DEPARTMENT OF COMPUTER SCIENCE

With effect from the academic year 2017-2020

Aim:

To provide a high-quality undergraduate education in computer science that prepares students for productive careers and lifelong learning.

Objectives

1. To demonstrate proficiency in problem-solving techniques using the computer.
2. To demonstrate proficiency in at least two high-level programming languages and two operating systems
3. To show the ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.
4. To show the ability to function effectively on teams to accomplish a common goal.
5. To sensitize the students to the social realities around them with the vision of making them responsible citizen.

Eligibility Norms for Admission

Those who seek admission to B.Sc. Computer Science must have passed the Higher Secondary Examinations conducted by the Board of Higher Secondary Examination, Tamil Nadu with Computer Science or Maths as one of the subjects or any other examination recognized and approved by the Syndicate of the Manonmaniam Sundaranar University, Tirunelveli.

Duration of the Programme : 3 years

Medium of Instruction : English

Passing Minimum

A minimum of 40% in the external examination and an aggregate of 40% is required. There is no minimum pass mark for the Continuous Internal Assessment.

Components of the B.Sc. Computer Science Programme

Part III – (Major and Allied)

Major	Core - Theory papers	(12 x 100)	1200
	Practicals (Core applied)	(6 x 50) + (3x 100)	600
	Project	(1 x 100)	100
	Elective- Theory papers	(3 x100)	300
	Major – Total marks		**2200**
Allied (I & II)			
	Theory	(4 x 100)	400
	Allied - Total marks		400
	Part III – Total marks		**2600**

All theory papers carry 100 marks each.

Major practicals during I and II year carry 50 marks each.

Major practicals during III year carry 100 marks each.

Practical examinations will be conducted at the end of odd and even semesters.

Course Structure
Distribution of Hours and Credits

Course	Sem. I	Sem.II	Sem.III	Sem. IV	Sem. V	Sem. VI	Total	
							Hours	Credits
Language	6(3)	6(3)			-	-	12	6
English	6(3)	6(3)			-	-	12	6
Major Core – Theory	4(4)	4(4)	5(4) + 5(4) + 5(4)	5(4) + 5(4)	6(5) + 5(5)	5(5) + 5(5) + 5(5)	59	53
Major Core – Practical	4(2)	4(2)	4(2) 4(2)	4(2) 4(2)	6(3)	4(2) 4(2)	38	19
Elective	-	-	-	5(5)	5(5)	5(5)	15	15
Project	-	-	-	-	6(5)		6	5
Allied- Theory	4(4)	4(4)	5(4)	5(4)	-	-	18	16
AECC	2(2)	2(2)	-	-			4	4
SBC	-	-	2(2)	2(2)	2(2)	2(2)	8	8
NMEC	4(2)	4(2)	-	-	-	-	8	4
* FC - I (Values for Life)	-	(1)	-	-	-	-	-	1
* FC – II (Personality Development)	-	-	-	(1)	-	-	-	1
*FC – III (HRE)					(1)			1
*FC – IV (WS)						(1)		1
*SDP -Certificate Course	-	(1)	-	-	-	-	-	1
*SLP –Extension Activity(RUN)	-	-	(1)	-	-	-	-	1
*STP – Clubs & Committees/ NSS	-	-	-	(1)	-	-	-	1
Total	**30(20)**	**30(22)**	**30(23)**	**30(25)**	**30(26)**	**30(27)**	**180**	**140+3**

Total number of hours = 180

Total number of credits = 140+3

*** Courses / Programmes conducted outside the regular working hours**

Courses Offered

Semester	Course	Subject Code	Paper	Hours / Week	Credit
I	**Part I**	TL1711 FL1711	Language : Tamil French	6	3
	Part II	GE1714	General English	6	3
	Part III	SC1711	Major Core I: Programming in C	4	4
		SC17P1	Practical I: Programming in C Lab	4	2
		SA1711	Allied I: Theory : Digital Computer Fundamentals	4	4
	Part IV	AEC171	Ability Enhancement Compulsory Course (AECC): English Communication	2	2
		SNM171	Non Major Elective Course(NMEC): CorelDraw	4	2
		VEC172	Foundation Course I: Values for Life	-	-
	Part V	SDP172	Skill Development Programme (SDP): Certificate Course	-	-
		STP174	Student Training Programme (STP): Clubs & Committees / NSS	-	-
II	**Part I**	TL1721 FL1721	Language : Tamil French	6	3
	Part II	GE1724	General English	6	3
	Part III	SC1721	Major Core II: Object Oriented Programming in C++	4	4
		SC17P2	Practical II: Programming in C++ Lab	4	2
		SA1721	Allied II: Theory: PC Hardware and Troubleshooting	4	4
	q Part IV	AEC172	Ability Enhancement Compulsory Course (AECC): Environmental Studies	2	2
		SNM172	Non Major Elective Course (NMEC): Internet and its Applications	4	2

		VEC172	Foundation Course I: Values for Life	-	1
	Part V	SDP172	Skill Development Programme (SDP): Certificate Course	-	1
		STP174	Student Training Programme (STP): Clubs & Committees / NSS	-	-
III	**Part III**	SC1731	Major Core III: Programming in Java	5	4
		SC1732	Major Core IV: Microprocessor and Assembly Language Programming	5	4
		SC1733	Major Core V: Data Structures and Algorithms	5	4
		SC17P3	Practical III: Programming in Java Lab	4	2
		SC17P4	Practical IV: Data Structure using C++ Lab	4	2
		SA1731	Allied III: Theory: Numerical and Statistical Methods	5	4
	Part IV	SBC173 / SBC174	Skill Based Course (SBC): Yoga / Computer Literacy	2	2
		VEC174	Foundation Course II: Personality Development	-	-
	Part V	STP174	Student Training Programme (STP): Clubs & Committees / NSS	-	-
		SLP173	Service Learning Programme (SLP): Extension Activity (RUN)	-	1
IV	**Part III**	SC1741	Major Core VI: Web Programming	5	4
		SC1742	Major Core VII: RDBMS with Oracle	5	4
		SC1743 SC1744 SC1745	Elective I: (a) System Analysis and Design (b) Software Engineering (c) Object Oriented Analysis and Design	5	5
		SC17P5	Practical V: Web Programming Lab	4	2
		SC17P6	Practical VI: Oracle Lab	4	2

		SA1741	Allied IV: Theory: Operations Research	5	4
	Part IV	SBC173 / SBC174	Skill Based Course (SBC): Yoga / Computer Literacy	2	2
		VEC174	Foundation Course II: Personality Development	-	1
	Part V	STP174	Student Training Programme (STP): Clubs & Committees / NSS	-	1
V	**Part III**	SC1751	Major Core VIII: Web Technology	6	5
		SC1752	Major Core IX: Operating Systems	5	5
		SC1753 SC1754 SC1755	Elective II (a) Data Communication and Computer Networks (b) Data Mining (c) Image Processing	5	5
		SC17P7	Practical VII: Web Technology Lab	6	3
		SC17PR	Project	6	5
	Part IV	SSK175	Skill Based Course (*SBC): Photoshop	2	2
		HRE175	Foundation Course III: Human Rights Education (HRE)	-	1
VI	**Part III**	SC1761	Major Core X: Android Application Development	5	5
		SC1762	Major Core XI: Computer Graphics and Multimedia	5	5
		SC1763	Major Core XII: UNIX and Shell Programming	5	5
		SC1764 SC1765 SC1766	Elective III (a) Mobile Computing (b) Client / Server Technology (c) Artificial Intelligence and Expert System	5	5
		SC17P8	Practical VIII: Android Application Development Lab	4	2
		SC17P9	Practical IX: Computer Graphics and Multimedia Lab	4	2
	Part IV	SSK176	Skill Based Course (*SBC): Dreamweaver CS4	2	2

		WSC176	Foundation Course IV: Women's Studies (WS)	-	1
			TOTAL	**180**	**140+3**

***SBC for the V & VI semesters is offered by the departments for their students**

SBC - We offer Photoshop and Dreamweaver CS4 during V & VI semester. The objective of Photoshop is to work with Images and Dreamweaver CS4 is to design webpage.

NMEC – We offer CorelDraw and Internet & its Applications during I and II semester. The objective of CorelDraw is to work with 2D Graphics and Internet & its Applications to design webpage and browse in internet.

Project – We offer project in V semester. The aim is to equip the students to develop real time projects.

Self Learning – Extra Credit Course

Semester	Subject code	Title of the paper	Hours / week	Credit
III	SC17S1	**Flash**	-	2
IV	SC17S2	**Maya**	-	2

Instruction for Course Transaction

Theory (Major Core) paper Hours

Components	Sem. I	Sem. II	Sem. III	Sem. IV	Sem. V	Sem. VI
Lecture Hours	50	50	60	60	75	60
Assignment / Group discussion	5	5	5	5	5	5
CIA (Test, Quiz)	5	5	5	5	5	5
Seminar	-	-	5	5	5	5
Total Hours / Semester	**60**	**60**	**75**	**75**	**90**	**75**

Theory (Elective/ Allied) paper hours

Components	Elective		Allied			
	Sem. V	**Sem. VI**	**Sem. I**	**Sem. II**	**Sem. III**	**Sem. IV**
Lecture Hours	65	65	50	50	65	65
Assignment / Group discussion	5	5	5	5	5	5
CIA (Test, Quiz)	5	5	5	5	5	5
Total Hours	**75**	**75**	**60**	**60**	**75**	**75**

Practical Hours

	Semester	Hours per week	Total hours / semester
Major	**I / II**	4	60
	III / IV	8	120
	V	6	90
	VI	8	120

Value Added Courses

S.No.	Name of the course	Total hours	Credit
I	**PC Hardware & Networking**	**30**	**1**
II	**Content Management System**	**30**	**1**

1. **PC Hardware & Networking**

   This course enables students to identify and rectify the onboard computer hardware, software and network related problems.

2. **Content Management System**

   This course provides capabilities for multiple users with different permission levels to manage content, data or information of a website.

Examination Pattern

Ratio of Internal and External:						
(Major / Elective /Allied)		**25:75**		**NMEC**	**40:60**	
Components of Internal:	Test	:	15	Test	:	20
	Quiz	:	5	Quiz	:	10
	Assignment	:	5	Assignment	:	10
	Total	**:**	**25**	**Total**	**:**	**40**

Question Pattern (Major / Allied / Elective)

Internal Test	Marks	External Exam	Marks
Part A 4x1 (No Choice)	4	Part A 10x1 (No Choice)	10
Part B 2x5 (Internal Choice)	10	Part B 5x5 (Internal Choice)	25
Part B 2x8 (Internal Choice)	16	Part B 5x8 (Internal Choice)	40
Total	**30**	**Total**	**75**

Question Pattern (NMEC)

Internal Test	Marks	External Test	Marks
Part A 4x1 (No Choice)	4	Part A 10x1 (No Choice)	10
Part B 3x3 (Internal Choice)	9	Part B 5x3 (Internal Choice)	15
Part B 1x7 (Internal Choice)	7	Part B 5x7 (Internal Choice)	35
Total	**20**	**Total**	**60**

Practical Papers

Major – I & II years

Internal : 20 marks
External : 30 marks
Total : 50 marks

Internal: 20 marks

Performance of the experiments : 2.5
Regularity in attending practical and submission of records : 2.5
Model exam : 10
Record : 5
Total : 20 marks

External: 30 marks

Major practicals : 20
Minor practicals : 10
Spotters (5 x 1½) : 7.5
Record : 2.5
Total : 30 marks

Practical Papers (Major - III year & Allied)

Internal : 40 marks
External : 60 marks
Total : 100 marks

Internal: 40 marks

Performance of the experiments	: 10
Regularity in attending practical and submission of records	: 5
Record	: 10
Model exam	: 15
Total	**: 40 marks**

External: 60 marks

Major practicals	: 25
Minor practicals	: 20
Spotters (4 x 2½)	: 10
Record	: 5
Total	**: 60 marks**

Semester I

Major Core I: Programming in C

Sub. Code: SC1711

No. of hours per week	No. of credits	Total no. of hours	Total marks
4	4	60	100

Objectives:

1. To familiarize the students with basic concepts of computer programming and developer tools.
2. To develop the skill of programming by learning the basic structure and methods.

Unit I

Overview of C:

History of C – Importance of C – Basic Structure of C programs. **Constants, Variables and Data Types:** Introduction - Character Set – C Tokens - Keywords and Identifiers – Constants – Variables – Data Types – Declaration of Variables – Assigning Values to Variables. **Operators and Expressions:** Arithmetic Operators – Relational Operators – Logical Operators – Assignment Operator – Increment and Decrement Operators – Conditional Operators – Bitwise Operators – Special Operators - Arithmetic Expressions – Evaluation of Expressions – Precedence of Arithmetic Operators.

Unit II

Managing Input and Output Operations: Formatted Input – Formatted Output. **Decision Making and Branching:** Introduction - Decision Making with **If** Statement – Simple **If** Statement – The **If … Else** Statement – Nesting of **If ....Else** Statements – The Switch Statement – The **goto** Statement. **Decision Making and Looping:** The while Statement – The **do** Statement – The **for** Statement – Jumps in Loops.

Unit III

Arrays: Introduction – One-Dimensional Arrays – Declaration of One-Dimensional Arrays – Initialization of One-Dimensional Arrays – Two-Dimensional Arrays – Initializing Two-Dimensional Arrays. **Character Arrays and Strings:** Introduction – Reading Strings from Terminal (Using scanf function) – Writing Strings to Screen (Using printf function) – String-Handling Functions.

Unit IV

User-Defined Functions: Introduction – Need for User-Defined Functions – Definition of Functions – Return Values and their Types – Function Calls – Function Declaration – Category of Functions – No Arguments and No Return Values – Argument but no Return Values – Argument with Return Values – No Argument but Returns a Value – Recursion – Passing Arrays to Functions (One-dimensional Arrays).

