

# Department of Computer Science

RATHINAM COLLEGE OF ARTS AND SCIENCE

(AUTONOMOUS)

RATHINAM TECHZONE CAMPUS, POLLACHI ROAD, EACHANARI, COIMBATORE – 21.



**Syllabus for**

**B.Sc. Information Technology and  
B.Sc. Computer Technology**

**(I, II, III, IV, V & VI Semester)**

**2015 – 2016 Batch onwards**

Advanced Learners Course papers - applicable from 2013-2014 Batch onwards

**Board of Studies – Computer Science (UG) (IT & CT)**

Sem	Part	Type	Sub Code	Subject & Paper	HRS per week	CIA	ESE	Max	Exam Hours	Credit
								mark		
I	I	L1		Language - I	5	25	75	100	3	4
I	II	E1		English - I	5	25	75	100	3	4
I	III	C1		Core I - C and C++ Programming	5	25	75	100	3	4
I	III	C2		Core II - Analog and Digital Electronics	5	25	75	100	3	4
I	III	CP3		Core Practical I - C and C++ Programming Lab	3	40	60	100	3	4
I	III	AL1		Allied I - Numerical and Statistical Methods	5	25	75	100	3	4
I	IV	FCA		Environmental Studies	2	-	50	50	3	2*
II	I	L2		Language - II	5	25	75	100	3	4
II	II	E2		English - II	5	25	75	100	3	4
II	III	C4		Core III - Java Programming	4	25	75	100	3	4
II	III	C5		Core IV - Data Structures and Algorithms	4	25	75	100	3	4
II	III	CP6		Core Practical II - Java Programming Lab	3	40	60	100	3	4
II	III	CP7		Core Practical III - MS Office and Basics of Internet Lab	2	10	40	50	3	2
II	III	AL2		Allied II - Principles of Management and Accounting	5	25	75	100	3	4
II	IV	FCB		Value Education - Human Rights *	2	-	50	50	3	2*
III	III	C8		Core V - Web Technology	6	25	75	100	3	4
III	III	C9		Core VI – Information Security and Cyber law	6	25	75	100	3	4
III	III	CP10		Core Practical IV - Web Technology Lab	4	40	60	100	3	4
III	III	AL3		Allied III - Computer Based Optimization Techniques	5	25	75	100	3	4
III	IV	SB1		Skill Based I – Android Application Development	3	10	40	50	3	2
III	IV	SBP2		Skill Based Practical I-Android Application Development Lab	4	10	40	50	3	2
III	IV	OL		Tamil ** / Advanced Tamil ** /Communicative English / Yoga for Human Excellence / Women’s Rights / Constitution of India *	2	-	50	50	3	2
III	-	ALC		ALC I - Advanced Learner Course – Paper 1	-	-	100	-	-	#2
IV	III	C11		Core VII - Relational Database Management System	5	25	75	100	3	4
IV	III	C12		Core IX - Information Storage and Management	5	25	75	100	3	4

IV	III	CP13		Core Practical V - ORACLE Lab	4	40	60	100	3	4
IV	III	CP14		Core Project VI - Mini Project	4	10	40	50	3	2
IV	III	AL4		Allied IV - Mathematics for Quantitative Aptitude and Verbal reasoning	5	25	75	100	3	4
IV	IV	SB3		Skill Based II - Operating System	5	10	40	50	3	2
IV	IV	OL		Tamil ** / Advanced Tamil ** / Communicative English / Yoga for Human Excellence / Women's Rights / Constitution of India *	2	-	50	50	3	2
IV	V	EA		Extension Activities	-	-	-	-	-	-
IV	-	ALC		ALC II - Advanced Learner Course – Paper 2	-	-	100	-	-	#2
V	III	C15		Core X - Big Data Analytics	6	25	75	100	3	4
V	III	C16		Core XI - Cloud Infrastructure and Services	6	25	75	100	3	4
V	III	C17		Elective - I	6	25	75	100	3	4
V	III	CP18		Core Practical VI - Hadoop Lab	4	40	60	100	3	4
V	IV	SB4		Skill Based III - Open Source tools	5	10	40	50	3	2
V	IV	SBP5		Skill Based Practical II – Open source Lab	3	10	40	50	3	2
V	-	ALC		ALC III - Advanced Learner Course – Paper 3	-	-	100	-	-	#2
VI	III	C19		Core XII - Networking & Data Communication	5	25	75	100	3	4
VI	III	C20		Elective - II	6	25	75	100	3	4
VI	III	C21		Elective - III	6	25	75	100	3	4
VI	III	CP22		Core Practical VII - Networking Lab	4	40	60	100	3	4
VI	III	CPV23		Core Project VIII - Project	4	20	80	100	3	4
VI	IV	SB6		Skill Based IV - Software Testing	5	10	40	50	3	2
VI	-	ALC		ALC IV - Advanced Learner Course – Paper 4	-	-	100	-	-	#2
				<b>TOTAL</b>				<b>3500</b>	<b>114</b>	<b>140</b>

\* - No Internal Examinations only External Examination – Online Examination

\*\* - No External Examinations only Internal Examinations

# - Optional Credits, Advanced Learners will learn and appear for the exam – No Internal Mark and Not Counted for CGPA.

### Elective Subjects:

	B.Sc. Information Technology	B.Sc. Computer Technology
Elective – I	1. Information Security 2. Cyber Security 3. Routing & Switching	1. Information Hiding 2. E-Learning models 3. Digital Marketing
Elective – II	1. Information Hiding 2. E-Learning models 3. Digital Marketing	1. Infrastructure Management Tools 2. Cryptography 3. Social Networking
Elective – III	1. Infrastructure Management Tools 2. Cryptography 3. Social Networking	1. Information Security 2. Cyber Security 3. Routing & Switching

### **Advanced Learner Courses**

Semester – III	1. PC Hardware and Troubleshooting 2. Micro Processor and its Applications 3. Problem Solving Techniques
Semester – IV	1. Content Management System 2. Internet on Things 3. Cascading Style Sheet
Semester – V	1. Action Script 2. Game Programming in JAVA 3. AJAX Programming
Semester – VI	1. Natural Language Processing 2. Soft Computing 3. IP V6

**Semester I (Common to B.Sc. CS /IT/CT/BCA)**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	Core I - C and C++ Programming	5			4	Core

**Introduction :**

This subject covers in detail all aspects of the C++ language, including its foundation: C. To provide a platform for the students in C and C++ programming.

**Objective :**

At the end of the course, we expect students to have a good understanding about the concept of Structures and object - oriented programming using C & C++, be able to write and read basic C & C++ code.

**Unit - I :**

An Overview of C – Expressions – Variables - Constants - String Constants - Operators - The Assignment Operator - Arithmetic Operators - Increment and Decrement - Relational and Logical Operators - Bitwise Operators - The ? Operator - The & and \* Pointer Operators - sizeof Operator - The Comma Operator - Expressions - Order of Evaluation – Statements.

**Unit – II :**

Arrays and Null-Terminated Strings – Pointers – Functions - Structures, Unions, Enumerations.

**Unit – III:**

An Overview of C++ : The Origins of C++ - What Is Object-Oriented Programming? – Encapsulation – Polymorphism – Inheritance - Some C++ Fundamentals - The C++ Keywords - The General Form of a C++ Program - Classes and Objects : Classes - Structures and Classes - Unions and Classes - Friend Functions - Friend Classes - Inline Functions - Parameterized Constructors - Static Class Members - Static Data Members - The Scope Resolution Operator.

**Unit – IV:**

**Function Overloading, Copy Constructors :** Arguments - Function Overloading - Overloading Constructor Functions - Copy Constructors - Default Function Arguments - Operator Overloading : Creating a Member Operator Function - Operator Overloading Using a Friend Function - Inheritance - Base Class Access Control - Inheritance and protected Members - Protected Base-Class Inheritance - Inheriting Multiple Base Classes - Constructors, Destructors, and Inheritance - Virtual Base Classes - Virtual Functions and Polymorphism.

**Unit – V:**

Exception Handling : Exception Handling Fundamentals - Catching Class Types - Using Multiple catch Statements - Exception Handling Options -Catching All Exceptions - Re-throwing an Exception - The C++ I/O System Basics : Old vs. Modern C++ I/O - C++ Streams - The C++ Stream Classes - C++'s Predefined Streams - Formatted I/O - Using width( ), precision( ), and fill( ) - Using Manipulators to Format I/O - C++ File I/O : <fstream> and the File Classes - Opening and Closing a File - Reading and Writing Text Files - Unformatted and Binary I/O - Characters vs. Bytes - put( ) and get( ) - read( ) and write( ).

**Text Book :**

1. C++ : The Complete Reference Third Edition - Herbert Schildt - Osborne McGraw-Hill.

**Reference:**

1. The C programming Language, second edition, Brian W.Kernighan, Dennis M.Ritchie, Prentice Hall
2. Object-Oriented Programming Using C++, Fourth Edition, Joyce Farrell - Course Technology.
3. Object –Oriented –Programming in C++ 6e by E Balagurusamy, McGraw-Hill, 2013.

**Semester I (Common to B.Sc. CS /IT/CT/BCA)**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Core II - Analog and Digital Electronics</b>	5			4	Core

**Introduction :** To learn the basic methods for the design of digital circuits and provide the fundamental concepts used in the design of digital systems.

**Objectives :** To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits To introduce the concept of memories and programmable logic devices.

**UNIT-I:**

Number System and Binary Codes: Decimal, Binary, Octal, Hexadecimal – Binary addition, Multiplication, Division – Floating point representation, Complements, BCD, Excess3, Gray Code. Arithmetic Circuits: Half adder, Full adder, Parallel binary adder, BCD adder, Half subtractor, Full subtractor, Parallel binary subtractor - Digital Logic: the Basic Gates – AND, OR, NOT, NAND, NOR Gates.

**UNIT-II:**

Minimization Techniques and Logic Gates : Minimization Techniques: Boolean postulates and laws – De-Morgan’s Theorem - Principle of Duality - Boolean expression - Minimization of Boolean expressions — Minterm – Maxterm - Sum of Products (SOP) – Product of Sums (POS) – Karnaugh map Minimization – Don’t care conditions.

**UNIT-III:**

Combinational Circuits: Design procedure – Half adder – Full Adder – Half subtractor – Full subtractor – Carry Look Ahead adder – Serial Adder/Subtractor - BCD adder – Multiplexer/ Demultiplexer – decoder - encoder – parity checker – parity generators .

**UNIT-IV:**

Sequential Circuits : Latches, Flip-flops - RS, JK and Master-Slave –Asynchronous Ripple or serial counter – Asynchronous Up/Down counter - Synchronous counters – Synchronous Up/Down counters – Programmable counters – Modulo–n counter, Registers – shift registers - Universal shift registers – Shift register counters – Ring counter.

**UNIT-V:**

Memory Devices : Classification of memories – ROM - ROM organization - PROM – EPROM – EEPROM – EAPROM, RAM – RAM organization – Write operation – Read operation – Memory cycle - Timing wave forms – Memory decoding – memory expansion – Static RAM Cell- Bipolar RAM cell.

Text Book :

1. M. Morris Mano & Michael D. Ciletti, Digital Design with an Introduction to the Verilog HDL, 5th Edition, Pearson Education, Inc., publishing as Prentice Hall.

**Reference:**

1. Donald P. Leach and Albert Paul Malvino, Digital Principles and Applications, 6th Edition, TMH, 2003.
2. Thomas L. Floyd, Digital Fundamentals, 8th Edition, Pearson Education Inc, New Delhi, 2003

**Semester I (Common to B.Sc. CS /IT/CT/BCA)**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Core Practical I - C and C++ Programming Lab</b>			3	4	Core

**C Programs**

1. Program to find the maximum number in list of array in 'C'.
2. Program to swap two number in C.
3. Program to find transpose of matrix.
4. Program to find factorial of a number using functions in 'C'.
5. Program to find whether a string is palindrome or not.
6. Program to find number of vowels, consonants, words, spaces and special character in the given Statement.

