosh, PHI Learning Pvt. Ltd.

Reference Books for further study

S. No.	Author	Title of Books	Publishers
1	Mohamed Rafiquzzaman	Microprocessors and Microcomputer - Based System Design	CRC Press, 1990
2	Barry B. Brey	The Intel Microprocessors: 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium 4, and Core2 with 64-bit Extensions	Pearson Education

Internet and Web Resources

S. No.	Description
1	https://www.tutorialspoint.com/microprocessor/microprocessor_tutorial.pdf

2	http://www.vssut.ac.in/lecture_notes/lecture1428551326.pdf
3	https://nptel.ac.in/courses/Webcourse-contents/IISc-BANG/Microprocessors%20and%20Microcontrollers/pdf/Teacher_Slides/mod1/M1L3.pdf
4	http://www.gabrielececchetti.it/Teaching/CalcolatoriElettronici/Docs/i8086_instruction_set.pdf

Videos and Multimedia Tutorials

S. No.	Description
1	https://nptel.ac.in/courses/108105102/62
2	https://www.youtube.com/watch?v=DmwOSdwzZ3E
3	https://www.youtube.com/watch?v=zMtErZsJ1o8

(CM402) INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS

1. AIM: To provide broad understanding of the basic concepts of database management system in particular relational database system.

2. COURSE OBJECTIVES: In this course thestudents will learn the following:
1. Understand the need and uses of database.
2. Learn designing of a database.
3. Use data manipulation language to query, update and manage a database.
4. Understand the concepts of transactions and database security.

3. PRE-REQUISITES: Elementary knowledge about computers and computer programming.

4. TEACHING AND EXAMINATION SCHEME

Semester	**IV**	**Periods/Week (in hours)**			**Total Hours**	**Examination Scheme**				
Course code & course title						**Theory Marks**		**Practical Marks**		**Total Marks**
CM402		**L**	**T**	**P**	**H**	**TH**	**TM**	**TW**	**PR/OR**	
Introduction to database management systems		3	1	2	6	75	25	25	25	150

5.COURSE OUTCOMES: Student will be able to:

CM402.CO1: Explain the concepts of database management system.

CM402.CO2: Use the concepts of Database management system.

CM402.CO3: Formulate SQL queries.

CM402.CO4: Design a simple Database System.

6.MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
	Basic & Discipline Specific Knowledge	Problem Analysis	Design and Development of Solutions	Engg. Tools, Experimentation & Testing	Engg. Practices for Society, Sustainability & Environment	Project Management	Life-long Learning
CO1	2	2	0	0	0	0	0
CO2	2	3	2	2	0	2	0
CO3	2	3	3	3	0	0	2
CO4	2	3	3	3	3	2	1

Relationship:Low-1 Medium-2 High-3

	PSO1	PSO2

CO1	2	2
CO2	3	3
CO3	3	3
CO4	3	3

7. DETAILED COURSE CONTENTS / MICRO-LESSON PLAN

M=Marks	Thr= Teaching hours	CO = Course Outcomes		
UNIT		M	Thr	CO
UNIT I	**1. INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS** 1.1 Database - an introduction 1.2 The database management system 1.3 Advantages of using a database 1.4 Features of data in a database 1.5 Components of a DBMS 1.6 The three-level architecture for a database system 1.7 Data modeling 1.7.1 Introduction 1.7.2 Types of data models: Record based logical models (Relational Model, Network Model, Hierarchical Model) Object based data models: ObjectOriented Model 1.7.3 Advantages and Disadvantages of Relational, Network, Hierarchical, Object Oriented Model 1.7.4 Comparison between Relational, Network, Hierarchical, Object Oriented	15	10	CO1, CO2, CO3, CO4
UNIT II	**2. INTRODUCTION TO RELATIONAL DATABASE MANAGEMENT SYSTEM** 2.1 Relational Model 2.1.1 Relational Database Primer**:** Tabular Representation of data**,** Some terminology**,** Domains 2.1.2 Relational Database Characteristics 2.2 Relational Algebra 2.2.1 Relational Algebra Operators: Restrict, Project, Product, Union, Intersection, Difference, Join, Divide 2.3 Relational Calculus 2.4 Database Integrity 2.4.1 Constraints 2.4.2 Declarative and Procedural Constraints: Type Constraints, Attribute Constraints, Instance Constraints, Database Constraints 2.5 Keys 2.5.1 Super key and key 2.5.2 Composite key 2.5.3 Candidate key	15	10	CO1, CO2, CO3, CO4

	2.5.4 Primary key 2.5.5 Alternate key or Secondary key 2.5.6 Foreign key			
UNIT III	**3. DATABASEDESIGN & ER MODELLING** 3.1 Entity/Relationship (E/R) Modelling 3.1.1 Components of an ER model: Entities, Attributes 3.1.2 Entity Relationship Diagram (ERD): Symbols in ER diagram 3.1.2 Relationships: Degree, Cardinality, Dependency 3.2 Functional Dependency 3.3 Normalization and Normal Forms 3.3.2 Introduction to Normalization: Need of Normalization: Advantages of Normalization 3.3.2 Definitions of Normal Forms: First Normal Form, Second Normal Form, Third Normal Form	15	9	CO1, CO2, CO3, CO4
UNIT IV	**4. STRUCTURED QUERY LANGUAGE** 4.1 Structured Query Language 4.1.1 SQL - an introduction 4.1.2 Advantages of SQL 4.1.3 SQL commands 4.1.4 SQL data types and literals 4.1.5 SQL operators 4.2 Queries 4.2.1 DDL Queries: Create table, Create table as select, Alter table add, Alter table modify, Drop table, Renaming a table 4.2.2 DML queries: Insert, Update, delete 4.2.3 Select query: The select, from, where clause, SQL operators in queries 4.2.4 Aggregate functions: avg, min, max, sum, count 4.2.5 Set operations (union, intersect, except) 4.2.6 Grouping while selecting 4.2.7 Joins: Need for joins, Use of Aliases, Equijoins & Non-Equijoins 4.2.8 Order by 4.2.9 Having	15	10	CO1, CO2, CO3, CO4
UNIT V	**5. TRANSACTION PROCESSING AND DATABASESECURITY** 5.1 Transaction 5.1.1 Transaction – Need and Mechanism 5.1.2 Transaction Processing (TP) Monitor 5.1.3 Transaction Properties 5.2 Recovery 5.2.1 Classification of recovery 5.2.2 System recovery	15	9	CO1, CO2, CO3, CO4