Unit V

Structures and Unions: Introduction - Defining a Structure – Declaring Structure Variables – Accessing Structure Members – Structure Initialization – Arrays of Structures – Unions. **Pointers:** Introduction – Understanding Pointers – Accessing the Address of a Variable – Declaring Pointer Variables – Accessing a Variable through its Pointer.

Text Book:

Balagurusamy, E. (2012). *Programming in ANSI C.* (7th edition). New Delhi: Tata McGraw Hill Education Private Limited.

Reference Books:

1. Byron S. Gottfried, (1998). *Programming in C.* (3rd edition). New Delhi: Tata McGraw Hill Education Private Limited.
2. Stephen Prata, (2004). *C Primer Plus.* (5th edition). New York: Addison-Wesley Publication.
3. King, K.N. (2008). *C Programming: A Modern Approach.* (2nd edition). New York: W.W. Norton & Company.
4. Paul Deitel, & Harvey Deitel, (2009). *How to Program C.* (6th edition). New Delhi: PHI Learning Private Limited.
5. Herbert Schildt, (2012). *C: The Complete Reference.* (4th edition). New Delhi: McGraw Hill Education Private Limited.

Semester I

Practical I

Programming in C Lab

Sub. Code: SC17P1

No. of hours per week	No. of credits	Total no. of hours	Total marks
4	**2**	**60**	**100**

Objectives:

1. Analyze the various programming constructs and implement it to perform specific task
2. Design and develop modular programming skills

Programs:

1. Program using if statement.
2. Program using for loop statement.
3. Program using while loop statement.
4. Program using do-while loop statement.
5. Program using array.
6. Program to search an element in an array.
7. Program using function.
8. Program using recursion.
9. Program using structure.
10. Program using pointers.

Semester I

Allied I: Digital Computer Fundamentals

Sub. Code: SA1711

No. of hours per week	No. of credits	Total no. of hours	Total marks
4	4	60	100

Objectives:

1. To enable the students with the basic principles of a personal computer.
2. To develop the skill for understanding the fundamentals of computer and peripherals.

Unit I

Computer Organization and Architecture: Introduction - Central Processing Unit - Internal Communication - Machine Cycle - The Bus. **Memory and Storage System:** Introduction - Memory Representation - Random Access Memory - Read Only Memory - Storage Systems - Magnetic Storage Systems - Optical Storage Systems.

Unit II

Input Devices: Introduction – Keyboard - Pointing Devices - Scanning Devices - Optical Recognition Devices - Digital Camera. **Output Devices**: Introduction - Display Monitors – Printers - Impact Printers - Non-Impact Printers – Plotters.

Unit III

Digital Systems and Binary Numbers: Digital Systems - Binary Numbers - Number Base Conversion - Octal and Hexadecimal Numbers – **Complements** – r's Complement-(r-1)'s Complement -Subtraction with r's Complement - Subtraction with (r-1)'s Complement .**Binary Codes**-Registers, Integrated circuits.

Unit IV

Boolean Algebra and Logic Gates: Introduction - Basic Definition - Axiomatic Definition of Boolean Algebra - Basic Theorems and Properties of Boolean Algebra - Digital Logic Gates. **Gate-Level Minimization:** NAND and NOR Implementation - Exclusive OR Function.

Unit V

Combinational Logic: Binary Adder– Subtractor - Binary Multiplier – Decoders – Encoders – Multiplexers-**Flip-Flops-** D Flipflop-JK Flipflop-Master Slave Flipflop

Text Books:

1. Balagurusamy, E. (2009). *Fundamentals of Computers.* (6th edition). New Delhi: Tata McGraw Hill Education India Pvt. Ltd.
2. Morris Mano, M., Micheal D. Ciletti, & John F. Wakerly, (2012). *Digital Design.* (4th edition). New Jersey: Pearson Publication.

Reference Books:

1. Norton Peter, (2004). *Introduction to Computers.* (6th edition). New Delhi: McGraw-Hill Education.
2. Ram, B. (2005). *Computer Fundamentals: Architecture and Organization.* (3rd edition). New Delhi: New Age International Publishers.
3. Rajaraman, V. (2010). *Fundamentals of Computers.* (5th edition). New Delhi: Prentice Hall India Learning Private Limited.
4. Thomas C. Bartee, (2011). *Digital Computer Fundamentals.* (6th edition). New Delhi: JBA Publishers.
5. Salaria, R.S. (2015). *Computer Fundamentals.* (1st edition). New Delhi: JBA Publishers.

Semester I

CorelDraw (NMEC)

Sub. Code: SNM171

No. of hours per week	No. of credits	Total no. of hours	Total marks
4	2	60	100

Objectives:

1. To enables our students to acquire practical proficiency for work with 2D graphics.
2. To obtain the knowledge and ideas of various designing aspects.

Unit I

CorelDraw Basics: Getting started with CorelDRAW – Creating a new file – The CorelDRAW Screen – Property Bar – Drawing Basic Geometric Figures – Drawing Polygons – Saving a file – Closing a File – Opening an Existing Corel Drawing – Views – The View Manager – Undoing, Redoing and Repeating Actions.

Unit II

Drawing and Selecting: Getting familiar with the Toolbox – Getting Started with the Project – More about Lines – Working with Objects Shapes – Using the Transformations Docker – Adding Effects to Objects.

Unit III

Working with Text: The Text Tool – Getting Started with the Book Cover – Converting from One Text Type to another – Formatting Text – The Text Editor.

Unit IV

Working with Images: Bitmap and Vector Images – Importing Images – Resizing, Rotating and Skewing Images – Cropping an Image – Importing Images from a CD – Converting to Bitmap.

Unit V

Adding Special effects to Bitmaps – Exporting Files to other Applications – Publishing to PDF – Backup and Recovering File.

Text Book:

Vikas Gupta, (2009). *Comdex DTP Course Kit.* (2nd edition). New Delhi: DreamTech Press.

Reference Books:

1. Steve Bain, (2002). *CorelDraw 11: The Official Guide.* (2nd edition). New Delhi: McGraw-Hill/Osborne Media.
2. Steve Bain, & Nick Wilkinson, (2004). *CorelDraw 12: The Official Guide.* (1st edition). New Delhi: McGraw Hill Professional.
3. Kogent Solutions Inc, (2008). *CorelDraw X4 in Simple Steps.* (3rd edition). New Delhi: Dreamtech Press.
4. Gary David Bouton, (2011). *CorelDraw X5*. (8th edition). New Delhi: McGraw Hill Education.
5. Gary David Bouton, (2015). *CorelDraw X7*. (11th edition). New Delhi: McGraw Hill Education.

Semester II

Major Core II: Object Oriented Programming in C++

Sub. Code: SC1721

No. of hours per week	No. of credits	Total no. of hours	Total marks
4	4	60	100

Objectives:

1. To introduce a programming approach which offers a powerful way to cope with the complexity of real world problems and the problems related with objects.
2. To develop the skill of programming by learning the basic structure and methods.

Unit I

Principles of Object-Oriented Programming: A look at Procedure-Oriented Programming - Object Oriented Programming Paradigm – Basic Concepts of Object Oriented Programming - Benefits of OOP. **Beginning with C++:** Definition of C++ - A Simple C++ Program – An Example with Class - Structure of C++ Program. **Tokens, Expressions and Control Structures:** Tokens – Keywords –Identifiers – Basic Data Types - Operators in C++ - Scope Resolution Operator – Memory Management Operators - Manipulators – Control Structures.

Unit II

Functions in C++: The Main Function - Function Prototyping – Call by Reference – Return by Reference - Inline Functions – Default Arguments - Function Overloading – Friend and Virtual Functions. **Classes and Objects:** Specifying a Class – Defining Member Function - Private Member Functions – Static Data Members – Arrays of Objects.

Unit III

Constructors and Destructors: Constructors – Multiple Constructors in a Class – Destructors. **Operator Overloading and Type Conversions:** Overloading Unary Operators - Overloading Binary Operators. **Inheritance: Extending Classes:** Single Inheritance – Multilevel

Inheritance – Multiple Inheritance – Hierarchical Inheritance – Hybrid Inheritance – Abstract Classes – Member Classes: Nesting of Classes

Unit IV

Pointers, Virtual Functions and Polymorphism: Pointers to Objects – this Pointer. **Managing Console I/O Operations:** C++ Streams – C++ Stream Classes – Formatted Console I/O Operations - Managing Output with Manipulators. **Manipulating Strings:** Creating (String) Objects – Manipulating String Objects – Relational Operations – String Characteristics.

Unit V

Working with Files: Classes for File Stream Operations – Opening and Closing a File – More about Open():: File Modes - File Pointers and their Manipulators – Sequential Input and Output Operations – Updating a File: Random Access – Command-Line Arguments. **Templates:** Introduction - Class Templates – Class Templates with Multiple Parameters – Function Templates – Function Templates with Multiple Parameters.

Text Book:

Balagurusamy, E. (2011). *Object Oriented Programming with C++*. (5th edition). New Delhi: Tata McGraw Hill.

Reference Books:

1. Ravichandran, D. (2001). *Programming with C++*. (5th edition). New Delhi: Tata McGraw Hill.
2. HerbtzSchildt, (2003). *C++: The Complete Reference*. (4th edition). New Delhi: McGraw Hill.
3. Paul Deitel, & Harvey M. Deitel, (2009). *C++ How to Program*. (7th edition). New Delhi: Prentice Hall.
4. Stanley B. Lippman, JoseeLajoie, Barbara E. Moo, (2012). *C++ Primer*. (5th edition). New York: Addison-Wesley.
5. BjarneStroustrup, (2013). *The C++ Programming Language*. (5th edition). New York: Addison-Wesley.

Semester II

Practical II

Programming in C++ Lab

Sub. Code: SC17P2

No. of hours per week	No. of credits	Total no. of hours	Total marks
4	**2**	**60**	**100**

Objectives:

1. To develop skill to make use of arrays and pointers in C++ programs.
2. To build knowledge about important concepts like functions, classes and constructors.

Programs:

1. Program with class
2. Inline Function
3. Friend Function
4. Constructor
5. Function Overloading
6. Single Inheritance
7. Multilevel Inheritance
8. Multiple Inheritance
9. Hybrid Inheritance
10. Program using File Handling
11. Program using Templates
12. Virtual Function

Semester II

Allied II: PC Hardware and Troubleshooting
Sub. Code: SA1721

No. of hours per week	No. of credits	Total no. of hours	Total marks
4	4	60	100

Objectives:

1. To develop an overall process for troubleshooting equipment and to resolve common peripheral problems
2. To troubleshoot and rectify the problems of computer and able to design fundamental logic circuits

Unit I

Introduction to PC: Definition of PC – Types – System Components. **Processor:** Processor Specifications – Modes – Features – Manufacturing – Physical Packaging – Multi Core Processors – Processor Upgrades – Processor Troubleshooting Techniques.

Unit II

Motherboards and Buses: Motherboard Form Factors – Motherboard Connectors - System Bus Types Functions & Features - Types of I/O Buses – System Resources - Resolving Resource Conflicts – Motherboard Selection Criteria.

Unit III

Memory: Memory Basics: ROM – DRAM - Cache Memory – SD RAM – DDR SDRAM. **Memory Modules:** SIMM – DIMM - RIMM. **Hard Disk Storage:** Definition of Hard Disk – Hard disk Drive Components – Drive Operation – Features

Unit IV

BIOS: BIOS Basics – BIOS Hardware/Software - Motherboard ROM BIOS – Upgrading the BIOS – Preboot Environment – CMOS Setup Specifications- Plug and Play BIOS – BIOS Error Messages.

Unit V

System Assembling and Maintenance: System Assembly – Motherboard Installation – Troubleshooting New Installations – Installing the Operating Systems – PC Diagnostics – Diagnostics Software - PC Maintenance Tools – Preventive Maintenance.

Text Book:

Scott Mueller, (2008). *Upgrading & Repairing PCs*. (18th edition). New Jersey: Pearson Education.

Reference Books:

1. Kenneth C. Mansfield, & James L. Antonakos, (2000). *Personal Computer Hardware and Troubleshooting Reference Guide.* (1st edition). New Delhi: Prentice Hall.
2. Stephen J. Bigelow, (2001). *Troubleshooting, Maintaining, & Repairing PCs.* (4th edition). New Delhi: Osborne/McGraw-Hill.
3. Craig Zacker, & John Rourke, (2001).*The Complete Reference: PC Hardware*. (Indian edition). New Delhi: McGraw Hill Education.
4. Govindarajulu, B. (2001). *IBM PC and Clones Hardware Trouble Shooting and Maintenance.* (3rd edition). New Delhi: Tata McGraw-Hill.
5. Micheal Meyers, (2003). *Introduction to PC Hardware and Troubleshooting.* (17th edition). New Delhi: Tata McGraw-Hill.

Semester II

Internet and its Applications (NMEC)

Sub. Code: SNM172

No. of hours per week	No. of credits	Total no. of hours	Total marks
4	2	60	100

Objectives:

1. To enable the students to browse internet, to create and use e-mail ID, to chat, and to have an exposure to designing web pages.
2. To enable the students to understand computer concepts, internet skills and uses a Web designing Lang.

Unit I

Introduction to Computers Programming Language: Types – History of Internet – Personal Computers – History of World Wide Web – Micro Software - .NET – Java – Web Resources.

Unit II

Web Browsers: Internet Explorer – Connecting to Internet – Features of Internet Explorer6 – Searching the Internet – Online help and tutorials – File Transmission Protocol (FTP) – Browser Settings.

Unit III

Electronic mail: Creating an E-mail ID – Sending and Receiving Mails – Attaching a File – Instance Messaging – Other Web Browsers.

