Programme : Diploma in Computer Engineering/Information technology

Programme Code : 06/26/07

Name of Course : Operating System

Course Code : CM381

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Two class tests each of 60 minutes.**	**02 Hrs.**	–	–	–
Marks	**20**	**80**	–	**25**	**25**

Course Rationale:

Operating Systems are system programs, which are very essential components of Computer system. Two primary aims of operating systems are to manage resources (e.g. CPU time, memory) and to control users and software. Operating system design goals are often contradictory and vary depending of user, software, and hardware criteria. This course describes the fundamental concepts behind operating systems, and examines the ways that design goals can be achieved and practice the concept of Operating System design.

Course Outcomes:

Students should be able to

1. Define Operating System and represent functions of Operating System.
2. Test software for performance measures such as compatibility, usability.Describe basic concepts of Process Management, Memory Management, I/O management and File Management.
3. Solve proxy problems on process management.
4. Describe concept of virtual memory, paging, and segmentation in memory management.
5. Distinguish deadlock avoidance and prevention.

Course Contents:
A. Theory

Specific Learning Outcomes (Cognitive,Domain)	**Topics and subtopics**	**Hrs.**
Section I		
Units 1 : Introduction		
1. Define Operating System 2. Describe Computer System-Architecture. 3.Demonstrate functionalities of Operating System. 4. Compare various Operating Systems.	1.1 What Operating Systems Do, Computer-System Organization, Computer-System Architecture 1.2 Operating-System Operations, Process Management, Memory Management, Storage Management, Protection and Security 1.3 Special-Purpose Systems, Open-Source Operating Systems.	06
Unit 2: Operating-System Structures		
1.Realize various services provided by OS 2. Describe System program 3.3. Demonstrate Operating System Structure 4. Define Kernel and Describe System Boot	2.1 Operating-System Services, User Operating-System Interface, System Calls, Types of System Calls 2.2 System Programs 2.3 Operating-System Structure,Virtual Machines 2.4 The kernel, System Boot.	10
Unit 3: Processes ,Thread and CPU Scheduling		
1.Define Process and Identify Process Concept, 2. Demonstrate IPC,Client-Server. 3. Compare Process and Threads 4. Describe and Compare various Process Scheduling Algorithm	3.1 Process Concept, Process Scheduling, Operations on Processes 3.2 Inter process Communication, Examples of IPC Systems 3.3 Communication in Client–Server Systems, Multithreading Models 3.4 Thread Libraries, Threading Issues, Operating System Examples. 3.5Basic Concepts, Scheduling Criteria. Scheduling Algorithms 3.6 Operating System Examples, The Critical-Section Problem	15

Section II		
Unit 4: Process Synchronization and Deadlocks		
1. 1. Interpret Process Synchronization, Deadlock 2.Categorize Deadlock Prevention and Deadlock Avoidance method 3. 3. Demonstrate Deadlock Detection and Recovery	4.1 Peterson's Solution, Synchronization Hardware, Semaphores 4.2 Classic Problems of Synchronization, Monitors, Synchronization Examples 4.3 System Model, Deadlock Characterization 4.4 Methods for Handling Deadlocks 4.5Deadlock Prevention, Deadlock Avoidance 4.6Deadlock Detection, Recovery from Deadlock	15
Unit 5: Memory Management		
1.Define Memory, Swapping 2. Illustrate Swapping ,Contiguous Memory Allocation 3. Specify need of Segmentation 4. Describe Virtual Memory	5.1 Main Memory: Background 5.2 Swapping, Contiguous Memory Allocation 5.3 Paging, Structure of the Page Table 5.4 Segmentation Example: The Intel Pentium 5.5 Virtual Memory: Background, Demand Paging, Copy on Write, Page Replacement Allocation of frames, Trashing	12
Unit 6:Storage Management		
1. State significance of Storage management 2. Describe File ,Access Methods ,File-System 3. Illustrate Free-Space Management	6.1 File-System Interface: File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing, Protection 6.2 File-System Implementation: File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance, Recovery,	06
	Total Hrs	**64**

B. List of Practicals/Laboratory Experiences/Assignments:

Practical No.	Specific Learning Outcomes (Psychomotor Domain)	Units	Practical Hrs.
1	Advanced Linux Installation: Network and Dual Boot)	Units 1 : Introduction	02
2	Linux Disk Management using fdisk utility to create, delete and change the partitions on the disk.	Units 5 : Storage Management	02
3	Setting/Changing file and directory related permissions chmod and umask command.)	Units 5 : Storage Management	02
4	Displaying File Information : inodes, inodes and directories, cp and inodes, mv and inodes, rm and inodes, ls –l	Unit 3: Processes ,Thread and CPU Scheduling	04
5	Working with Linux-supported File Systems: Mounting and Unmounting to be tested with external drives.	Unit 5: Storage Management	02
6	Linux Process Management : Jobs: Background, Kills and Interruptions and setting process priority Get Process status, Find Processes by Pattern or User, Display the Most Active Processes,Kill processes, kill all processes(Executing commands for process management –ps, fg, bg, kill ,killall, nice, at ,jobs)	Unit 3: Processes ,Thread and CPU Scheduling	04
7	Linux: Memory Management Practicing top, vmstat and free command.	Unit 5: Memory Management	02
8	Scheduling jobs with crontab : cron daemon, crontab options, The format of crontab file, Environment variable settings, crontab command lines	Unit 3: Processes ,Thread and CPU Scheduling	02
9	System states :init Shutting down and changing Runlevels, Managing Users and Groups: Adding and Removing users with adduser,usermod and userdel commands.	Unit 3: Processes ,Thread and CPU Scheduling	04
10	Adding and Removing groups with groupadd,groupmod and groupdel commands, Superuser-The root User Desktop,System Time and Date	Unit 4: Process Synchronization and Deadlocks.	02
11	Executing various Shell commands Creating shell variables Writing shell scripts using decision making and various control structures. Executing various shell utilities Using file test and string test conditions in scripts. Making use of Positional Parameters. Configuring your own login shell. Using Functions in Shell scripts.	Unit 4: Process Synchronization and Deadlocks.	06
		Total Hrs	32

Instructional Strategy:

Sr.No	Topic	Instructional Strategy
1	Introduction	Classroom teaching and laboratory demonstration
2	Operating System Structures	Classroom teaching, laboratory Work
3	Processes,Threads and CPU scheduling	Classroom teaching, laboratory Work
4	Process Synchronization and Deadlock	Class room teaching, laboratory demonstration
5	Memory Management	Class room teaching, laboratory demonstration
6	Storage Management	Class room teaching, laboratory demonstration

Specification Table for Theory Paper:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Introduction	04	02	02	08
2	Operating system structures	04	04	04	12
3	Processes,Thread and CPU scheduling	08	06	06	20
4	Process synchronization and deal lock	04	06	06	16
5	Memory Management	04	06	06	16
6	Storage Management	04	02	02	08
Total		**28**	**26**	**26**	**80**

Assessment and Evaluation Scheme:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	Continuous Assesment	PT	Students	Two PT (average of two tests will be computed)	20	10	Test Answer sheets	1,2,3,4,5
				Assignment	20		Assignment Book	1,2,3,4,5
				TOTAL	20	10		
	(Term End Examination)	End Exam		End Of the Course	80	28	Theory Answer sheets	1,2,3,4,5
Direct Assessment Practical	Continuous Assesment	ST	Students	One skill test at end of term	–	–	Practical Answer sheets	
		Journal Writing		Assignments	25	–	Journal	1,2,3,4,5
				TOTAL	25	10		
	(Term End Examination)	End Exam		End Of the Course	25	10	Practical Answer Sheets	1,2,3,4,5
Indirect Assessment	Student Feedback on course		Students	After First PT	Student Feedback Form			1,2,3 4,5,6
	End exam			End Of The Course	Questionnaires			

Scheme Of Practical Evaluation:

S.N.	Description	Max. Marks
1	Evaluation	05
2	Practical Execution	10
3	Viva voce	05
	TOTAL	**25**

Mapping Course Outcomes With Program Outcomes:

Course Outcomes	Program Outcomes (POs)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	1	3	1	–	–	–	–	–	–	–
2	1	3	3	–	–	–	–	–	–	–
3	1	2	2	–	–	–	–	–	–	–
4	1	3	2	2	–	–	–	–	–	–
5	1	2	2	2	–	–	–	–	–	–

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Reference & Text Books:

Text Book

Sr. No	Author	Title,Publisher, Year of publication	ISBN Number
1	Silberschatz Galivin,Gange,John Wisley and Sons	Operating System Concepts,	9788126520510
2	Achyut Godbole,	Operating System McGraw-Hill 2009	1283188910
3	D.M.Dhamdhare	System Programming Operating System and Tata McGraw-Hill	9780071333115
4	Kamtin Jonthan	DOS 6 and 6.2	9780074635797
5	Peterson	Operating System and Tata McGraw-Hill	9780123850591
6	Milan Milenkovic	Operating System Concepts and Design Tata McGraw-Hill	9780070419209
7	Andrew S. Tanenbaum	Modern Operating Systems Prentice Hall of India	8120339045

E-References:

1. `http://1.codex.cs.yale.edu/avi/os-book/OS9/slide-dir`

Programme : Diploma in Computer Engineering

Programme Code : 06/26

Name of Course : Microprocessor Programming

Course Code : CM382

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Two class tests each of 60 minutes.**	**03 Hrs.**	–	–	–
Marks	**20**	**80**	**25**	–	**25**

Course Rationale:

Microprocessor is challenging field, to meet challenges of growing advanced microprocessor technology. It is necessary for computer engineering to know the architecture and behavior of processors in order to become efficient programmer. The course aims in providing the knowledge of 8085/8086 processors to the students since they are the foundation of Intel processor family.

Course Outcomes:

Students should be able to

1. Write and execute assembly programs using macros, procedures, and interrupts.
2. Describe working principle of microprocessors.
3. Identify instruction categories for specific addressing modes
4. Debug assembly programs.