	5.2.3 Failure recovery 5.2.4 Media recovery 5.3 Two phase commit 5.4 Database Security 5.4.1 Introduction 5.4.2 Database users 5.4.3 Types of database users 5.4.4 Database privileges			
	Total	75	48	

8. COURSE DELIVERY:

The Course will be delivered through lectures, class room interactions, exercises and case studies

9. SPECIFICATION TABLE FOR THEORY/ MACRO-LESSON PLAN

Unit No	Unit	Number of lectures	Marks
1	**1. INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS** 1.1 Database - an introduction 1.2 The database management system 1.3 Advantages of using a database 1.4 Features of data in a database 1.5 Components of a DBMS 1.6 The three-level architecture for a database system 1.7 Data modeling	10	15
2	**2. INTRODUCTION TO RELATIONAL DATABASE MANAGEMENT SYSTEM** 2.1 Relational Model 2.2 Relational Algebra 2.3 Relational Calculus 2.4 Database Integrity 2.5 Keys	10	15
3	**3. DATABASE DESIGN & ER MODELLING** 3.1 Entity/Relationship (E/R) Modelling 3.2 Functional Dependency 3.3 Normalization and Normal Forms	9	15
4	**4. STRUCTURED QUERY LANGUAGE** 4.1 Structured Query Language 4.2 Queries	10	15
5	**5. TRANSACTION PROCESSING AND DATABASE SECURITY** 5.1 Transaction 5.2 Recovery 5.3 Two phase commit 5.4 Database Security	9	15
	Total	48	75

10. SPECIFICATION TABLE FOR TERM WORK & PRACTICALS HOURS

No	Practical
1	Designing E-R diagrams for given applications.
2	Tabular representation of E-R diagrams.
3	Overview and comparison of different database softwares. (MySQL, Oracle, Microsoft SQL Server)
4	Installation and Configuration of DBMS.
5	Creating & Executing DDL commands with Integrity constraints on tablein SQL.
6	Creating & Executing DML commands in SQL.
7	Buildand execute SQL queries using various Arithmetic, Conditional and Logical
8	Buildand execute SQLqueries using the DQL Commands with various clauses and aggregate functions.
9	Build and execute queries using various types of Join operations.
10	Build and execute queries for implementing Set Operations.
11	Study of Transaction processing and Database Security concepts.
12	Mini Project: Design and implement Database Management Systems

11. LEARNING RESOURCES

Text Books

S. No.	Author	Title of Books	Publishers
1	Isrd Group	Introduction to Database Management Systems	McGraw Hill Education (India) Private Limited
2	Atul Kahate	Introduction to Database Management Systems	Pearson
3	AviSilberschatz, Henry F. Korth, S. Sudarshan	Database System Concepts	Tata McGraw Hill

Reference Books for further study

S. No.	Author	Title of Books	Publishers
1	ShilbhadraDasgupta,Rini Chakrabarti	Advanced Database Management System	Dreamtech Press
2	An Introduction to Database Systems	Date, C. J.	PearsonEducation

Internet and Web Resources

S. No.	Description
1	http://holowczak.com/oracle-sqlplus-tutorial/
2	http://www.roseindia.net/programming-tutorial/Database-Tutorials
3	http://www.w3schools.com/sql/

Videos and Multimedia Tutorials

S. No.	Description
1	ER Model - https://www.youtube.com/watch?v=Wv1c9K4788A
2	Join Operations - https://www.youtube.com/watch?v=zYH-e6tUYbw

(CM403) OBJECT ORIENTED PROGRAMMING

1. AIM: To develop Object Oriented Programming skills.

2. COURSE OBJECTIVES: In this course thestudents will learn the following:
1. Understand basic skills of objectoriented programming.
2. Develop object oriented programs.
3. Build strong foundation for advanced programming.

3. PRE-REQUISITES: Knowledge of Computer Programming.

4. TEACHING AND EXAMINATION SCHEME

Semester IV	Periods/Week (in hours)			Total Hours	Examination Scheme				
Course code & course title					Theory Marks		Practical Marks		Total Marks
CM403 Object Oriented Programming	L	T	P	H	TH	TM	TW	PR/OR	
	3	1	2	6	75	25	25	25	150

5.COURSE OUTCOMES: On successful completion of the course, the student will be able to:

CM403.CO1: Explain the concepts of Object-Oriented programming.
CM403.CO2: Use the features of Object-Oriented programming in computer programs.
CM403.CO3: Compare various Java programming constructs.
CM403.CO4:Develop simple java programs.

6.MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
	Basic & Discipline Specific Knowledge	Problem Analysis	Design and Development of Solutions	Engg. Tools, Experimentation& Testing	Engg. Practices for Society, Sustainability & Environment	Project Management	Life-long Learning
CO1	0	2	0	0	0	0	0
CO2	0	3	2	0	0	0	0
CO3	2	3	3	3	2	2	1
CO4	2	3	3	3	3	3	2