Unit IV

Introduction to HTML: Headers – Linkers – Images – Special Characters and Line Breaks – Lists – Simple HTML Programs.

Unit V

Tables and Forms: Creating a Table – Formatting a Table – Adding Objects to Table – Creating a Form – Formatting a Form - Frames.

Text Books:

1. ITL Education Solutions Limited, (2005). *Introduction to Information Technology*. (7th edition). Singapore: Pearson Education.
2. Xavier, C. (2010). *World Wide Web Design with HTML*. (23rd edition). New Delhi: TMH Publication.

Reference Books:

1. Dave Roberts, (1996). *Internet Protocols Handbook: The Most Complete Reference for Developing Internet Applications*. (3rd edition). New Delhi: Galgotia Publications.
2. McBride, P.K. (2006). *Communicating with E-mail and the Internet*. (1st edition). UK: Butterworth-Heinemann Publishers.
3. Jon Duckett, (2011). *HTML and CSS: Design and Build Websites*. (3rd edition). New Jersey: John Wiley & Sons.
4. Oliver Hersent, David Boswarthick, & Omar Elloumi, (2011). *The Internet of Things*. (2nd edition). New Jersey: John Wiley & Sons Publications.
5. Rizwan Ahmed, P. (2013). *Internet and its Application*. (2nd edition). Chennai: Margham Publications.

Semester III

Major Core III: Programming in Java

Sub. Code: SC1731

No. of Hours per Week	Credit	Total No. of Hours	Marks
5	4	75	100

Objectives:

1. To understand the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
2. To develop skill for developing software's using different framework.
3.

Unit I

An Overview of Java: Object Oriented Programming – A First Simple Program – Two Control Statements – Lexical Issues – Java Class Libraries. **Data Types, Variables, and Arrays:** Java is a Strongly Typed Language – The Simple Styles – Integers - Floating Point Types – Characters – Boolean – A Close Look at Literal – Variables – Arrays. **Operators:** Arithmetic Operators - The Bitwise Operator - Relational Operator – Boolean Logical Operator - The Assignment Operator – The ? Operator – Operator Precedence – Using Parenthesis. **Control Statements:** Java Selection Statements – Iteration Statements – Jump Statements.

Unit II

Introducing Classes: Class Fundamentals – Declaring Objects – Assigning Object Reference Variables – Introducing Methods – Constructors - The this Keyword - **A Closer Look at Methods and Classes** - Overloading Methods - Using Objects as Parameters - Recursion. **Inheritance:** Inheritance Basics - Using Super – Creating a Multilevel Hierarchy – When Constructors are Called – Method Overriding – Dynamic Method Dispatch – Using Abstract Classes - Using Final with Inheritance. **Packages and Interfaces:** Packages – Access Protection – Importing Packages - Interface.

Unit III

Exception Handling: Fundamentals - Exception Types – Uncaught Exceptions – UsingTry and Catch Clauses – Nested Try Statements – Throw – Throws-Finally - Java's Built in Exceptions – Creating Your Own Exceptions Sub classes. **Multi-threaded Programming:** The Java Thread Model – The Main Thread – Creating Thread – Creating Multiple Threads – Using isalive( ) and Join( ) – Thread Priorities.

Unit IV

The Applet Class: Applet Basics – Applet Architecture – An Applet Skeleton – Simple Applet Display Methods – The HTML APPLET Tag – Passing Parameter to Applets – Applet Context and Show Document. **Event Handling:** Two Event Handling Mechanisms – The Delegation Event Model – Event Classes – Sources of Events – Event Listener Interfaces – Using the Delegation Event Model.

Unit V

Introducing AWT - Working With Windows, Graphics and Text: AWT Classes – Window Fundamentals – Working with Frame Windows– Working with Graphics - Working with Color. Using AWT Controls, Layout Managers and Menus: Control Fundamentals –Labels - Using Buttons - Applying Check Boxes - Checkbox Group - Choice Controls - Using Lists - Using Text Field - Using a Textarea.

Text Book:

Herbert Schildt, (2002).*The Complete Reference Java 2*. (5th edition).New Delhi: Tata McGraw Hill Publication.

Chapters: 2, 3, 4, 5, 6, 8, 9, 10, 11, 19, 20, 21, 22

Reference Books:

1. Deitel.H.M. and Deitel.P.J, (2006). *Java: How to program*. (2nd edition). Chennai: Prentice Hall of India.
2. John zciknowski, (2000). *Mastering Java 2*. (2nd edition). Pune: BPB Publications.
3. E. Balaguruswamy, (2009). *Programming with Java*. (4th edition). Bangalore: McGraw Hill.
4. John R. Hubbard, (2004). *Programming with JAVA*. (2nd edition). New Delhi: Schaum's Series.
5. Paul Deitel, Harvey Deitel, (2011). *Java: How to Program*. (10th edition). New York: Prentice Hall.

Semester III

Major Core IV: Microprocessor and Assembly Language Programming

Sub. Code: SC1732

No. of Hours per Week	Credit	Total No. of Hours	Marks
5	4	75	100

Objectives:

1. To introduce the basic concepts of microprocessor and assembly language programming.
2. To equip the skill for developing simple assembly language programs using the 8085 instruction set.

Unit I

Microcomputers, Microprocessors, and Assembly Language: A Microprocessor as a Programmable Device - Microprocessor as a CPU - Organization of a Microprocessor Based System – Working of Microprocessor. **Microprocessor Architecture and Micro Computer Systems**: Microprocessor Architecture and its Operations. **8085 Microprocessor Architecture and Memory Interfacing**: The 8085 MPU - Memory Interfacing.

Unit II

Introduction to 8085 assembly language Programming: The 8085 Programming Model - Instruction Classification – Instruction Format: Instruction Word Size – Opcode Format - To Write, Assemble and Execute a Simple Program. Programming Techniques with Additional Instruction: Programming Techniques: Looping, Counting and Indexing - Arithmetic Operations Related to Memory - Logic Operations.

Unit III

Introduction to 8085 Instructions: Data Transfer (Copy) Operations - Arithmetic Operations - Logic Operations - Branch Operations - Writing Assembly Language Programs. Code Conversion, BCD Arithmetic and 16-bit Data Operations: BCD to Binary - Conversions - Binary to BCD Conversion.

Unit IV

Counters and Time Delays Stack and Sub routine: Counters and Time Delays. Stack and Sub routine: Stack -Sub Routine - Restart, Conditional Call and Return Instructions. Interrupts: The 8085 Interrupt - RST Instructions - An Implementation of the 8085 Interrupt - Multiple Interrupts and Priorities.

Unit V

Case Study: 8086 Architecture - 80386 Architecture - 80486 Architecture - A Comparative Study of Pentium I, II, III & IV- Intel Dual Core - Intel Core 2 Duo - Introduction to Microcontroller - Comparative Studies of Microprocessor and Microcontroller.

Text Book:

Ramesh.S.Goankar, (2011). *Microprocessor Architecture, Programming, and Applications with the 8085*. (5th edition). India: Penram International Publishing.

Chapters: 1, 2, 3, 4, 5, 6, 7, 8(8.1), 9, 12

Reference Books:

1. Mohamed Rafiquzzaman, (2010). *Microprocessors and Microcomputer-Based System Design*. (2nd edition). Bombay: CRC Press.
2. Yu-cheng Liu, Glenn A. Gibson, (2005). *Microcomputer Systems: The 8086/8088 Family*. (2nd edition). New Delhi: PHI Publication.
3. Douglas V. Hall, SSSP Rao, (2012). *Microprocessors and Interfacing*. (3rd edition). New Delhi: McGraw Hill Education.
4. Short, (2003). *Microprocessors and Programmed Logic*. (2nd edition). New Delhi: Pearson Publication.
5. Anokh Singh, Chhabra, A. K. (2005). *Fundamentals of Microprocessors and Microcontrollers*. (2nd edition). New Delhi: S. Chand Publication.

Semester III

Major Core V: Data Structures and Algorithms

Sub. Code: SC1733

No. of Hours per Week	Credit	Total No. of Hours	Marks
5	**4**	**75**	**100**

Objectives:

1. To focus on how the data are organized and how they can be implemented using different algorithms.
2. To develop the interpretive skills, including the ability to analyze data statistically and interpret results.

Unit I

Problem Solving: Introduction to Data Structures - Types of Data Structures - How to write an Algorithm - Implementation of Algorithm - Asymptotic Notation – Arrays - Basic Operations in Array - Concept of Linked List - Linked List and Dynamic Memory Management - Types of Linked List - Linked List Operations - Circular Linked List - Doubly Linked List.

Unit II

Stacks: Concept of Stack - Representation of Stack Using Array - Linked Stack – Expressions - Evaluation of Postfix Expression - Recursion. Queues: Introduction - Representation of Queues Using Arrays - Linked Queue - Circular Queue - Priority Queues - Double Ended Queues.

Unit III

Tree Structures: Introduction - Binary Trees - Representation of Trees - Display of Binary Trees - AVL Trees – Heaps - Applications of Binary Heap.

Unit IV

Graphs: Introduction - Properties of Graph - Representation of Graph - Applications of Graph - Shortest path Algorithm - Topological Sort.

Unit V

Algorithm Design and Analysis - Greedy Algorithms - General Method - Applications of Greedy Algorithm - Knapsack Problem - Huffman Code - Divide and Conquer Method - Backtracking

Text Book:

Putembekar, A. A. (2009). *Data Structures and Algorithm*. (1st edition). New Delhi: Technical Publications.

Reference Books:

1. Ellis Howrowitz, (2008). *Fundamentals of Data Structures in C*. (2nd edition). India: Universities Press Pvt. Ltd.
2. Seymour Lipschutz, Vijayalakshmi Pai, G. A. (2006). *Data Structures*. (15th edition). New Delhi: Tata McGraw-Hill.
3. Adam Drozdek, (2012). *Data Structures and algorithm in C*. (3rd edition). New York: Cengage Learning.
4. Aaron M. Tenenb*aum, Moshe J. Augenstein, YedidyahLangsam, (2009).* Data Structures Using C and C++. (2nd edition). Chennai: PHI.
5. Malik, D. S. (2010). *Data Structure using C++*. (2nd edition). New Delhi: Cengage Learning.

Semester III

Allied III: Numerical and Statistical Methods

Sub. Code: SA1731

No. of Hours per Week	Credit	Total No. of Hours	Marks
5	4	75	100

Objectives:

1. To equip the students with statistical tools and concepts that help in decision making.
2. To apply the knowledge of computing and mathematical methods appropriate to various discipline.

Unit I

Algebraic and Transcendental Equations: Introduction – Errors in Numerical Computation – Iteration Method – Bisection Method.

Unit II

Simultaneous Equations: Introduction – Simultaneous Equations – Back Substitution – Gauss Elimination Method – Gauss-Jordan Elimination Method – Calculation of Inverse of a Matrix.

Unit III

Interpolation: Introduction – Newton's Interpolation Formulae – Lagrange's Interpolation Formulae – Divided Differences – Newton's Divided Differences Formulae

Unit IV

Correlation and Regression: Introduction – Correlation – Rank correlation – Regression [Expect Correlation coefficient for a bivariate frequency distribution].

Unit V

Probability: Introduction – Probability – Conditional Probability – Properties of independent events – Baye's theorem.

Text Books:

1. Arumugam, S., Thangapandi Issac, S., Soma Sundaram, A. (2013). *Numerical Analysis with Programming in C*. (4th edition). Bombay: New Gamma Publishing House.
2. Arumugam, S., Thangapandi Issac, S. (2013). *Statistics*. (1st edition). Andra: New Gamma Publishing House.

Reference Books:

1. Sastry, S.S. (2003). *Introduction Methods of Numerical Analysis*. (3rd edition). India: Prentice Hall Publication.
2. Sear Borough, J. N. (1966). *Numerical Mathematical Analysis*. (6th edition). New Delhi: Oxford and IBH Publishing Co.
3. Gupta, P.P., Malik, G. S., Sanjay Gupta, (1992). *Calculus of Finite Differences and Numerical Analysis*. (16th edition). Bombay: Krishna Prakashan Mandir.
4. Kapur, J. N., Saxena, (1986). *Mathematical Statistic*. (12th edition). NewDelhi: Chand and Company.
5. Mangaladoss, (1994). *Statistics and its Applications*. (11th edition). New Delhi: Suja Publishing House.

Semester III

Practical III

Programming in Java Lab

Sub. Code: SC17P3

No. of Hours per Week	Credit	Total No. of Hours	Marks
4	2	60	100

Objectives:

1. To create the programs by using the object of oriented concepts.
2. To build software development skills using java programming for real world applications.

Programs:

1. Program using if condition
2. Program using if-else
3. Program using Overloading Method
4. Program using Overloading Constructor
5. Program using Override Method
6. Copy an Array
7. Program using package
8. Exception Handling
9. Creating a java program using Thread
10. Create an Applet program
11. Create an Applet program using Mouse Event

Semester III

Practical IV

Data Structure Using C++ Lab

Sub. Code: SC17P4

No. of Hours per Week	Credit	Total No. of Hours	Marks
4	**2**	**60**	**100**

Objectives:

1. To develop the skills to design and analyze simple linear and non-linear data structures.
2. To strengthen the ability to identify and apply the suitable data structure for the given real world problem.

Programs:

1. Write a program using recursion
2. Write a program to implement stack using array
3. Write a program to implement Queue using array
4. Write a program to insert a node into a linked list
5. Write a program to delete a node from the linked list
6. Write a program to implement quick sort
7. Write a program to implement merge sort
8. Write a program to implement linear search
9. Write a program to implement binary search
10. Tree Traversal

Semester III

Flash (Self Learning Course)

Sub. Code: SC17S1

No. of Hours per Week	Credit	Total No. of Hours	Marks
-	2	-	100

Objectives:

1. To enable the students to make critical thinking skills to design and to create animations.
2. To create professional-quality animations and manage an efficient workflow.