**C++ Programs**

1. Write a program that converts an uppercase letter to a lowercase in C++
2. Write a program with a do-while loop that prints the numerals from 10 to 20 (inclusive), with a blank line between each number.
3. Write a program that stores an array of friends' names, phone numbers, and addresses and prints them two ways: with their name, address, and phone number, or with only their name and phone number for a phone listing.
4. Write a program calculates the area of a rectangle and displays it using constructor in C++.
5. Write a program to accessing private data from non-member function using friend function in C++.
6. Write a Program for Exception Handling Divide by zero Using C++
7. Write a C++ Program for students performance analysing using C++ File Streams



**Semester II (Common to B.Sc. CS /IT/CT/BCA)**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Core III - Java Programming</b>	4	0	0	4	Core

**Introduction :**

To understand the concepts of object-oriented, event driven, and concurrent programming paradigms and develop Skill Baseds in using these paradigms using Java

**Objective:**

Language elements covered include loops, arrays, input/output structures, events, exceptions, and threads.

**UNIT-I:**

Object oriented programming concepts – objects – classes – methods and messages – abstraction and encapsulation – inheritance – abstract classes – polymorphism.- Objects and classes in Java – defining classes – methods - access specifiers – static members – constructors – finalize method

**UNIT-II:**

Arrays – Strings - Packages – Java-Doc comments -- Inheritance – class hierarchy – polymorphism – dynamic binding – final keyword – abstract classes

**UNIT-III:**

The Object class – Reflection – interfaces – object cloning – inner classes – proxies - I/O Streams - Graphics programming – Frame – Components – working with 2D shapes.

**UNIT-IV:**

Basics of event handling – event handlers – adapter classes – actions – mouse events – AWT event hierarchy – introduction to Swing – Model-View-Controller design pattern – buttons – layout management – Swing Components – exception handling – exception hierarchy – throwing and catching exceptions.

**UNIT-V:**

Motivation for generic programming – generic classes – generic methods – generic code and virtual machine – inheritance and generics – reflection and generics - Multi-threaded programming – interrupting threads – thread states – thread properties – thread synchronization – Executors – synchronizers.

**Text Book :**

Cay S. Horstmann and Gary Cornell, “Core Java: Volume I – Fundamentals”, Eighth Edition, Sun Microsystems Press, 2008.

**Reference:**

1. K. Arnold and J. Gosling, “The JAVA programming language”, Third edition, Pearson Education, 2000.
2. Timothy Budd, “Understanding Object-oriented programming with Java”, Updated Edition, Pearson Education, 2000.

**Semester II (Common to B.Sc. CS /IT/CT/BCA)**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Core IV - Data Structures and Algorithm</b>	4	0	0	4	Core

**Introduction:**

This course aims to introduce a number of popular data structures and algorithms, along with the basic techniques in algorithm analysis.

**Objective:**

The topics covered are sorting and searching algorithms, categorizing efficiency in time and memory use, linked list and tree data structures, stacks and queues. The objectives are that you should know about the data structures and algorithms.

**UNIT-I:**

Introduction: Overview - How to create a program – How to Analyse program. Arrays: Sparse Matrices - Representation of Arrays. Stacks and Queues: Fundamentals - Evaluation of Expression

**UNIT-II:**

Linked Lists: Singly Linked List - Linked Stacks and Queues - Polynomial Addition - More on Linked Lists - Doubly Linked List – Dynamic Storage Management - Garbage Collection and Compaction.

**UNIT-III:**

Trees: Basic Terminology - Binary Trees - Binary Tree Representations – Binary Tree Traversal - More on Binary Trees - Threaded Binary Trees - Counting Binary Trees.

**UNIT-IV:**

Graphs: Terminology and Representations - Traversals, Connected Components and Spanning Trees Shortest Paths and Transitive Closure- Activity Networks, Topological Sort and Critical Paths

**UNIT-V:**

Internal Sorting: Searching - Insertion Sort - Quick Sort - Heap Sort – Shell Sort – Merge sort – Bubble sort- Radix sort. External Sorting: Storage Devices -Sorting with Disks: K-Way Merging

**Text Books:**

Ellis Horowitz, Sartaj Shani, Data and File Structures Galgotia Publication.

**Reference:**

Prof. Maria S.Rukadikar\_“Data Structure and Algorithm” Publisher: Shroff; First Edition, 2011.

**Semester II (Common to B.Sc. CS /IT/CT/BCA)**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Core Practical II - Java Programming Lab</b>	0	0	3	4	Core

1. Create a Student Package to Maintain the Information about the student. Use Constructors to initialize the student Number and Use Overloading method to set the percentage of the mark. By Using this Package Create a Java Program.
2. Program to Implement Polymorphism, Inheritance and Inner Classes.
3. Program to implement the concept of Package in employee salary processing.
4. Java Program to Handle Different Mouse Events.
5. Create an swing for a Calculator Application.
6. Animate Images at Different Intervals by using Multithreading Concepts.
7. To write a java program that creates a string object and initializes it with your name and performs the following operations
  - a) To find the length of the string object using appropriate String method.
  - b) To find whether the character 'a' is present in the string. If yes find the number of times 'a' appear in the name and the location where it appears
8. Write a java program to create a StringBuffer object and illustrate how to append characters and to display the capacity and length of the string buffer.
9. Write a Java Program to implement the concept of Interface with your own example.
10. Write a Java Program to handle divide by Zero error using Exception Handling.
11. Write a Java Program to design your dream house using Java 2D shapes.

**Semester II (Common to B.Sc. CS /IT/CT/BCA)**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Allied II - Principles of Management and Accounting</b>	5	0	0	4	Allied

**Introduction:**

To acquaint the students, the Management Techniques that facilitates managerial decision – making  
To enable the students to learn principles and concepts of Accountancy.

**Objectives:**

After the successful completion of the course the student should have a thorough knowledge on The Management Techniques in business decision making. On successful completion of this course, the student should have understood Concepts and conventions of Accounting Basic.

**UNIT-I:**

Definition of Management – Management Vs Administration – Nature and Scope of Management - Functions of Management - Contribution of F.W. Taylor – Henry Fayol – Mary Parker Follet – Mc Gregor and Peter F. Drucker

**UNIT –II:**

Planning -Meaning, Nature and Importance of Planning –Steps in Planning –Forecasting –Decision Making Process –Types of decision

**UNIT –III:**

Staffing – meaning, nature, staffing process, recruitment & selection. Directing, supervision- leadership –Styles –Motivation -Meaning –benefits –Maslow and McGregor theories. Personality - Determinants, structure, behavior, assessment, psycho-analytical social learning, trait theories

**UNIT –IV:**

Fundamentals of Book Keeping – Accounting Concepts and Conventions – Types of accounts, functions, role, Journal – Ledger – Subsidiary books – Trial balance.

**UNIT –V:**

Final accounts of a sole trader with adjustments –Errors and rectification.

**Note:** Distribution of Marks between problems and theory shall be 40% and 60%.

**References:**

1. Business Management -Dinkar Pagare
2. Principles of Management-J.Jayasankar Margham Publications
3. Principles of Management, RN Gupta, S. Chand & Company Ltd.
4. Principles of Management, LM Prasad, Sultan Chand Publication
5. Financial Accounting R.L.Gupta, V.K.Gupta, M.C.Shukla — Sultanchand & sons
6. Advanced Accountancy K.L.Narang, S.N.Maheswari - -Kalyani publishers.

**Semester II (Common to B.Sc. CS /IT/CT/BCA)**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Core Practical III - MS Office and Basics of Internet Lab</b>	0	0	2	2	Core

**BASICS OF INTERNET LAB**

1. To create an email-id.
2. To compose and send a mail.
3. To forward a mail and to reply for a mail.
4. To send a mail with an attachment.
5. To download the attached document of a mail received.
6. To send a mail to a large number of recipients using cc and bcc options.
7. To search a thing using a search engine.
8. To open and read newspaper sites, TV programs schedules using Internet.
9. To upload your resume with any one job portal.

**MS OFFICE AUTOMATION LAB**

**MS-WORD**

10. Text Manipulation

- Change the font size and type
- Aligning and justification of Text
- Underlining the Text
- indent the Text
  - i) Prepare a Bio-data
  - ii) Prepare a Letter

11. Usages of Numbering, Bullets, Footer and Headers.

Usages of Spell check and find and replace

1. Prepare a document in newspaper format
2. Prepare a document with bullets, footers and Header

12. Tables and manipulation

Creation, Insertion, Deletion (Columns & Rows) and usage of Auto format.

- a) Create a calender and Auto format it
- b) Create a mark sheet using table and find out the total marks.

13. Creation of templates.

- a) Prepare a letter using and template
- b) Prepare a biodata using various kinds of templates

14. Mail Merge Concepts

Prepare an invitation to be sent to specific addresses, in the data source.

**MS-EXCEL**

15. Describe the types of functions
16. Data sorting – Ascending and Descending (both numbers and alphabets)
17. Mark list preparation for a student
18. Individual Pay Bill preparation
19. Electricity Bill preparation
20. Invoice Report preparation with Graphs.

**MS-POWERPOINT**

21. Create a Slideshow showing your personal details and resume.
22. Create an automated slideshow for an advertisement of a product.
23. Create an automated slideshow with external video and sound effects.

**Semester – III**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Core V - Web Technology</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>Core</b>

**Introduction :** Introduce the concept of Internet and WWW, Design an attractive web site using HTML and CSS., Understand the implementation of form validation in Web pages.

**Objective:** The fundamental of web technology is given with hands-on training. The student able to learn how to program and develop an web application.

**Unit - I: Introduction -** The internet in Industry and research – HTML5, CSS3, Javascript – Evolution of the Internet and WWW – Web Basics – Multitier Application Architecture – Client side vs Server side scripting – W3C – HTML5 – Headings – Linking – Images - special characters and Horizontal rules – Lists – Tables – Forms.

**Unit – II :** HTML Form Input types – Color – Date – Datetime – email – month – number – range – search – time – Input and Datalist elements and auto complete attribute – Page structure elements – Header – Nav – section and footer element.

**Unit – III:** Introduction to Cascading style sheet – inline styles – embedded styles – Linking external style sheets – positioning elements – backgrounds – drop-down menus – Text shadows – rounded corners – color – box shadows – Multiple Background images – Animations – Transitions and Transformations

**Unit – IV: Introduction to Scripting** - Your first script – obtaining user input with prompt dialogs – Arithmetic – Decision Making :Equality and Relational Operators – Control statements – if – if..else – while – increment and decrement operators – For Statement – switch – do...while – break and continue – logical operators.

**Unit – V:** Javascrit : Functions – Recursion – Arrays – Sorting Arrays with Array Method Sort – Searching Arrays with Array Method indexof – Multidimensional Arrays – Math Object – String Object – Date Object – Javascript Event Handling – Rollover with Mouseover and mouseout – Event Bubbling.

**Text Book :**

1. Paul Deitel, Harvey Deitel, and Abbey Deitel, “Internet and World Wide Web – How to Program”, 5<sup>th</sup> Edition, Pearson Education, 2012.

**Reference:**

1. Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition, Pearson Education, 2007.Deitel,
2. Deitel, Goldberg, "Internet & World Wide Web How To Program", Third Edition, Pearson Education, 2006.
3. Marty Hall and Larry Brown, "Core Web Programming" Second Edition, Volume I and II, Pearson Education, 2001.
4. Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2006

**Semester – III**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Core VI – Information Security and Cyber law</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>Core</b>

**Introduction :**

Define the Information Security and its need. Cyber law in India and how it control cyber crime.