Relationship:Low-1 Medium-2 High-3

	PSO1	PSO2
CO1	2	2
CO2	3	3
CO3	2	2
CO4	3	3

7. DETAILED COURSE CONTENTS / MICRO-LESSON PLAN

M=Marks	Thr= Teaching hours	CO = Course Outcomes

UNIT		M	Thr	CO
UNIT I	**1. INTRODUCTION TO JAVA** 1.1 Basic concept of object-oriented programming 1.1.1 Objects & classes 1.1.2 Data abstraction & encapsulation 1.1.3 Inheritance 1.1.4 Polymorphism 1.1.5 Dynamic binding 1.1.6 Message communication 1.1.7 Advantages & applications of OOP. 1.2 Java features 1.2.1 Compiled & interpreted 1.2.2 Platform independent & portable 1.2.3 Object oriented 1.2.4 Robust & secure 1.2.5 Distributed 1.2.6 Simple, small & familiar 1.2.7 Multithreaded & interactive 1.2.8 High performance 1.2.9 Dynamic & extensible 1.3 Java Environment 1.4 Overview of Java language 1.4.1 Java program structure 1.4.2 Tokens 1.4.3 Java statements 1.5 Constants, variables & data types 1.5.1 Constants 1.5.2 Variables 1.5.3 Data types 1.5.4 Declaration of variables 1.5.5 Giving values to variables 1.5.6 Scope of variables 1.5.7 Symbolic constants 1.5.8 Type casting 1.5.9 Standard default values 1.6 Operators & expressions 1.6.1 Arithmetic operators 1.6.2 Relational 1.6.3 Logical operators 1.6.4 Assignment operators 1.6.5 Increment/decrement operators 1.6.6 Conditional operators 1.6.7 Bitwise operators 1.6.8 Special operators 1.6.9 Arithmetic expressions 1.6.10 Evaluation of expression 1.6.11 Precedence of arithmetic operators 1.6.12 Type conversion in expression 1.6.13 Operator precedence & associativity 1.7 Decision making, branching & looping 1.7.1 if statement	15	9	CO1, CO2, CO3, CO4

	1.7.2 if-else, nested if-else, if-else if ladder 1.7.3 switch 1.7.4 while 1.7.5 do-while 1.7.6 for 1.7.7 jumps in loops (break, continue) 1.7.8 Labeled loop 1.7.9 Nested loops			
UNIT II	**2. CLASSES, OBJECTS &ARRAY** 2.1 Classes & objects 2.1.1 Introduction 2.1.2 Defining a class 2.1.3 Field declaration 2.1.4 Method declaration 2.1.5 Creating objects 2.1.6 Accessing class members 2.1.7 Constructors 2.1.8 Method overloading 2.1.9 Static methods 2.1.10 Nesting of methods 2.2 Visibility control 2.3 Arrays, Strings & Vectors 2.3.1 One dimensional array 2.3.2 Creating an array 2.3.3 Two-dimensional array 2.3.4 Strings**:** String array**,** String methods**,** String buffer class 2.3.5 Enumerated types	15	10	CO1, CO2, CO3, CO4
UNIT III	**3. INHERITANCE, INTERFACES AND PACKAGES** 3.1 Inheritance 3.1.1 Defining a subclass 3.1.2 Subclass constructor 3.1.3 Multilevel inheritance 3.1.4 Hierarchical inheritance 3.1.5 Overriding methods 3.1.6 Final variables & methods 3.1.7 Final classes 3.1.8 Finalizer method 3.1.9 Abstract methods & classes 3.2 Interfaces 3.2.1 Introduction 3.2.2 Defining interfaces 3.2.3 Extending interfaces 3.2.4 Implementing interfaces 3.2.5 Accessing interface variables 3.3 Packages 3.3.1 Introduction	15	10	CO1, CO2, CO3, CO4

	3.3.2 Java API packages 3.3.3 Using system packages 3.3.4 Naming conventions 3.3.5 Creating packages 3.3.6 Accessing a package 3.3.7 Adding a class to a package 3.3.8 Hiding classes			
UNIT IV	**4.EXCEPTION HANDLING AND MULTITHREADING** 4.1 Exception handling 4.1.1 Types of errors 4.1.2 Exceptions 4.1.3 Syntax of exception handing code 4.1.4 Multiple catch statements 4.1.5 Using finally statements 4.1.6 Throwing our own exception 4.2 Multithreaded Programming 4.2.1 Creating threads 4.2.2 Extending the thread class 4.2.3 Stopping & Blocking the thread 4.2.4 Lifecycle of a thread 4.2.5 Using thread methods 4.2.6 Thread exceptions 4.2.7 Thread priority 4.2.8 Synchronization 4.2.9 Implementing the runnable interface	15	10	CO1, CO2, CO3, CO4
UNIT V	**5. GRAPHICS ANDAPPLETS** 5.1 Graphics Programming 5.1.1 Graphics class 5.1.2 Lines & rectangles 5.1.3 Circles & ellipses 5.1.4 Drawing arcs 5.1.5 Drawing polygon 5.2 Applet Programming 5.2.1 Introduction 5.2.2 Applet lifecycle 5.2.3 Building Applet code 5.2.4 Creating an executable Applet 5.2.5 Designing a webpage 5.2.6 Applet tag 5.2.7 Adding Applet to a HTML file 5.2.8 Running the Applet 5.2.9 Aligning the display	15	09	CO1, CO2, CO3, CO4
	Total	75	48	

8. COURSE DELIVERY:

The Course will be delivered through lectures, class room interactions, exercises and case studies

9. SPECIFICATION TABLE FOR THEORY/ MACRO-LESSON PLAN

Unit No	Unit	Number of lectures	Marks
1	**1. INTRODUCTION TO JAVA** 1.1 Basic concept of object-oriented programming 1.2 Java features 1.3 Java Environment 1.4 Overview of Java language 1.5 Constants, variables & data types 1.6 Operators & expressions 1.7 Decision making, branching & looping	9	15
2	**2. CLASSES, OBJECTS &ARRAY** 2.1 Classes & objects 2.2 Visibility control 2.3 Arrays, Strings & Vectors	10	15
3	**3. INHERITANCE, INTERFACES AND PACKAGES** 3.1 Inheritance 3.2 Interfaces 3.3 Packages	10	15
4	**4.EXCEPTION HANDLING AND MULTITHREADING** 4.1 Exception handling 4.2 Multithreaded Programming	10	15
5	**5. GRAPHICS ANDAPPLET** 5.1 Graphics Programming 5.2 Applet Programming	9	15
	Total	48	75

10. SPECIFICATION TABLE FOR TERM WORK & PRACTICALS HOURS

No	Practical
1	Program to implement constants, variables, operators and expressions.
2	Program to Implement if-else.
3	Program to implement loops.
4	Program to implement switch-case.
5	Program to implement arrays and strings.
6	Program to implement Inheritance.
7	Program to implement packages.
8	Program to implement interfaces.
9	Program to implement multithreading.
10	Program to implement exception handling.