Unit I:

Introducing Flash CS5: Exploring the User Interface of Flash CS5-Working with Workspaces-Setting the Stage-Saving a Flash Document. Getting Stared with Tools: Working with Drawing Tool-Working with the selection and Modification Tools-Working with Colors in Flash.

Unit II:

Working with Objects and Text: Editing Objects in Flash-Transforming Objects-Editing a Text Field. **Working with the TimeLine Panel:** Working with Frames and Key frames in flash-Working with Layers and Layer Folders in flash.

Unit III:

Using Symbols, Instance, and the Library: Creating Symbols in Flash-Modifying Symbols. Inserting Instances in Flash-Exploring the Library Panel in Flash. **Working with Sound and Video:** Working with Sound Files in Flash-Using Video in Flash.

Unit IV:

Creating Animations: Understanding Tweened Animations-Using Shape Tweening in Flash-Working with Motion Tweening in Flash-Editing Motion Path of a Tweened Object-Working with Motion Presets in Flash-Creating a Mask Layer.

Unit V:

Working with Advanced Animation: Working with Bone Tool-Working with 3D animation in Flash. Publishing and Exporting Flash Files:Publishing Files in Flash-Exploring Files in Flash.

Text Book:

Kogent Learning Solutions Inc., (2011). *Flash CS5 in Simple Steps*. (2nd edition). New Delhi: Dreamtech Press.

Reference Books:

1. James Gonzalez, (2006). *Flash Professional 8*. (1st edition). New Delhi: Peachpit Press.
2. Scott Kelby, (2017). *The Flash Book*. (1st edition). New Delhi: Rocky Nook.
3. Adobe, (2014). *Adobe Flash Professional*. (1st edition). New Delhi: Pearson Education India.
4. Melnikov S. (2006). *Flash 8 Game Developing Handbook*. (1st edition). New Delhi: BPB Publications.
5. Brian Underdahl, (2003). *Macromedia Flash MX 2004: The Complete Reference*. (2nd edition). New Delhi: McGraw Hill.

Semester IV

Major Core VI: Web Programming

Sub. Code: SC1741

No. of Hours per Week	Credit	Total No. of Hours	Marks
5	4	75	100

Objectives:

1. To enable the students to understand the programming features of .Net Framework using ASP.NET and C#.
2. To develop dynamic web pages and various software applications which inbuilt the entrepreneurship skill.

Unit I

ASP.Net 3.5 Essentials: New Features in ASP.Net 3.5-The ASP.Net Life Cycle-Overview of Visual Studio 2008-Exploring a sample ASP.Net-Creating a sample ASP.Net Website. Web Forms: Standard Control: The Label Control-The Button Control-The Textbox-The Hidden Field Control-File Upload Control-The Image Control-The ImageMap Control-The ListBox Control-The Drop-Down List Control- The Checkbox Control—The Radio Button Control-User Controls and Custom Controls-Working with User Control-Working with Custom Controls.

Unit II

Navigation Control: The TreeView Control-Creating the TreeView Control-Generating TreeView form a Database-Using the Menu Class-The Menu Control-Creating Static Menus-Creating Dynamic Menus. **Validation Control:** Introduction-The Required Field Validation Control-The Range Validator Control-The Regular Expression Validator Control-The Compare Validator Control-The Custom Validator Control-The Validation Summary Control.

Unit III

Working with Database Controls: The GridView Control-The DataList Control-The DetailsView Control-The FormView Control-The ListView Control-The Repeater Control- The SqlDataSource Control-The AccessDataSource Control-The ObjectDataSource Control-The XmlDataSource Control. Introducing Login Controls: The Login Control-The LoginView Control-The LoginStatus Control- The LoginName Control-The Password Recovery Control.

Unit IV

Introducing C# 2008: Need of C# - C# Preprocessor Directives-New Features of 2008-Creating A Simple C# 2008 Console Application-Identifiers And Keywords-Data Types, Variables, and Constants-Expressions and Operators. **Namespace, Classes, Objects, and Structs:** Namespaces-Classes and Objects-Constructors and Destructors-Static Classes and Static Class Members-Properties-Indexers-Structs.

Unit V

Object Oriented Programming: Encapsulation–Inheritance-Polymorphism-Abstraction-Interfaces. Pointers, Delegates and Events: Delegates, Events. Flow Control and Exceptional Handling: Control Flow statements-Exceptional handling.

Text Book:

Kogent Learning Solutions Inc., (2011). *NET 3.5 Programming - Black Book.* (New Edition). New Delhi: DreamTech Press Publication.

Chapters: 26, 29, 30,31,33,39.

Chapters: 11, 12,13,14,15

Reference Books:

1. Kogent Learning Solutions Inc., (2010). *C# 2008 Programming - Black Book.* (Platinum Edition). New Delhi : DreamTech Press Publications.
2. Reynald Adolphe , (2016). *Expert Programming In C# and .Net*. (2nd edition). Bangalore: Packt Publication.
3. Richaro Peres, (2016). *Entity Framework Core Cookbook*. (2nd edition). Bangalore: Packt Publication.
4. Matthew Mac, Donald and Màrio Szpuszta, (2008). *Pro Asp.Net 3.5 in C# 2008*. (2nd edition). Hariyana: Apress Publication.
5. Jeff Martin, (2016). *Visual Studio 2015*. (2nd edition), Bangalore: Packt Publication.

Semester IV

Major Core VII: RDBMS with Oracle
Sub. Code: SC1742

No. of Hours per Week	Credit	Total No. of Hours	Marks
5	4	75	100

Objectives:

1. To develop the skills of the students to write queries for various database related operations.
2. To build databases for various department by applying logic, methods, concepts and technique of database management system.

Unit I

Introduction: Database - System Applications - View of Data - Database Languages - Relational Databases. **Introduction to the Relational Model:** Structure of Relational Database - Database Schema-Keys - Schema Diagrams. **Introduction to SQL:** Set Operations - Aggregate Functions. **Database Design and the E-R Model:** The Entity-Relationship Model- Constraints -Entity-Relationship Diagrams. **Normalization:** First Normalization Form - Second Normalization Form - Third Normalization.

Unit II

The Basic Parts of Speech in SQL – Creating the Newspaper Table – Select, from, where, and order by – Logic and Value **Getting Text Information and Changing It** – Data types – Define String – Notation – Concatenation – Cut and Paste Strings – Order by and where with String Functions

Unit III

Playing The Numbers: The Three Classes of Number Functions – Notation – Single-Value Functions – Group-Value Functions – List Functions – Finding Rows with MAX or MIN – Precedence and Parentheses. Dates: Then, Now, and the Difference: Date Arithmetic – ROUND and TRUNC in Date Calculations – TO_DATE and TO_CHAR Formatting – Dates in where Clauses – Using the EXTRACT Function – Using the TIMESTAMP Data Types. Grouping Things Together: The Use of Group by and Having - Views of Groups - The Power of Views of Groups.

Unit IV

Dependent Queries: Advanced Subqueries – Outer Joins – NATURAL and INNER Joins – UNION, INTERSECT, and MINUS. Changing Data: Insert, Update, Merge, and Delete –

Insert – Rollback, Commit, and Autocommit – Multitable Inserts – Delete – Update – Using the Merge Command. Creating, Dropping, and Altering Tables and Views: Creating a Table – Dropping Tables – Altering Tables – Creating a View – Creating a Table from a Table – Creating an Index-Organized Table – Using Partitioned Tables. An Introduction to PL/SQL: PL / SQL Overview – Declarations Section – Executable Commands Section – Exception Handling Section

Unit V

Triggers: Required System Privileges – Required Table Privileges – Types of Triggers – Trigger Syntax – Enabling and Disabling Triggers – Replacing Triggers – Dropping Triggers. Procedures, Functions, and Packages: Required System Privileges – Required Table Privileges – Procedures VS Functions - Procedures VS Packages – Create Procedure Syntax – Create Function Syntax – Create Package Syntax – Viewing Source Code for Procedural Objects – Compiling Procedures, Functions, and Packages – Replacing Procedures, Functions, and Packages – Dropping Procedures, Functions, and Packages.

Text Books:

1. Abraham Silber schatz, Hendry F. Korth, Sudharshan, S. (2011). *Database system Concepts*. (6th edition). New Delhi: Tata McGraw Hill Companies.
2. Kevin Loney, George Koch and the experts at TUSC, (2002). *Oracle 9i - The Complete Reference*. (Electronic edition). New Delhi: Tata McGraw Hill.

Reference Books:

1. Ramez Elmasri & Shamkant B. Navathe, (2009). *Fundamentals of Database Systems*. (5th edition). New Jersey: Pearson Education.
2. Michael Abbey, Mike Corey, Ian Abramson, (2001). *Oracle 9i A Beginner's Guide*. (2nd edition). New Delhi: Tata MacGraw Hill.
3. Steven Feuerstein, Bill Pribyl, (2014). *Oracle PL/SQL Programming*. (6th edition). New Jersey: O'Reilly Media Publication.
4. Ivan Bayross, (2010). *SQL, PL/SQL the Programming Language of Oracle Paperback*. (6th edition). New Delhi: BPB Publications.
5. Ron Hardman, Michael Mclaughlin, (2005). *Expert Oracle PL/SQL*. (4th edition). New Delhi: Oracle Press.

Semester IV

Elective I

(a) System Analysis and Design

Sub. Code: SC1743

No. of Hours per Week	Credit	Total No. of Hours	Marks
5	5	75	100

Objectives:

1. To build computer based information systems and to describe methods that are used to analyze systems, design them and build them.
2. To apply design and development principles in the construction of software systems of varying complexity.

Unit I

The System Design Environment: Definition of system – Need for system analysis. **Typical Information Systems:** Introduction to typical information systems - Human resource system - Customer or Client System - Inventory control system - Accounting system - Marketing system. **Problem Solving Steps:** The linear cycle. **Gathering Information:** A frame work for gathering information -Search procedures.

Unit II

Starting a Project: Setting the project goal - Generating the broad alternative solution - Economic feasibility - Defining the project plan. Data Flow Diagram: Data flow symbols - Describing systems by data flow diagram - Data modelling techniques. Describing Data: Conceptual modelling - Entity relationship analysis - E_R diagram and DFDs.

Unit III

Advanced Modelling Methods: Some advanced topics on the entity relationship model - Alternative modelling methods. Documentation: Documentation – Project dictionary entries - Using the project dictionary. Designing a New System: Problem solving and design - Problem solving with structured system techniques - Designing the new logical model.

Unit IV

Relational Analysis: Relations - Functional dependencies - Relation keys - Normal form relations. Database Design: Conversion to logical record structure - Completing the database specification - Conversion to a set of files - Conversion to DBMS structure. Program Design: Steps in program design - Structure charts - Conversion from DFD to structured chart.

Unit V

Practical Design Methodologies: Introduction - Structured system analysis — HIPO - SSADM. **Project Management:** Choosing project management entities - Organizing project management entities - Tools used in project – Reviewing project progress - Project reviews and walkthroughs.

Text Book:

I.T. Hawryszkiewycz, (1991). *Introduction to System Analysis and Design*. (2nd edition). New Delhi: Prentice Hall of India.

Reference Books:

1. Eliaz.M.Awad, (1994). *System Analysis and Design*. (2nd edition). New Delhi: Galgotia Publications.
2. Srinivasan, Garg Vinod Kumar, (2006). *Work book on Systems Analysis & Design*. (2nd edition). New Delhi: PHI Learning Private Limited Publications.
3. Dennis, Wixom, Roth, (2009). *System Analysis and Design*. (5th edition). New York: John Wiley & Sons Inc.
4. Kenneth E. Kendall, (2006). *System Analysis and Design*. (8th edition). New Delhi: Prentice Hall of India.
5. V.Rajaraman, (2011). *System Analysis and Design of Information Systems*. (3rd edition). New Delhi: PHI Learning Private Limited.

Semester IV

Elective I

(b) Software Engineering

Sub. Code: SC1744

No. of Hours per Week	Credit	Total No. of Hours	Marks
5	5	75	100

Objectives:

1. To design, test, and to maintain the software's.
2. To be employed in industry, government, or entrepreneurial endeavours to demonstrate professional advancement through significant technical achievements.

Unit I

Introduction: FAQ about Software Engineering – Professional and ethical responsibility. **Socio Technical Systems:** Emergent System Properties – System Engineering - Organizations, People and Computer Systems – Legacy Systems. **Critical System:** A Simple Safety - Critical System – System dependability – Availability and Reliability – Safety.

Unit II

Software Process: Software Process Models – Process iteration-Process Activities – The Rational Unified Process – CASE - Project Management: Management Activities – Project Planning - Project Scheduling- Risk Management. Software Requirements: Functional and Non-functional requirements - User requirements – System requirements – Software requirements document. Requirements Engineering Process: Feasibility Studies – Requirements Elicitation and Analysis – Requirements Validation.

Unit III

System Models: Context Models - Behavioural Models - Data Models - Object Models - Structured Methods – **Formal Specification:** Formal Specification in the Software Process - **Sub System Interface Specification Design:** Architectural design decisions – System Organization – Modular Decomposition Styles – Control Style. **Object Oriented Design:** An Object Oriented Design Process – Design Evolution.

Unit IV

Rapid Software Development: Agile Methods – Extreme Programming – Rapid Application Development – Software Prototyping – Component. **Based Software Engineering:** Components and Components Models – The CBSE Process – Component Composition. **Software Evolution:** Program evolution dynamics – Software Maintenance – Evolution Process. **Verification and Validation:** Planning verification and validation - Software inspections - verification and formal methods.

Unit V

Software Testing: System testing – Component Testing – Test Case Design – Test Automation. Software Cost Estimation: Software Productivity – Estimation Techniques – Algorithmic Cost Modelling - Project duration and staffing. Quality Management: Process and Product quality – Quality Assurance and Standards - Quality Planning. Configuration Management: Configuration Management Planning - Change Management – CASE tools for Configuration Management.