Course Contents:
A. Theory

Specific Learning Outcomes (Cognitive,Domain)	**Topics and subtopics**	**Hrs.**
Units 1 : Basics of Microprocessor 8085		
1.Draw the architecture of 8085. 2 Describe pin configuration 3.Summarize block diagram of 8085.	1.1 Draw the architecture of 8085 Define the Functions of different pins of 8085. 1.2 8085 Microprocessor, Salient features Pin description, Architecture of 8085 -Functional Block diagram.	10
Unit 2: Introduction to 8086 Microprocessor		
1.List silent features of 8086 2.Discuss the functional block diagram of 8086. 3.Draw a pin diagram of 8086 4.Recognize pipeline and memory segmentation 5.Compare minimum and maximum mode of 8086.	2.1 Salient features ,Pin descriptions Architecture of 8086 - Functional Block Diagram. 2.2 Register organization, Concepts of pipe lining, Memory segmentation Physical memory addresses generation. 2.3 Operating Modes of 8086 ,8284 Clock Generator , 8288 Bus Controller , 74LS245 Bi-directional Buffer ,74LS373 Octal Latch ,Minimum Mode,operation and its timing diagram , Maximum Mode operation and its. timing diagram.	10
Unit 3: Instruction Set of 8086 Microprocessor		
1.Memorize instruction set. 2.List and recognize various addressing mode. 3.Discuss and describe different types of instruction.	3.1 Machine Language Instruction format addressing modes 3.2 Instruction set,Groups of Instructions, Arithmetic Instructions Logical Instructions , Data transfer instructions 3.3 Bit manipulation instructions, String Operation Instructions, Program control transfer or branching Instructions, Process control Instructions.	12
Unit 4: Basic Structure of Assembly Language Programming		
1.1. Demonstrate use of writing algorithm and flowchart. 2.Role play on various assembly language programming tools. 3.Practice assembler directives and operators.	4.1 Program development steps, Defining problem, Writing Algorithms Flowchart ,Initialization checklist , Choosing instructions ,Converting algorithms to assembly language programs. 4.2 Assembly Language Programming Tools,Editors, Assembler linker , Debugger. 4.3 Assembler directives and Operators.	10

Unit 5: 8086 Assembly Language Programming		
1.Develop 8086 assembly language program 2.Design arithmetic operation on hex and BCD number. 3. Construct different programs on Numbers 4.Develop various string operations. 5. Prepare Conversions of hex and BCD number	5.1Model of 8086 assembly language programs. 5.2 Programming using assembler-Arithmetic operations on Hex and BCD numbers - Addition, Subtraction, Multiplication and Division. 5.3 Sum of Series , Smallest and Largest numbers from array , Sorting numbers in Ascending and Descending order ,Finding ODD/EVEN numbers in the array , Finding Positive and Negative Numbers in array. 5.4 Block transfer ,String Operations - Length, Reverse, Compare, Concatenation, Copy , Count Numbers of '1' and '0' in 8/16 bit number , BCD to Hex and Hex to BCD number conversion.	12
Unit 6: Procedure and Macro in Assembly Language Program		
1.Define procedure Directives 2.Compare Macro and Procedure. 3.Construct Program using macros and procedure. 4.Recognize 8086 interrupts.	6.1 Procedure •Defining Procedure - Directives used, FAR and NEAR •CALL and RET instructions. •Reentrant and Recursive procedures. •Assembly Language Programs using Procedure. 6.2 Defining Macros. Assembly Language Programs using Macros.8086 interrupts.	10
	Total Hrs	**48**

B. List of Practicals/Laboratory Experiences/Assignments:

Practical No.	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Identify the Assembly Language programming tools like Assembler,linker,debugger,editor..	Basics of Microprocessor 8085	02
2	Write an Assembly Language Program to add / subtract two 16 bit numbers	Assembly Language Programming	02
3	Write an ALP to find sum of series of numbers.	Assembly Language Programming	02
4	Write an ALP to multiply two 16 bit unsigned/ signed numbers.	Assembly Language Programming	02
5	Write an ALP to divide two unsigned/signed numbers (32/16 ,16/8, 16/16, 8/8) .	Assembly Language Programming	04
6	Write an ALP to add / Sub / multiply / Divide two BCD numbers.	Assembly Language Programming	06
7	Write an ALP to find smallest/ largest number from array of n numbers.	Assembly Language Programming	02
8	Write an ALP to arrange numbers in array in ascending/ descending order.	Assembly Language Programming	04
9	Write an ALP to perform block transfer data using string instructions / without using string instructions.	Assembly Language Programming	02
10	Write an ALP to compare two strings using string instructions / without using string instructions.	Assembly Language Programming	02
11	Write an ALP to display string in reverse order, string length, Concatenation of two strings.	Assembly Language Programming	02
12	Write an ALP to convert Hex to Decimal, Decimal to Hex.	Assembly Language Programming	02
		Total Hrs	32

Specification Table for Theory Paper:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	**Comprehension**	**Application**	
1	Basics of Microprocessor 8085	06	03	03	12
2	Introduction to 8086 Microprocessor	06	04	02	12
3	Instruction Set of 8086 Microprocessor	03	03	08	14
4	Basic Structure of Assembly Language Programming	02	05	07	14
5	8086 Assembly Language Programming	08	03	03	14
6	Procedure and Macro in Assembly Language Program	03	03	08	14
Total		**18**	**14**	**08**	**40**

Assessment and Evaluation Scheme:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	Continuous Assessment	ST	Students	Two PT (average of two tests)	20	10	Test Answer sheets	1,2,3,4,5,6
						–		
				TOTAL	20	10		
	(Term End Examination)	End Exam		End Of the Course	80	28	Theory Answer sheets	1,2,3,4,5,6
Direct Assessment Practical			Students			–		
		Journal Writing		Assignments	25	–	Journal	1,2,3,4,5,6
				TOTAL	25	10		
	(Term End Examination)	End Exam		End Of the Course	25	10	Practical Answer Sheets	1,2,3,4,5,6
Indirect Assessment	Student Feedback on course		Students	After First PT	Student Feedback Form			1,2,3 4,5,6
	End exam			End Of The Course	Questionnaires			

Scheme Of Practical Evaluation:

S.N.	**Description**	**Max. Marks**
1	Observations	05
2	Practical Performance	10
3	Viva voice	10
	TOTAL	**25**

Mapping Course Outcomes With Program Outcomes:

Course Outcomes	**Program Outcomes (POs)**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	1	3	1							
2	1	3	3	1						
3		2	3	3						
4	1	3	3	3						

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Reference & Text Books:
Text Book

Sr. No	**Author**	**Title**	**Publication**
1	Awate S.P.	8085 Microprocessor Assembly language Programming applications	McGraw Hill
2	Ramesh Gaonkar	Microprocessor Architecture, Programming Applications with the 8085	Penram International Publishing (India) (Third Edition)
3	B.Ram	Microprocessor programming (8085)	
4	Liu –Gibson	Microprocessor systems 8086/88 family	Prentice Hall of India
5	Douglous Hall	Microprocessor and interfacing	Tata -McGraw Hill

E-References:
1. `https://www.tutorialspoint.com/microprocessor`
2. `http://www.eazynotes.com/pages/microprocessor/notes/block-diagram-of-intel-8086.html`
3. `https://www.elprocus.com/8086-assembly-language-programs-explanation`

Programme : Diploma in Computer Engineering

Programme Code : 06/26

Name of Course : Computer Graphics Using 'C'

Course Code : CM383

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**03**	**48**
Practical	**02**	**32**
Tutorial	**02**	**32**

Evaluation:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Two class tests each of 60 minutes.**	**03 Hrs.**	–	–	–
Marks	**20**	**80**	**25**	–	**25**

Course Rationale:

Today's graphics oriented PCs require that students explore and understand a dazzling array of graphics techniques and technologies. Graphics under 'C' details the fundamentals of graphics programming for the IBMPC and compatibles, teaching 'C' programmers of all level how to create impressive graphics easily and efficiently.

Course Outcomes:

Students should be able to

1. Define and distinguish concepts such as pixel, resolution, screen size, and graphical object size.
2. Describe various graphics file formats.
3. Write and execute programs in C/ C++ applying standard graphics algorithms.
4. Perform and demonstrate basic and composite graphical transformations on given object data.
5. Recognize types of projections.

Course Contents:
A. Theory

Specific Learning Outcomes (Cognitive,Domain)	**Topics and subtopics**	**Hrs.**
Units 1 : Computer Graphics Systems		
1.Select various graphics file formats 2.Use different graphics functions and standards.	1.1 Raster scan display: 1.2 Primitive operations: - moveto, lineto 1.3 Graphics Software 1.4 Coordinate representations 1.5 Graphics file formats: Basics, advantages disadvantages – BMP – GIF – JPEG – TIFF – PCX 1.6 Graphics Functions and Standards: Text mode, Graphic mode Shapes, colors, graphics standards	06
Unit 2: Raster Scan Graphics		
1.Apply drawing algorithms in creating complex graphics 2.Demonstrate character display and polygon filling algorithms.	2.1 Line Drawing Algorithms 2.2 Digital Differential Analyzer 2.3 Bresenham's Algorithm 2.4 Circle Generation- Symmetry of circle , Bresenham's Algorithm. 2.5 Scan conversion 2.6 Generation of the Display 2.7 Frame Buffers 2.8 Line Display, Character Display 2.9 Polygon Filling : Seed fill algorithms: Flood fill, Boundary fill, scanline algorithms . 2.10 Fundamentals of Antialiasing	12
Unit 3: 2-Dimensional and 3-Dimensional Transformations		
1.Perform various transformations on graphics object 2. Use composite transformations	3.1 Basic Transformations: Translation Scaling, Rotation 3.2 Matrix representations homogeneous coordinates 3.3 Composite Transformations-Scaling relative to a fixed pivot, rotation about a pivot point 3.4 Three dimensional transformation 3.5 Other transformations	10
Unit 4:Windowing and Clipping Techniques		
1.Apply clipping algorithms for area, text and line. 2.Describe Windowing concepts.	4.1 Windowing concepts. 4.2 Clipping algorithms 4.3 Area clipping 4.4 Line clipping: Cohen Sutherland clipping algorithm, Cyrusbeck , Liang Barsky, Mid point subdivision 4.5 Polygon clipping: Sutherland Hodgeman 4.6 Text clipping 4.7 Window to-viewport transformation	08
Unit 5:Three Dimensional Graphics		
1.Find Defect using different technique. 2.Describe Defect Life cycle.	5.1 Hidden line elimination and hidden surface elimination (back face removal, z-buffer, painters algorithm and Warnock's algorithms) 5.2 Bezier and B-Spline curves, Hilbert's Curve, Koch curve	08
Unit 6:Perspective and Parallel Transformation		
1.List and Recognize types of projections.	6.1 Types of Perspective and Parallel projection 6.2 Vanishing points .	04
Total Hrs	**48**	