11	Program to implement applets and graphics.
12	Object Oriented Programming based mini project.
No	**Tutorial Exercise**
1	At least 2 problems on each unit given above

11. LEARNING RESOURCES

Text Books

S. No.	Author	Title of Books	Publishers
1	E Balagurusamy	Programming in Java	Tata Mc Graw Hill Education
2	Timothy Budo	An Introduction to Object-Oriented Programming with Java	Pearson Education
3	Danniel Liang	Introduction to Java programming	Pearson Education
4	Sachin Malhotra &Saurabh Chaudary	Programming in Java	Oxford University

Reference Books for further study

S. No.	Author	Title of Books	Publishers
1	Herbert Schildt	Java 2: The Complete Reference	Tata Mc Graw Hill Education
2	David Flanagan	Java Examples in a Nutshell	O'Reilly Media

Internet and Web Resources

S. No.	Description
1	https://www.tutorialspoint.com/java/
2	https://docs.oracle.com/javase/tutorial/java/TOC.html
3	https://beginnersbook.com/java-tutorial-for-beginners-with-examples/

Videos and Multimedia Tutorials

S. No.	Description
1	https://www.youtube.com/watch?v=r59xYe3Vyks&vl=en
2	https://www.youtube.com/watch?v=3u1fu6f8Hto
3	https://www.youtube.com/watch?v=uWYPVz_i7W4

(CM404) INTERNET TECHNOLOGIES

1. AIM: To develop web programming skills of the students for building dynamic and interactive web-based applications using PHP.

2. COURSE OBJECTIVES: In this course thestudents will learn the following:
1. Understand basic PHP constructs.
2. Develop web pages using PHP.
3. Establish database connectivity using PHP.
4. Build dynamic websites.

3. PRE-REQUISITES: Knowledge of Web Designing.

4. TEACHING AND EXAMINATION SCHEME

Semester	**IV**	**Periods/Week (in hours)**			**Total Hours**		
Course code & course title						**Theory Marks**	
CM404 Internet Technologies		**L**	**T**	**P**	**H**	**TH**	**TM**
		3	-	2	5	75	25

5.COURSE OUTCOMES: Student will be able to:

CM404.CO1:Explain the basics of PHP for web development.
CM404.CO2: Use in-built functions of PHP.
CM404.CO3: Compare PHP constructs for Internet Programming.
CM404.CO4: Develop basic programs using PHP.

6.MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
	Basic & Discipline Specific Knowledge	Problem Analysis	Design and Development of Solutions	Engg. Tools, Experimentation& Testing	Engg. Practices for Society, Sustainability & Environment	Project Management	Life-long Learning
CO1	2	3	3	0	0	0	2
CO2	2	3	2	2	2	0	3
CO3	2	3	3	3	2	2	3
CO4	2	3	3	3	3	3	3

Relationship:Low-1 Medium-2 High-3

	PSO1	PSO2
CO1	2	2
CO2	3	3
CO3	2	2
CO4	3	3

7. DETAILED COURSE CONTENTS / MICRO-LESSON PLAN

M=Marks	Thr= Teaching hours	CO = Course Outcomes		
UNIT		**M**	**Thr**	**CO**
UNIT I	**1. INTRODUCTION OF PHP** 1.1 Relationship between Apache and PHP 1.2 Steps to Install & test web server 1.3 Steps to Configure Apache to use PHP 1.4 Creating First PHP Page 1.5 Mixing HTML and PHP 1.6 Printing string and values 1.7 Adding comments to PHP Code 1.8 Working with variables 1.9 Storing data in variables 1.10 Creating constants 1.11 Understanding PHP's internal Data Types	15	9	CO1, CO2 CO3, CO4
UNIT II	**2. OPERATORS, FLOW CONTROL AND LOOPS** 2.1 Operators 2.1.1 Math operator 2.1.2 Assignment operator 2.1.3 String Operator 2.1.4 Bit-wise Operator 2.1.5 Operator Precedence 2.1.6 Comparison operator 2.1.7 Logical Operator 2.1.8 Ternary operator 2.2 Flow Control 2.2.1 If Statement 2.2.2 Else Statement 2.2.3 Else If Statement 2.2.4 Switch Statement 2.3 Loops 2.3.1 For Loop 2.3.2 While Loop 2.3.3 Do While Loop 2.3.4 Foreach Loop	15	10	CO1, CO2, CO3, CO4
UNIT III	**3. STRINGS, ARRAYS AND FUNCTIONS** 3.1 Strings 3.1.1 The string function 3.1.2 Conversion of string variables 3.1.3 Formatting text strings 3.2 Arrays 3.2.1 Building arrays 3.2.2 Modifying the data in arrays 3.2.3 Deleting array elements 3.2.4 Handling array with loops 3.2.5 The PHP array function 3.2.6 Extracting data from array 3.2.7 Sorting arrays 3.2.8 Using array operator	15	10	CO1, CO2, CO3, CO4

	3.2.9 Comparing array to each other 3.2.10 Handling multidimensional array 3.2.11 Splitting and merging array 3.3 Functions 3.3.1 Creating function in PHP 3.3.2 Passing and return of data, array 3.3.3 PHP conditional function 3.3.4 PHP variable function			
UNIT IV	**4. READING DATA IN WEB PAGES AND WORKING WITH DATABASESIN PHP** 4.1 Setting up web pages to communicate with PHP 4.1.1 Handling Web Components 4.1.2 Text Fields 4.1.3 Text areas 4.1.4 Check boxes 4.1.5 Radio buttons 4.1.6 List boxes 4.1.7 Password controls 4.1.8 Hidden controls 4.2 Database Connection using PHP 4.2.1 Creating MYSQL database 4.2.2 Creating and accessing a table 4.2.3 Inserting new data items into a table 4.2.4 Updating existing data from a table 4.2.5 Deleting records from a table	15	10	CO1, CO2, CO3, CO4
UNIT V	**5. COOKIES, SESSION ANDFILE HANDLING** 5.1. Cookies 5.1.1. Introduction of cookies 5.1.2. Setting a cookie 5.1.3. Reading Cookie variables 5.1.4. Setting cookies expiration 5.1.5. Deleting cookies 5.2. Sessions 5.2.1. Introduction of Session 5.2.2. Start PHP session 5.2.3. Manage PHP session variable 5.2.4. Destroy session 5.3. File Handling 5.3.1. Opening file using fopen 5.3.2. File handling functions: feof(), fgets(), fgetc(), file_get_contents(), file_exists(), fclose()	15	09	CO1, CO2, CO3, CO4
	Total	75	48	

8. COURSE DELIVERY:

The Course will be delivered through lectures, class room interactions, exercises.

