PONDICHERRY UNIVERSITY
(A CENTRAL UNIVERSITY)

Bachelor of Computer Applications (B.C.A)
(Choice Based Credit System)

Regulations & Syllabus

2017-18 onwards

Pondicherry University

Bachelor of Computer Applications (B.C.A)

REGULATIONS

(Effective from the academic year 2017-2018)

1. Aim of the Course

The BCA course aims to impart the students with fundamental and hands on knowledge of computers, applications of computer science and modern computer science applications.

2. Eligibility of Admission

Candidates for admission to BCA shall be required to have passed 10 + 2 system of Examination or equivalent with Mathematics / Business Mathematics / Computer Science/ Computer Applications as one of the subjects of study.

3. Lateral Entry Admission

Candidates who have passed Diploma in Computer Science / Information Technology/ Computer Technology / Computer Application in I Class (10+3 years of study) are eligible to apply for the lateral entry to the 2nd year of the course subject to availability of seats, but limited to 10% of the sanctioned intake.

4. Duration of the course

The course shall be of three years' duration spread over six consecutive semesters. The maximum duration to acquire prescribed number of credits in order to complete the Programme of Study shall be twelve consecutive semesters (six years).

5. Medium

The medium of instruction shall be English.

6. Course Structure

Category	Course Name	Number Of Papers	Credits Per Paper	Total Credits
MIL	Modern Indian Languages	2	3	6
ENG	English	2	3	6
AECC	Ability Enhancement Compulsory Course	2	2	4
SEC	Skill Enhancement Course	4	2	8
GE	Generic Elective Course	2	3	6
DSC	Discipline Specific Core Course	Theory- 12 Practical – 9 Project -1	Theory- 3 Practical – 2 6	12x3=36 9 x 2 =18 1 x 6 = 6 Total = **60**
DSE	Discipline Specific Elective Course	6	4	6 x 4 =24
OE	Open Elective Course	2	3	2 x 3 =6
			Total	**120**

MIL, ENG, AECC

The crediting of MIL, ENG and AECC courses is as per Pondicherry University UG CBCS regulations.

DSC and DSE

At least 60% (72 credits) of the total minimum credit requirement must be earned by the student from DSC and DSE courses as follows in order to obtain the degree - 60 credits from Discipline Specific Core and 12 credits from Discipline Specific Elective courses.

SEC

Out of the 4 Skill Enhancement Courses, one course viz. - Online Course / In-Plant Training (2 weeks) / One month Internship / mini project is mandatory. The Online Course to be studied, the organization to be chosen for In-Plant Training or One month internship is to be

validated or approved by a panel of members comprising of the Department Faculty, before a student pursues the same.

For the remaining 3 SEC courses, any of the 2 credit Skill Enhancement Courses specified in the curriculum (BCA) could be credited or substituted with Skill Enhancement Courses in the curriculum of other UG computer science courses or Skill Enhancement Courses of other UG Non-Computer Science Disciplines of study that constitute to skill development or an assortment of these without any overlap of courses.

GE

Any 2 of the 3 credit Generic Elective Courses specified in the curriculum (BCA) could be credited to constitute the 6 credits or substituted with Generic Elective courses in the curriculum of other UG Computer Science Disciplines of study or UG Courses of Non-Computer Science Disciplines of study that add proficiency to the students - with the advice of the Faculty Advisor, or an assortment of these without any overlap of courses.

DSE

The six 4 credit papers to be credited under DSE can be credited from Discipline Specific Elective specialization stream courses as follows:

I. Three of the 4 credit courses should be credited from one specialization stream courses or across the different specialization stream courses specified in the curriculum.

II. The remaining three of the 4 credit courses may be credited from
   a. Another specialization stream courses of the curriculum or across the different specialization stream courses specified in the curriculum without any overlap of courses credited in I above.

   or

   b. Another specialization stream courses or across the different specialization stream courses in the curriculum of other UG Computer Science Disciplines of study without any overlap of courses credited in I above.

   or

c. An assortment of the above options in II a and IIb.

OE

Any 2 of the 3 credit Open Elective Courses specified in the curriculum (BCA) could be credited to constitute the 6 credits or substituted with Open elective courses in the curriculum of other UG Computer Science disciplines of study or substituted with UG Courses of Non-Computer Science Disciplines of study that add proficiency to the students - with the advice of the Faculty Advisor or an assortment of these without any overlap of courses.

7. Faculty to Students Ratio

The Faculty to Student Ratio in all the practical / laboratory classes shall be maintained at 1:25.

8. Pattern of Examination

I. The End-Semester examination and internal assessments for MIL, ENG, AECC, DSC, GE and OE courses are as per Pondicherry University UG CBCS regulations.

II. All SEC courses (except Online Course / In-Plant Training (2 weeks) / One month Internship**)** to be treated as a practical / laboratory course and the End-Semester examination to be conducted as per Pondicherry University UG CBCS regulations.

III. The internal assessments for all practical / laboratory courses (for DSC, SEC courses) shall be as follows – 15 marks from two internal practical / laboratory assessment tests and 5 marks based on practical / laboratory course based mini application development.

IV. The internal assessment for DSE courses shall be conducted as follows - 12 marks from two internal assessment tests and 8 marks based only on two internal practical / laboratory assessment tests.