B. List of Practicals/Laboratory Experiences/Assignments:

Practical No.	Specific Learning Outcomes (Psychomotor Domain)	Units	Practical Hrs.
1	Programs for displaying the point on the screen, graphics demonstration program.	Unit 2:Raster Scan Graphics	02
2	Programs for drawing: Lines, circles and ellipse. Programs for drawing and filling polygon using functions	Unit 2:Raster Scan Graphics	02
3	Implement DDA algorithm and Bresennham's algorithm for line drawing.	Unit 2:Raster Scan Graphics	02
4	Implement DDA algorithm and Bresennham's algorithm of circle drawing.	Unit 2:Raster Scan Graphics	02
5	Implement Flood fill algorithm for Polygon filling.	Unit 2:Raster Scan Graphics	02
6	Implement scan-line algorithm for polygon filling.	Unit 2:Raster Scan Graphics	02
7	Programs for two-dimensional translation, scaling, rotation and reflection.	Unit 3: 2-Dimensional and 3-Dimensional Transformations	04
8	Write Program for 2 D transformations -¿ shearing and Translation Program	Unit 3: 2-Dimensional and 3-Dimensional Transformations	02
9	Write Program for 3-D transformations -¿ scaling, Rotation	Unit 3: 2-Dimensional and 3-Dimensional Transformations	04
10	Program for point clipping, line clipping and polygon clipping.	Unit 4: Windowing and Clipping Techniques	04
11	Programs for drawing Bezier and B-Spline curves.	Unit 5: Three Dimensional Graphics	04
12	Implement midpoint subdivision algorithm for line clipping.	Unit 5: Three Dimensional Graphics	02
32		**Total Hrs**	32

Instructional Strategy:

Sr.No	Topic	Instructional Strategy
1	Graphics Systems	Explanation of basic concepts
2	Raster Scan Systems	Explanation and Practical Demonstration
3	Two Dimensional transformation	Explanation and Demonstration
4	Windowing Clipping Techniques	Explanation and Problems based on topic
5	Three Dimensional Graphics	Explanation and Demonstration using projector
6	Perspective and Parallel Transformation	Explanation and Demonstration using projector

Assessment and Evaluation Scheme:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	Continuous Assesment	PT	Students	Two PT (average of two tests will be computed)	10	–	Test Answer sheets	1,2,3,4,5,6
				Assignment	–		Assignment Book	1,2,3
				TOTAL	10	=		
	(Term End Examination)	End Exam		End Of the Course	40	14	Theory Answer sheets	1,2,3
Direct Assessment Practical	Continuous Assesment	ST	Students	One skill test at end of term	10	–	Practical Answer sheets	
		Journal Writing		Assignments	15	–	Journal	4,5,6,
				TOTAL	50	20		
	(Term End Examination)	End Exam		End Of the Course	50	20	Practical Answer Sheets	4,5,6
Indirect Assessment	Student Feedback on course		Students	After First PT	Student Feedback Form			1,2,3 4,5,6
	End exam			End Of The Course	Questionnaires			

Scheme Of Practical Evaluation:

S.N.	**Description**	**Max. Marks**
1	Observations	05
2	Calculations and Result	15
3	Viva	05
	TOTAL	**25**

Mapping Course Outcomes With Program Outcomes:

Course Outcomes	**Program Outcomes (POs)**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1		1	1							
2		2	1						2	
3		3	3	2	2			2	2	
4		3	3	2	2			2	2	
5		2	1							

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Reference & Text Books:

Text Book

Sr. No	**Author**	**Title,Publisher, Year of publication**	**ISBN Number**
1	Donald Hearn and M Pauline Baker	Computer Graphics	Prentice-Hall
2	David F.Rogers	Procedural Elements for Computer Graphics	McGraw-Hill
3	William M. Newman Robert F. Sproull	Principles of Interactive Computer Graphics	McGraw-Hill
4	Zhigang Xiang Roy Plastock	Computer Graphics	Schaum O Series

E-References:

1. `http://www.rspa.com/`
2. `http://www.doc.ic.ac.uk/ dfg/graphics`

Programme : Diploma in Computer Engineering

Programme Code : 06

Name of Course :Computer Peripherals and Hardware Maintenance

Course Code : CM384

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**03**	**48**
Practical	**02**	**32**
Tutorial	**02**	**32**

Evaluation:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Two class tests each of 60 minutes.**	**02 Hrs.**	–	–	–
Marks	**10**	**40**	**25**	–	**25**

Course Rationale:

The PC Compatible Microcomputer family is rapidly moving forward in power capabilities. This Course introduces students regarding tools, and equipments of system and also upgrades repairs the system. This course introduces different peripheral devices and interfacing cards.

Course Outcomes:

Students should be able to

1. Troubleshoot faults in computer system.
2. Distinguish between various computer systems such as desktop, server, laptop, and palmtop.
3. Install and configure system software for computer system.
4. Manage secondary storage devices with proper mounting strategy..
5. Setup BIOS.

Course Contents:
A. Theory

Specific Learning Outcomes (Cognitive,Domain)	**Topics and subtopics**	**Hrs.**
Units 1 :Introduction to Computer Hardware		
1. Describe computer system. 2. Compare between different computer systems. 3.Classify computer system in different categories 4. Analyze the applications of different computer system. 5. Determine the use of each computer system.	1.1Features of Computer Systems:Features of Desktop Systems, Features of Server Computers, Features of Laptops,Features of Tablets	04
Unit 2: Motherboards		
1.List different components of motherboard. 2. Classify memory according to their use. 3. Demonstrate the use of different connectors. 4.Analyze the use of modem and Graphics cards. 5. Justify the selection criterion of motherboard. 6. Construct the diagram for motherboard controller.	2.1 Features of Motherboards, Components of Motherboard, Form Factor of motherboards, Motherboard Controller 2.2 Memory Support, Graphics Support, BIOS, IDE and SATA Connectors. 2.3 Power Supply Connectors, External Devices Interfaces, Buses and Expansion Slots 2.4 Speaker and Battery, System Board Jumpers and LED, I/O Addresses and Interrupts 2.5 Selection of Motherboards, Using Modem Cards, Using Graphics Cards.	10
Unit 3: Processing Units		
1. Outline the different features of processors. 2. List the processors and their processing power 3. Clarify on CPU overheating Issues. 4. Compare different problems of processors and list solution for the same 5. Explain the use of GPU.	3.1Processor Features, Developmental Stages of CPU 3.2 Towards Multiple Core Processors, Processor Specifications, CPU Overheating Issues 3.3 Processor: Common Problems and Solutions, Graphics Processing Units.	08

Unit 4: Memory and storage		
1. Classify computer memory. 2. Differentiate between storage devices 3. Compare different file systems. 4. List the features of hard disk. 5. Explain how hard disk work 6.Justify the use of Blu-ray disk	4.1 Features of Computer Memory, Types of Computer Memory. 4.2 Hard Disks Details, Working of Hard Disks, Features of Hard Disks, Hard Disk Specifications. 4.3 Blu-ray Discs, External Storage Devices 4.4 Introduction to file system FAT 16, FAT 32, NTFS,EXT2/EXT3	08
Unit 5: Power supply and UPS		
1. Describe the working of SMPS. 2. Compare online and offline UPS. 3. List features of UPS. 4. Exprees how cabinets are selected. 5. Explain the use of UPS Batteries.	5.1 Features of SMPS, Types of SMPS, Specification for SMPS,Selecting SMPS and Computer Cabinets 5.2 Uninterrupted Power Supply: Working of UPS, Types of UPS, UPS Features and Specifications, UPS Batteries	08
Unit 6:I/O Devices		
1. Classify different keyboard. 2. Describe working of printer and scanner. 3. List different features of keyboard, scanner and printer. 4. Compare different printers. 5.Classify scanners into different categories 6. Recommend the use of modems. 7. Animate the use of LED monitors.	6.1 Keyboard Features, Types of Keyboard, Types of mouse, Working of mouse, LED Monitors and Touch Screen Monitors. 6.2 Printers : Types of Printers, features, Specifications, Inkjet Printer Specification, Working of Laser Printer, Managing Laser Printers 6.3 Scanners and Speakers: Features of Scanner, Components of Scanner, Specifications of Scanner, Working of scanners, Computer Speakers: Working of Speakers, Speaker Specifications. 6.4 Modem: Internal and External modem, Block diagram and specifications	10
Total Hrs	**48**	

B. List of Practicals/Laboratory Experiences/Assignments:

Practical No.	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Demonstration of External Interfaces and Connectors.	Motherboards	02
2	Installation of mother – board and Study of motherboard layout.	Motherboards	02
3	Study of POST and various system beeps.	Motherboards	02
4	Installing Hard Disk with the interfacing types (SATA , PATA)and Troubleshooting Tips	Memory and Storage	02
5	Installing SMPS and UPS and its Troubleshooting Tips	Power supply and UPS	02
6	Installation of Optical Drive(CD / DVD Drives)Troubleshooting Tips	Memory and Storage	02
7	Configuring BIOS	Motherboards	02
8	Installing Windows Operating System, Partitioning and formatting a hard disk using Bootable CD, Disk Management and formatting from My Computer.	Memory and Storage	02
9	Maintenance of Printers and Troubleshooting tips	I/O Devices	02
10	Maintenance of Scanner and Troubleshooting tips.	I/O Devices	02
11	Maintenance of Keyboard and Mouse and Troubleshooting tips.	I/O Devices	02
12	Maintenance of Speaker and Troubleshooting tips.	I/O Devices	02
13	Writing detail specifications for buying machines	Motherboards , Memory and Storage , I/O Devices	02
14	Preventive Maintenance of PC: Checking Environment, Dealing with Dust, and Removing Heat with Fan and Troubleshooting tips.	Motherboards , Memory and Storage , I/O Devices	02
15	Demonstrate the use of preventive maintenance tools like logic probe, logic pulsar, current tracer, logic analyzer and windows diagnostics software	Motherboards , Memory and Storage , I/O Devices	02
		Total Hrs	32

Instructional Strategy:

Sr.No	Topic	Instructional Strategy
1	Introduction to Computer Hardware	Classroom teaching
2	Motherboards	Classroom teaching, laboratory work
3	Processing Units	Classroom teaching
4	Memory and storage	Class room teaching, laboratory work
5	Power supply and UPS	Class room teaching, laboratory work
6	I/O Devices	Class room teaching, laboratory work

Assessment and Evaluation Scheme:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	Continuous Assesment	PT	Students	Two PT (average of two tests will be computed)	10	–	Test Answer sheets	1,2,3,4,5,6
					–			
				TOTAL	10	=		
	(Term End Examination)	End Exam		End Of the Course	40	14	Theory Answer sheets	1,2,3,4,5,6
Direct Assessment Practical			Students			–		
		Journal Writing		Assignments	25	–	Journal	1,2,3,4,5,6,
				TOTAL	25	10		
	(Term End Examination)	End Exam		End Of the Course	25	10	Practical Answer Sheets	1,2,3,4,5,6
Indirect Assessment	Student Feedback on course		Students	After First PT	Student Feedback Form			1,2,3 4,5,6
	End exam			End Of The Course	Questionnaires			