9. SPECIFICATION TABLE FOR THEORY/ MACRO-LESSON PLAN

Unit No	Unit	Number of lectures	Marks
1	**1. INTRODUCTION OF PHP** 1.1 Relationship between Apache and PHP 1.2 Steps to Install & test web server 1.3 Steps to Configure Apache to use PHP 1.4 Creating First PHP Page 1.5 Mixing HTML and PHP 1.6 Printing string and values 1.7 Adding comments to PHP Code 1.8 Working with variables 1.9 Storing data in variables 1.10 Creating constants 1.11 Understanding PHP's internal Data Types	9	15
2	**2. OPERATORS, FLOW CONTROL AND LOOPS** 2.1 Operators 2.2 Flow Control 2.3 Loops	10	15
3	**3. STRINGS, ARRAYS AND FUNCTIONS** 3.1 Strings 3.2 Arrays 3.3 Functions	10	15
4	**4. READING DATA IN WEB PAGES AND FILE HANDLING** 4.1 Setting up web pages to communicate with PHP 4.2 Database Connection using PHP	10	15
5	**5.COOKIES, SESSION AND WORKING WITH DATABASES IN PHP** 5.1 Cookies 5.2 Sessions 5.3 File Handling	9	15
	Total	48	75

10. SPECIFICATION TABLE FOR TERM WORK & PRACTICALS HOURS

No	Practical
1	Install and configure Apache web server and test web page
2	Write a PHP script to implement following: Variables. Data Types Comments
3	Write a PHP script to demonstrate following: arithmetic operators comparison operators logical operators

4	Write PHP Script to implement following: if-else Nested if-else
5	Write PHP Scripttoimplement following: while loop do-while loop for loop
6	Write PHP Script to implementString functions.
7	Write PHP Script to implementfollowing: One dimensional array Multi-Dimensional array Array functions
8	Write PHP Script to implement following: Conditional Functions Variable Functions
9	Write PHP Scriptto implement Forms for: Submitting data to self-webpage using GET and POST methods Submitting data to other webpage using GET and POST methods
10	Write PHP Scriptto implement MySQL database connection for achieving following: Create table Insert data into table Update data from table View data from table Delete data from table
11	Write PHP script to implement File functions.
12	Mini Project: Create a dynamic web site using PHP and MySQL.

11. LEARNING RESOURCES

Text Books

S. No.	Author	Title of Books	Publishers
1	PHP: The Complete Reference	Steven Holzner	McGraw-Hill
2	Learning PHP, MySQL, JavaScript,CSS& HTML5, Third Edition	Robin Nixon	O'reilly Media
3	DT Editorial services	HTML, JavaScript, PHP, Java, JSP, ASP.NET, XML and AJAX Black Book	DreamTech Press

Reference Books for further study

S. No.	Author	Title of Books	Publishers
1	Julie C. Meloni	Teach yourself PHP, MySQLand Apache All in One , 5thEdition	Pearson Education
2	W. Jason Gilmore	Beginning PHP and MySQL	Apress

Internet and Web Resources

S. No.	Description
1	http://www.w3schools.com/PHP
2	https://www.tutorialspoint.com/php/
3	https://www.homeandlearn.co.uk/php/php.html

Videos and Multimedia Tutorials

S. No.	Description
1	PHP - https://www.youtube.com/watch?v=OK_JCtrrv-c

(CM405)DATA COMMUNICATION & COMPUTER NETWORKS

1. AIM: To provide students with an overview of the concepts and fundamentals of data communication and computer networks.

2. COURSE OBJECTIVES: In this course thestudents will learn the following:

1. Understand the concept of Data Communication
2. Learn Data encoding/decoding techniques, Basics of Computer Networks, Switching Techniques and Network Topologies
3. Understand OSI Model, Transmission Control Protocol/Internet Protocol Suite, Data link layer protocols
4. Study Network and Transport layer services and Protocols.

3. PRE-REQUISITES: Knowledge of Computer Hardware and peripherals.

4. TEACHING AND EXAMINATION SCHEME

Semester	**IV**	**Periods/Week (in hours)**			**Total Hours**		
Course code & course title						**Theory Marks**	
CM405 Data Communication & Computer Networks		**L**	**T**	**P**	**H**	**TH**	**T**
		3	-	2	5	75	2

5. COURSE OUTCOMES: Student will be able to:

CM405.CO1: Explain Data Communication Systems, Computer Networks and its components.

CM405.CO2: Examine the different modulation techniques, network topologies, OSI layers and TCP/IP model.

CM405.CO3: Compare different data communication techniques, networking methodologies and protocols.

CM405.CO4: Design a Local Area Network.

6. MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
	Basic & Discipline Specific Knowledge	Problem Analysis	Design and Development of Solutions	Engg. Tools, Experimentation& Testing	Engg. Practices for Society, Sustainability & Environment	Project Management	Life-long Learning
CO1	2	3	1	0	0	0	2
CO2	3	3	3	0	0	0	2
CO3	2	3	1	0	0	0	2
CO4	2	3	3	3	2	2	3