**Objective:**

Define key terms and critical concepts of information security; enumerate the phases of the security systems development life cycle. Sections involved in Cyber security or cyber law.

**Unit - I:**

Introduction – 1960s – 1970s and 1980s – 1990s – 2000 to present – What is security?. – Components of Information system. – Systems development Life Cycle – The Security Systems Development Life Cycle – Security Professionals and the organization – Information Security: Is it an Art or a Science. The need for Security – Business Needs – Threats – Attacks – Secure Software Development.

**12 Lectures**

**Unit – II :**

Legal and Ethics in Information Security – International Laws and Legal Bodies – Ethics and Information Security – Codes of Ethics and Professional Organizations – Risk Management – Risk Identification – Risk Assessment – Risk Control Strategies – Selecting a risk Control Strategy.

**12 Lectures**

**Unit – III:**

Planning for Security – Information security Planning and Governance – Information Security Policy, Standards and Practices – The information Security Blueprint – Security Education, Training, and Awareness program – Security Technology – Firewalls and VPNs – Intrusion Detection and Prevention Systems and Other Security Tools.

**12 Lectures**

**Unit – IV:**

Introduction – Need for Cyber Law – Cyber crime on the rise – Important Terms related to cyber law – need for cyber law in India – History of Cyber law in India – IT act, 2000 – other laws amended by IT Act 2000 – National Policy on Information Technology 2012. Overview of rules issued under the IT Act 2000.

**12 Lectures**

**Unit – V:**

**Cyber Crimes** – definition – First cyber crime – types of cyber frauds – cyber frauds in India – Preventive measures – Cyber Crimes – penalties and offences under the IT Act, 2000 – offences under other legislations.

**12 Lectures**

**Text Book :**

1. Michael E. Whitman, Herbert J. Mattord, “Principles of Information Security”, Fourth Edition, Cenagage Learning, USA.
2. Pankaj Sharma, “Information Security and cyber Law”, Vikas Publishing.

**Reference:**

1. [http://www.indiancybersecurity.com/Cyber\\_law\\_overview.html](http://www.indiancybersecurity.com/Cyber_law_overview.html)
2. Mark Rhodes-Ousley, “Information Security – The Complete Reference”, Mc Graw-Hill Education, 2013.



**Semester – III**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Core Practical IV – Web Technology Lab</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>	<b>Practical</b>

1. Write an HTML code to display your education details in a tabular format.
2. Write an HTML code to display your CV on a web page.
3. Write an HTML code to create a Home page having three links: About Us, Our Services and Contact Us. Create separate web pages for the three links.
4. Write an HTML code to create a login form. On submitting the form, the user should get navigated to a profile page.
5. Write an HTML code to create a Registration Form. On submitting the form, the user should be asked to login with this new credentials.
6. Write an HTML code to create your Institute website, Department Website and Tutorial website for specific subject.
7. Write an HTML code to illustrate the usage of the following:
  - a. Ordered List
  - b. Unordered List
  - c. Definition List
8. Write an HTML code to create a frameset having header, navigation and content sections.
9. Write an HTML code to demonstrate the usage of inline CSS.
10. Write an HTML code to demonstrate the usage of internal CSS.
11. Write an HTML code to demonstrate the usage of external CSS.
12. Write a Java script to prompt for users name and display it on the screen.
13. Design HTML form for keeping student record and validate it using Java script.
14. Write programs using Java script for Web Page to display browsers information.
15. Write a JavaScript program to demonstrate looping
16. Write a JavaScript program to find the factorial of given number.
17. Write a JavaScript program to find the given text is palindrome or not.
18. Write a JavaScript program to change the background of a browser.

**Semester – III**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Skill Based I – Android Application Development</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>Core</b>

**Introduction :**

Learn to create Android programs using Java, and create the app.

**Objective:**

To Build Android apps - Understand how Android applications work, their life cycle, manifest, Intents, and using external resources - Design and develop useful Android applications.

**Unit - I: Developing Spectacular Android Applications:** Need of Develop for android - Android Programming Basics - Hardware Tools - Software Tools. **Prepping Development Headquarters:** Assembling Toolkit - Tuning Up the Hardware - Installing and Configuring Support Tools - Getting the Java Development Kit - Acquiring the Android SDK - Getting the Total Eclipse - Getting Acquainted with the Android Development Tools.

**Unit – II : First Android Project:** Starting a New Project in Eclipse - Deconstructing Project - Setting Up an Emulator - Creating Launch Configurations - Running the Hello Android App - Understanding Project Structure. **Designing the User Interface:** Creating the Silent Mode Toggle Application - Laying Out the Application - Developing the User Interface - Adding an Image to Application - Creating a Launcher Icon for the Application - Adding a Toggle Button Widget - Previewing the Application in the Visual Designer.

**Unit – III: Coding Android Application:** Understanding Activities - Creating the First Activity - Working with the Android Framework Classes – Installing and reinstalling the Application - Responding to Errors.

**Unit – IV: Understanding Android Resources:** Understanding Resources - Working with Resources. **Turning the Application into a Home-Screen Widget:** Working with App Widgets in Android - Working with Pending Intents - Creating the Home-Screen Widget - Placing the Widget on the Home Screen

**Unit – V: Turning Publishing the App to the Android Market:** Creating a Distributable File - Creating an Android Market Account - Pricing the Application - Getting Screen Shots for the Application - Uploading the Application to the Android Market - Watching the Installs Soar.

**Text Book :**

1. Donn Felker, “Android Application Development for Dummies”, Wiley Publishing, Inc.
2. Reto Meier, “PROFESSIONAL Android 4 Application Development”, John Wiley & Sons,

**Reference:**

1. Wei-Meng Lee,” Beginning Android™ Application Development”, Wiley Publishing, Inc..
2. Neil Smyth, “Android Studio Development Essentials”, Techotopia, 2014

**Semester – III**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Skill Based Practical I – Android Application Development Lab</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>	<b>Practical</b>

List of Programs

1. Getting Started with Mobile App Development
2. Create and validate a login application using username as Email ID else login button must remain disabled.
3. Creating a Hello World program Experiment with the most basic features and mobile application interaction concepts lists, text boxes, buttons, graphics, etc)
4. Create a following menu items in mobile application program.
  - a. cut
  - b. copy
  - c. paste
  - d. delete
  - e. select all
  - f. unselect all
5. Create an application to change screen color as per the user choice from a menu.
6. Create an Android application with a combo box, spinner, toast message get selected item.
7. Create an application to call a phone number entered by the user and edit Text

**Semester – IV**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Core VII – Relational Database Management System</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>Core</b>

**Introduction :**

This paper will help an entry-level programmer learn the foundational concepts of Relational Database Management Systems and to apply these in practice and learn how to use the Structured Query Language to work with databases.

**Objective:**

- To lay a strong foundation into the basic principles, theory and practice of using relational databases
- To emphasize the need, role, importance and uses of databases in applications development
- To distinguish between different models of organizing, storing and use of data

**Unit - I: Introduction** – Database system applications – purpose of Database systems – View of Data – Database languages – Relational Databases – Database Design – Data storage and Querying – Transaction Management – Database Architecture. Relational Model – Structure of Relational Databases – Database Schema – Keys – Schema Diagrams – Relational Query Language – Relational Operations.

**12 Lectures**

**Unit – II : Introduction to SQL** – SQL Query Language – SQL Data Definition – Basic Structure – Additional Basic Operations – Set Operations – Null Values – Aggregate Functions – Nested Sub queries – Modification of Database – Join Expressions – Views – Integrity Constraints – SQL Data types and Schemas – Accessing SQL from a Programming Language – Functions and Procedures – Triggers.

**12 Lectures**

**Unit – III:** Database Design – Design Process – ER Model – Constraints – ER Diagrams – Reduction to relational Schemas – ER design Issues – Extended ER Features – Alternative Notations for Modelling data.

**12 Lectures**

**Unit – IV:** Relational Database Design – Atomic Domains and First Normal Form – Decomposition using Functional Dependencies – Functional Dependency Theory – Algorithms for Decomposition – Decomposition using Multivalued Dependencies.

**12 Lectures**

**Unit – V: Storage and File Structure** – Overview of Physical Storage Media – Magnetic disk and Flash Storage – RAID – Tertiary Storage – File Organization – Organization of Records in Files – Data-Dictionary Storage – Database Buffer.

**12 Lectures**

**Text Book :**

Abraham Silberschatz, Henry F Korth, S. Sudarshan, “Database System Concepts”,6<sup>th</sup> Edition, McGraw Hill, 2011.

**Reference:**

Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Pearson Education.

**Semester – IV**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Core VIII – Information Storage and Management</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>Core</b>

**Introduction :**

Information storage is a central pillar of information technology. A large quantity of digital information is being created every moment by individual and corporate consumers of IT. This information needs to be stored, protected, optimized, and managed.

**Objective:**

Learn to make informed decisions about storing, managing, and protecting digital information in classic, virtualized, and cloud environments. Benefited in preparing Information Storage Associate (EMCISA) Certification

**Unit - I:** Introduction to Information Storage and Management: Information Storage - Evolution of Storage Technology and Architecture - Data Center Infrastructure - Key Challenges in Managing Information. Storage System Environment: Components of a Storage System Environment - Disk Drive Components - Disk Drive - Logical Components of the Host.

**12 Lectures**

**Unit – II :** Data Protection: RAID: Implementation of RAID - RAID Array Components - RAID Levels - RAID Comparison - Hot Spares. Components of an Intelligent Storage System: Front end - cache.

**12 Lectures**

**Unit – III:** Components of an Intelligent Storage System: Back end – Physical Disk - Intelligent Storage Array - Concepts in Practice: EMC CLARiiON and Symmetrix. Direct-Attached Storage and Introduction to SCSI: Types of DAS - DAS Benefits and Limitations - Disk Drive Interfaces - Introduction to Parallel SCSI: Evolution of SCSI.

**12 Lectures**

**Unit – IV:** Storage Area Networks: Fibre Channel: Overview - The SAN and Its Evolution - Components of SAN - FC Connectivity - Fibre Channel Ports - Fibre Channel Architecture – Zoning - Fibre Channel Login Types - FC Topologies.

**12 Lectures**

**Unit – V:** Introduction to Business Continuity: Information Availability - BC Terminology - Failure Analysis - Business Impact Analysis - BC Technology Solutions. Backup and Recovery: Backup Purpose - Backup Considerations - Recovery Considerations - Backup Methods - Backup Process.

**12 Lectures**

**Text Book :**

G. Somasundaram, Alok Shrivastava “Information Storage and Management - Storing, Managing, and Protecting Digital Information”, Wiley Publishing, Inc, 2005.