Text Book:

Ian Sommerville, (2007). *Software Engineering.* (7th edition). New Delhi: Pearson Publication.

Reference Books:

1. Roger S. Pressman, (2004). *Software Engineering Concepts*. (6th edition). New Delhi: McGraw Hill Publication.
2. Richard Fairly, (2006). *Software Engineering*. (6th edition).New Delhi: Tata McGraw Hill Publication.
3. John Sonmez, (2004). *The Complete Software Developer's Career Guide.* (3rd edition). Haryana: Simple Programmer Publishing.
4. Rod Stephens, (2001). *Beginning Software Engineering*. (1st edition). New Delhi: Wrox Publication.
5. Frank Tsui, (2014). *Essentials of Software Engineering*. (2nd edition).Hyderabad: Bartlett Publication.

Semester IV

Elective I

(c) Object Oriented Analysis and Design

Sub. Code: SC1745

No. of Hours per Week	Credit	Total No. of Hours	Marks
5	5	75	100

Objectives:

1. To analyze and design an application, system or business by applying object oriented programming.
2. To apply object oriented techniques and notation to the process of developing software.

Unit I

The Object Model: The Evolution of the Object Model - Elements of the Object Model - Applying the Object Model. **Classes And Objects**: The nature of an Object - Relationships among objects.

Unit II

Classes And Objects: The nature of the Class - Relationships among Classes - The Interplay of Classes and Objects - On building quality classes and objects. Classification: The importance of Proper classification - Identifying Classes and Objects - Key abstractions and mechanisms.

Unit III

The Notation: Elements of the notation - Class diagrams- state transition diagrams - object diagrams - interaction diagrams - module diagrams - process diagrams. The Process: First principles, the micro development process - The Macro development process.

Unit IV

Introduction: What is the UML? – Notations and Meta Models – Why do Analysis and Design?. **An Outline Development Process:** Overview of the Process - Inception- Elaboration- Construction – Transition – When to use Iterative Development. **Use Cases:** Use Case Diagrams - Business and System Use cases - When to use Use cases.

Unit V

Class Diagrams: The Essentials: Perspectives -Associations – Attributes – Operations – Generalization - Constraint Rules- When to use Use Class Diagrams. Interaction Diagrams:

Sequence Diagrams - Collaboration Diagrams - Comparing Sequence and Collaboration Diagrams - When to use Interaction Diagrams.

Text Books:

1. Grady Booch, (2006). *Object Oriented Analysis and Design.* (2nd edition). New Delhi: Pearson Education.
2. Martin Fowler and Kendall Scott, (2004). *UML Distilled, A brief Guide to the Standard Object Modelling Languages.* (2nd edition). New Delhi: Pearson Education.

Reference Books:

1. Craig Larma, (2002). *Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and the Unified Process*. (2nd edition). New Delhi: Pearson Education.
2. Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides, (2008). *Design Patterns: Elements of Reusable Object Oriented Software*. (1st edition). New Delhi: Pearson Education.
3. Mc Laughalin, (2009). *Object Oriented Analysis and Design.* (1st edition). Bombay: Head First Series.
4. Ivar Jacobson, (1992). *Object Oriented Software Engineering: A Use Case Driven Approach.* (1st edition). New Delhi: Pearson Education.
5. James Rumbaugh et al, (1991). *Object Oriented Modelling and Design.* (1st edition). New Delhi: Prentice Hall of India.

Semester IV

Practical V

Web Programming Lab

Sub. Code: SC17P5

No. of Hours per Week	Credit	Total No. of Hours	Marks
4	2	60	100

Objectives:

1. To understand the design and implement dynamic WebPages.
2. Use Visual C# and ASP.Net to create WebPages with advanced creativity

Programs:

Visual C#

1. Designing an application to work with Class and Object
2. Designing an application to work with Constructor
3. Designing an application to work with Single Dimensional Arrays
4. Designing an application with Method Overload
5. Designing an application to work with Inheritance
6. Designing an application to work with Exception handling

ASP.NET

1. Designing a Webpage using standard Web Forms Application
2. Designing Application with Navigation Controls
3. Designing application to work with databases
4. Program using Gridview Control.
5. Developing an application using Validation Controls.
6. Designing a Webpage using Login Controls.

Semester IV

Practical VI

RDBMS with Oracle Lab

Sub.Code: SC17P6

No. of Hours per Week	Credit	Total No. of Hours	Marks
4	**2**	**60**	**100**

Objectives:

1. To enrich various database concepts.
2. To develop the skills for data analyst in various fields.

Programs:

1. Table creation and manipulation
2. Queries using aggregate functions
3. Queries using set operations
4. Create table with various integrity constraints

   (not null, primary key, unique, check)
5. Create table with a foreign key
6. View creation and manipulation
7. Retrieving Rows with Number and Date Function
8. Retrieving Rows with Subqueries
9. Joining Tables (Inner and Outer Join)
10. Simple Pl/SQL program
11. PL/SQL program using if-else
12. PL/SQL Program using For loop
13. PL/SQL Program using while loop
14. Program to validate data entry using triggers

Semester IV

Allied IV: Operations Research

Sub. Code: SA1741

No. of Hours per Week	Credit	Total No. of Hours	Marks
5	4	75	100

Objectives:

1. To do things best under the given circumstances.
2. To provide the basic tools in solving the management problems using mathematical approach for decision making.

Unit I

LPP - Introduction – Mathematical formulation of LPP – Graphical Solution of LPP - Standard form of LPP - Simplex Method – Introduction - Simplex Procedure - Use of Artificial Variables.

Unit II

Two Phase of Simplex Method - Duality in LPP – Introduction - Formulating a Dual Problem.

Unit III

The Transportation Problem – Introduction - Solution of a Transportation Problem - The North West Corner Rule - Vogel's Approximation Method.

Unit IV

The Assignment Problem – Introduction - Mathematical Formulation of an Assignment Problem - Hungarian Algorithm for Solving Assignment Problem - Travelling Salesman Problem.

Unit V

Project Scheduling by PERT/CPM – Concept of Network Construction - Critical Path Method (CPM) - PERT Calculation - CPM and PERT Compared.

Text Books:

1. Sarma Kedarnath, S. D. (2008). *Operations Research: Theory and Applications*. (15th edition). New Delhi: RamNath & Company.

Chapters: 1,3,5,7,9,10

2. Kanti Swarup, Gupta, P.K., ManMohan, (2009). *Problems in Operations Research*. (14th edition). New Delhi: Sultan Chand & Sons Publications.

Chapters**:** 2-4, 6,7,19

Reference Books:

1. Sharma, J. K. (2009). *Operations Research: Theory and Applications*. (4th edition). New Delhi: MacMillan Publications.
2. Ravi Ravindran, A. (2008). *Operations Research: Principles and Practice*. (2nd edition). New Jersey: Wiley Production.
3. Sankara Narayanan, T., Joseph A. Mangaladoss, (2004). *Operations Research*. (5th edition). New Delhi: Persi-Persi Publications.
4. Gupta, P. K., Hira, D. S. (1997). *Operations Research*. (2nd edition). New Delhi: S.Chand and Co. Ltd.
5. Arumugam, S., Thanga Pandi Issac, A. (2003). *Operations Research: Vol I*. (5th edition). New Delhi: New Ganna Publishing House.

Semester IV

Maya (Self Learning Course)

Sub. Code: SC17S2

No. of Hours per Week	Credit	Total No. of Hours	Marks
-	2	-	100

Objectives:

1. To equip with the basic skills needed to create animations.
2. To in build the basic knowledge and skill in 3D animations.

Unit I

Getting Started with 3D and Maya 2009: Exploring the Main Features of Maya 2009 - Starting Maya 2009 - Exploring the Maya 2009 User Interface - Working with Projects and Scenes in Maya 2009.

Unit II

Working with Objects in Maya 2009: Exploring the types of Objects in Maya 2009. Polygonal Modelling in Maya 2009: Creating a Polygon Mesh-Modifying a Polygon Mesh.

Unit III

NURBS Modelling in Maya 2009: Creating a NURBS Curve - Editing a NURBS Curve - Creating a NURBS Surface - Editing a NURBS Surface.

Unit IV

Animating Objects in Maya 2009: Describing the types of Animation - Working with Key frame Animation - Working with Animation Layers.

Unit V

Shading, Lighting and Texturing in Maya 2009: Working with Shaders -Exploring Lights - Working with Maya Textures.

Text Book:

Kogent Learning Solutions Inc, (2009). *Maya 2009 Simple Steps*. (3rd edition). New Delhi: DreamTech Press.

Reference Books:

1. Adam Watkins, (2012). *Getting started in 3D with Maya*. (1st edition). Bombay: Focal press.
2. Jana Germano, (2017). *Simplifying Maya.* (2nd edition). New Delhi: Packet Publishing.
3. George Maestri, (2005). *Maya at a Glance*. (1st edition). New Delhi: Sybex.
4. Total Palamar, (2015). *Mastering Autodesk Maya 2016*.(2nd edition).New Delhi: Sybex.
5. James F. Kurose, Keith W. Ross, (2010). *Simplifying Maya*. (5th edition). New Jersey: Pearson International.

Semester V

Major Core VIII: Web Technology

Sub. Code: SC1751

No. of Hours per Week	Credit	Total No. of Hours	Marks
6	5	90	100

Objectives:

1. To enable the students to understand the basic concepts and architecture involved in web technology, scripting languages and mark-up languages.
2. To implement the professional ethics to design web pages.

Course Outcome

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO -1	develop an ability to design and implement static and dynamic web pages.	**PSO – 4**	**C**
CO -2	differentiate web applications using client-side (JavaScript, HTML, XML) and server-side technologies (ASP.NET, ADO.NET).	**PSO –7**	**AP**
CO -3	define the fundamental ideas and standards underlying Web Service Technology	**PSO – 1**	**U**
CO -4	apply the knowledge of the internet and related internet concepts that are vital in understanding web application development and analyze the insights of internet programming to implement complete application over the web.	**PSO –11**	**AP**

Unit I

Introduction to Web Technologies: History of the Web – Understanding Web System Architecture – Understanding 3-Tier Web Architecture – Web Browsers. **HTML and JavaScript Programming:** Introducing HTML Document Structure – Creating Headings on a Web Page – Working with Links – Creating a Paragraph – Working with Images – Working with Tables – Working with Frames – Introduction to Forms and HTML Controls – Introducing Cascading Style Sheets.

Unit II

Introducing JavaScript – Handling Events – Using Variables in JavaScript – Using Array in JavaScript – Creating Objects in JavaScript – Using Operators – Working with Control Flow Statements – Working with Functions.

Unit III

Introducing PHP: Version of PHP – Features of PHP - Creating a PHP Script – Running a PHP Script – Handling Errors in a PHP Script – Escape Characters. **Working with Variables and Constants:** Using Variables – Using Constants – Exploring Data Types in PHP – Exploring Operators in PHP. **Controlling Program Flow:** Conditional Statements - Looping Statements - Break, Continue, Exit Statements. **Working with Functions, Arrays, Files and Directories:** User-Defined Functions in PHP – Built-in Functions in PHP - Introducing Arrays - Types of Arrays - Working with Files - Working with Directories.

Unit IV

Working with Forms and Database: Introduction to Web Forms – Working with <form> Tag and Form Elements – Processing a Web Form – Validating a Form – Introducing Databases – Using PHP and MySql. **Exploring Cookies, Session and PHP Security:** Working with Cookies – Working with Sessions – Protecting Data – Configuring PHP Security.

Unit V

Introduction to XML: Definition of XML – XML Versus HTML – Electronic Data Interchange (EDI) – XML Terminology – Introduction to DTD – Document Type Declaration – Elements Type Declaration – Attribute Declaration – Limitation of DTDs – Introduction to Schema – Complex Types – Extensible Style Sheet Language Transformations (XSLT).

Text Books:

1. Kogent Learning Solutions Inc., (2012). *Web Technologies Black Book*. (New Edition). New Delhi: DreamTech Press Publishers.

   Chapters: 1, 2, 3, 4, 5, 6, 7, 8

2. Achyut S. Godbole & Atul Kahate, (2008).*Web Technologies TCP/IP Architecture and Java Programming*. (2nd edition). New Delhi: Tata McGraw Hill Publications.

   Chapters: 13

Reference Books:

1. Achyut S.Godbole & Atul Kahate, (2008).*Web Technologies TCP/IP to Internet Application Architecture*. (2nd edition). New Delhi: Tata McGraw Hill Publications.
2. Uttam K.Roy, (2010).*Web Technologies*. (2nd edition). Pune: Oxford University Press.
3. Craig Grannell, (2008).*The Essential Guide to CSS and Html Web Design*. (2nd edition).Bombay: Apress Publication.
4. Jennifer Niederst Robbins, (2012). *Learning Web Design*. (4th edition).Bombay: O'reilly Publication.

David Pitt, (2014).*Modern Web Essential Javascript & Html5*. (2nd edition), New Delhi: Infoq Publication

Semester V

Major Core IX: Operating Systems

Sub. Code: SC1752

No. of Hours per Week	Credit	Total No. of Hours	Marks
5	5	75	100

Objectives:

1. To focus on the different operating systems and the back processing involved in it.
2. To inculcate the knowledge of working process of various operating systems.