Relationship: Low-1 Medium-2 High-3

	PSO1	PSO2
CO1	2	1
CO2	2	1
CO3	2	1
CO4	2	1

7. DETAILED COURSE CONTENTS / MICRO-LESSON PLAN

M=Marks	**Thr= Teaching hours**	**CO = Course Outcomes**		
UNIT		**M**	**Thr**	**CO**
UNIT I	**1. FUNDAMENTALS OF DATACOMMUNICATION** 1.1 Introduction to data communication 1.2 Data Communication System/Model-Transmitter-Medium-Receiver 1.3 Concept of Signal and Data 1.4 Concept of channel and channel characteristics –The Electromagnetic Spectrum, Channel noise, Channel bandwidth, Channel data transmission rate (bit rate), channel capacity, transmission time, propagation time, throughput, channel utilization. 1.5 Communication modes - Simplex, half duplex and full duplex. 1.6 Digital Data Transmission-Parallel transmission and Serial transmission- Serial Data Transmission modes - Synchronous and Asynchronous transmission. 1.7 Transmission media 1.7.1 Guided media/bounded media: Twisted pair – Unshielded Twisted Pair(UTP) – Category 1 to Category 6 and Shielded Twisted Pair (STP) Co-axial cable – Baseband and Broadband coaxial cable, Standards for co-axial cable, connectors. Optical Fibre – Fibre opticscommunication components/system - Light Source, Transmission media, Light Detector. Advantages & disadvantages of Optical fibre, 1.7.2 Unguided media -Radio, Microwave, Satellite and Infrared transmission, Cellular phones.	15	10	CO1, CO2, CO3, CO4
UNIT II	**2. DATAMODEMS AND MULTICHANNEL DATACOMMUNICATION** 2.1 Concept of Modulation – need of modulation	15	9	CO1, CO2, CO3,

	2.2 Types of modulation 2.2.1 Analog Data, Analog Signal: Amplitude Modulation, Frequency Modulation, Phase Modulation 2.2.2 Analog data, Digital signal: Pulse Code Modulation (PCM) 2.2.3 Digital data, Analog Signal/Modem Modulation Techniques: Amplitude Shift Keying, Frequency Shift Keying, Phase Shift Keying 2.2.4 Digital data, Digital Signal/Encoding Techniques: Unipolar-NRZ (NRZ-L,NRZ-I),RZ 2.3 Introduction to Modem 2.3.1 Building blocks of modem 2.3.2 Types of Modems -half Duplex, Full Duplex			CO4
UNIT III	**3.NETWORKING FUNDAMENTALS** 3.1 An overview of networking 3.1.1 Need of computer networks 3.1.2 Classification of computer networks based on: Transmission technology –Broadcast networks and Point to Point networks Geographical area covered: LAN, MAN, WAN Acknowledgement sent by receiver-Connectionless andconnection-oriented communication 3.2 Switching techniques: 3.2.1 Circuit Switching 3.2.2 Packet switching 3.2.3 Message switching 3.2.4 Cell switching (ATM) 3.3 Network Topologies 3.3.1 Types of Topologies: Bus topology: Examples of bus topology: Ethernet, Local Talk Ring topologies, Examples of Token Ring Topology: IBM Token Ring, FDDI (Fiber Distributed Data Interface) Star topologies, Example of Star Network: ATM (Asynchronous Transmission Mode) Tree Topology, Mesh Topology	15	10	CO1, CO2, CO3, CO4
UNIT IV	**4.OSI MODEL, TCP/IP SUITE AND DATA LINK PROTOCOLS**	15	10	CO1, CO2,

	4.1 Network architectures 4.1.1 Layering the communication process 4.1.2 The need for layered solutions 4.2 Open system Interconnection (OSI) model 4.2.1 Functions of all 7 Layers 4.2.2 Data transmission in OSI Model 4.3 TCP/IP Protocol suite 4.3.1 TCP/IP Reference model layers 4.3.2 LAN Protocol and OSI 4.3.3 Data transmission by TCP and Ethernet 4.3.4 Data Encapsulation 4.3.5 Data Routing 4.4 Data Link Protocol 4.4.1 Protocol 4.4.2 Transmission Control Procedure: Synchronous protocols, Asynchronous Data Link Control (DLC) Protocols 4.4.3 Character Oriented Protocols (COP): Binary synchronous Protocol (Bisync or BSC) 4.4.4 Bit Oriented Protocols (BOP): High level Data Control Protocol (HDLC)			CO3, CO4
UNIT V	**5.NETWORK LAYER AND TRANSPORT LAYER** 5.1 Network Layer Protocols 5.1.1 Overview of Internet Protocol: IP AddressingScheme (Dotted Decimal Notation, Loopback Address, IP Multicast Addresses) IP version 6 (Limitations of IP version 4, Features of IP version 6, General IPv6 Packet Format) 5.1.1 Address Resolution Protocol: Resolution through Dynamic Binding, Address Resolution Cache 5.1.2 Reverse Address Resolution Protocol 5.1.3 Internet Control Message Protocol: Error Reporting by ICMP (Destination Unreachable, Source Quench, Redirect, Time Exceeded), ICMP Message Delivery 5.2 Transport Layer Protocols 5.2.2 Transmission Control Protocol: Features of TCP, Understanding the TCP Connection (Establishing,Terminating and Resetting a TCP Connection) 5.2.3 Features of User Datagram Protocol (UDP) 5.2.4 Difference between TCP and UDP	15	9	CO1, CO2, CO3, CO4
	Total	75	48	

8. COURSE DELIVERY:
The Course will be delivered through lectures, class room interactions and exercises.

9. SPECIFICATION TABLE FOR THEORY/ MACRO-LESSON PLAN

Unit No	Unit	Number of lectures	Marks
1	**1. FUNDAMENTALS OF DATA COMMUNICATION** 1.1 Introduction to data communication 1.2 Data Communication System/Model 1.3 Concept of Signal and Data 1.4 Concept of channel and channel characteristics 1.5 Communication modes 1.6 Digital Data Transmission 1.7 Transmission media	10	15
2	**2.DATA MODEMS AND MULTI CHANNEL DATA COMMUNICATION** 2.1 Concept of Modulation 2.2 Types of modulation 2.3 Introduction to Modem	9	15
3	**3.NETWORKING FUNDAMENTALS** 3.1 An overview of networking 3.2 Switching techniques 3.3 Network Topologies	10	15
4	**4.OSI MODEL, TCP/IP SUITE AND DATA LINK PROTOCOLS** 4.1 Network architectures 4.2 Open system Interconnection (OSI) model 4.3 TCP/IP Protocol suite 4.4 Data Link Protocol	10	15
5	**5.NETWORK LAYER AND TRANSPORT LAYER** 5.1 Network Layer Protocols 5.2 Transport Layer Protocols	9	15
	Total	48	75

10. SPECIFICATION TABLE FOR TERM WORK & PRACTICALS HOURS

No	Practical
1	Study of Data Communication fundamentals.
2	Study of different types of communication modes.
3	Study of different types of communication media.
4	Study of different types of modulation techniques.
5	Study of Modem
6	Study of different types of computer networks.
7	Study of network topologies.
8	Comparative study of OSI and TCP/IP model.
9	Study of Data link protocols.