**Semester – IV**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Core Practical V – Oracle Lab</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>	<b>Core</b>

1. **Database Schema for a customer-sale scenario**

Customer(**Cust id : integer**, cust\_name: string)

Item(**item id: integer**, item\_name: string, price: integer)

Sale(**bill no: integer**, bill\_data: date, **cust\_id: integer**, **item\_id: integer**, qty\_sold: integer)

For the above schema, perform the following—

- Create the tables with the appropriate integrity constraints
- Insert around 10 records in each of the tables
- List all the bills for the current date with the customer names and item numbers
- List the total Bill details with the quantity sold, price of the item and the final amount
- List the details of the customer who have bought a product which has a price>200
- Give a count of how many products have been bought by each customer
- Give a list of products bought by a customer having cust\_id as 5
- List the item details which are sold as of today
- Create a view which lists out the bill\_no, bill\_date, cust\_id, item\_id, price, qty\_sold, amount
- Create a view which lists the daily sales date wise for the last one week

2. **Database Schema for a Student Library scenario**

Student(**Stud no : integer**, Stud\_name: string)

Membership(**Mem no: integer**, **Stud no: integer**)

Book(**book no: integer**, book\_name:string, author: string)

Iss\_rec(**iss no:integer**, iss\_date: date, **Mem no: integer**, **book no: integer**)

For the above schema, perform the following—

- Create the tables with the appropriate integrity constraints
- Insert around 10 records in each of the tables
- List all the student names with their membership numbers
- List all the issues for the current date with student and Book names
- List the details of students who borrowed book whose author is CJDATE
- Give a count of how many books have been bought by each student
- Give a list of books taken by student with stud\_no as 5
- List the book details which are issued as of today
- Create a view which lists out the iss\_no, iss\_date, stud\_name, book name
- Create a view which lists the daily issues-date wise for the last one week

3. **Database Schema for a Employee-pay scenario**

employee(**emp id : integer**, emp\_name: string)

department(**dept id: integer**, dept\_name:string)

paydetails(**emp id : integer**, **dept id: integer**, basic: integer, deductions: integer, additions: integer, DOJ: date)

payroll(**emp id : integer**, pay\_date: date)

For the above schema, perform the following—

- Create the tables with the appropriate integrity constraints
- Insert around 10 records in each of the tables
- List the employee details department wise

- d. List all the employee names who joined after particular date
  - e. List the details of employees whose basic salary is between 10,000 and 20,000
  - f. Give a count of how many employees are working in each department
  - g. Give a names of the employees whose netsalary>10,000
  - h. List the details for an employee\_id=5
  - i. Create a view which lists out the emp\_name, department, basic, dedeuctions, netsalary
  - j. Create a view which lists the emp\_name and his netsalary
4. Write a program to find largest number from the given three numbers.
  5. Write a program to check whether the given number is Armstrong or not
  6. Write a program to generate all prime numbers below 100.
  7. Write a program to demonstrate predefined exceptions
  8. Create a cursor, which displays all employee numbers and names from the EMP table.
  9. Create a cursor, which update the salaries of all employees as per the given data.
  10. Create a procedure to find reverse of a given number
  11. Create a procedure to demonstrate IN, OUT and INOUT parameters
  12. Create a function to check whether given string is palindrome or not.
  13. Create a trigger before/after update on employee table for each row/statement.
  14. Create a trigger before/after delete on employee table for each row/statement.
  15. Create a trigger before/after insert on employee table for each row/statement.

**Semester – IV**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Skill Based II – Operating system</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>Core</b>

**Introduction :** In this course, all the advances that have led to the state-of-the-art operating system covering the topics like operating system functions, concurrency, process control & deadlock, memory management and disk scheduling.

**Objective:** To provide comprehensive and up-to-date coverage of the major developments in operating system. To cover important theoretical foundations including process synchronization, concurrency, event ordering, mutual exclusion, deadlock, scheduling and i/o management.

**Unit - I:** Introduction – Computer System Organization – Architecture – Structure – Operations – Process Management – Memory Management – Storage Management – Protection and Security – Open – Source Operating Systems – Operating System Services – User and Operating System Interface – System Calls – Types – System Programs – OS Design and Implementation.

**Unit – II :** Process Management – Process Concept – Process Scheduling – Operations on Process – Interprocess Communications – Threads – Multicore Programming – Thread Libraries – Threading Issues – Process Synchronization – Critical-section Problem – Synchronization Hardware – Mutex Locks – Semaphores – Classic Problems of Synchronization – Monitors.

**Unit – III:** CPU Scheduling – Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Thread scheduling – Multiple Processor Scheduling – Real-Time CPU Scheduling – Dead lock – System Model – Deadlock Characterization – Methods for Handling Deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery from Deadlock.

**Unit – IV:** Memory Management – Main Memory – Swapping – Contiguous Memory Allocation – Segmentation – Paging – Structure of the Page Table – Virtual Memory – Demand Paging – Copy-on Write – Page Replacement – Allocation of Frames – Memory Mapped Files – Allocating Kernel Memory.

**Unit – V:** File-System Interface – File Concept – Access Methods – Directory and Disk Structure – File Sharing - Protection – File System Structure – File System Implementation – Directory – Allocation – Free-space management – Protection – Access Control – Program Threats – System and Network Threats.

**Text Book :**

Abraham Silberschatz, Peter Baer Galvin, and Greg Gagne, “Operating System Concepts”, 9<sup>th</sup> Edition, Willy publishing. 2013.

**Reference:**

1. Andrew S. Tanenbaum, “Modern Operating Systems”, Second Edition, Pearson Education, 2004.
2. Gary Nutt, “Operating Systems”, Third Edition, Pearson Education, 2004.
3. William Stallings, “Operating Systems – Internals and Design Principles”, Pearson Education, 2008.
4. H. M. Deitel P. J. Deitel D. R. Choffnes, “Operating Systems”, Pearson Education Inc, 2004



**Semester – V**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Core X – Bigdata Analytics</b>	<b>5</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>Core</b>

**Introduction:** This paper is for students who'd like to understand more advanced tools used to wrangle and analyze big data. In this course you will be guided in basic approaches to querying and exploring data using higher level tools built on top of a Hadoop Platform.

**Objective:** The basics of Analytics – Concepts , Data preparation – merging, managing missing numbers sampling , Data visualisation, Basic statistics. Lots of practise to ensure that we are very comfortable handling an Analytics project on BigData

**Unit - I: Big Data - From the Business Perspective :**What is Big Data – Characteristics of Big Data.

**Unit – II : Big Data – From the Technology Perspective :** All about Hadoop – The History of Hadoop – Components of Hadoop – Application Development in Hadoop – Getting your Data into Hadoop.

**Unit – III: Getting Started with Big Data Analytics -** Changing Focus with Big Data – The role of the Data Analyst – Implementing Big Data Analytics within an Organization Using Alteryx – Blending Data form Multiple Sources – Looking at Alteryx Designer Desktop.

**Unit – IV: Analyzing Big Data in Context :** Focus on Context, Not Just Integration – Combining Big Data with spatial Data – leveraging External Data Provider Resources. **Getting Value form predictive Analytics ad Big Data :** Why do Predictive Analytics on Big Data ? – Moving Predictive Analytics to the From Predictive analysis.

**Unit – V: Humanizing Big Data Analytics :** Putting Big Data in the Hands of Those Who Need it – Humanizing Bata Design Principles – Humanizing Big Data Analytics Workflow – Considering Consumerization of Big Data Analytics – Getting an Alteryx Analytics Gallery Overview – Publishing Data and Analytics to Cloud Service – Focusing on Consuming Applications – The Best Platform for Strategic Analytics.

**Text Book :**

1. Understanding Big Data(Analytics for Enterprise Class Hadoop and Streaming Data) , Chris Eaton, Dirk Deroos, Tom Deutsch, George Lapis, Paul Zikopoulos, 2011 (Unit – I, II)
2. Big Data Analytics for Dummies, Michael Wessler, OCP & CISSP, 2012 (Unit – III, IV, V)

**Reference:**

1. Big Data Analytics using Splunk, Peter Zadrozny and Raghu Kodali, Apress 2013.

**Semester – V**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Core XI - Cloud Infrastructure and Services</b>	<b>5</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>Core</b>

**Introduction :** A model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction.

**Objective:** To provide basic knowledge about Cloud computing, Classic Data Center, Cloud Infrastructure and Cloud services and management.

**Unit - I:** Journey to the Cloud: Essential Cloud Characteristics - Building Cloud Infrastructure - Understand Existing Infrastructure- Classic Data Center - Virtualize the Infrastructure. Classic Data Center (CDC): Application - DBMS.

**Unit – II :** Classic Data Center (CDC): Compute: Examples of Compute System - Server Clustering - Logical Components of Compute, Storage : Storage Device Options - Redundant Array of Independent Disks (RAID) - RAID Techniques - RAID Levels - Intelligent Storage System - Components of an Intelligent

**Unit – III:** Classic Data Center (CDC) : Storage Networking Technologies : Compute to Compute Communication - Compute to Storage Communication: Data Access by Compute - Direct Attached Storage (DAS) - Emergence of Storage Networking Technologies - FC SAN - Components of FC SAN - Fibre Channel Fabric - Port Types – Zoning.

**Unit – IV:** Virtualized Data Center: Compute Virtualization Overview: Need for Compute Virtualization – Hypervisor - Types of Hypervisor - Benefits of Compute Virtualization. Storage Virtualization Overview: Benefits of Storage Virtualization - Virtual Machine Storage: Storage for Virtual Machines - File System for Managing VM Files.

**Unit – V:** Cloud Infrastructure and Management: Cloud Infrastructure and Service Creation: Cloud Infrastructure Framework - Physical Infrastructure - Virtual Infrastructure - Applications and Platform Software - Cloud Infrastructure Management and Service Creation Tools - Cloud Service Management: Overview of Cloud Service Management - Processes in Cloud Service Management - Capacity Management - Performance Management - Problem Management.

**Text Book :**

1. Barrie Sosinsky, “Cloud Computing Bible”, Wiley Publishing Inc, 2007.
2. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, August 2008.

**Semester – V**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Core Practical – VI – Hadoop Lab</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>	<b>Practical</b>

Software Required for Hadoop Lab

[jdk][eclipse][hadoop 0.20.0][hadoop-server virtual machine][VMPlayer]

List of Practicals

1. Setting up the environment for the Hadoop.
2. Word Count using Hadoop.
3. Map Reduce using Hadoop.
4. Hadoop using Bigdata
5. HIVE using Hadoop

**Semester – V**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Skill Based III – Open Source Tools</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>Skill</b>

**Introduction :**

This course provides the necessary knowledge to design and develop dynamic, data-driven & interactive web pages using HTML, CSS, PHP and MySQL. It introduces students to PHP framework and syntax, most important techniques used to build dynamic web sites and perform hands on practice with a MySQL database to create database-driven HTML forms. It is interspersed with step-by-step training illustrating the concepts are explained.

**Objective:**

On successful completion of this subject the students have the ability to develop a web site using the open source software like PHP & MYSQL

**Unit - I:** HTML - Introduction: HTML - Elements - Tags - Text - Formatting –Paragraph- Attributes - Font Text Links - Comments - Lists - Images - Image Links - Tables – Bgcolor - Background - Web Forms - Input - Text Fields - Password - Reset - Submit - Checkboxes - Radio - Select - Hidden Fields - Upload - Text area. HTML Special Tags : Body - Meta , HTML - Style , HTML - Div , HTML - Layouts , HTML - Frames , Formatting Tags , HTML - Bold , HTML - Paragraphs , HTML - Headings , HTML - Line Breaks , HTML - Horizontal Rule, HTML – Email, HTML - Italic , HTML - Code , HTML - Superscript , HTML - Subscript , HTML – Strikethrough.

**Unit – II :** CSS Introduction: CSS Syntax, CSS Types, CSS Id & Class ,CSS How ,Styling Backgrounds : Styling Text , Styling Fonts , Styling Links , Styling Lists , Styling Tables - CSS Box Model: CSS Border CSS Outline - CSS Margin - CSS Padding - CSS Dimension - CSS Display - CSS Positioning - CSS Floating - CSS Navigation Bar - CSS Image Gallery - CSS Image Opacity - CSS Align.

**Unit – III:** Introducing PHP – Basic development Concepts – Creating first PHP Scripts – Using Variable and Operators – Storing Data in variable – Understanding Data types – Setting and Checking variables Data types – Using Constants – Manipulating Variables with Operators. Controlling Program Flow: Writing Simple Conditional Statements - Writing More Complex Conditional Statements – Repeating Action with Loops – Working with String and Numeric Functions.