Course Outcome

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO -1	analyze the structure of OS and basic architectural components involved in OS design	**PSO – 12**	**AN**
CO -2	analyze the applications to run in parallel either using process or thread models of different OS	**PSO – 6**	**AN**
CO -3	describe the various device and resource management techniques for timesharing and distributed systems	**PSO - 9**	**U**
CO -4	understand the mutual exclusion ,deadlock detection of distributed operating system	**PSO – 7**	**U**
CO -5	apply the mechanisms adopted for file sharing in distributed applications	**PSO – 4**	**AP**

Unit I

Computer System Overview: Basic Elements – Processor Registers – Instruction Execution – Interrupts – The Memory Hierarchy – Cache Memory – I/O Communication Techniques. **Operating System Overview:** Operating System Objectives and Functions - The Evolution of Operating Systems

Unit II

Process Description and Control: Process - Process States, Process Description – Process Control. Threads, SMP, and Microkernels: Processes and Threads. Concurrency: Mutual Exclusion and Synchronization: Principles of Concurrency – Semaphores. Concurrency: Deadlock and Starvation: Principles of Deadlock – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection.

Unit III

Memory Management: Memory Management Requirements – Memory Partitioning – Paging – Segmentation. **Virtual Memory:** Operating System Software.

Unit IV

Uniprocessor Scheduling: Types of Scheduling. **Multiprocessor and Real Time Scheduling:** Multiprocessor Scheduling - Real Time Scheduling. **I/O Management and Disk Scheduling:** I/O Devices – Organization of the I/O Function – Operating System Design Issues – I/O Buffering – Disk Scheduling.

Unit V

File Management: Overview – File Organization and Access – File Directories – File Sharing – Record Blocking – Secondary Storage Management. Computer Security Threats: Computer Security Concepts – Threats, Attacks, and Assets – Intruders – Viruses, Worms, and Bots.

Text Book:

William Stallings, (2009). *Operating Systems*. (6th edition). New Delhi: Prentices Hall India.

Reference Books:

1. Pabitra Pal Choudhury, (2009). *Operating Systems*. (2nd edition). New Delhi: PHI Learning (Pvt) Ltd.
2. Abraham Silberschatz, (2009). *Operating System Concepts*. (2nd edition). New Delhi: FirstSoft Technologies Pvt. Limited.
3. Silberschatz, A., Galvin, P. B., Gagne, G. (2008). *Operating Systems Concepts*. (8th edition). New Jersey: John Wiley Publications.
4. Nutt, G. (1997). *Operating Systems: A Modern Perspective*. (2nd edition). New Jersey: Pearson Education.

Semester V

Elective II - (a) Data Communication and Computer Networks

Sub. Code: SC1753

No. of Hours per Week	Credit	Total No. of Hours	Marks
5	5	75	100

Objectives:

1. To focus the students on the various technologies and terminologies used in transmitting data through computer networks.
2. To build the skill of networking technology for effective communication.

Course Outcome

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO -1	independently understand basic computer network technology.	**PSO – 1**	**U**
CO -2	understand and explain Data Communications System and its components.	**PSO – 2**	**U**
CO -3	identify the different types of network topologies and protocols	**PSO - 3**	**U**
CO -4	enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.	**PSO – 12**	**U**
CO -5	apply the different types of network devices and their functions within a network	**PSO – 3**	**AP**
CO -6	familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.	**PSO –9**	**AP**

Unit I

Introduction: Data Communications – Networks - Protocols and Standards. Network Models: Layers in the OSI Model - TCP/IP Protocol Suite – Addressing.

Unit II

Multiplexing: Frequency-Division Multiplexing - Statistical Time-Division Multiplexing. **Transmission Media:** Guided Media - Unguided Media: Wireless. **Switching:** Circuit-Switched Networks – Datagram Networks - Structure of a Switch.

Unit III

Using Telephone and Cable Networks for Data Transmission: Dial-up Modems – Cable TV Networks – Cable TV for Data Transfer. **Error Detection and correction**: Introduction - Block Coding. **Data Link Control:** Protocols – HDLC - Point-to-Point Protocol. **Multiple Access:** Channelization.

Unit IV

Wired LANs: Ethernet: Fast Ethernet - Gigabit Ethernet. **Wireless LANs:** Bluetooth. **Connecting LANs, Backbone Networks, and Virtual LANs:** Connecting Devices. **Wireless WANs: Cellular Telephone and Satellite Networks:** Cellular Telephony - Satellite Network. **Network Layer: Logical Addressing:** IPv4 Addresses - IPv6 Addresses. **Network Layer: Address Mapping, Error Reporting, and Multicasting**: Address Mapping.

Unit V

Process-to Process Delivery: UDP, TCP, and SCTP: User Datagram Protocol (UDP) – TCP. Domain Name System: Name Space – Domain Name Space – DNS in the Internet. Remote Logging, Electronic Mail, and File Transfer: Remote Logging - Electronic Mail – File Transfer Protocol (FTP). Cryptography: Symmetric-Key Cryptography - Asymmetric Key Cryptography: RSA. Network Security: Digital Signature.

Text Book:

Behrouz A Ferouzan, (2010). *Data Communications and Networking*. (4th edition). New Delhi: Tata McGraw Hill Education Private Ltd.

Reference Books:

1. Andrew S. Tanenbaum, (2011). *Computer Networks*. (4th edition), New Delhi: Prentice Hall of India.
2. Prakash C. Gupta, (2013). *Data Communications and Computer Networks*. (2nd edition). New Delhi: PHI Learning Private Ltd.
3. William Stallings, (2009). *Data and Computer Communications*. (8th edition).New Jersey: Pearson Publication.
4. Prakash C. Gupta, (2013). *Data Communications and Computer Networks*. (6th edition). New Delhi: Prentice Hall India Learning Private Limited.

Semester V

Elective II - (b) Data Mining

Sub. Code: SC1754

No. of Hours per Week	Credit	Total No. of Hours	Marks
5	5	75	100

Objectives:

1. It gives the clear idea about the concepts and techniques of data mining, a promising and flourishing frontier in database systems.
2. To expand student's knowledge and skills gained in database management and look in depth at the data mining methods.

Course Outcome

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO -1	expands knowledge and skills gained in database management and look in depth at the data mining methods	**PSO – 2**	**U**
CO -2	evaluate and implement a wide range of emerging and newly-adopted methodologies and technologies to facilitate the knowledge discovery.	**PSO –9**	**AN**
CO -3	discover and measure interesting patterns from different kinds of databases.	**PSO –11**	**AP**
CO -4	discover interesting patterns from large amounts of data to analyze and extract patterns to solve problems.	**PSO –12**	**U, C, AP**

Unit I

Introduction and Data Warehousing: Introduction – Architecture of Data Mining – Data Mining-Different types of Data – Classification of Data Mining – Multi Dimensional Data Model – Data Warehouse Architecture.

Unit II

Data Preprocessing: Data Preprocessing – Data Cleaning – Designing GUI – Association Rule Mining – Multi Level Association Rules.

Unit III

Baseband Data Transmission: Bayesian Classification – Other Classification Methods – Cluster Analysis – Outlier Analysis.

Unit IV

Recent Trends: Aggregation – Generalization – Construction – Mining Raster Databases – Mining Association – Mining Time-Series.

Unit V

Mining Text Databases: Mining the World Wide Web – Web Usage Mining – Data Mining for Biomedical and DNA Data Analysis - Data Mining for the Retail Industry - Data Mining for the Telecommunication Industry – Social Impacts of Data Mining.

Text Book:

Padma Priya, M.A., Jansi Rani, S.V. (2008). *Data Warehousing and Data Mining*. (2nd edition). New Delhi: Magnus publications.

Reference Books:

1. Sudheep Elayidom, M. (2014). *Data Mining and were housing.* (1st edition). New Delhi: Pearson Publication.
2. Alex Berson, (2017). *Data were housing. Data Mining, & OLAP*. (4th edition). New Delhi: McGraw Hill Education.
3. Khushboo, Sandeep, Akash, (2014). *Data Mining and were housing*. (5th edition). New Delhi: BPB Publications.
4. Deepali Vora Varsha Bhosale, (2016). *Data were housing and Data Mining.* (2nd edition). New Delhi: Technical Publication.
5. Gunjan Goswami, (2012). *Data Mining and Data were housing*. (5thedition). New Delhi: S.K. Kataria & Sons.

Semester V

Elective II - (c) Image Processing

Sub. Code: SC1755

No. of Hours per Week	Credit	Total No. of Hours	Marks
5	5	75	100

Objectives:

1. To learn and understand the fundamentals of digital image processing, and various image Transforms, Image Enhancement Techniques, image compression and Segmentation used in digital image processing.
2. To develop the skill in students to able to apply the tools in the laboratory in image restoration, enhancement and compression.

Course Outcome

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO -1	recall the basic image related concepts	**PSO – 1**	**R**
CO -2	interpret image compression, image segmentation, representation techniques	**PSO - 1**	**U**
CO -3	categorized various compression techniques	**PSO –7**	**AP**
CO -4	analyze images in the frequency domain using various transforms.	**PSO –12**	**AN**
CO - 5	evaluate the techniques for image enhancement.	**PSO –11**	**E**

Unit I

Introduction: Fundamentals - Digital Image Representation - Fundamental steps in Image Processing. **Elements**: DIP systems - Digital Image fundamentals - Visual Perception - Image Model - Sampling and Quantization - Pixel Relationships - Image Geometry - Photographic Film.

Unit II

Image Enhancement: Spatial Domain methods - Frequency Domain methods – Enhancement by point processing – Spatial Filtering – Enhancement in the Frequency domain – Specifications – Color Image Processing.

Unit III

Image Compression: Fundamentals – Image Compression models – Elements of Information Theory – Error Free Compression – Lossy Compression – Image Compression Standards.

Unit IV

Image Segmentation: Detection of discontinuities – Edge linking and Boundary detection – Thresholding – Region Orientation segmentation – Use of motion in segmentation.

Unit V

Representation and Description: Representation Schemes – Boundary Descriptors – Regional Descriptors – Morphology – Relational Descriptors.

Text book:

Rafael C. Gonzalez and Richard E. Woods, (1992). Digital Image Processing. (1st edition). New Delhi: Pearson education Publication.

Reference Books:

1. Annadurai, (2006). *Fundamentals of Digital Image Processing*. (1st edition). New Delhi: Pearson Publication.
2. Chedchen,(2006). *Signal and Image processing for Remote Sensing*. (1st edition). New Delhi: Pearson Publication.
3. Castleman, (2007). *Digital Image Processing*. (3rd edition). New Delhi: Pearson India.
4. Mart J. Burge, Willhelm Burger, (2009). *Principles of Digital Image Processing*. (1st edition). New Delhi: Springer India Private limited.
5. Jayaraman, S., Esakkirajan S., Veerakumar, T. (2017). *Digital Image Processing*. (1st edition). New Delhi: McGrow Hill Education.

Semester V

Practical VII - Web Technology Lab

Sub. Code: SC17P7

No. of Hours per Week	Credit	Total No. of Hours	Marks
6	3	90	100

Objectives:

1. To develop an ability to design and implement static and dynamic web pages.
2. To apply the knowledge of the internet and related internet concepts for web application development and analyze the insights of internet programming to implement complete application over the web.

Course Outcome

LO	Upon completion of this course the students will be able to :	PSO addressed	CL
LO-1	analyze a web page and identify its elements and attributes using XML.	**PSO –12**	**AN**
LO-2	build interactive web page using HTML.	**PSO –4**	**C**
LO-3	construct and manipulate PHP applications	**PSO - 2**	**AP**
LO-4	develop dynamic web pages using client side programming and server side programming.	**PSO - 8**	**C**
LO-5	identify, formulate and analyze problems as well as identify the computing requirements appropriate to their solutions.	**PSO – 7**	**U**
LO-6	understand and apply CSS definitions for document Presentation.	**PSO – 6**	**AP**

HTML

1. Creating a Webpage to display the text with Headings, Paragraphs and List.

2. Creating a Webpage with Frames and Hyperlink.

3. Creating a Webpage with Tables.

4. Creating a Webpage using ImageMap.

JavaScript

1. Program using Arithmetic Operators.

2. Program using Forms and Controls.

3. Program using Functions.

PHP

1. Program for Functions.

2. Program using Control statements and looping statements.

1. Program to Pass Value from One form to another form.
2. Program using Include() and Session()
3. Program to Display the records from MySQL.
4. Program to Edit and Delete the records from MySQL.

XML

1. Creating Simple XML document.
2. Creating XML document with DTD.
3. XML using attributes and Entities.
4. Creating Tree structure XML document

Semester V
SBC - Photoshop
Sub. Code: SSK175

No. of Hours per Week	Credit	Total No. of Hours	Marks
2	2	30	100

Objectives:

1. To enable students to create images for web design, logos, graphics, layouts, image touch-ups and colour enhancement.
2. To develop the skills for manipulating the images creatively.

Course Outcome

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO -1	understand retouch and repair a scanned photograph.	**PSO –10**	**AP**
CO -2	create abilities to use Photoshop that are employable and rewarding.	**PSO – 3**	**C**
CO -3	understand how to do basic photo repairs and color enhancements techniques.	**PSO –11**	**AP**
CO -4	define and apply the basic functions of pixel selection, painting and editing tools	**PSO - 5**	**R**
CO -5	understand file compression, Import and export files and save files in different formats	**PSO –11**	**AN**
CO -6	utilize retouching features to make pictures perfect	**PSO - 11**	**C**

Unit I

Starting Photoshop CS2 : Getting Started with Photoshop CS2 – Opening an Existing File – The Photoshop Program Window – Guidelines for Working with Toolbox – Screen Modes – Creating a New File – Saving Files – Removing Files – Closing File.

Unit II

Working with Images: Vector and Bitmap Images – Opening Recently used Files – Image Size – Image Resolution – Editing Images – Opening Files Created in Illustrator or Freehand – Color Modes – Setting a Current Foreground and Background Colors – File Formats. Unit III

Making Selections: Making Selection – The Grow and Similar Commands – Moving a Portion of an Image – Editing Selections – Copying a Selection into another Image – Filling a

Selection – Transforming Selections.