10	Study of Network protocols.
11	Study of Transport protocols.
12	Implementation of LAN.

11. LEARNING RESOURCES
Text Books

S. No.	Author	Title of Books	Publishers
1	ISRD Group	Data Communication and Computer Networks	Tata McGraw-Hill, ace series
2	Prakash C. Gupta	Data communications and Computer Networks	PHI Learning Private Limited,2014
3	Rajneesh Agrawal and Bharat Bhushan Tiwari	Data Communication and Computer Networks	Vikas Publishing house Ltd, 2005

Reference Books for further study

S. No.	Author	Title of Books	Publishers
1	Behrouz A Forouzan	Data Communication and Networking	Tata McGraw-Hill,2008
2	William Stallings	Data and Computer Communications	Pearson Education, 2008

Internet and Web Resources

S. No.	Description
1	The TCP/IP Guide, by Charles M. Kozierok, Free online Resource, http://www.tcpipguide.com/free/index.htm

Videos and Multimedia Tutorials

S. No.	Description
1	https://www.youtube.com/watch?v=VDkYgGGtDnc
2	https://www.youtube.com/watch?v=UXMIxCYZu8o

(CM406) COMPUTER LABORATORY-II

1. AIM: To introduce various tools and technologies to create professional and interactive websites.

2. COURSE OBJECTIVES: In this course thestudents will learn the following:
1. Select and use web-based applications.
2. Manage web content and develop graphical user interfaces of website.
4. Create and publish web documents.

3. PRE-REQUISITES: Knowledge of Web Designing

4. TEACHING AND EXAMINATION SCHEME

Semester	IV	Periods/Week (in hours)	Total Hours	Examination Scheme		
Course code & course title				Theory Marks	Practical Marks	Total Marks

CM406 Computer Laboratory II	L	T	P	H	TH	TM	TW	PR/OR	
	-	-	2	2	-	-	25	50	75

5. COURSE OUTCOMES: Student will be able to:

CM406.CO1:Discussweb basedapplications, web Content Management Systems, animation and data reporting tools.

CM406.CO2:Use webbasedapplications, web Content Management Systems, animation and data reporting tools.

CM406.CO3: Prepare Graphical user interfaces, animations and informative reports.

CM406.CO4:Design and publish web documents.

6. MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
	Basic & Discipline Specific Knowledge	Problem Analysis	Design and Development of Solutions	Engg. Tools, Experimentation& Testing	Engg. Practices for Society, Sustainability & Environment	Project Management	Life-long Learning
CO1	1	0	1	1	0	0	1
CO2	1	0	1	2	1	0	1
CO3	1	1	2	2	1	1	1
CO4	1	1	2	2	2	1	1

Relationship:Low-1 Medium-2 High-3

	PSO1	PSO2
CO1	1	1
CO2	2	2
CO3	2	2
CO4	2	2

7. DETAILED COURSE CONTENTS / MICRO-LESSON PLAN

M=Marks	**Thr = Teaching hours**	**CO = Course Outcomes**		
UNIT		**M**	**Thr**	**CO**
UNIT I	**1. INTRODUCTION TO WEB BASED APPLICATIONS** 1.1 Creating Email account (like Gmail) 1.2 Email compose and reply 1.2.1 Streamlined compose pane 1.2.2 Checking mail while typing 1.2.3 Formatting options 1.2.4 Keyboard shortcuts 1.2.5 Drag and drop addresses, files 1.2.6 Compose two messages at once 1.2.7 Draft	10	4	CO1, CO2, CO4

	1.2.8 Create signatures, labels, filters 1.2.9 Contacts 1.2.10 Create groups and mailing lists 1.2.11 Import contacts, contacts picker 1.3 Chat 1.4 Calendar 1.4.1 Scheduling 1.4.2 Setting up reminders 1.4.3 Sharing 1.5 Working with Documents 1.5.1 Word, Excel 1.5.2 Creating form 1.6 Drive 1.6.1 Setting up file storage and synchronization services (like Google drive) 1.6.2 Organize, find, share, open and preview files			
UNIT II	**2. WORKING WITH CONTENT MANAGEMENT SYSTEM (LIKE WORDPRESS)** 2.1. Introduction to Content management system (CMS) 2.2. Downloading and Installing CMS on web server (like XAMPP) 2.3. Menus on the Administration Screen 2.4. Dashboard: Website management functions of CMS 2.5. Themes 2.5.1. Installing and handling themes 2.5.2. Editing the appearance of themes 2.5.3. Theme configurations 2.5.4. Adjusting different elements of installed themes like slideshow, post, pages 2.6. Posts 2.6.1. Adding new post 2.6.2. Modifying existing posts 2.6.3. Placing images, videos to the posts 2.6.4. Adding categories to publishing the posts on the websites 2.7. Pages 2.7.1. Adding new webpages 2.7.2. Modifying existing webpages 2.7.3. Placing images, videos, mp3 on the pages 2.7.4. Publishing the pages on the websites 2.8. Menus 2.8.1. Creating Custom Menus	10	8	CO1, CO2, CO4,