**Unit – IV:** Working with Arrays: Storing Data in Arrays – Processing Arrays with Loops and Iterations – Using Arrays with Forms - Working with Array Functions. Working with Dates and Times - Using Functions and Classes: Creating User-Defined Functions - Creating Classes – Using Advanced OOP Concepts. Advanced concepts in PHP: Cookies – sessions – server variables.

**Unit – V:** Introduction to MYSQL: What is Database- Understanding Tables, Record & Fields- Types Data Type -Creating Database & Tables- Dropping Database & Tables - Adding Fields - Selecting Table - Alerting Fields Properties - SQL Queries: Insert Record, Select Record, Deleting Record, Modifying Record, WHERE Clause , Using Operators , Sorting Records , Eliminating Duplicates, Database Connections.

**Text Book :**

1. HTML&CSS Design and build Web Sites-JON DUCKETT, John Willy and Sons, 2006.
2. PHP A Beginner’s Guide, VIKRAM VASWANI, Tata McGraw-Hill, 2007.
3. Learning MY SQL, Seyed M.M. & Hugu E.Williams,O’Reilly, 2008

**Reference:**

1. The PHP Complete Reference – Steven Holzner – Tata McGraw-Hill Edition, 2006.
2. PHP/MySQL Programming for the Absolute Beginner by Andy Harris, 2005.

**Semester – V**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Skill Based Practical II – Open Source Lab</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>Practical</b>

List of Programs

1. Write an HTML code to create a Home page having three links: About Us, Our Services and Contact Us. Create separate web pages for the three links.
2. Write an HTML code to demonstrate the usage of inline, internal, external CSS.
3. Write an HTML code to create a Registration Form. On submitting the form, the user should be asked to login with this new credentials.
4. Create a simple HTML form and accept the user name and display the name through PHP echo statement.
5. Write a PHP script to get the client IP address.
6. Write a PHP Script to display your Education details using table, list, formatting, background image.
7. Write a PHP script to:
  1. Transform a string all uppercase letters.
  2. Transform a string all lowercase letters.
  3. Make a string's first character uppercase.
  4. Make a string's first character of all the words uppercase.
8. Write a PHP script to display string, values within a table.
9. Write a PHP script to generate unique random numbers within a range.
10. Create a script to construct the following pattern, using nested for loop.

```
*
*  *
*  *  *
*  *  *  *
```
11. Write a PHP script to sort the following associative array :  
array("xxxx"=>"21","yyyy"=>"41","kkkk"=>"39","kkmm"=>"40") in
  - a) ascending order sort by value
  - b) ascending order sort by Key
  - c) descending order sorting by Value
  - d) descending order sorting by Key
12. Write a PHP calculator class which will accept two values as arguments, then add them, subtract them, multiply them together, or divide them on request.
13. Design a webpage that should compute one's age on a given date using PHP.
14. Design a authentication web page in PHP with MySQL to check user name and Password
15. Design a Web page for getting details from user and insert the user details in the database using PHP and My SQL.

**Semester – VI**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Core XII - Networking &amp; Data Communication</b>	<b>5</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>Core</b>

**Introduction :**

This course helps the students to learn about the network from basic idea to the depth of the subject. They can acquire knowledge about the network concepts as well as communication concepts based on the current trends of information technology.

**Objective:**

student should be able to understand:

1. Basic idea about network
2. Physical layer functions and concepts
3. Data link layer functions and concepts
4. Network layer functions, Protocols and concepts
5. Transport layer functions & Application layer- Protocols and concepts
6. Security

**Unit - I:**

Introduction – Network models – Physical layer - data and signals – digital transmission – Multiplexing- Transmission media – Switching

**Unit – II :**

Data link layer - Error detection and correction – Data link control – Wireless LAN – SONET/SDH – Virtual Circuit Networks

**Unit – III:**

Network layer – Logical addressing - Internet protocol – Address mapping, Error reporting. Multicasting, Delivery, Forwarding and routing

**Unit – IV:**

Transport Layer – Process-to-Process Delivery, Congestion control and quality of service Application layer – DNS, Remote logging, E- mail and File Transfer, WWW and HTTP, SNMP and multimedia

**Unit – V:**

Security – Cryptography – Network security – Security in Internet

**Text Book :**

1. Data communication and networking – Behrouz A Forouzan – Tata McGraw Hill – 4<sup>th</sup> Edition – 2004. (Chapters :1 to 32)

**Reference:**

1. Jean Wairand - Communication Networks (A first Course) - Second Edition - WCB/McGraw Hill - 1998.

**Semester – VI**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Core Practical VII – Networking Lab</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>	<b>Practical</b>

**List of Practical's**

1. Programs using TCP Sockets (like date and time server & client, echo server & client, etc.)
  - a. Program Using TCP Sockets Date and Time Server
  - b. Implementation of Client-Server Communication Using TCP.
  - c. Implementation of TCP/IP ECHO
2. Programs using UDP Sockets (like simple DNS)
  - a. Program using UDP Socket UDP Chat Server/Client
  - b. DNS Server to Resolve a given Host Name
  - c. UDP DNS server/client
3. Programs using Raw sockets (like packet capturing and filtering)
  - a. Packet Capturing and Filtering
4. Programs using RPC
  - i. Client – Server Communication using RPC
  - ii. Arithmetic Calculator using RPC-RMI
5. Simulation of sliding window protocols
6. Experiments using simulators
  - i. Simple Topology Creation using NS - 2
  - ii. User Datagram Protocol using NS -2
  - iii. Transmission Control Protocol using NS - 2
7. Performance comparison of MAC protocols
8. Performance comparison of Routing protocols
9. Study of TCP/UDP performance
10. Study of Performance Comparison of TCP and UDP using NS – 2

**Semester – VI**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Skill Based IV - Software Testing</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>Skill</b>

**Introduction :**

This subject deals software testing concepts like unit-wise testing, integration Goal: Knowledge on software testing and how to test the software at various levels.

**Objective:**

To inculcate knowledge on Software testing concepts.

**Unit - I:**

Software Development Life Cycle models: Phases of Software project – Quality,Quality Assurance, Quality control – Testing, Verification and Validation – Process Model to represent Different Phases - Life Cycle models- waterfall model- RAD model- Prototype model- V-model-modified v-model.

**Unit – II :**

White-Box Testing: Static Testing –Structural Testing –Challenges in White-Box Testing.Black-Box Testing: What is Black-Box Testing? - Why Black-Box Testing? –When to do Black-Box Testing? – How to do Black-Box Testing? – Requirement based testing-Boundary Value analysis-Decision tables– Challenges in White BoxTesting.

**Unit – III:**

Integration Testing: Integration Testing as Type of Testing – Integration Testing as a Phase Testing. Scenario Testing – Defect Bash System and Acceptance Testing: system Testing Overview – Why System testing is done? –Functional versus Non-functional Testing - Functional testing – Nonfunctional Testing – Acceptance Testing – Summary of Testing Phases.

**Unit – IV:**

Performance Testing: Factors governing Performance Testing – Methodology of Performance Testing – tools for Performance Testing – Process for Performance Testing –Challenges. Regression Testing: What is Regression Testing? – Types of Regression Testing– When to do Regression Testing – How to do Regression Testing – Best Practices.

**Unit – V:**

Adhoc testing:buddy testing- pair testing-Exploratory testing and Agile and Extreme testing. Test Planning, Management, Execution and Reporting: Test Planning – Test Management – Test Process – Test Reporting –Best Practices. Test Metrics and Measurements: Project Metrics – Progress Metrics – Productivity Metrics – Release metrics- common people issues.

**Text Book :**

1. SOFTWARE TESTING Principles and Practices – Srinivasan Desikan &Gopalswamy Ramesh, 2006, Pearson Education.

**Reference:**

1. EFFECTIVE METHODS OF SOFTWARE TESTING–William E.Perry, 3rd ed, 2005
2. SOFTWARE TESTING – Renu Rajani, Pradeep Oak, 2007,



**Elective:**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Information Security</b>	<b>5</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>Elective</b>

**Introduction :**

Students learn the fundamentals of information security

**Objective:**

- Recount the history of computer security and how it evolved into information security
- Define key terms and critical concepts of information security
- Enumerate the phases of the security systems development life cycle
- Describe the information security roles of professionals within an organization

**Unit - I:**

Information Security: Introduction, History of Information security, What is Security, CNSS Security Model, Components of Information System, Balancing Information Security and Access, Approaches to Information Security Implementation, The Security Systems Development Life Cycle.

**Unit – II :**

Cryptography: Concepts and Techniques, symmetric and asymmetric key cryptography, steganography, Symmetric key Ciphers: DES structure, DES Analysis, Security of DES, variants of DES, Block cipher modes of operation

**Unit – III:**

AES structure, Analysis of AES , Key distribution Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Analysis of RSA, Diffie-Hellman Key exchange

**Unit – IV:**

Message Authentication and Hash Functions: Authentication requirements and functions, MAC and Hash Functions, MAC Algorithms: Secure Hash Algorithm, Whirlpool, HMAC, Digital signatures, X.509, Kerberos

**Unit – V:**

Intruders, Virus and Firewalls: Intruders, Intrusion detection, password management, Virus and related threats, Countermeasures, Firewall design principles, Types of firewalls

**Text Book :**

1. Principles of Information Security : Michael E. Whitman, Herbert J. Mattord, CENGAGE Learning, 4th Edition.
2. Cryptography and Network Security : William Stallings, Pearson Education, 4th Edition

**Reference:**

1. Cryptography and Network Security : C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning
3. Cryptography and Network Security : Atul Kahate, Mc Graw Hill, 2nd Edition
4. Principles of Computer Security: WM.Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
6. Handbook of Security of Networks, Yang Xiao, Frank H Li, Hui Chen, World Scientific, 2011.

**Elective:**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Cyber Security</b>	<b>5</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>Elective</b>

**Introduction :**

To learn the fundamentals of the Cyber Security and the way to keep the information secure.

**Objective:**

The student understands the importance of cyber security and manages the data and network without any attacks.

**Unit - I:**

Cyber Security Fundamentals – Network and Security Concepts – Information Assurance Fundamentals – Basic Cryptography – Symmetric Encryption – Public Key Encryption – The Domain Name System – Firewalls – Virtualization – Radio-Frequency Identification.

**Unit – II :**

Microsoft Windows Security Principles – Windows Tokens – Windows Messaging – Windows Program Execution – The Windows Firewall.

**Unit – III:**

Attacker Techniques and Motivations – How Hackers cover their tracks – Fraud Techniques – Threat Infrastructure – Exploitation – Techniques to gain a Foothold – Misdirection, Reconnaissance and Disruption methods.

**Unit – IV:**

Malicious Code – Self-Replicating Code – Evading Detection and Elevating Privileges – Spyware – Attacks against privileged user accounts and escalation of privileges – Stealing information and Exploitation.

**Unit – V:**

Defence and Analysis techniques – Memory Forensics – Honeypots – Malicious Code Naming – Automated Malicious Code Analysis Systems – Intrusion Detection systems.

**Text Book :**

1. Cyber Security Essentials, James Graham, Richard Howard, Ryan Olson, CRC Press, 2011.

**Reference:**

1. Cyber Security and Cyberwar : What everyone needs to know, P. W. Singer and Allan Friedman, Oxford University Press, 2014.
2. Cyber Security for Dummies, Lawrence C. Miller, CISSP, Wiley Publishing, 2014

**Elective:**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Routing &amp; Switching</b>	<b>5</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>Elective</b>

**Introduction :**

To understand the fundamental concepts of computer networking.

**Objective:**

To Allow the student to gain expertise in some specific areas of networking such as the routing and switching.