Unit IV

Painting, Drawing and Retouching Tools: The painting Tools – The Drawing Tools – The Retouching Tools – Layers - Layers Palette – Working with Layers.

Unit V

Filters: The Filter Menu – Filter Gallery – Extract Filter – Liquify Filter – Vanishing Point Filter – Artistic Filters – Blur Filters – Brush Stroke Filters.

Text Book:

Vikas Gupta, (2009). *Comdex DTP Course Kit*. (2nd edition). New Delhi: DreamTech Press Publications.

Reference Books:

1. Martin Evening, (2012). *Adobe Photoshop CS6 for Photographers*. (2nd edition). New Delhi: Elsevier Pvt. Ltd.
2. Tanya Staples, (2005). *Photoshop CS2 for the Web*. (2nd edition). New Delhi: Peachpit Press.
3. Taz Tally, (2006). *Photoshop CS2 Before and After Makeovers*. (2nd edition). New York: John Wiley & Sons Publisher.
4. Philip Andrews, (2005). *Adobe Photoshop CS2*. (2nd edition). New Delhi: Focal Press.
5. Kogent Learning, (2012). *Photoshop CS2 in Simple Steps*. (3rd edition). New Delhi: Dreamtech Press.

Semester VI

Major Core X: Android Application Development

Sub. Code: SC1761

No. of Hours per Week	Credit	Total No. of Hours	Marks
5	5	75	100

Objectives:

1. To enable the students to build own Android Apps and to use Android's Communication APIs for SMS, telephony etc.
2. To develop mobile applications with social and ethical responsibilities in a professional working discipline.

Course Outcome

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO -1	describe the platforms upon which the Android OS will run	**PSO - 2**	**U**
CO -2	apply the fundamental paradigms and technologies to develop mobile applications	**PSO - 5**	**AP**
CO -3	create a simple application that runs under the Android operating system	**PSO – 4**	**C**
CO -4	develop an application that uses multimedia under Android operating system	**PSO – 10**	**C**
CO -5	implement various methods in Android to create mobile applications for communication network	**PSO – 9**	**AP**

Unit I

Fundamentals of Java for Android Application Development: Introduction to Java – Introducing Java Dalvik Virtual Machine - Developing a Simple Java Program - Interfaces- Inheritance. **Getting an Overview of Android:** Introducing Android - Discussing about Android Applications - The Manifest File - Downloading and Installing Android – Exploring the Development Environment - Developing and Executing the First Android Application.

Unit II

Using Activities, Fragments and Intents in Android: Working with Activities: Creating an activity – Starting an activity – Managing the Lifecycle of an activity –Applying Themes and styles to an activity - Hiding the title of the activity. **Using Intents:** Exploring Intent Objects – Exploring Intent Resolution – Exploring Intent Filters – Fragments - Using the Intent Object to Invoke Built-in Application.

Unit III

Working with the User Interface Using Views and View Groups: Working with View Groups: The LinearLayout Layout- The RelativeLayout Layout – The FrameLayout Layout - Working with Views – Binding Data with the AdapterView Class - Designing the AutoTextCompleteView- Implementing the Screen Orientation – Creating Menus.

Unit IV

Handling Pictures and Menus with Views: Working with Image Views – Designing Context Menu for Image View – Notifying the User. **Storing the Data Persistently:** Introducing the Data Storage Options – Using the Internal Storage - Using the External Storage - Using th SQLite. **Emailing and Networking in Android:** Building an Application to Send Email.

Unit V

Working with Graphics and Animation: Working with Graphics – Using the Drawable Object – Using the ShapeDrawable Object – Working with Animations. **Audio, Video, and Camera:** Role of Media Playback. **Using Media Player:** Media Formats Supported by Media Player – Preparing Audio for Playback – Preparing Video for Playback - Using Camera for Taking Pictures.

Text Book:

Pradeep Kothari & Kogent Learning Solutions Inc., (2015). *Android Application Development (with KitKat Support) Black Book*. (1st edition). New Delhi: Dreamtech Press Publishers.

Reference Books:

1. Reto Meier, (2009). *Professional Android Application Development*. (2nd edition). New Jersey: Wiley Publishing Inc.
2. Blake Meike, Lombardo John, Zigurd mednieks, Rick Rogers, (2009). *Android Application Development*. (1st edition). New York: O'Reilly Publication.
3. Dimarzio, J. F. (2010). *Android a Programmer Guide*. (1st edition). New Delhi: McGraw Hill Education.
4. Reto Meier, (2010). *Professional Android 2 Application Development*. (1st edition). New Jersey: Wiley India Pvt Ltd.
5. Wallace Jackson, (2013). *Learn Android App Development*. (2nd edition). New Delhi: Apress Publication.
6. James C. Sheusi, (2013). *Android application development for java programmers*. (2nd edition). New Delhi: Cengage Learning.

Semester VI
Major Core XI: Computer Graphics and Multimedia
Sub. Code: SC1762

No. of Hours per Week	Credit	Total No. of Hours	Marks
5	5	75	100

Objectives:

1. To acquire the knowledge of computer graphics and multimedia.
2. To extend creativity and innovation in various fields of computing technology.

Course Outcome

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO -1	understand fundamental principles of computer graphics	**PSO – 12**	**U**
CO -2	discuss algorithms for 2D and 3D transformations	**PSO – 9**	**U**
CO -3	interpret simple problems in the basic representation and handling of multimedia data (images, audio and animation	**PSO - 4**	**AP**
CO -4	create simple 2D animations, 3D animations	**PSO – 5**	**AP**

Unit I

Introduction: Applications of Computer Graphics - Operations of Computer Graphics – Graphics Software Packages - Requirements of a Graphical System - Graphical User Interfaces. Graphical Input-Output Devices: Common Input Devices - Graphical Output Devices – Raster Scan Video Principles: Plasma Panel Display - LCD Panels - Random scan Devices - Graphic Accelerators and Co-processors.

Unit II

Scan Conversions: Scan Conversions Methods - Polynomial Method - DDA Algorithms: DDA for a Line – DDA for circle Generation - DDA for Ellipse - DDA for Parabola - Bresenham's Algorithms - Bresenham's Line Drawing Algorithm - Bresenham's Circle Algorithm - Scan Conversion of Solids: Solid Areas or Polygons – Inside-Outside Test – Solid Area Filling Algorithms: Boundary Fill Algorithm - Flood Fill Algorithm - Scan Line Fill Algorithm.

Unit III

2-D Geometrical Transformation: Some Basic Transformation. Homogenous Coordinate Systems: Scaling about a Reference Point - Rotation about an Arbitrary Point. Other Transformations: Reflection - Shearing. 3-D Geometrical Transformation: 3-D Translation – 3-D Scaling – 3-D Rotation. Other 3D Transformations: 3-DReflection – 3-D Shearing.

Unit IV

2-D Viewing and Clipping: Windows and Viewports - Viewing Transformations. Clipping of Lines in 2-D: Cohen Sutherland Clipping Algorithm - Midpoint Subdivision Method – Concepts of Parametric Clipping - Polygon Clipping - Clipping against Concave Windows. 3-D Viewing and Clipping: Clipping of Lines in 3-D - Cohen Sutherland Clipping Algorithm in 3-D - Liang-Barky 3-D Clipping Algorithm.

Unit V

Multimedia Basics: Concepts of Multimedia – MIDI - Image Compression Standards - Video Compression and Encoding - Virtual Reality. Graphic Image File Formats: Image File Formats. Animation and Flash Overview: Flash Basics – The Flash Work Environment - Using Layers - Creating Animation.

Text Book:

Malay K.Pakhira, (2012). *Computer Graphics Multimedia and Animation*. (2nd edition). New Delhi: Prentice Hall of India.

Reference Books:

1. Donald. D.hearan, Pauline Baker, (2011). *Computer Graphics*. (2nd edition). New Delhi: Pearson Education publication.
2. Ralf Steinmetz, Klara Nahrstedt, (2012). *Multimedia: Computing Communications and Applications*. (11th edition). New Delhi: Pearson Education publication.
3. A.P.Godse, (2011). *Computer Graphics and Multimedia*. (4th edition). New Delhi: Technical Publications.
4. Pakhira, (2008). *Computer Graphics:Multimedia and Animation*. (2nd edition). New Delhi: Prentice-Hall of India.
5. Rajan Parekh, (2006). *Principles of Multimedia*. (2nd edition). New Delhi: McGrawHill Education.

Semester VI

Major Core XII: UNIX and Shell Programming

Sub. Code: SC1763

No. of Hours per Week	Credit	Total No. of Hours	Marks
5	5	75	100

Objectives:

1. To familiarize students with the UNIX environment and shell scripting/programming.
2. To inculculate the knowledge of working process of UNIX operating systems.

Course Outcome

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO -1	identify set of commands in UNIX	**PSO – 1**	**R**
CO -2	describe the features & functions of an operating system.	**PSO - 1**	**U**
CO -3	customize environment settings using a text editor	**PSO – 1**	**U**
CO -4	demonstrate UNIX commands for file handling and process control	**PSO - 1**	**AP**
CO -5	combine several simple commands in order to produce more powerful operations.	**PSO -1**	**AP**
CO -6	utilize system utilities to perform administrative tasks	**PSO - 1**	**AP**
CO -7	analyze the working of the user defined commands and will be able to change the permissions associated with files.	**PSO - 3**	**AN**
CO -8	create and manage simple file processing operations, organize directory structures with appropriate security	**PSO - 3**	**C**
CO -9	create, delete, move and rename files and directories	**PSO – 1**	**C**

Unit I

Getting Started: The Operating System – The UNIX Operating System - A Brief Session. **The UNIX Architecture and Command Usage:** The UNIX Architecture - Features of UNIX - Locating Command - Internal and External Commands – Command Structure - Flexibility of Command Usage – Man Browsing the Manual Pages On-line. **General Purpose Utilities:** cal - date - echo - printf - bc - script – passwd - who – uname – tty - stty.

Unit II

The File System: The File – File Name – The HOME Variable – pwd – cd – mkdir – rmdir - Absolute and Relative Pathnames – ls: Listing Directory Content - The UNIX File System**. Handling Ordinary Files:** cat – cp – rm – mv – more - lp – file – wc – od – cmp – comm – diff – gzip – gunzip – zip and unzip. **Basic File Attributes:** ls -l: Listing File Attributes - File Ownership - File Permissions – chmod - Directory Permissions - Changing File Ownership.

Unit III

The vi Editor: vi Basics - Input Mode —Entering and Replacing Text – Saving Text and Quitting—The ex Mode - Navigation - Editing Text - Undoing Last Editing Instructions - Repeating the Last command – Searching for a Pattern - Substitution—Search and Replace. The Shell: Shell Offerings - Pattern Matching - Escaping and Quoting – Redirection – Pipes – tee - Command Substitution - Shell Variables.

Unit IV

The Process: ps: Process Status – Mechanism of Process Creation - Running Jobs in Background – nice: Job Execution with Low Priority – Killing Processes with Signals - at and batch: Execute Later – cron: Running Jobs Periodically. Customizing the Environment: Environment Variables – The Common Environment Variables – Aliases – Command History - In-line Command Editing. More File Attributes: File Systems and Inodes – The Directory - umask: Default File and Directory Permissions – find: Locating Files.

Unit V

Simple Filters: The Sample Database - pr – head – tail – cut – paste – sort. Filters Using Regular Expressions: grep. Essential Shell Programming: Shell Scripts – read: Making Scripts Interactive – Using Command Line Arguments – exit and Exit Status of Command – The Logical Operators && and || -- Conditional Execution – The if Conditional – The case Conditional – while: Looping – for: Looping with a List – Debugging Shell Scripts with set –x.

Text Book:

Sumitabha Das, (2013). *UNIX Concepts and Applications*. (3rd edition). New Delhi: Tata McGraw Hill Publications.

Reference Books:

1. S.Prata, (2008). *Advanced UNIX: A Programming's Guide*. (2nd edition). New Delhi: BPB Publications.
2. W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, (2014). *Unix Network Programming, The sockets Networking API, Vol. 1*. (3rd edition). New York: Addison Wesley.
3. Graham Glass, King Ables, (2009). *Unix for programmers and users*. (3rd edition). New Delhi: Pearson Education.
4. N.B Venkateswarlu, (2010). *Advanced Unix programming*. (2nd edition). New Delhi: BS Publications.
5. Yashwanth Kanitkar, (2010). *Unix Shell programming*. (1st edition). New Delhi: BPB Publisher.

Semester VI
Elective III - (a) Mobile Computing
Sub. Code: SC1764

No. of Hours per Week	Credit	Total No. of Hours	Marks
5	5	75	100

Objectives:

1. To develop system and application level software for small, battery powered terminals equipped with the wireless network connection.
2. To develop the professional ethics in computing and able to implement the logic and techniques in information technology.

Course Outcome

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO -1	understand the basic concepts and principles in mobile computing	**PSO – 1**	**U**
CO -2	describe the concepts of Bluetooth, RFID, WiMAX	**PSO - 1**	**U**
CO -3	acquire and apply the knowledge of GSM and GPRS	**PSO – 4**	**U, AP**
CO -4	understand the process of CDMA,3G,Wireless LAN	**PSO – 4**	**U**
CO -5	describe and implementing the security techniques	**PSO – 9**	**AP**

Unit I

Introduction: Mobile Computing - Dialogue Control – Networks. **Mobile Computing Architecture:** Architecture of Mobile Computing - Three Tier Architecture - Mobile Computing through Internet. **Mobile Computing Through Telephony:** Evolution of Telephony - Multiple Access Procedures - Mobile Computing through Telephone.

Unit II

Emerging Technologies: Introduction – Bluetooth - Radio Frequency Identification [RFID] - Wireless Broadband [WIMAX] - Internet Protocol Version 6[IPV6]. **Global System for Mobile Communications[GSM]:** GSM Architecture - GSM Entities - Call Routing in GSM

- PLMN Interfaces - GSM Addresses and Identifiers - Network Aspects in GSM - GSM Frequency Allocation.