Scheme Of Practical Evaluation:

S.N.	**Description**	**Max. Marks**
1	Practical performance	20
2	Viva	05
	TOTAL	**25**

Mapping Course Outcomes With Program Outcomes:

Course Outcomes	**Program Outcomes (POs)**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	1	3	3	2						
2	1	3	2	2				2	2	
3		2	3	3				2	2	
4		2	3	3				2	2	
5		3	2	3				2	2	
6		2	2	3				2	2	

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Reference & Text Books:

Text Book

Sr. No	Author	Title,Publisher, Year of publication	ISBN Number
1	The Complete PC Upgrade and maintenance Guide	Mark Minasi, BPB Publication	9780782121513
2	Troubleshooting, Maintaining and Repairing PCs	Bigelow, Tata McGraw Hill	9780070473676
3	The computer hardware installation, interfacing, troubleshooting and maintenance	K.L. James,PHI	9788120347984

E-References:

1. `http://www.webopedia.com/`
2. `http://www.itworkscomputerrepair.com/`
3. `https://en.wikipedia.org/wiki/Computermaintenance`

Programme : Diploma in Computer Engineering/Information technology

Programme Code : 06/26

Name of Course : Digital Techniques

Course Code : CM385

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Two class tests each of 60 minutes.**	**03 Hrs.**	–	–	–
Marks	**20**	**80**	**25**	–	**25**

Course Rationale:

This subject forms the foundation of digital electronics system. It is essential to know these Fundamentals to understand the concept of microprocessor its application.

Course Outcomes:

Students should be able to

1. Represent decimal numbers into binary, octal, hexa and vice-versa.
2. Perform arithmetic operations on binary, octal, hexa number system.
3. Design digital circuits using Logic Gates.
4. Use multiplexer and demultiplexer to realize logic equations.
5. Construct K-Map to simplify various Boolean expressions.
6. Analyze and design various combinational and sequential circuits.

Course Contents:
A. Theory

Specific Learning Outcomes (Cognitive,Domain)	**Topics and subtopics**	**Hrs.**
Units 1 : Number System and Codes		
1.State basic concept of Number System. 2.Perform arithmetic operation on number system. 3. Develop the problem using different types Codes.	1.1 1.1 Introduction 1.2 Number Systems : Binary Number System, Signed Binary Numbers, Octal Number System, Hexadecimal Number System , Binary Arithmetic. 1.3 One's Complement and Two's Complement . arithmetic , 9's Complement 10's complement Arithmetic. 1.4 Codes: BCD, Gray codes, Excess 3 code, Error detecting and Correcting Codes.	08
Unit 2: Logic Gates and Boolean Algebra		
1.List and draw various gates and their truth tables. 2. State characteristics of digital ICs. 3. Describe Universal Gate. 4. List and apply various Boolean algebra theorems.	2.1 1.1 Introduction 1.2 Working principals and Truth of AND,OR,NOT, NOR, NAND, EX-OR, EX-NOR Gates. 2.3 Characteristics of Digital IC's. 2.4 Universal Gates. 2.5 Boolean Algebra : Basic Boolean Operations , Basic Law's of Boolean Algebra , Duality Theorem, De-Morgan's Theorems.	10
Unit 3:Combinations logic design		
1. Construct KMap for logic Function . 2. Simplify the Standard Representation For Logic Functions. 3. Apply don't care condition for logic function.	3.1 Introduction :Standard Representation For Logic Functions 3.2 Karnaugh Map Representation and Simplification of Logic Functions 3.3 Minimization of Logic Functions Specified in Minterms / Maxterms or Truth Table. 3.4 Minimization of Logic Functions not Specified in Minterms / Maxterms. 3.5 Don't care conditions , Design Examples : Arithmetic Circuit.	08

Unit 4: Multiplexer and De Multiplexer		
1. Describe block diagram, truth table of multiplexer. 2. Design various logic diagram of multiplexer. 3. Describe block diagram, truth table of demultiplexer. 4. Design various logic diagram of demultiplexer 5. Discuss adder as subtractor.	4.1 Multiplexer – Block diagram, Truth table, Logical expression and logic diagram of Multiplexers (2:1, 4:1, 8:1and 16:1), Multiplexer Tree. 4.2 Demultiplexer – Block diagram, Truth table, Logical expression and logic diagram of Demultiplexer (1:2, 1:4, 1:8and 1:16), Demultiplexer Tree. 4.3 Adders and their use as subtractors.	14
Unit 5: Combinational logic design using MSI circuit		
1. Design Priority encoders. 2. Describe Block Diagram of Truth Table and Decoder.	5.1 Priority Encoders - Decimal to BCD Encoder (IC 74147) and Octal to Binary (IC 74148) -Block diagram, Truth table. 5.2 Decoder - BCD to 7-segment Decoder (IC 7447) - Block diagram, Truth table. 5.3 Digital comparator IC (7485) - Block diagram, Truth table. ALU 74181. 5.4 BCD Arithmetic, Digital Comparators ,Parity Generator/Checkers.	10
Unit 6:Flip Flops		
1. Discuss Various Flip Flops. 2. Design Flip Flop Using NAND gate.	6.1 Introduction, 1-Bit Memory Cell, R S flip-flop. 6.2 Clocked S-R Flip-Flop J-K Flip-Flop. 6.3 Race Around Condition . Master-Slave J-K Flip-Flop D- flip flop and T-flip flop - using NAND gates – Symbol. 6.4 Application Of flip Flop.	08
Unit 6:Sequential Logic Design		
1. Design Sequential Logic Circuit using logic gates. 2. simplify Asynchronous counter and Synchronous Counters. 3. Compare Various Shift register.	7.1 Introduction Registers 7.2 Shift register : -Serial in- Serial Out (SISO) -Serial in-Parallel Out (SIPO) -Parallel in-Serial Out (PISO) -Parallel in- Parallel Out (PIPO) Applications of Shift Registers 7.3 Counters : -Ripple or Asynchronous counter -Synchronous Counters -Ring counter -Asynchronous UP/DOWN Counters -Modulus of the Counter	10
	Total Hrs	**64**

B. List of Practicals/Laboratory Experiences/Assignments:

Practical No.	Specific Learning Outcomes (Psychomotor Domain)	Units	Practical Hrs.
1	Know your Digital Lab : IC tester,Multimeter,Bread Board,Trainer Kit.	Units 1 :Number System and codes	02
2	Study of Basic Gates ICs and verification of Truth tables by monitoring the Output on ICs.	Units 2 : Logic Gates and Boolean Algebra	04
3	To derive AND ,OR, NOT gates using universal Gates .	Units 2 : Logic Gates and Boolean Algebra	02
4	Verify De-Morgan's Theorem Using ICs	Unit 2: Logic Gates and Boolean Algebra	02
5	Minimization and realization of functions using Key maps and its implementation	Unit 3: Combinational logic design	04
6	To connect and observe O/P across multiplexer on Trainer Kit.	Unit 4:Multiplexer and De Multiplexer	04
7	To connect and observe O/P across Adder/Subtractor on Trainer Kit.	Unit 4:Multiplexer and De Multiplexer	02
8	To implement seven –segment Decoder on Trainer Kit.	Unit 5:Combinational logic design using MSI circuit	04
9	To verify the Truth Tables of S-R,J-K, DLT Flip-Flops	Unit 6: Flip-Flop	04
10	To implement/observe the working of Shift Registers on Trainer Kit.	Unit 7: Sequential Logic Design	02
11	To implement/observe the working of counters on Trainer Kit.	Unit 7: Sequential Logic Design	02
12	Skill Test	–	02
		Total Hrs	32

Instructional Strategy:

Sr.No	Topic	Instructional Strategy
1	Number System and Codes	Explanation, Case study and Implementation
2	Logic Gates and Boolean Algebra	Explanation, Case study and Implementation
3	Combinational logic design	Explanation, Case study and Implementation
4	Multiplexer and Demultiplexer	Explanation, Case study and Implementation
5	Combinational logic design using MSI circuit	Explanation, Case study and Implementation
6	Flip Flops	Explanation, Case study and Implementation
7	Sequential Logic Design	Explanation, Case study and Implementation

Specification Table for Theory Paper:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Number System and Codes	04	01	01	06
2	Logic Gates and Boolean Algebra	05	02	03	10
3	Combinational logic design	06	02	02	10
4	Multiplexer and Demultiplexer	05	03	02	10
5	Combinational logic design using MSI circuit	12	03	05	20
6	Flip Flops Sequential Logic Design	06	03	04	13
7	Sequential Logic Design	06	02	03	11
Total		**44**	**16**	**20**	**80**

Assessment and Evaluation Scheme:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	Continuous Assesment	PT	Students	Two PT (average of two tests will be computed)	20	10	Test Answer sheets	1,2,3,4,5,6,7
				—	–		—	—
				TOTAL	20	10		
	(Term End Examination)	End Exam		End Of the Course	80	28	Theory Answer sheets	1,2,3,4,5,6,7
Direct Assessment Practical	Continuous Assesment	—	Students	—	—	–	—	
		Journal Writing		Assignments	25	–	Journal	1,2,3,4,5,6,7
				TOTAL	25	10		
	(Term End Examination)	End Exam		End Of the Course	25	10	Practical Answer Sheets	1,2,3,4,5,6,7
Indirect Assessment	Student Feedback on course		Students	After First PT	Student Feedback Form			1,2,3,4,5,6,7
	End exam			End Of The Course	Questionnaires			

Scheme Of Practical Evaluation:

S.N.	**Description**	**Max. Marks**
1	Observation	05
2	Evaluation	10
3	Viva	10
	TOTAL	**25**

Mapping Course Outcomes With Program Outcomes:

Course Outcomes	**Program Outcomes (POs)**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	2	3	3	2	–	–	–	–	–	–
2	3	3	1	2	–	–	–	–	–	–
3	3	3	3	1	–	–	-	–	–	–
4	1	3	3	2	–	–	–	–	–	–
5	1	3	3	3	–	–	–	–	–	–
6	3	3	2	3	–	–	–	–	–	–
7	3	3	2	3	–	–	–	–	–	–

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Reference & Text Books:

Text Book

Sr. No	Author	Title,Publisher, Year of publication	ISBN Number
1	R.P. JAIN	Modern Digital Electronics McGraw-Hill	—
2	Albatr paul Malvind	Digital Principal Application TMH	—

E-References:

1. http://www.learnabout-electronics.org/Digital/dig11.php
2. https://www.tutorialspoint.com/computer$_{l}ogical_{o}rganization/logic_{g}ates$
3. http://www.electronicshub.org/multiplexer-and-demultiplexer
4.