**Unit - I:**

Internetworking: Internetworking Basics - Internetworking Models - The OSI Reference Model. Ethernet Networking and Data Encapsulation: Ethernet Networks in Review - Ethernet Cabling - Data Encapsulation.

**Unit – II :**

Introduction to TCP/IP: Introducing TCP/IP - A Brief History of TCP/IP - TCP/IP and the DoD Model - IP Addressing - IPv4 Address Types - Subnetting Basics. Internet Protocol Version 6 (IPv6): Why Do We Need IPv6? - The Benefits and Uses of IPv6 - IPv6 Addressing and Expressions - How IPv6 Works in an Internetwork.

**Unit – III:**

IP Routing: Routing Basics - The IP Routing Process - Configuring IP Routing - Configuring IP Routing in Our Network - Dynamic Routing - Routing Information Protocol (RIP). IP Services: Virtual Router Redundancy Protocol - IPv6 Routing Protocols.

**Unit – IV:**

Switching: Switching Services - Configuring Catalyst Switches - Enhanced Switched Technologies: Spanning Tree Protocol (STP) - Types of Spanning-tree Protocols - Modifying and Verifying the Bridge ID - Spanning-tree Failure Consequences – Ether Channel.

**Unit – V:**

VLANs and InterVLAN Routing: VLAN Basics - Identifying VLANs - Routing between VLANs - Configuring VLANs. Security: Perimeter, Firewall, and Internal Routers - Introduction to Access Lists - Standard Access Lists - Extended Access Lists - Monitoring Access Lists.

**Text Book :**

1. Todd Lammle, “CCNA-Routing and Switching Study Guide”, Published by John Wiley & Sons, Inc. Indianapolis, Indiana, 2013.

**Reference Book:**

1. TCP/IP Illustrated, Volume 1: The Protocols by Kevin R. Fall, W. Richard Stevens, 2nd Edition, Addison-Wesley Professional Computing Series, 2015.

**Elective:**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Information Hiding</b>	<b>5</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>Elective</b>

**Introduction :**

**Objective:**

**Unit - I:**

Introduction to Information Hiding: Technical Steganography, Linguistic Steganography, Copy Right Enforcement, Wisdom from Cryptography Principles of Steganography: Framework for Secret Communication, Security of Steganography System, Information Hiding in Noisy Data , Adaptive versus non-Adaptive Algorithms, Active and Malicious Attackers, Information hiding in Written Text.

**Unit – II :**

A Survey of Steganographic Techniques: Substitution systems and Bit Plane Tools, Transform Domain Techniques: - Spread Spectrum and Information hiding, Statistical Steganography, Distortion Techniques, Cover Generation Techniques. Steganalysis: Looking for Signatures: - Extracting hidden Information, Disabling Hidden Information.

**Unit – III:**

Watermarking and Copyright Protection: Basic Watermarking, Watermarking Applications, Requirements and Algorithmic Design Issues, Evaluation and Benchmarking of Watermarking system.

**Unit – IV:**

Transform Methods: Fourier Transformation, Fast Fourier Transformation, Discrete Cosine Transformation, Mellin-Fourier Transformation, Wavelets, Split Images in Perceptual Bands. Applications of Transformation in Steganography

**Unit – V:**

Fingerprinting - Introduction - Examples of Fingerprinting - Terminology and Requirements - Classification - Object-Based Classification - Detection-Sensitivity-Based Classification -Fingerprinting Method-Based Classification - Fingerprint-Based Classification - Research History - Fingerprinting Schemes - Statistical Fingerprinting - Collusion-Secure Fingerprinting - Asymmetric Fingerprinting - Traitor Tracing - Anonymous Fingerprinting

**Text Book :**

Katzendbisser, Petitcolas, "Information Hiding Techniques for Steganography and Digital Watermarking", Artech House, 2014

**Reference:**

Peter Wayner, "Disappearing Cryptography: Information Hiding, Steganography and Watermarking 2/e", Elsevier, 2011.

**Elective:**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>E-Learning Models</b>	<b>5</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>Elective</b>

**Introduction :**

To provide the base of knowledge necessary to tackle everything from early concepts of e-learning.

**Objective:**

The students gain the knowledge of developing e-learning models.

**Unit - I:**

Getting started : Why develop e-learning? - E-learning approaches- E-learning components - Synchronous and asynchronous e-learning - Quality of e-learning -The activities - The team - The technology.

**Unit – II :**

Designing an e-learning course - Identifying and organizing course content - Needs analysis - Analysing the target audience - Identifying course content - Defining learning objectives- Defining the course sequence -Defining instructional, media, evaluation and delivery strategies - Defining instructional methods - Defining the delivery strategy - Good practices - Defining the evaluation strategy.

**Unit – III:**

Creating interactive content - Preparing content - How subject matter experts contribute to e-learning development - Tips for content development and language style - Creating storyboards - What is a storyboard? - Structure of an interactive e-lesson - Techniques for presenting content - Adding examples - Integrating media elements - Developing practice and assessment tests - Additional resources -Courseware development - What does courseware development imply?- Authoring tools - Types of authoring tools - Selecting an authoring tool.

**Unit – IV:**

Managing and evaluating learning activities - Course delivery and evaluation - Components of an instructor led or facilitated course - Planning and documenting activities - Facilitating learners' activities - Using communication tools for e-learning.

**Unit – V:**

Learning platforms- What are learning platforms? - Proprietary vs. open-source LMS - Moodle and other open-source LMS solutions - Solutions for limited or no connectivity - Case study: The IMARK work flow to produce and deliver e-learning content.

**Text Book :**

1. E-learning methodologies - A guide for designing and developing e-learning courses, ISBN 978-92-5-107097-0, 2013.

**Reference:**

1. E-learning: A guidebook of Principles, Procedures and Practices, Som Naidu, 2<sup>nd</sup> Revised Edition, CEMCA, 2006.

**Elective:**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Digital Marketing</b>	<b>5</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>Elective</b>

**Introduction :**

To give an overview of Digital Marketing and illustrate the different components of marketing.

**Objective:**

The students understand the importance of computer and digital media for the marketing. Social media, email are used by the students for digital marketing.

**Unit - I:**

Introduction – Going digital – the evolution of marketing – the changing face of advertising – the technology behind digital marketing – Strategic Thinking – understanding the digital consumer – Your window to the digital world.

**Unit – II :**

The search for Success – About the engines – optimizing your site for the engines – advertising on the search engines – universal search – more opportunities to rank - Website intelligence and return on investment

**Unit – III:**

E – mail Marketing – Planning your campaign – Measuring your Success – e-mail a vital component of digital marketing

**Unit – IV:**

Social media and online Consumer Engagement – Different forms of social media - Social media dashboards – the rules of engagement – adding social media to your own site.

**Unit – V:**

Online PR and Reputation Management – Promoting your business through online channels – Damage limitation – Mobile Marketing – Tracking and measuring human behaviour.

**Text Book :**

1. Understanding Digital Marketing : Marketing Strategies for Engaging the Digital Generation by Damian Ryan, Calvin Jones, Kogan Page Publishers, 2012

**Reference Book :**

1. "Digital Marketing Strategy, Implementation and Practice", Dave Chaffey and Fiona Ellis-Chadwick, Sixth Edition, Pearson Education, 2016
2. "The Art of Digital Marketing Hardcover" by Ian Dodson, Wiley Publishers, 2016.

**Elective**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Bio Metrics</b>	<b>5</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>Elective</b>

**Introduction:**

Through this paper, the student learns the advantages and methods of making a document security.

**Objective:**

To teach the various methods of the Bio Metric features. Securing the system as well as data.

**Unit - I:**

Person Recognition – Biometric Systems – Enrolment and recognition phases – Sensor Module – Feature Extraction Module – Database Module – Matching Module – Biometric Functionalities – Verification and Identification – Biometric System Errors – Design cycle of Biometric Systems

**Unit – II :**

Finger print recognition – Friction Ridge pattern – Fingerprint Acquisition – Feature Extraction – Matching – Fingerprint Indexing – Fingerprint Synthesis – Palmprint

**Unit – III:**

Face Recognition – Image Acquisition – Face Detection – Feature Extraction and Matching – Handling pose, illumination, and expression variations – Heterogeneous face recognition – Face Modelling

**Unit – IV:**

Ear detection – Ear Recognition – Challenges in ear recognition – Gait – Feature extraction and matching – challenges in gait recognition – Hand Geometry – Image Capture – Hand Segmentation – Feature Extraction

**Unit – V:**

Multi Biometrics – Sources of Multiple Evidence – Acquisition Processing Architecture – Fusion Levels – Security of Biometric Systems – Adversary Attacks – Attacks at the user Interface attacks – attacks on Biometric processing.

**Text Book :**

- Anil K. Jain, Arun A. Ross, Karthik Nandakumar, “Introduction to Biometrics”, Springer, 2011.

**Reference Book :**

- Biometric Technology Authentication Biocryptography And Cloud Based Architecture by Das R, Taylor & Francis, 2015.

**Elective:**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Cryptography</b>	<b>5</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>Elective</b>

**Introduction:** To Provide a outline on the principles and practice of Cryptography and network security. Basic Issues to be addressed by a network security capability and the Practical applications are explored.

**Objective:** To make the students to understand the principles of encryption algorithms, conventional and public key cryptography.

**Unit - I:**

Introduction – Computer Security Concepts – The OSI Security Architecture – security Attacks – Security Services – Security Mechanisms – A Model for Network Security – Symmetric Ciphers – Classical Encryption Techniques – Symmetric Cipher Model – Substitution Techniques – Transposition Techniques – Steganography.

**Unit – II :**

Block Ciphers and The Data Encryption Standard – Block ciphers principles – The Data Encryption Standard (DES) – A DES example – The Strength of DES – Block cipher Design principles – Advanced Encryption Standard – the origin – AES Structure – AES round functions – AES key expansion – An AES Example – AES Implementation.

**Unit – III:**

Block Cipher Operation – Multiple encryption and Triple DES – Cipher Block Chaining Mode – Cipher Feedback mode – Counter Mode – XTS Mode for Block – Oriented Storage Devices – Stream Ciphers – RC4

**Unit – IV:**

Public-Key Cryptography and RSA – Principles of Public-key cryptosystems – The RSA Algorithm – Other public-key cryptosystems – Diffie – Hellman Key Exchange – Elgammal Cryptosystem – Secure Hash Algorithm - Digital Signatures – Elgamal Digital Signature scheme – Digital Signature Standard (DSS)

**Unit – V:**

Network and Internet Security – Transport Level Security – Web Security Issues – Secure Socket Layer (SSL) – Transport Layer Security (TLS) – HTTPS – Secure Shell (SSH) – Wireless Network Security – Electronic Mail Security – IP Security

**Text Book :**

1. William Stallings, “Cryptography and Network Security: Principals and Practice”, Prentice Hall – 5<sup>th</sup> Edition, 2013.

**Reference:**

1. Wade Trappe, Lawrence C. Washington, "Introduction To Cryptography with Coding Theory", Pearsons India, 2011.
2. Behrouz A. Forouzan, Debdeep Mukopadhyay, "Cryptography and Network Security", TMH, 2nd Edition, 2013.



**Elective:**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Social Networking</b>	<b>5</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>Elective</b>

**Introduction :**

- Gives the overview of Social Networking and the method to implement it.

**Objective:**

- The students are able to understand the importance of Social Networking and its functionality.

**Unit - I:**

Introduction : Analyzing Relationships to Understand People and Groups - From Relationships to Networks—More Than Meets the Eye - Social Networks vs. Link Analysis - The Power of Informal Networks - Terrorists and Revolutionaries: The Power of Social Networks.

**Unit – II :**

Graph Theory: What Is a Graph? - Graph Traversals and Distances - Graph Distance - 6 Degrees of Separation is a Myth! - Small World Networks. Centrality, Power, and Bottlenecks: Sample Data: The Russians are Coming! – Centrality - What Can't Centrality Metrics Tell Us?