	2.8.2. Modifying themes default menu			
UNIT III	**3. WORKING WITH CONTENT MANAGEMENT SYSTEM (LIKE WORDPRESS)** 3.1. Media 3.1.1. Uploading pictures, videos 3.1.2. Editing images and publishing them on the websites 3.1.3. Embedding videos from external source (like YouTube) to website 3.2. Links 3.2.1. Adding New links 3.2.2. Editing the links 3.2.3. Adding categories to the links 3.2.4. Managing Categories 3.3. Widgets 3.3.1. Adding widgets to the theme 3.3.2. Editing widgets to the theme 3.4. Plugins 3.4.1. Introduction to plugins 3.4.2. Installing plugins 3.4.3. Editing plugins. 3.5. Managing the user accessibility to the website/blog.	10	6	CO1, CO2, CO4,
UNIT IV	**4. USING ANIMATION CREATION TOOL (LIKE ALICE)** 4.1. Code Editor, methods panel, control panel/tiles, scene editor, galleries 4.2. Camera Navigation control: turn camera left/right, forward/backward, Move camera 4.3. Creating first animation: open, save and run the project, add and position objects 4.4. Animation using Do in order, on together, Move up, down, forward, backward, right, left 4.5. Animation using control structures 4.6. Using memory variables 4.7. Using user-defined procedures 4.8. Add rotation and randomization: Examples of human objects walk, sit, run 4.9. Use keyboard controls 4.10. Develop small animation	10	8	CO1, CO2, CO3, CO4,
UNIT V	**5. DATA REPORTING TOOL (LIKE DATA VISION)** 5.1. Introduction 5.2. Installing Data Reporting Tool 5.3. Starting Data Reporting Tool	10	6	CO1, CO2, CO3, CO4,

	5.3.1. Launching Data Reporting Tool 5.3.2. Running Data Reporting Tool from Command Line 5.4. Data Reporting Tool User Interface 5.4.1. The File Menu 5.4.2. The Edit Menu 5.4.3. The Insert Menu 5.4.4. The Format Menu 5.4.5. The Database Menu 5.4.6. The Report Menu 5.4.7. The Help Menu 5.5 Creating Report 5.5.1 Connecting to a Database 5.5.2 Adding fields and text 5.6 Running Report 5.6.1 Displaying a Report On-screen 5.6.2 Saving a Report's Output 5.6.3 Printing a Report's Output			
	Total	50	32	

8. COURSE DELIVERY:

The Course will be delivered through lectures, class room interactions, exercises and case studies

9. SPECIFICATION TABLE FOR PRACTICAL PLAN

Unit No	Unit	Number of Practical Hours	Marks
I	1 **INTRODUCTION TO WEB BASED APPLICATIONS** 1.1 Creating Email account 1.2 Email compose and reply 1.3 Chat 1.4 Calendar 1.5 Working with Documents 1.6 Drive	4	10
II	**2. WORKING WITH CONTENT MANAGEMENT SYSTEM (LIKE WORDPRESS)** 2.1. Introduction to CMS 2.2. Downloading and Installing CMS on web Server 2.3. Menus on the Administration Screen 2.4. Dashboard: Website management functions of CMS 2.5. Themes	8	10

	2.6. Posts 2.7. Pages 2.8. Menus 2.9. Modifying themes default menu		
III	**3. WORKING WITH CONTENT MANAGEMENT SYSTEM (LIKE WORDPRESS)** 3.1. Media 3.2. Links 3.3. Widgets 3.4. Plugins 3.5. Managing the user accessibility to the website/blog.	6	10
IV	**4. USING ANIMATION CREATION TOOL (LIKE ALICE)** 4.1 Code Editor, methods panel, control panel/tiles, scene editor, galleries 4.2 Camera Navigation control 4.3 Animation using Do in order, on together, Move up, down, forward, backward, right, left 4.4 Animation using control structures 4.5 Using memory variables 4.6 Using user-defined procedures 4.7 Add rotation and randomization 4.8 Use keyboard controls 4.9 Develop small animation	8	10
V	**5. DATA REPORTING TOOL (LIKE DATA VISION)** 5.1. Introduction 5.2. Installing Data Reporting Tool 5.3. Starting Data Reporting Tool 5.4. Data Reporting ToolUser Interface 5.5. Creating Report 5.6. Running Report	6	10
	Total	32	50

10. SPECIFICATION TABLE FOR TERM WORK & PRACTICALS HOURS

No	Practical
1	Create Email Account. Test various mail utilities such as compose mail, send mail, forward mail, reply mail, attach a file, creating signature, draft.
2.	Test calendar functionality.
3.	Test Online documents, file storage and synchronization services.

4.	Create group, share information, send messages to a group.
5.	Download and install Content Management System on web server.
6.	Work with Content Management System administration menu and Dashboard
7.	Create page and post with text and images.
8.	Create a menu to help visitors navigate pages and posts.
9.	Install animation creation application and study code editor, scene editor, methods panel, control panel and galleries.
10.	Write, debug and test control statement-based programs using animation creation application.
11.	Develop animation using Do in order, on together, Move up, down, forward, backward, right, left
12.	Develop and test small animation applications.
13.	Install and study Data Reporting Tool user interface.
14.	Create reports using Data Reporting Tool.
15.	Mini Project to demonstrate use of animations, reports in website developed using Content Management System.

11. LEARNING RESOURCES

Text Books

S. No.	Author	Title of Books	Publishers
1	Sams Teach Yourself WordPress 3 in 10 Minutes	Chuck Tomasi, Kreg Steppe	SAMS
2	Learning to Program with Alice, 3rd Edition	Dann, Cooper and Pausch	Prentice Hall (Pearson Education)

Reference Books for further study

S. No.	Author	Title of Books	Publishers
1	Hal Stern, David Damstra, Brad Williams	Professional Wordpress Design and Development	Wrox
2	Joel Adams	Alice 3 in Action Computing Through Animation	Cengage Learning

Internet and Web Resources

S. No.	Description
1	http://learn.wordpress.com
2	http://www.1stwebdesigner.com/wordpress/wordpress-step-by-step-beginners-guide/
3	http://www.graphicrating.com/2009/07/31/wordpress-tutorials-and-resources-for-designers-and-developers/
4	http://www.alice.org/3.1/materials_download (Lab exercises for Alice)
5	http://datavision.sourceforge.net/DataVision/DataVision.html
6	http://www.learn-it-with-examples.com/development/reporting-tools/other-tools/data-visio

	n-reporting-tool.html

Videos and Multimedia Tutorials

S. No.	Description
1	http://www.alice.org/3.1/materials_videos (Video tutorial for Alice)
2	http://www.andrew.cmu.edu/user/dslater/screencasts/index.html (Video tutorial for Alice)