Programme : Diploma in Computer Engineering/Information technology

Programme Code : 06/26

Name of Course : Computer Networks

Course Code : CM386

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Two class tests each of 60 minutes.**	**02 Hrs.**	–	–	–
Marks	**20**	**80**	–	**25**	**25**

Course Rationale:

Computer network subject is totally based on networking of computers the communication between all the computers. There are various computers worldwide which are connected to each other to form a proper communication. The networking part of this subject will stress on how to organize the network structure i.e. topology of the n/w as well as it will give the details about the hardware devices those are required to form a network. Also it will stress on transmission media i.e. the physical wires which are required to connect all the hardware devices with one another.

This subject stress on the different protocols those are used to perform communication within network. Also it will stress on various switching techniques such as circuit switching and packet switching as well as way of routing in switched network.

Course Outcomes:

Students should be able to

1. Define and classify Computer Network.
2. Identify different topologies of computer network. Describe various transmission media.
3. Identify various networking devices.
4. Illustrate working of OSI reference model and TCP/IP model.
5. Describe protocols like UDP, TCP, SMTP, HTTP, FTP, TELNET, DHCP etc.
6. Maintain LAN hardware using tools.

Course Contents:
A. Theory

Specific Learning Outcomes (Cognitive,Domain)	**Topics and subtopics**	**Hrs.**
Units 1 : Networking Concepts		
1. Define network 2. State need of Computer Network 3. Enlist applications of Computer Network 4. List components of Computer Network 5. Describe benefits of Computer Network 6. Classify Computer Network types 7. Classify Computer Network by their Component	1.1 Fundamentals of Computer Network- Definition Need of Computer Network, Applications, Component of Computer Network 1.2 Network Benefits: Sharing Information (File Sharing, E-mail)- Sharing Resources (Printer Sharing, Application Services), Maintaining the Network, Backing up data. 1.3 Computer Network Classifications- C lassification of Network by their Geography. -PAN, CAN, LAN, MAN, WAN. 1.4 Classification of Network by their Component Role–Peer-to-Peer Network, client-Server-Based Network	10
Unit 2: Network Topologies and Networking Devices		
1. Define topology 2. List and explain types of network topologies 3. State need of network devices 4. Describe working of different network devices 5. Describe working of mobile and WI FI 6. Explain different network connectors 7. Describe network software	2.1 Network Topologies - Introduction, Definition 2.2 Types of Topology- i) Bus ii) Ring iii) Star iv) Mesh v) Tree vi) Hybrid. 2.3 Network Control / Connecting Devices – Need of Network Control devices, Role of Network Control devices in a Network, 2.4 Network Control devices:- Hub, Repeater, Bridges, Switches, Router, Gateway, Modem. Firewall 2.5 Introduction to Mobile and Wi-Fi devices. 2.6 Network connectors:- RJ45,BNC,NIC, Optical fiber connectors: SC,ST 2.7 Network software: NIC Device Driver, client-server software	12
Unit 3: Transmission Media		
1. Define Guided media, Unguided media 2. State need of transmission media 3. List and explain different transmission media 4. Describe Bluetooth architecture and wireless communication protocols	3.1 Introduction – Need of Transmission Media, Selection Criteria. 3.2 Types of Transmission Media- Guided Media: Cable Characteristics, Types of Cable-Twisted Pair Cable, Co-axial Cable, Fiber Optic Cable. Unguided media: Types of Communication Band-Microwave Communication, Radio wave Communication, Satellite Communication 3.3 Latest Technologies in Wireless Network- Bluetooth Architecture, Wi-Fi, Wireless communication protocols	10

Unit 4: OSI Reference Model and TCP/IP Suite		
1. Define subnetting, masking 2. Describe working of OSI reference model and TCP/IP model 3. Compare OSI reference model and TCP/IP model 4. List and explain IP addresses 5. Describe IPv6 and IPv4 with header format	4.1 Introduction– Layered Architecture , Interfaces between Layer 4.2 Layers of the OSI Reference Model (Functions of each Layer and Protocols used) – Physical Layer, Data-Link Layer, Network Layer, Transport Layer, Session Layer, Presentation Layer, Application Layer. 4.3 Layered Structure of the TCP / IP Model – Host-to- Network, Internet, Transport, Application 4.4 Comparision between OSI and TCP / IP Network Model 4.5 IP Addressing – IP Address classes, classless IP addressing, Subnetting, Supernetting, Masking. 4.6 Introduction, IPv4, IPv6(Header Format), Difference between IPv4 IPv6.	14
Unit 5: Local Area Network		
1.Define token 2. Describe different medium access control methods. 3. Explain working of control token, slotted ring,token ring , token bus , Cambridge Ring	5.1 Medium access control Methods: CSMA/CD , CSMA/CA 5.2 Control Token, Slotted Ring, Token Ring, Token Bus, Token Passing, Cambridge Ring	06
Unit 6: Wide Area Network and Distributed application		
1. Define protocol 2. Distinguish circuit switching and packet switching 3. State working of DNS 4. Describe working of different protocols.	6.1 Circuit Switching: Space division and Time division circuit switching 6.2 Packet Switching: Principle, Switching technique 6.3 Comparison between circuit switching and packet switching techniques 6.4 Distributed application : Introduction to domain name service, Introductions to Protocols- SMTP, SNMP, HTTP, FTP, DHCP, TELNET	12
	Total Hrs	**64**

B. List of Practicals/Laboratory Experiences/Assignments:

Practical No.	Specific Learning Outcomes (Psychomotor Domain)	Units	Practical Hrs.
1	Identify Components of Network in your Computer Network Lab.	Units 1 :Networking Concepts	02
2	To Identify and understand different types of Transmission Media.	Units 3 : Transmission Media	02
3	To Identify and understand different types of Networking devices. .	Units 2 : Network Topologies and Networking Devices	02
4	To connect and understand different network control devices used in LAN	Unit 2: Network Topologies and Networking Devices	04
5	To prepare a network cable and Network Cross over Cable using RJ-45 connectors (to connect two hub/switch) and test by Line Tester.	Unit 2: Network Topologies and Networking Devices	04
6	Basic Configuration of router.	Unit 2: Network Topologies and Networking Devices	02
7	To Connect Computers in Star Topology using Wired Media and any Network control Device.	Unit 2: Network Topologies and Networking Devices	04
8	To Install Network Interface Card to locate MAC address of Computer.	Unit 2:Network Topologies and Networking Devices	02
9	To install TCP/IP protocol and configure advanced TCP/IP properties.	Unit 4: OSI Reference Model and TCP/IP Suite	02
10	To install a network printer and to Share Printer and Folder in Network	Unit 2: Network Topologies and Networking Devices	02
11	To Run Basic TCP/IP Utilities and Commands.(Ping, ipconfig, Tracert, Netstat, Wireshark, ARP, NBTSTAT.EXE, WINIPCFG.EXE),	Unit 4: OSI Reference Model and TCP/IP Suite	02
12	Capture TCP,UDP,IP,ARP,ICMP,Telnet, FTP packet using Wireshark packet sniffer software	Unit 6 : Wide Area Network and Distributed application	02
		Total Hrs	32

Instructional Strategy:

Sr.No	Topic	Instructional Strategy
1	Networking Concepts	Class room teaching, laboratory demonstration
2	Network Topologies and Networking Device	Class room teaching, laboratory demonstration
3	Transmission Media	Class room teaching, laboratory demonstration
4	OSI Reference Model and TCP/IP Suite	Class room teaching, laboratory demonstration
5	Local Area Network	Class room teaching, laboratory demonstration
6	Wide Area Network and Distributed application	Class room teaching, laboratory demonstration

Specification Table for Theory Paper:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Networking Concepts	04	04	04	12
2	Network Topologies and Networking Device	02	06	08	16
3	Transmission Media	02	04	06	12
4	OSI Reference Model and TCP/IP Suite	02	06	08	16
5	Local Area Network	02	04	04	10
6	Wide Area Network and Distributed application	02	06	06	14
Total		**32**	**24**	**24**	**80**

Assessment and Evaluation Scheme:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	Continuous Assesment	PT	Students	Two PT (average of two tests will be computed)	20	10	Test Answer sheets	1,2,3,4,5,6
				—	–		—	—
				TOTAL	20	10		
	(Term End Examination)	End Exam		End Of the Course	80	28	Theory Answer sheets	1,2,3,4,5,6
Direct Assessment Practical	Continuous Assesment	—	Students	—	—	–	—	
		Journal Writing		Assignments	25	–	Journal	1,2,3,4,5,6
				TOTAL	25	10		
	(Term End Examination)	End Exam		End Of the Course	25	10	Practical Answer Sheets	1,2,3,4,5,6
Indirect Assessment	Student Feedback on course		Students	After First PT	Student Feedback Form			1,2,3,4,5,6
	End exam			End Of The Course	Questionnaires			

Scheme Of Practical Evaluation:

S.N.	Description	Max. Marks
1	Evaluation	05
2	Viva	20
	TOTAL	**25**

Mapping Course Outcomes With Program Outcomes:

Course Outcomes	Program Outcomes (POs)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	2	3	3	2	–	–	–	–	–	–
2	3	3	1	2	–	–	–	–	–	–
3	3	3	3	1	–	–	-	–	–	–
4	1	3	3	2	–	–	–	–	–	–
5	1	3	3	3	–	–	–	–	–	–
6	3	3	2	3	–	–	–	–	–	–

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Reference & Text Books:

Text Book

Sr. No	Author	Title,Publisher, Year of publication	ISBN Number
1	Achyut S. Godbole	Networking Concepts. McGraw Hill	—
2	Achyut S. Godbole	Network concepts, McGraw Hill	—
3	A.S.Tanenbanm	Networking,PHI McGraw Hill	—
4	Behrouz A. Forouzan	Networking, McGraw Hill	—

E-References:

1. `www.4shared.net`
2. `www.ihrb.org`
3. `www.networkconceptsinc.com`
4. `www.n2networksolutions.com`
5. `www.networkcomputing.com`

Programme : Diploma in Computer Engineering

Programme Code : 06/26

Name of Course : Data Structure

Course Code : CM387

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**04**	**64**
Practical	**02**	**32**
Tutorial	**02**	**32**

Evaluation:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Two class tests each of 60 minutes.**	**03 Hrs.**	–	–	–
Marks	**20**	**80**	**25**	–	**25**

Course Rationale:

In the present era it is very essential to develop programs and organize data in such a way that it solves a complex problem efficiently. Data structure is such a tool, which aims in developing data organizing and programming skills.