Unit III

Short Message Service: Mobile Computing Over SMS - Short Message Service. **General Packet Radio Services [GPRS]:** GPRS and the Packet Data Network - GPRS Network Architecture - Data Services in GPRS - Applications for GPRS - Limitations of GPRS.

Unit IV

CDMA and 3G: Introduction – Spread-Spectrum Technology - Wireless Data - Third Generation Networks. **Wireless LAN:** Wireless LAN Advantages - Wireless LAN Architecture - Mobility in Wireless LAN - Mobile Ad hoc Networks and Sensor Networks - Wireless LAN Security.

Unit V

Security Issues in Mobile Computing: Introduction - Information Security - Security Techniques and Algorithm – Trust - Security Models - Security Framework for Mobile Environment.

Text Book:

Asoke K Talukder, Roopa R Yavagal, (2005). *Mobile Computing*. (2nd edition).New Delhi: Tata McGraw Hill.

Reference Books:

1. Charulatha, (2010). *Mobile Computing*. (2nd edition).Chennai: Charu Latha Publications.
2. V.Jeyasri Arokiamary, (2009). *Mobile Computing*. (3rd edition).New Delhi: Technical Publications.
3. Tomasz Imielinski, Henry F.Korth, (2013). *Mobile Computing*. (Illustrated edition). New New York: Springer US.
4. Raj Kamal, (2012). *Mobile Computing*. (2nd edition).Pune: Oxford University Press.
5. Uwe Hansmann Lothar Merk Martin Nicklous Thomas Stobar, (2006). *Principles of Mobile Computing*. (2nd edition). New Delhi: Dreamtech Press.

Semester VI

Elective III - (b) Client / Server Technology

Sub. Code: SC1765

No. of Hours per Week	Credit	Total No. of Hours	Marks
5	5	75	100

Objectives:

1. To describe the relationship between the computer programs.
2. To inculcate knowledge on Client / Server concepts.

Course Outcome

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO -1	create network connectivity with Client/Server computing	PSO –8	C
CO -2	apply the process of communication technology	PSO – 3	AP
CO -3	apply the components of Client/Server technology	PSO –12	AP
CO -4	understand the administration and technologies of the system	PSO –5	U

Unit I

Client / Server Computing – Advantages of Client / Server Computing – Technology Revolution – Connectivity – Ways to improve Performance – How to reduce network Traffic

Unit II

Components of Client / Server Applications – The Client: Role of a Client – Client Services – Request for Service. **Components Of Client/Server Applications – The Server:** The Role of a Server – Server Functionality in Detail – The Network Operating System – What are the Available Platforms – The Server Operating system.

Unit III

Components of Client / Server Applications – Connectivity: Open System Interconnect – Communications Interface Technology – Interprocess communication – WAN Technologies.

Unit IV

Components of Client / Server Applications–Software: Factors driving demand for application software development – Rising Technology Staff costs – Need to improve Technology – Need for Common Interface across Platforms – Client / Server system development Methodology. **Components Of Client/Server Applications–Hardware:** Hadware/Network Acquisition – PC-Level Processing Units – Machintosh, notebooks, Pen – UNIX Workstation – x-terminals – Disk, Tape, Optical Disks, NIC and UPS.

Unit V

Components of Client / Server Applications–Service and Support: System Administration. The Future of Client / Server Computing: Enabling Technologies – Transformational Systems.

Text Book:

Patrick Smith, Steve Guenferich, (2012). *Client/Server Computing*. (2nd edition). New Delhi: Prentice Hall of India Private Limited.

Chapters 1-8 & 10

Reference Books:

1. James E. Goldman, (1998). *Client/Server Information Systems: A Business-Oriented Approach.* (1st edition), New York: Wiley Publication.
2. Rand Morimot, (2013). *Windows Server 2016 Unleashed*. (1st edition). Chennai: Sams Publication.
3. William Stanek, (2013). *Windows Server 2012 Inside Out.* (1st edition). New Delhi: Microsoft Press Publication.
4. Alex Berson, (1996). *Client/Server Architecture.* (1st edition). New Delhi: McGraw-Hill Publication.
5. Roger Anne, (2005). *Client/Server Information Systems: A Quick Guide*. (1st edition). New Delhi: McGraw-Hill Publication.

Semester VI

Elective III - (c) Artificial Intelligence and Expert System

Sub.Code: SC1766

No. of Hours per Week	Credit	Total No. of Hours	Marks
5	5	75	100

Objectives:

1. To understand the importance of creativity and how it is supported by IT.
2. To give the student the ability to design and program small expert systems.

Course Outcome

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO -1	gives the ability to design and program small expert systems.	**PSO –9**	**U,C**
CO -2	learn how to analyze the complexity of a given problem and come with suitable optimizations.	**PSO – 2**	**U**
CO -3	understand mathematical models such as belief networks and Markov decision processes and apply them to a range of AI problems.	**PSO –6**	**U,AP**
CO -4	have a glance at machine learning algorithms and extracting knowledge models from data.	**PSO –12**	**U**

Unit I

Introduction: Techniques – Problems, problem spaces and search – Defining the problem as a state space search – Production system – Problem characteristics – Production system characteristics – Issues in the Design of Search Programs – Additional Problems.

Unit II

Techniques: Heuristic search techniques - Generate and test – Hill climbing – best first search – Problem reduction - constraint satisfaction – Means ends analysis - Game playing - Overview – The Minimax Search Procedure – Alpha Beta Cutoffs – Additional Refinements.

Unit III

Representations: Knowledge representation Issues - Representations and mappings – Approaches to knowledge representation – Issues in Knowledge Representation – The Frame Problem - Representing simple facts in logic – Representing Instance and Isa Relationships – Computable Functions and Predicates – Resolution.

Unit IV

Representing knowledge using rules: Procedural versus declarative knowledge – logic Programming - Forward versus backward reasoning – Matching – Control Knowledge - Symbolic reasoning under uncertainty - Introduction to Non monotonic Reasoning – logics for Non monotonic reasoning.

Unit V

Introduction: Expert system - limitation of expert system - Development of expert system - Expert system application – MYCIN, PROSPECTOR.

Text Books:

1. Elain Rich and Kevin Knight, (2002). *Artificial Intelligence*. (2nd edition). New Delhi: Tata McGraw Hill.
2. Donald A. Waterman, (2004). *A Guide to Expert systems*. (1st edition). New Delhi: Pearson Education.

Reference Books:

1. Dan W. Palterson, (2007). *Introduction to Artificial Intelligence and Expert System*. (1st edition). New Delhi: Person Education.
2. Elaine Rich, Kevin Knight, (2017). *Artificial Intelligence*. (3rd edition). New Delhi: McGraw Hill Publication.
3. Stuart J. Russell, Peter Norving, (2015). *Artificial Intelligence*. (1st edition). New Delhi: Person Education India.
4. Dan W. Palterson, (2015). *Introduction to Artificial Intelligence*. (3rd edition). New Delhi: Pearson Education.
5. Janaki Raman, V.S. (2005). *Fundamental of Artificial Intelligence and Export Systems*. (1st edition). New Delhi: Macmillan Publication.

Semester VI

Practical VIII - Android Application Development Lab

Sub. Code: SC17P8

No. of Hours per Week	Credit	Total No. of Hours	Marks
4	2	60	100

Objectives:

1. To implement various methods in Android to create mobile applications for communication network.
2. To create a simple application that runs under the Android Operating System.

Course Outcome

LO	Upon completion of this course the students will be able to :	PSO addressed	CL
LO -1	create application workings with the Activities and Intents	**PSO – 4**	**AP**
LO -2	create application workings with the User Interface using Views	**PSO – 8**	**AP**
LO -3	create application workings with Graphics	**PSO – 1**	**AP**
LO -4	create application workings with Pictures and Menus	**PSO – 8**	**AP**

Programs:

1. Create “Hello World” application.
2. Create a Application to display greeting message and to change the icon of Android
3. Create an Application that will change the color of the screen based on selected options from the menu.
4. Create an Application that will display Toast(message) when radio button clicked.
5. Create an Application using Edit Text View.
6. Create an Application using Image Button View.
7. Create an Application to Hide the Title of the Activity.
8. Create an Application to convert Text to speech.
9. Create an Application to search a record in a Database.
10. Create an Application to implement the Screen Orientation.
11. Create an Application to draw an oval using ShapeDrawable object.
12. Create an Application to display images using Gallery View.
13. Create an Application to display images using Grid View.
14. Create an Application using Camera for taking pictures.

Semester VI

Practical IX - Computer Graphics and Multimedia Lab

Sub. Code: SC17P9

No. of Hours per Week	Credit	Total No. of Hours	Marks
4	2	60	100

Objectives:

1. To acquaint with the basic principles of 2D and 3D computer.
2. To create simple 2D animations.

Course Outcome

LO	Upon completion of this course the students will be able to :	PSO addressed	CL
LO- 1	acquaint with the basic principles of 2D and3D computer graphics.	PSO – 12	AP
LO- 2	acquaint with algorithms for rasterisation and clipping of 2D graphic primitives and filling of closed regions.	PSO – 9	AP
LO- 3	learn algorithms for 2D and 3D transformations, visibility solution, lighting,shading and texturing.	PSO – 8	AP

Programs:

1. Line Drawing using DDA
2. Circle Drawing using Bresenham's Algorithm
3. Different Shapes Using Graphics Function
4. Random Balls
5. Bouncing Ball
6. News Headlines
7. Drop Word By Word
8. Moving a Car
9. Scenery of Rain
10. Tiled and Cascaded Display
11. 2D Transformation
12. Line Drawing using Bresenham's Algorithm

Semester VI

SBC - Dreamweaver CS4

Sub. Code: SSK176

No. of Hours per Week	Credit	Total No. of Hours	Marks
2	2	30	100

Objectives:

1. To create a simple but well designed website to XHTML standards using Dreamweaver MX.
2. To equip the students with skills needed to create website.

Course Outcome

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO -1	implement the Knowledge of Web Publishing	**PSO – 4**	**A**
CO -2	understand HTML and CSS coding for Websites.	**PSO – 8**	**U**
CO - 3	understand the basic Skills needed to create your own websites	**PSO – 4**	**U**
CO -4	create professional looking website with Dreamweaver CS4 collection of tools	**PSO – 4**	**C**

Unit I

Introduction to Dreamweaver CS4: Introduction - What's new in Dreamweaver CS4 - Starting Dreamweaver CS4 - The Status Bar - The property Inspector - Buttons on Object Panel -

Customizing Dreamweaver. Creating a New Page in Dreamweaver CS4: Introduction - Creating a new Page -Viewing a Page in a Browser.

Unit II

Entering Text - Adding a Line - Creating Unordered List - Creating Ordered List - Changing Font - Adding a new Font - Making Text Bold / Italics / Changing color of the Text- Creating a new CSS Style Sheet - Changing a new CSS Style Sheet. Adding Graphics and

Multimedia: Introduction - Adding an Image - Adding a Border to an Image - Resizing an Image - Changing Dimension by Dragging.

Unit III

Wrapping Text Around Image - Adding Horizontal Rule - Adding Background Image - Adding Multimedia Files - Add a Sound File - Add Looping to a Sound - Creating Flash Text - Insert a Java Applet. Working with Tables in Dreamweaver CS4: Inserting a Table - Inserting Text into Tables - Changing Background Color of Table-Inserting Image in a Table-Inserting Rows and Columns - Splitting a Table Cell - Merging Cells of a Table.

Unit IV

Working with Forms in Dreamweaver CS4: Creating a Form - Adding Text Fields - Adding Labels - Adding Radio Buttons - Adding Check Boxes - Adding a List of Menu - Adding Push Buttons and Picture Buttons. Working with Frames in Dreamweaver CS4: Introduction - Dividing a Page into Frames - Adding Contents of Frame - Saving Frame Pages - Saving Frame Set - Deleting Frame.

Unit V

Working with Style Sheets in Dreamweaver CS4: Introduction - Creating a HTML Tag - Creating a Class - Using CSS Selectors to Modify Links - Creating an External Style Sheet - Creating a Layer - Resizing a Layer - Adding Background Colour to a Layer- Changing the Stacking Order of Layers

Text Book:

Kogent Learning Solutions Inc., (2011). *Dreamweaver CS4*. (1st edition). New Delhi: DreamTech Press publication.

Reference Books:

1. David Sawyer McFarland, (2008). *Dreamweaver CS4: The Missing Manual*. (1st edition). New Jersey: O' Reilly Media Inc.
2. Janine Warner, (2008). *Dreamweaver CS4 for Dummies*. (1st edition). New Jersey: Wiley Publishing Inc.
3. Dinnesh Maidasani, (2007). *Dreamweaver 8*. (3rd edition). New Delhi: Laxmi Publications.
4. Bangia, (1899). *Learning Dreamweaver CS4*. (1st edition). New Delhi: Khanna Publications.
5. Joseph Lowery, (2009). *Adobe Dreamweaver CS4 Bible*. (3rd edition). New York: Wiley India Pvt Ltd.

Value Added Courses
Content Management System

Unit I

Overview of CMS: Course Introduction and Orientation - Systems Administration for Wordpress Developers - Course Tools - Know your environment.

Unit II

Advance Wordpress - Understanding the Dashboard - Understanding Themes - Understanding Widgets - Understanding Plugins.

Unit III

Create a Custom Theme - Building a basic Wordpress Framework – Create a Custom Plugin.

Unit IV

Create A Custom Widget - Build your custom theme - Question and Answers.

Unit V

Build your custom theme/Widgets/Plugins - Question and Answers - Work on final project - Question and Answers.

Employability

Entrepreneurship

Skill Development

** All the Courses focused on Skill Development