**Unit – III:**

Cliques, Clusters and Components: Components and Subgraphs - Subgraphs—Ego Networks – Triads – Cliques - Hierarchical Clustering 2-Mode Networks: Does Campaign Finance Influence Elections? - Theory of 2-Mode Networks - Expanding Multimode Networks

**Unit – IV:**

Information Diffusion: Anatomy of a Viral Video - How Does Information Shape Networks (and Vice Versa)? - A Simple Dynamic Model in Python - Coevolution of Networks and Information

**Unit – V:**

Graph Data in the Real World: Medium Data: The Tradition - Big Data: The Future, Starting Today - “Small Data”—Flat File Representations - “Medium Data”: Database Representation - Working with 2-Mode Data - Social Networks and Big Data - Big Data at Work

**Text Book :**

1. Social Network Analysis for Startups – By Maksim Tsvetovat and Alexander Kouznetsov – O'REILLY Publisher. 2010.

**Reference:**

1. Connected: The Surprising Power of Our Social Networks and How They Shape Our Lives (Hardcover) by Nicholas A. Christakis. 2012.
2. Social Network Analysis by David Knoke, Sage Publications (CA), 2007.

**Advanced Learner Course - Semester - III**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>PC Hardware and Troubleshooting</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>ALC</b>

**Introduction:**

To give an introduction on the internals of computer.

**Objective:**

The student themselves solve the issues in their personal computers and laptops. The student understands the functionality of the computer Components.

**Unit - I:**

Introduction – Computer Organization – Number System and Codes – Memory – Arithmetic and Logic Unit – Control Unit – Instruction prefetch – Interrupts – Input/output techniques – Device Controllers – Error detection techniques – Microprocessor – Personal Computer Concepts and Techniques – Advanced System concepts – operating systems.

**Unit – II:**

Peripheral Devices – Keyboard – CRT Display Monitor – Printer – Magnetic Storage Devices – Floppy disk drive – Hard Disk Drive – Special Types of Disk drives – Mouse – Modem – Scanner – Digital Camera – Special Peripherals.

**Unit – III:**

PC Bus and Motherboard functions – DMA Logic – RAM Logic – ROM Logic – NMI Logic – Time of Day Logic – Keyboard interface – Control bus logic – Address bus logic – data bus logic – Advanced Motherboards – Pentium Motherboards. Printer Controller – Floppy disk controller – Hard disk controller – Display Adapter – Serial Interface – RS232 Interface – UART – USB – Firewire.

**Unit – IV:**

Installation and Preventive Maintenance – System Configuration – Pre-Installation Planning – Installation Practice – Routine Checks – PC Assembling and Integration – BIOS Setup – Disk Operating System – Virus – Data Recovery.

**Unit – V:**

Trouble Shooting – Computer Faults – Nature of faults – Types of faults – Diagnostic Programs and Tools – Bus faults – Faults Elimination process – Systematic Troubleshooting – Symptoms observation – symptoms analysis – Fault diagnosis – Fault rectification – Troubleshooting levels – POST- PC diagnostic software.

**Text Book :**

1. B. Govindarajalu, “IBM PC and Clones : Hardware, Troubleshooting and Maintenance”, TMH, 2002.

**Advanced Learner Course - Semester - III**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Total	Type
	<b>Microprocessor and its Applications</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>ALC</b>

Introduction :

To provide an insight view of the computer and give an overview of the microprocessor.

**Objective:** To provide an in depth knowledge of the architecture and programming with x86 Microprocessors and its instruction set.

**Unit - I: Basic Concepts: Introduction:** Assembly Language Applications - Virtual Machine Concepts. **Data Representation:** Binary Integers and addition – Integer Storage sizes – Signed Integers – Character Storage. **Boolean Operations:** Truth Table for Boolean function.

**Unit – II: x86 Processors Architecture:** Basic Concepts - x86 Architecture Details - x86 Memory Management - Components of a Typical Computer - Input Output System.

**Unit – III: Assembly Language Fundamentals:** Basic elements of a Assembly Language – Adding and subtracting Integers – Assembling, Linking and Running Programs – Defining Data – Symbolic Constants – Real-Address Mode Programming.

**Unit – IV: Data Transfers, Addressing and Arithmetic:** Data Transfer Instructions – Adding and Subtracting – Data-Related Operators and Derivatives – Indirect Addressing – JMP and LOOP Instructions.

**Unit – V: Procedures:** Linking to an External Library – The Book’s Link Library – Stack Operations – Defining and Using Procedures – Program Design using Procedures.

**Text Book :**

1. KIP R. IRVINE, “Assembly Language for x86 Processors”, Sixth edition, Pearson Education, 2011.
2. M. Rafiqzaman, "Microprocessors - theory and applications", Prentice Hall India, Revised Edition, 2009, New Delhi.

**Reference:**

1. Ramesh S.Gaonkar, “Microprocessor - Architecture, Programming and Applications with the 8085”, Penram International Publishing Private Limited, 4<sup>th</sup> Edition.
2. R. Theagarajan, S. Dhanasekaran, S. Dhanapal, “Microprocessor and its Applications”, New Age International Publishers, 2008.

**Advanced Learner Course - Semester – III**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Total	Type
	<b>Problem Solving Techniques</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>ALC</b>

Introduction :

Provides an insight on solving a problem.

Objective :

The students learns the fundamental on how to solve a problem using Computer.

**Unit - I: Introduction to Computer Problem Solving:** Introduction – The problem solving Aspects – Top – down Design – Implementation of Algorithms – Program Verification – The Efficiency of Algorithms – The analysis of Algorithm.

**Unit – II: Fundamental Algorithms:** Exchanging of values of two variables – Counting – Summation of a set of Numbers – Factorial Computation – Generation of the Febonacci Sequence – Reversing the digits of an integer number – Base conversion – Character to Number Conversion.

**Unit – III: Factoring Methods:** Finding the square root of a number – The Smallest Divisor of and integer – The Greater common divisor of two integers – Generating Prime numbers – Computing the prime factors of an integer – Generation of Pseudo – random Numbers – Raising a number to a Large power – Computing the  $n$ th Fibonacci number.

**Unit – IV: Array Techniques:** Array order reversal – Array – counting of Histogramming – Finding a Maximum number in a set – Removal of duplicates from an Ordered Array – Finding the  $k$  th Smallest Element – Longest Monotone Subsequence.

**Unit – V: Text Processing and Pattern Searching:** Text Line Length adjustment – Left and right justification of text – Keyword searching in Text – Linear Pattern Search – Sublinear Pattern search.

**Text Book :**

1. R.G. Dromey, “How to Solve it by Computers”, Prentice-Hall international series in computer science.
2. Margaret L. Arnold, Linda A. Heyne, James A. Busser, “Problem Solving, *Tools and Techniques for the Park and Recreation Administrator*”, Fourth Edition.

**Reference:**

1. Steven G. Krantz, “Techniques of Problem Solving”, American Mathematical Society.
2. Colin G Smith, ” Creative Problem Solving Techniques To Change Your Life”.

**Advanced Learner Course - Semester – IV**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Content Management System</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>ALC</b>

**Introduction:**

To provide an introduction on Content Management System and how to manage contents in web.

**Objective:**

The student learns the professional content management system; At the end of this course the students are able to develop a content management system by their own.

**Unit - I:**

Introduction – What is Content – Content and Intellectual Property rights – CMS versus DAM-S and MAM-S – Application Domains – Content Management in Television, radio and media production, non-media organization, advanced media services.

**Unit – II:**

Content Management: the problem illustrated – Media and essence handling requirement – Requirements for metadata creation and handling – user requirements example – Content related workflows – workflows in broadcast – workflows in e-commerce – content-related workflows in corporate and other organization

**Unit – III:**

Essence – the different forms of essence – Encoding and compression basics – Video – Audio – image, web, text and other essence formats – essence processing

**Unit – IV:**

Content Representation and Metadata – Metadata – Metadata access and exchange – Metadata description schemes – Standards for metadata transmission and exchange – File formats

**Unit – V:**

Content Management System Architecture – Software design principles – Software architecture – CMS Component software architecture – the core – Content Management system Infrastructure

**Text Book :**

Dr Andreas Mauthe, Dr Peter Thomas, “Professional Content Management Systems Handling Digital Media Assets”, Willey, 2004.

**Advanced Learner Course - Semester – IV**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Cascading Style Sheet</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>ALC</b>

**Introduction:**

Cascading Style sheet is a backbone for the appearance of the webpage. This paper provides an outline on how to make a page more style.

**Objective:**

- Understand what a style sheet is and how it actually styles a web page
- Know how to create a style sheet and link an html document to the style sheet
- Understand the basic building blocks of any style sheet: rules, selectors, properties and values

**Unit - I :**

Introduction to Cascading Style Sheets-Anatomy of CSS-Style Sheet Syntax-Attaching Styles-Embedding Style Sheets- Linking to External Style Sheets.

**Unit – II :**

Margins and Padding-CSS Styles-Border and List Styles-ID's, Classes- Pseudo-classes-Cascade and inheritance.

**Unit – III:**

CSS Properties-Background Properties-Text Properties-Font Properties-Border Properties-List Properties-Lists, Tables & Forms-Layout

**Unit – IV:**

Applying CSS-In-line css-Internal css-External css-Selectors, Properties and Values-Lengths and Percentages-Colours-Text-'font-family'-'font-size'-'font-weight'-'font-style'-'text-decoration'-'text-transform'

**Unit – V:**

Text spacing-Margins and Padding-The Box Model-Borders-Positioning elements-backgrounds-Element dimension-User style sheets-Text flow -conflicting styles-CSS validation.

**Text Book :**

Ian Pouncey, Richard York, “Beginning CSS – Cascading style sheets for web design”, Wrox Programmer to Programmer, 3<sup>rd</sup> Edition.

**Reference Book :**

Julie C Meloni, “Teach yourself HTML, CSS and Javascript”, Sams Publishing company.

**Advanced Learner Course - Semester – IV**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Internet of Things</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>ALC</b>

**Introduction:**

To prove an introduction on the concept of Internet of Things.

**Objective:**

- The student learns the important of Internet and how the things connected to internet to work effectively.

**Unit - I:**

Introduction – Hello world – Setting up the development environment – Building the program in Visual Studio – Deploying to the device – Writing to Actuators – Blinking Led - Reading from Sensors – Light switch – voltage reader.

**Unit – II:**

Device as HTTP Client 1 : The Internet of Things – HTTP – Push vs Pull – Pachube – Hello Pachube – Setting up the Network Configuration – Hello Pachube – What Netduino Said to Pachube – What Pachube Said to Netduino.

**Unit – III:**

Device as HTTP Client 2 : Sending HTTP Request – The Simple Way – SimplePut Request – Making Web Requests – Sending HTTP Requests – The Efficient Way – EfficientPutRequest – Pachube Client.

**Unit – IV:**

Device as Http Server 1 : Hello Web – Relaying Messages to and from the Netduino – Helloweb – Request Handlers – HellowebHtml – What you should know about ports – Handling Sensor Request – From Sensor Reading to Http Resources – URIs of Measured Variables – VoltageMonitor – What you should know about HttpGet

**Unit – V:**

Device as Http Server 2 : Handling Actuator Requests – From HTTP Resources to controlling things – URIs of Manipulated Variables – LedController – Test Client in C# - Embed a Javascript Test Client on the Netduino – What you should know about HTTPPUT – Going Parallel – Multithreading – Parallelblinker.