Course Outcomes:

Students should be able to

1. Analyze algorithms and determine its time and space complexity to identify cost effective algorithm for a given problem.
2. Apply various data structures for implementation of different algorithms using C programming language.
3. Implement various algorithms for searching and sorting.
4. Implement operations on various data structures like Stack, Queue, Tree and Graph to solve computing problems using C programming language.
5. Select and use appropriate data structure which is best suitable for a given problem.

Course Contents:
A. Theory

Specific Learning Outcomes (Cognitive,Domain)	**Topics and subtopics**	**Hrs.**
Units 1 : Introduction to data structures		
1.Differentiate between various complexities. 2.Enlist various data structure Operation. 3.Use dynamic memory allocation in programs.	1.1 Introduction, Basic Terminology:- Elementary data structure organization Classification of data structure 1.2. Operations on data structures:- Traversing, Inserting, deleting Searching, sorting, and merging , Complexity :-Time complexity , Space Complexity, Big 'O' Notation 1.4.Structures in 'C', Dynamic memory Allocation.	8
Unit 2: Arrays		
1.Implement array data structure to carry out various data structure operation on array 2.Enlist advantages and disadvantages of array compare to other data structures.	2.1 Introduction, Linear Arrays Representation of linear arrays in memory. 2.2 Traversing linear Arrays, Inserting and Deleting 2.3.Multidimensional Arrays .	6
Unit 3: Searching and Sorting		
1.Analyze time and space complexity of various searching and sorting method., 2.Create programs for various sorting and searching operation	3.1 Searching: Basic search techniques, Linear search, Binary search, Hashing 3.2 Sorting: General background, bubble sort, Selection sort, insertion sort, merge sort and radix sort, Shell sort	8
Unit 4: Linked Lists		
1. 1.Implement linked list data structure to carry out various data structure operation . 2.Use Linked list to implement other data structures .	4.1Introduction, Singly link list, Representation of link list in memory 4.2 Creating, traversing, searching in Sorted as well as unsorted link list 4.3. Memory allocation, garbage Collection 4.4.Inserting into linked list,Deleting from a linked list 4.5.Header links list, Two-way list, Implementation of link list.	10
Unit 5:Stacks, Queue and Recursion		
1.1. Implement Stack and Queue data structure to carry out various data structure operation. 2.Use stack and queues to solve various problem(likes prefix to postfix conversion,evaluation of expression, Tower of Hanoi etc) 3.Differentiate between stack and queue.	5.1 Stacks: Concept, representing stacks in 'C', Applications of stacks 5.2 Polish Notations (Prefix, postfix, Infix),Quick sort 5.3.Recursion: Recursive definitions and processes, Recursion in 'C', writing recursive programs factorial, Fibonacci 5.4.Tower of Hanoi, Implementation of recursive, procedures by means of stack 5.5.Queues: The queue and its sequential representation, concept of queues, priority queues	12

Unit 6: Trees		
1.Implement Tree data structure to carry out various data structure operation. 2.Use tree For Sorting and searching.	6.1 Introduction, Binary trees, Binary tree representation, Traversing binary tree 6.2 Traversal algorithms using stacks 6.3.Binary search tree (BST), searching and inserting in BST, deleting from BST. 6.4.Heap, Heap sort, Path lengths: Huffman algorithm	10
Unit 7: Graphs and their applications		
1.Implement Graph data structure to carry out various data structure operation. 2.Find out Shortest Path between to vertices using various graph techniques.	7.1.Introduction, Graph theory terminology 7.2.Sequential representation of graphs, Adjacency matrix, Path matrix. 7.3.Warshall's Algorithm,Shortest Paths. 7.4.Linked representation of graph, Operations on graphs, traversing a graph(BFS,DFS). 7.5.Application Of Graph	10
Total Hrs	**48**	

B. List of Practicals/Laboratory Experiences/Assignments:

Practical No.	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.	Tutorial
1	Write Programs based on: Structures	Introduction to data structures		02
2	Write Programs based on: Array operations; insertion, deletion.	Arrays	01	01
3	Write Programs based on Multidimensional Arrays.	Arrays	01	01
4	Write Programs based on Various searching operation (Linearand Binary Search).	Arrays	01	01
5	Write Programs based on Various sorting Method (bubble sort, Selection sort, insertion sort, merge sort and radix sort, Shellsort).	Arrays	01	03
6	Write Programs based on Creating a link list.	Linked Lists		02
7	Write Programs to search in sorted and unsorted linked list.	Linked Lists	03	01
8	Write Programs based on inserting of the node, inserting at first node, inserting after given position.	Linked Lists	03	02
9	Write Programs to delete a node in linked list.	Linked Lists	01	01
10	Write Programs based on two way (doubly) link list.	Linked Lists	02	02
11	Write Programs based on Stack implementation using PUSH and POP operations.	Stacks, Queues and Recursion	02	02
12	Write Programs based on Infix to Postfix operation.	Stacks, Queues and Recursion	01	01
13	Write Programs based on Tower of Hanoi.	Stacks, Queues and Recursion	01	02
14	Write Programs based on recursion.	Stacks, Queues and Recursion	01	01
15	Write Programs based on Queue implementation using PUSH and POP operations.	Stacks, Queues and Recursion		02
16	Write Programs based on Creating a binary tree.	Tree	02	
17	Write Programs based on Inorder, Preorder and post order traversal.	Tree	01	01
18	Write Programs based on Inserting, searching BST.	Tree	01	01
19	Write Program to Heapsort.	Tree	03	03
20	Write Programs based on Shortest path.	Graph	02	02
21	Write Programs based on BFS and DFS using Graph.	Graph	02	01
22	Write Programs based on Stack implementation using PUSH and POP operations.	Graph	02	02
		Total Hrs	32	32

Instructional Strategy:

Sr.No	Topic	Instructional Strategy
1	Introduction to Data Structures	Demonstration of 'C' Compiler, Create simple program array, pointer, string, function.
2	Arrays	Write 'C' programs based on Arrays
3	Sorting and Searching	Write 'C' programs based on Sorting and searching.
4	Link Lists	Write 'C' programs based on linked list
5	Stacks, Queues	Recursion and Demonstration of 'C' Compiler, Create simple program Stack, Queue and Recursion.
6	Trees	Write 'C' programs based on Tree.
7	Graphs and their applications	Demonstration of 'C' Compiler, Create simple program graphs.

Specification Table for Theory Paper:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Introduction to Data Structures	02	02	00	04
2	Arrays	02	02	02	06
3	Sorting and Searching	03	03	06	12
4	Link Lists	04	03	07	14
5	Stacks, Queues and Recursion	05	04	06	15
6	Trees	04	03	06	13
7	Graphs and their applications	04	03	05	12
Total		**26**	**20**	**34**	**80**

Assessment and Evaluation Scheme:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	Continuous Assesment	ST	Students	Two PT (average of two tests)	20	–	Test Answer sheets	1,2,3,4,5,6
						–		1,2,3,4,5,6
				TOTAL	20	=		
	(Term End Examination)	End Exam		End Of the Course	80	28	Theory Answer sheets	1,2,3,4,5,6
Direct Assessment Practical	Continuous Assesment		Students			–		
		Journal Writing		Assignments	25	–	Journal	1,2,3,4,5,6,
				TOTAL	25	10		
	(Term End Examination)	End Exam		End Of the Course	25	10	Practical Answer Sheets	1,2,3,4,5,6
Indirect Assessment	Student Feedback on course		Students	After First PT	Student Feedback Form			1,2,3,4,5,6
	End exam			End Of The Course	Questionnaires			

Scheme Of Practical Evaluation:

S.N.	Description	Max. Marks
1	Observations	05
2	Practical performance	10
3	Viva voce	10
	TOTAL	**25**

Mapping Course Outcomes With Program Outcomes:

Course Outcomes	Program Outcomes (POs)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	1	3	1	1	-	-	-	-	-	-
2	-	3	3	-	-	-	-	-	-	-
3	-	3	3	1	-	-	-	-	-	
4	-	3	3	1	-	-	-	-	-	
5	1	3	3	1	-	-	-	-	-	

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Reference & Text Books:

Text Book

Sr. No	Author	Title	Publication
1	Tanenbaum, Langsman, Augenstein	Data Structures in 'C' PHI Publications	
2	Lipschultz	Data Structures Schaum Outline Series	
3	Yashwant Kanetkar	Pointers in 'C', BPB Publications language	
4	Tremblie and Sorrenson	Data Structures in 'C' PHI Publications	

E-References:

1. `http://www.tutorialspoint.com/data-structures-algorithms/sorting-algorithm`
2. `https://en.wikipedia.org/wiki/Data-structure`
3. `https://www.tutorialspoint.com/data_structures_algorithms/algorithms_basics.htm`
4. `https://www.cs.cmu.edu/ adamchik/15-121/lectures`

Name of Programme : **Diploma in Computer Engineering**

Programme Code : **06/07/26**

Name of Course : **Object Oriented Programming: C++**

Teaching Scheme : **CM388**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**03**	**48**
Term work / Practical	**02**	**32**
Tutorial	**01**	–

Evaluation:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests of 60 min. duration**	**03 Hrs.**	–	–	–
Marks	**20**	**80**	**25**	–	**25**

Rationale:

This subject intends to teach the students the basic concepts of object-oriented programming (OOP). Large programs are probably the most complicated entities ever created by humans. Because of this complexity, programs are prone to error and software errors can be expensive and even life-threatening. Object-Oriented Programming offers a new and powerful way to cope with this complexity. Its goal is clearer, more reliable, more easily maintained programs. This subject will act as backbone for all other subjects that are based on Object Oriented concept.

Course Outcomes:

After completing this course students will be able to

1. Represent the solution to problem with Object Oriented programming methodology.
2. Write and execute programs in C++ with Object Oriented concepts
3. Distinguish between procedure/functional/logical oriented paradigm and object oriented paradigm..
4. Design generic classes that may be reuse in similar applications.

Course Contents:
A. Theory

Specific Learning Outcomes (Cognitive,Domain)	**Topics and subtopics**	**Hrs.**
Section I		
Units 1 : Basics of Object-Oriented Programming		
1. State importance of Object Oriented Programming 2. Define object, class, program, tokens, keywords, identifiers, constants, array. 3. List applications of Object Oriented Programming 4. Describe Structure of C++ program. 5. State benefits of OOP. 6. Implement C++ program using tokens, keywords, identifiers, constants and variable. 7. State types of arrays with example. 8. Execute program using various operators and arrays.	1.1 What is Object Oriented Programming?, Programming Paradigm, Benefits of OOP& Applications, Structure of C++ program, A simple C++ program, Creating ource file, Compiling & Linking 1.2 Tokens, Keywords, Identifiers, Basic Data Types, User Defined data types, Derived Data Types, Symbolic Constants, type Compatibility, Declaration Of Variables, Reference Variables 1.3 Operators In C++, Scope Resolution Operators, Member Dereferencing Operators, Manipulators, Type Cast Operator, Expressions & their types, Implicit Conversions, Operator Precedence, Control Structure. 1.4 Introduction of arrays and its types.	10
Unit 2: Function in C++		
1. Define Function, member function 2. Implement program using main Function, Function Prototyping, Call By Reference, Return By, Reference, Inline Function 3. Apply the concept of Default Arguments, Const Arguments, Function Overloading, Friend & Virtual Functions 4. Perform program using classes and objects.	2.1 Introduction, The Main Function, Function Prototyping, Call By Reference, Return By, Reference, Inline Function 2.2 Default Arguments, Const Arguments, Function Overloading, Friend & Virtual Functions 2.3 Classes & Objects: Introduction, Specifying a Class, Creating objects, Memory Allocation For objects, Arrays of Objects, Object As a Function Arguments Returning Objects. 2.4 Defining Member functions ,Making An Outside Function Inline, Nesting Of Member Function, Private Member Functions 2.5 Static Data Member, Static Member Functions	08
Unit 3: Constructors & Destructors		
1. Define Constructors , Destructors 2. Execute program using constructors and Destructors	3.1 Introduction, Constructors, Parameterized Constructors Multiple Constructors in a Class 3.2 Constructors With Default Arguments, Dynamic initialization Of Objects, Object Pointers. 3.3 Destructors.	06

Specific Learning Outcomes (Cognitive,Domain)	Topics and subtopics	Hrs.
Section II		
Unit 4: Operator over loading and Pointers		
1. Define pointer 2. State rules of overloading operators 3. Perform program using different operators. 4. Execute program on pointers, string and virtual functions.	4.1 Introductions Defining Operator Overloading, Rules For Overloading Operators Introduction, Overloading Unary Operator, Overloading Binary Operator, Overloading Binary Operators Using Friends 4.2 Manipulation of Strings Using Operators, Pointers, Pointers to Objects, this pointer, Pointer to Derived classes, Virtual functions, Pure virtual function	06
Unit 5: Inheritance and Introduction to Templates		
1. Define inheritance, template, abstract class, virtual base class 2. Describe access specifies with its types. 3. Classify inheritance with its types. 4. Implement programs using inheritance, virtual base class , abstract class and templates.	5.1 Introduction, Defining Derived Classes, Access specifiers and its types,Single Inheritance 5.2 Making a Private Member Inheritable Multilevel Inheritance, Inheritance, Hierarchical Inheritance, Hybrid Inheritance 5.3 Virtual Base Classes, Abstract Classes, Constructors In Derived Classes, Member Classes: Nesting of classes. 5.4 Class Templates, Class Templates with Multiple Parameters, Function Templates 5.5 Function Templates with multiple parameters, Overloading of Templates function.	08
Unit 6: Working with files and Exception Handling		
1. Define exception, stream 2. Describe working of files. 3. Explain mechanism of exception. 4. Implement program using files and exceptions.	6.1 Managing console I/O Operations, C++ streams, C++ stream classes, Unformatted I/O operations, Formatted I/O operations managing output with manipulators. 6.2 Working with files , Introduction, Classes for file stream operations, Opening & closing a file, Detecting End-of-file, more about open (): 6.3 File modes, File pointers and their manipulations, Sequential Input and Output operations 6.4 Updating a file: Random access, Error handling during file operations, Command line arguments. 6.5 Exception Handling: Introduction, Basics of Exception Handling, Exception handling mechanism 6.6 Throwing mechanism, catching mechanism.	10
	Total Hrs	**48**

B. List of Practicals/Laboratory Experiences/Assignments:

Practical No.	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Write a program to implement looping different statements.	Basics of Object-Oriented Programming	02
2	Write a program to demonstrate all control structures.	Basics of Object-Oriented Programming	01
3	Write a program to implement concept of an array.	Basics of Object-Oriented Programming	01
4	Write a program to perform matrix operations using multi-dimensional array.		02
5	Write a program to implement concept of a class.	Function in C++	02
6	Write a program to create one class which contains member functions and invoke the same using objects.	Function in C++	02
7	Write a program to implement concept of overloading.	Function in C++	02
8	Write a program which implements friend function and inline function.	Function in C++	02
9	Write a program which implements all the types of constructors with destructor.	Constructors & Destructors	02
10	Write a program to demonstrate operator overloading for: Unary operator and Binary operator.	Operator over loading and Pointers	02
11	Write a program to demonstrate: Pointer to object. Pointer to derived class.	Operator over loading and Pointers	02
12	Write a program for MULTILEVEL inheritance.	Inheritance and Introduction to Templates	02
13	Write a program for MULTIPLE inheritances.	Inheritance and Introduction to Templates	02
14	Write a program for HYBRID inheritance.	Inheritance and Introduction to Templates	02
15	Write a program to implement : Class template. Function template.	Inheritance and Introduction to Templates	02
16	Write a program to perform various operations on file.	Working with files and Exception Handling	02
17	Write a program to perform Exception Handling.	Working with files and Exception Handling	02
	Mini project: Implement mini project using all the C++ concepts.		
		Total Hrs	32

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1	Basics of Object-Oriented Programming	Class room teaching, laboratory demonstration
2	Function in C++	Class room teaching, laboratory demonstration
3	Constructors & Destructors	Class room teaching, laboratory demonstration
4	Operator over loading and Pointers	Class room teaching, laboratory demonstration
5	Inheritance and Introduction to Templates	Class room teaching, laboratory demonstration
6	Working with files and Exception Handling	Class room teaching, laboratory demonstration

Specification Table for Theory Paper:

Unit No.	**Units**	**Levels from Cognition Process Dimension**			**Total Marks**
		R	**U**	**A**	
1	Introduction and physical properties of fluid	02	04	00	06
2	Hydrostatic pressure and pressure measurement in pipes	02	08	06	16
3	Fundamentals of fluid flow	02	04	06	12
4	Flow through pipes	04	04	06	014
5	Flow through open channel	02	04	06	12
6	Flow measurement	02	04	00	06
Total		**14**	**32**	**24**	**70**

R-Remember U-Understand A-Analyze/ Apply

Assessment and Evaluation Scheme:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	Continuous Assesment	PT Class Room As-sign-ments	Students	Two PT (average of two tests will be completed)	20	–	Test Answer sheets	1,2,3
				Assignments	–	–	Assignment Book	1,2,3
				TOTAL	20	=		
	(Term End Examination)	End Exam		End Of the Course	80	28	Theory Answer sheets	1,2,3
Direct Assessment Practical	Continuous Assesment	ST	Students	One skill test at end of term	–	–	Practical Answer sheets	4,5,6
		Journal Writing		Assignments	25	–	Journal	4,5,6,
				TOTAL	25	10		
	(Term End Examination)	End Exam		End Of the Course	25	10	Practical Answer Sheets	4,5,6
Indirect Assessment	Student Feedback on course		Students	After First PT	Student Feedback Form			1,2,3 4,5,6
	End Of Course			End Of The Course	Questionnaires			

Scheme Of Practical Evaluation:

S.N.	**Description**	**Max. Marks**
1	Observations and Writing	05
2	Execution and Result	15
3	Viva voce	05
	TOTAL	**25**

Mapping Course Outcomes With Program Outcomes:

Course Outcomes	**Program Outcomes (POs)**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	2	2	2	3	1	1	1	1	2	2
2	2	3	2	2	2	-	1	1	3	3
3	2	3	2	2	1	-	1	1	3	3
4	2	3	2	3	2	2	2	1	3	3
5	3	2	3	3	3	2	1	2	3	3
6	2	3	3	2	3	2	2	2	2	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Reference & Text Books:

Sr. No	Title	Author, Publisher, Edition and Year of publication	ISBN Number
1	Basics of Object-Oriented Programming	E Balagurusamy, Tata McGRAW Hill,	
2	Function in C++		
3	Constructors & Destructors		
4	Operator over loading and Pointers		
5	Inheritance and Introduction to Templates	Ivan Bayross, BPB Publication, 3rd edition ,	10:81-7656-964-X
6	Working with files and Exception Handling	Kevin Lonely, Tata McGraw Hill,	

E-References:

- https://www.w3schools.com/sql , accessed on 14th Dec 2016.
- https://www.tutorialspoint.com/sql, accessed on 14th Dec 2016.
- https://www.studytonight.com/dbms, accessed on 14th Dec 2016.

Programme : Diploma in Computer engineering / Information Technology

Programme Code : 06 / 07/26

Name of Course : JAVA Programming-I

Course Code : CM389

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**03**	**48**
Practical	**02**	**32**

Evaluation:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Two class tests each of 60 minutes.**	**3 Hrs.**	–	–	–
Marks	**20**	**80**	**25**	–	**25**

Course Rationale: This course introduces students to intermediate and advanced features of the Java programming language. Students will learn about object-oriented programming concepts such as inheritance, interfaces, abstract classes, abstract methods, and polymorphism; will learn how to write and read Java primitive types to and from.Any application on World Wide Web can be easily implemented. To have knowledge of Internet programming this course covers JAVA as a programming language.

Course Outcomes: After completing this course students will be able to

1. Represent and apply the solution to problem using object - oriented concepts.
2. Differentiate between platform independent and other types of languages.
3. Write and execute programs in Java using object-oriented principles, basic control structures, vectors, packages, interfaces, applets.
4. Write and execute programs in java using concepts of Multithreading and exception handling.
5. Create and execute user defined packages and exceptions.
6. Implement I/O functionality using Streams in Java.