**Text Book :**

Cuno Pfister, “Getting Started with the Internet of Things”,

**Advanced Learner Course - Semester – V**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Action Script</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>ALC</b>

**Introduction:**

To provide an platform for the students to learn the importance of programming in Flash

**Objective:**

To inculcate the practice the programming in Flash. The students write structured programming code for behaviour and for action.

**Unit - I:**

Action Script Overview – What is Actionscript 3.0 – The Flash Platform – Procedural vs Object-oriented Programming – The document class – Core Language Fundamentals : Miscellaneous Basics – Variables and Datatypes – Conditionals – Loops – Arrays – Functions – Custom Objects – This – Absolute vs Relative Addresses.

**Unit – II:**

Graphics and Interaction – Properties, Methods, and Events – Inherited Attributes – Properties – Events – Methods – Event Propagation – Frame and Timer Events – Removing Event Listeners – The display list – Sum of its parts – Managing object names, positions and data types.

**Unit – III:**

Timeline Control – Playhead movement – Frame rate – Simple site or application structure – Frame labels – OOP – Classes – Inheritance – Composition – Encapsulation – Polymorphism – Navigation bar.

**Unit – IV:**

Motion – Basic Movement – Geometry and Trigonometry – Physics – Timeline Animation recreations – Drawing with vectors – Drawing with Pixels – Text – Creating Text fields – Selecting text – Formatting Text – Triggering Action script from HTML Links.

**Unit – V:**

Sound – Action Script Sound Architecture – Internal and External Sounds – Working with Microphone Sound – Video – Encoding – Components – Captions.

**Text Book :**

Rich Shupe with Zevan Rosser, “Learning Action Script 3.0” 2<sup>nd</sup> Edition, O’Reilly Media Inc.,

**Reference :**

Joey Lott, Darron Schall and Keith Peters, “Action Script 3.0 Cookbook”, O’Reilly Media Inc.

Colin Mook, “Essential ActionScript 3.0”, O’Reilly Media Inc.



**Advanced Learner Course - Semester – V**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Game Programming in Java</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>ALC</b>

**Introduction:**

The student able to learn the fundamentals of Game programming using Java.

**Objective:**

The student develops a simple game using JAVA with sounds

**Unit - I:**

Why Java for Games Programming – Java is too slow for games programming – Java has memory leaks – Java is too high-level – Java application Installation is a Nightmare – Java isn't Supported on Games Consoles – No one uses Java to write Real Games. – An Animation Framework – Animation as a threaded Canvas – Adding User Interaction – Converting to Active Rendering – FPS and UPS – Other Animation Approaches.

**Unit – II:**

An Introduction to Java Imaging – Image Formats – the AWT Imaging Model – An overview of Java 2D – The Graphics2D Class – Java 2D and Active Rendering – Buffering an Image – From Image to BufferedImage – The Internals of BufferedImage – BufferedImageOp Operations – Managed Images – VolatileImage – Java 2D Speed – Portability and Java 2D – JAI – Image loading, Visual Effects and Animation.

**Unit – III:**

Introducing Java Sound – Applet Playing – the AudioClip Class – The Sound Player – The Java Sound API - Sampled Audio – MIDI – Java Sound API Compared with JMF and JOAL – JAVA sound API Resources – Audio Resources – Loading and Playing Sounds.

**Unit – IV:**

Audio Effects – Audio Effects on Sampled Audio – Byte array manipulation – utilizing mixer controls – Audio effects on MIDI Sequences – Audi Synthesis – Sampled Audio Synthesis – MIDI Synthesis – Audio Synthesis Libraries

**Unit – V:**

Sprites – A Side Scroller – An Isometric Tile Game – Introducing Java 3D – Java 3D – Java 3D Strengths – Criticisms of Java 3D for Games Programming – Alternatives to Java 3D – Shooting a Gun – A 3D Maze.

**Text Book :**

Andrew Davison. “Killer Game Programming in JAVA”, O'Reilly, 2005.

**Reference :**

Joel Fan, “Black Art of Java Game Programming”, Sams, Macmillan Computer Publishing, 1996

**Advanced Learner Course - Semester – V**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>AJAX Programming</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>ALC</b>

**Introduction:**

The student able to understand the future of web applications through AJAX.

**Objective:**

The student able to develop applications using AJAX – more interactive and in fast manner.

**Unit - I:**

AJAX and the future of web applications – Delivering functionality via the web – advantages of web applications – building websites since 1990 – HTTP and HTML – PHP and other server-side technologies – Javascript and other client side technologies – understanding AJAX – Building a Simple Application with AJAX.

**Unit – II:**

Client-Side Techniques with Smarter JavaScript – JavaScript and the DOM – JavaScript Events and the DOM – Even more DOM – JavaScript, DOM, and CSS – Using the XMLHttpRequest Object – Working with XML Structures/

**Unit – III:**

Server Side Techniques with PHP and MySQL – PHP and DOM – Passing parameters and Handling PHP errors – Connecting to Remote Servers and JavaScript Security – Using a Proxy Server Script – A Framework for making Repetitive Asynchronous Requests – Working with MySQL

**Unit – IV:**

AJAX Form Validation – Implementing Form Validation – Thread-Safe AJAX – AJAX CHAT – AJAX Suggest and Auto Complete – Google Suggest

**Unit – V:**

AJAX Real-Time Charting and SVG – AJAX Grid – AJAX RSS Reader – Working with RSS – the RSS Document Structure – Google Reader – Implementing AJAX RSS Reader.

**Text Book :**

Cristian Darie, Bogdan Brinzarea, Filip Chereches-Tosa, Mihai Bucica, "Building Responsive Web Applications – AJAX and PHP", Packt Publishing, 2006.

**Reference :**

Ryan Asleson and Nathaniel T. Schutta, "Foundations of AJAX", Apress, 2006.

**Advanced Learner Course - Semester – VI**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Natural Language Processing</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>ALC</b>

**Introduction:**

To give an overview of how to process text and handle the language in Python.

**Objective:**

The student learns the concept of language processing by implementing them in Python.

**Unit - I:**

Language Processing and Python - Computing with Language - Accessing Text Corpora and Lexical Resources - Processing Raw Text.

**Unit – II:**

Writing Structured Programs - Back to the Basics - Sequences - Questions of Style - Functions: The Foundation of Structured Programming - Doing More with Functions - Program Development - Algorithm Design

**Unit – III:**

Categorizing and Tagging Words - Using a Tagger - Tagged Corpora - Mapping Words to Properties Using Python Dictionaries - Automatic Tagging - N-Gram Tagging - Transformation-Based Tagging - How to Determine the Category of a Word

**Unit – IV:**

Learning to Classify Text - Supervised Classification -Further Examples of Supervised Classification - Evaluation - Decision Trees - Naive Bayes Classifiers - Maximum Entropy Classifiers - Modeling Linguistic Patterns

**Unit – V:**

Extracting Information from Text - Information Extraction - Chunking - Developing and Evaluating Chunkers - Recursion in Linguistic Structure - Named Entity Recognition - Relation Extraction.

**Text Book :**

Steven Bird, Ewan Klein, and Edward Loper, “Natural Language Processing with Python”, O'REILLY, 2009

**Reference :**

Anne Kao and Stephen R. Poteet, “Natural Language Processing and Text Mining”, Springer, 2007.

**Advanced Learner Course - Semester – VI**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>Soft Computing</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>ALC</b>

**Introduction:**

To discuss and understand the capability of neural networks, fuzzy systems and genetic algorithms to acquire and apply knowledge in an intelligent manner.

**Objective:**

To emphasize on learning the design, implementation and application of soft computing methodologies. To give a detailed understanding of how to obtain the solution of cross-disciplinary problems quickly, accurately and acceptably.

**Unit - I:**

Neural Networks, Application Scope of Neural Network, Fuzzy Logic, Genetic Algorithm, Hybrid Systems, Soft Computing -**Artificial Neural Network : An Introduction** - Fundamental Concept, Evolution of Neural Networks, Basic Models of Artificial Neural Network, Important Terminologies of ANNs, McCulloch-Pitts Neuron, Linear Separability, Hebb Network

**Unit – II:**

**Supervised Learning Network** - Introduction, Perception Networks, Back-Propagation Network, Radial Basis Function Network, Time Delay Neural Network. **Associative Memory Networks** - Introduction, Training Algorithm of Pattern Association, Autoassociative Memory Network, Heteroassociative Memory Network, Bidirectional Associative Memory, Hopfield Networks (Discrete Only)

**Unit – III:**

**Unsupervised Learning Networks** - Introduction, Fixed Weight Competitive Nets, Kohonen Self-Organizing Motor Maps, Adaptive Resonance Theory Network. **Special Networks** - Introduction, Simulated Annealing Network, Boltzmann Machine.

**Unit – IV:**

**Fuzzy Set Theory** - Fuzzy versus Crisp, Crisp Sets, Fuzzy Sets, Crisp Relations, Fuzzy Relations. **Fuzzy Systems** - Crisp Logic, Predicate Logic, Fuzzy Logic, Fuzzy Rule Based System, Defuzzification Methods, Applications

**Unit – V:**

**Fundamentals of Genetic Algorithms** - Genetic Algorithms: History, Basic Concepts, Creation of Offsprings, Working Principle, Encoding, Fitness Function, Reproduction.

**Text Book :**

1. S.N. Sivanandam and S.N. Deepa, “Principles of Soft Computing”, Wiley India (P) Ltd

**Reference:**

1. S.N. Sivanandam and M. Paulraj, “Introduction to Artificial Neural Networks”, Vikas Publishing House.
2. Sudarshan K. Valluru and T. Nageswara Rao, “Introduction To Neural Networks, Fuzzy Logic and Genetic Algorithms, JAICO Publishing House.

**Advanced Learner Course - Semester – VI**

Subject Code	Subject Title	Lecture	Tutorial	Practical	Credit	Type
	<b>IPV6</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>ALC</b>

**Introduction:**

To Provide an overview of IPv6.

**Objective:**

The student learns the concept of addressing in IPv6, tunnels, routing and DNS.

**Unit - I:**

IPv6 – Why? – Ipv6 Benefits – Myths – Ipv6-When? – Differences between IPv4, IPv6, and other protocols – IPv6 Addressing – interface identifiers – Multicast scoping – special addresses – Address Allocation and assignment – Enabling IPv6 – Diagnostics.

**Unit – II:**

Tunnels – Automatic Tunneling – 6over4 and ISATAP – Teredo – 6to4 – Manually configured Tunnels – Routing – Routing IPv6 – Dynamic Routing – Installing Zebra – Enabling IPv6 on CISCO and Zebra – RIPng – OSPFv3 – BGP – Site-Local Addresses.

**Unit – III:**

The DNS – Representing IPv6 information in the DNS – Installing and Configuring BIND – Choosing an address for your nameserver – Adding IPv6 information to Zone files – AAAA Records – Reverse Mapping – Dynamic DNS Updates – Applications – API issues – FTP – Telnet – Browsing the Web – Mail Clients – Media Players.

**Unit – IV:**

The Transition – Planning the Transition – Application Transition Scenarios – Proxying – Transport Protocol Translation – Network Address Translation – Protocol Translation – IPv6 Internals – Checksums – Extension Headers – ICMPv6 – Address Selection – DHCPv6 – IPv6 Over.

**Unit – V:**

Security – Differences from IPv4 – Filters – IPSec – Troubleshooting – tcpdump – IPv6 Connectivity – Path MTU Discovery and Fragmentation – Providing Transit Services.

**Text Book :**

Lljitsch van Beijnum, “Running IPv6”, Apress, 2006.

**Reference :**

1. Joseph Davies, “Microsoft – Understanding ipv6”, 3<sup>rd</sup> Edition, Microsoft Press
2. Silvia Hagen, “IPv6 Essentials”, 2<sup>nd</sup> Edition, O’Reilly, 2012.