Course Contents:
A. Theory

Specific Learning Outcomes (Cognitive,Domain)	**Topics and subtopics**	**Hrs.**
Units 1 : Java Evolution and Basics Of Java		
1. State Features of Java. 2. Describe JVM. 3. Enlist different data types & Operators in Java. 4. Define decision making Branching Looping. 5. Describe One Dimensional arrays Two Dimensional arrays.	1.1.Creation Of Java, Java Features, The Java Buzzwords, Simple Java Program. 1.2.Java Virtual Machine, Constant, Variables, Data Types, Operators and Expressions 1.3.Decision making and Branching, Decision making and Looping. 1.4.Arrays, One Dimensional arrays, Creating an array, Two Dimensional arrays	06
Unit 2: Classes, Object and Methods		
1. Define Class,Methods,Objects. 2. Describe creation of objects & Accessing class members. 3. Define Constructors,Method Overloading & Nesting of Methods. 4. Describe Inheritance . 5. Enlist different types of Inheritance. 6. Write a program for Overriding. 7. Describe the final variables,final class & methods. 8. State different visibility controls. 9. Define Vectors & Wrapper Classes. 10.Write a program for Vectors & Wrappers Classes.	2.1 Defining a class, Fields declaration, Methods declaration, Creating object, Accessing class members 2.2 Constructors, Methods Overloading, Nesting of methods 2.3 Inheritance: Extending a Class (Defining a subclass Constructor, Multilevel inheritance Hierarchical inheritance) 2.4 Overriding Methods, Final keyword (variable and Methods, Final variables and methods, Final classes, Finalizer Methods) 2.5 Abstract methods and Classes, Methods with Varargs, Visibility Control (Public access, friend access, Protected access, Private access, Private Protected access) 2.6 Vectors, Wrapper Classes, Enumerated Types, Annotations.	08
Unit 3: Introduction to Strings ,Interfaces and Packages		
1. Enlist Special String Operations. 2. Describe Character Extraction String Comparison. 3. Define String & StringBuffer. 4. Describe Command Line Arguments & Static Members. 5. Define Interfaces 6. Describe different forms of implementing Interfaces. 7. Create user defined Packages & accessing a package 8. Write a program to add class to a package & hiding classes.	3.1 Special String Operations, Character Extraction, String Comparison, Searching Strings, Modifying a String, Data conversion using ValueOf(), StringBuffer 3.2 Command Line Arguments, Static Members. 3.3 Interfaces : Defining interfaces, Extending interfaces, Implementing interfaces, Accessing Interface variables. 3.4 Packages: Java API Packages, Using System Packages, Using system Package, Naming Conventions, Creating Packages, Accessing a package, Using a package, Adding a class to a package, Hiding Classes, Static Import	10

Unit 4: Multithreaded Programming , Managing Errors and Exceptions		
1. Define Thread. 2. Describe Thread Life Cycle. 3. Write a program to Create & Extending Thread class. 4. Enlist Thread Methods & Thread Exceptions. 5. Describe Thread Priority & Synchronization. 6. Implement the runnable Interface. 7. Define Exception ,Errors its types. 8. Write a program of Exception Handling code. 9. Enlist Exception Handling parameters. 10. Describe multiple catch statements. 11. Write a program throwing our own Exceptions & Exceptions for Debugging.	4.1 Creating Thread, Extending a thread class, Stopping and Blocking a thread, Life cycle of thread 4.2 Using thread methods, Thread exceptions, Thread priority, Synchronization, Implementing the 'Runnable' Interface, Inter-thread communication 4.3 Exception : Types of errors, Exceptions, Syntax of Exception Handling code 4.4 Multiple catch statements, Using finally statement, Throwing our own Exceptions, Using Exception for Debugging	08
Unit 5: Introduction To Applet with Graphics Programming		
1. Differentiate between Local & Remote Applets, Applets & Applications. 2. Create an Executable Applet & Design a Web page using Applet tag. 3. Write a Program for passing Parameters to Applets & Event Handling. 4. Describe Graphics Class Methods. 5. Displaying Numerical values, Getting input from the Use. 6. Write a program to Draw different Shapes of Graphics Class using Applet. 7. Define AWT & Swing. 8. Describe AWT Package.	5.1 Local and remote applets, How applets differ from applications, Preparing to write applets, Building applet code, Applet life cycle. 5.2 Creating an Executable Applet, Designing a Web page, Applet tag, Adding Applet to HTML file, Running the Applet. 5.3 More about Applet Tag, Passing parameters to applets, Aligning the Display, More about HTML Tags, Displaying Numerical values, Getting input from the User, Event Handling. 5.4 Graphics Programming : The Graphics Class, Lines and rectangle, Circle and Ellipse, Drawing Arcs, Drawing Polygons, Line Graphs, Using control loops in Applets, Drawing Bar charts. 5.5 Introduction to AWT Package, Introduction to Swings.	08
Unit 6: Managing Input/Output Files in Java		
1. Define Streams. 2. Enlist Different Classes. 3. State Input/Output Exceptions. 4. Describe the different Files Operations. 5. State different Primitive Data Types. 6. Write a program for Concatenating & Buffering Files. 7. Write a Program for Random Access Files. 8. Describe Other Stream Classes.	6.1 Concept of Streams, Stream classes, Byte stream classes, character stream classes, using streams, Other useful I/O classes 6.2 Using the file class, Input/Output Exceptions, Creation of files, Reading/writing characters, Reading/writing bytes 6.3 Handling primitive data types, Concatenating and Buffering files, Random Access Files, Interactive Input and Output, Other Stream Classes	08
	Total Hrs	**48**

B. List of Practicals/Laboratory Experiences/Assignments:

Practical No.	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Write a program to demonstrate various operators and expressions using switch case.	Java Evolution and Basics Of Java	01
2	Write a program to implement looping different statements	Java Evolution and Basics Of Java	01
3	Write a program based on type casting and decision making statements.	Java Evolution and Basics Of Java	01
4	Write a program to implement concept of an array.	Java Evolution and Basics Of Java	01
5	Write a program to perform matrix operations using multi-dimensional array.	Java Evolution and Basics Of Java	02
6	Write a program on multiple type constructor by using classes.	Classes, Object and Methods	01
7	Write a program on operator overloading.	Classes, Object and Methods	01
8	Write a program to implement vector class and wrapper class with its respective methods.	Classes, Object and Methods	01
9	Write a program on Abstract method class.	Classes, Object and Methods	01
10	Write a program for method overriding.	Introduction to Strings ,Interfaces and Packages	01
11	Write a program to implement multilevel inheritance by applying various access controls to its data members and methods.	Introduction to Strings ,Interfaces and Packages	01
12	Write a program to accept input for the program by using command line argument	Introduction to Strings ,Interfaces and Packages	01
13	Write a program to demonstrate use of all string classes and its method using switch case.	Introduction to Strings ,Interfaces and Packages	01
14	Write a program to demonstrate use of all string classes and its method using switch case.	Introduction to Strings ,Interfaces and Packages	02
15	Programs to demonstrate - use of implmenting interfaces. - use of extending interfaces.	Introduction to Strings ,Interfaces and Packages	01
16	Programs on creating package, Accessing a package, Importing class from other package, Adding a class to a package	Introduction to Strings ,Interfaces and Packages	01
17	Write a program using thread.	Multithreaded Programming, Managing Errors and Exceptions	01
18	Write a program showing try and catch block for exception handling, catching invalid commandline argument, multiple catch statement.	Multithreaded Programming, Managing Errors and Exceptions	01
19	Write a program to create an applet that will accept values of 3 test marks i.e: Test1, Test2, Test3 and each out of 25. User will enter marks in 3 separate text fields. Applet will have a button labeled "FIND AVG". When user clicks on button the average of test marks will be displayed in the 4th text field.	Introduction To Applet with Graphics Programming	02
20	Write a program to draw different shapes using applet. (use Switch case)	Multithreaded Programming, Managing Errors and Exceptions	02
21	Write a program to copy contents from source file to destination file by using Input/ Output Stream.	Managing Input/Output Files in Java	02
22	Write a program to concatenate 2 strings by using file streams.	Managing Input/Output Files in Java	02
23	Perform a mini project by using all java concepts..	Managing Input/Output Files in Java	04
		Total Hrs	32

Specification Table for Theory Paper:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Java Evolution and Overview of Java Language	2	2	5	9
2	Classes, Object and Methods	2	2	9	13
3	Array, Strings ,Vectors, Interfaces and Packages	4	5	10	19
4	Multithreaded Programming, Managing Errors and Exceptions	4	3	6	13
5	Applet and Graphics Programming	5	4	9	18
6	Managing Input/Output Files in Java	3	1	4	8
Total		**29**	**08**	**43**	**80**

R-Remember U-Understand A-Analyze / Apply

Assessment and Evaluation Scheme:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	Continuous Assesment	PT	Students	Two PT (average of two tests will be computed)	10	–	Test Answer sheets	1,2,3,4,5,6
						–		
					10	=		
		–		End Of the Course	40	13	Practical Answer Sheets	1,2,3,4,5,6
Direct Assessment Practical	CA (Continuous Assessment)	=	Students	–	–	–	–	
		Journal Writing		Assignments	25	–	Journal	1,2,3,4,5,6,
				TOTAL	25	10		
		–		End Of the Course	25	10	Practical Answer Sheets	1,2,3,4,5,6
Indirect Assessment	Student Feedback on course		Students	After First PT	Student Feedback Form			1,2,3,4,5,6
	End Of Course			End Of The Course	Questionnaires			

Scheme Of Practical Evaluation:

S.N.	Description	Max. Marks
1	Observations,	05
2	Practical Performance	15
3	Viva voce	05
	TOTAL	**25**

Mapping Course Outcomes With Program Outcomes:

Course Outcomes	Program Outcomes (POs)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	2	2	2	3	1	1	1	1	2	2
2	2	3	2	2	2	-	1	1	3	3
3	2	3	2	2	1	-	2	1	2	3
4	2	3	2	3	2	2	2	1	3	3
5	3	2	3	3	3	2	1	2	3	3
6	2	3	3	2	3	2	2	2	2	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Reference & Text Books:

Text Book

Sr. No	**Title**	**Author, Publisher, Edition and Year of publication**	**ISBN Number**
1	Programming with Java	E. Balagurusamy, Tata McGraw Hill	8189401269
2	The Complete Reference Java2	Herbert Schildt, Tata McGraw Hill,5th Edition	0070495432
3	The Complete IDIOT's Guide To JAVA 2	Michael Morrison, PHI,2 edition language	0789721317
4	Special Edition Using Java 1.2	Joseph L. Weber, Que; 4th edition	9780789715296
5	Core Java Volume I	Cay S. Horstmann, Prentice Hall; 9th edition	9780137081899

E-References:

1. `https://www.edx.org/course/introduction-java-programming-part-1-hkustx-comp102-1x-2`
2. `https://www.tutorialspoint.com/java/`
3. `www.javatpoint.com/java-oops-concepts`
4. `www.studytonight.com/java/inheritance-in-java.php`
5. `www.journaldev.com/Java`
6. `https://docs.oracle.com/javase/tutorial/deployment/applet/`