V. The marks for attendance (5 marks) applies to all courses and the awarding of attendance marks is as per Pondicherry University UG CBCS regulations.

VI. The Project work is to be evaluated as follows:

    i. The internal assessment (25 marks) is awarded as follows:

a. 10 marks is awarded based on two internal project reviews conducted in periodic intervals by a panel comprising of members of the Department during the tenure of the project.
b. The student's project guide awards 10 marks for the project work and 5 marks for attendance (attendance marks as specified in the Pondicherry University UG CBCS regulations).

ii. The End Semester Examination assessment (75 marks) is evaluated under two aspects viz – i)Project Work – (50 marks) ii)Project Report and Viva-Voce (25 marks)

Passing Minimum

Passing Eligibility and classification for the award of the Degree is as per Pondicherry University UG CBCS regulations.

Lateral Entry

The Lateral Entry students have to complete 102 credits from the DSC, DSE, GE, SE, OE courses as per curriculum (IIIrd to VIth semesters). In addition, they should complete the two AECC courses (4 credits) for the award of the degree. One MIL (3 credits) and one ENG (3 credit) courses also need to be completed, if it is not studied in the last three years of the course eligible for lateral entry admission.

Other aspects of CBCS not covered in this document by default conforms to the Pondicherry University UG CBCS regulations.

PONDICHERRY UNIVERSITY

Bachelor of Computer Applications (BCA)

PROPOSED STRUCTURE OF THE COURSE UNDER CBCS 2017-2018

Category	Number Of Papers	Credits Per Paper	Total Credits
MIL	2	3	6
ENG	2	3	6
AECC	2	2	4
SEC	4	2	8
GE	2	3	6
DSC	Theory- 12 Practical – 9 Project -1	Theory- 3 Practical – 2 6	12x3=36 9 x 2 =18 1 x 6 = 6 Total = **60**
DSE	6	4	6 x 4 =24
OE	2	3	2 x 3 =6
		Total	**120**

MIL - Modern Indian Languages (Tamil, Hindi, Sanskrit, etc)

ENG – English

AECC – Ability enhancement Courses (Public Administration and Environmental Studies)

SEC – Skill Enhancement Courses

GE – Generic Elective

DSC – Discipline Specific Core

DSE - Discipline Specific Elective

OE – Open Elective

FIRST SEMESTER

S.No	COURSE	SUBJECT CODE	Paper	CREDITS		HOURS		
				Th	Prac	L	T	P
1	MIL	LTAM/LHIN/ LARA/ LMAL/ LFRE 111	Language-I	3	-	4	1	0
2	ENG	ENGL112	English-I	3	-	4	1	0
3	DSC – 1	CSCA113	Introduction to Problem Solving using C	3		4	2	
4	DSC – 2	CSCA114	Digital Electronics	3		4	2	
5	AECC-1	PADM115	Public Administration	2		2	0	0
6		CSCA116	Programming in C Lab		2*			3
7		CSCA117	Digital Lab		2*			3
			TOTAL	**18**		**30**		

SECOND SEMESTER

S.No	COURSE	SUBJECT CODE	Paper	CREDITS		HOURS		
				Th	Prac	L	T	P
1	MI4L	LTAM/LHIN/ LARA/ LMAL/ LFRE 121	Language-II	3		4	1	0
2	ENG	ENGL122	English-II	3		4	1	0
3	DSC – 3	CSCA123	Python Programming	3		3	1	
4	DSC – 4	CSCA124	Data Structures and Algorithms	3		3	1	
5	GE-1 (1 out of 2)	CSCA125	Mathematics for Business	3		3	1	0
		CSCA126	Probability and Statistics					
6	AECC-2	ENVS127	EVS	2		2		
7		CSCA128	Python Programming Lab		2*			3
8		CSCA129	Data Structures & Algorithms Lab		2*			3
			TOTAL	**21**		**30**		

THIRD SEMESTER

S.No	COURSE	SUBJECT CODE	Paper	CREDITS		HOURS		
				Th	Prac	L	T	P
1	DSC – 5	CSCA231	Programming with Visual Basic	3		3	1	
2	DSC – 6	CSCA232	Database Management System	3		3	1	
3	DSC – 7	CSCA233	Computer Networks	3		4	1	
4	DSC – 8	CSCA234	Software Engineering	3		4	1	
5	GE-2 (1 out of 2)	CSCA235	Discrete Mathematics	3		3	1	0
		CSCA236	Operations Research					
6	SEC-1	CSCA201	Office Automation Tools		2*			2
		CSCA202	Multimedia Tools					
7		CSCA237	Visual Basic and DBMS Lab		2*			3
8		CSCA238	Computer Networks Lab		2*			3
			TOTAL	**21**		**30**		

FOURTH SEMESTER

S.No	COURSE	SUBJECT CODE	Paper	CREDITS		HOURS		
				Th	Prac	L	T	P
1	DSC – 9	CSCA241	Operating Systems	3		3	1	
2	DSC – 10	CSCA242	Object Oriented Programming using Java Programming	3		3	1	
3 4	DSE – 1 DSE – 2 (2 out of 5 stream s)	CSCA243	Data Warehousing	3	1	3	1	2
		CSCA244	Artificial Intelligence					
		CSCA245	Principles of Information Security					
		CSCA246	Wireless Communication Technologies	3	1	3	1	2
		CSCA247	IT Project Management					
5	OE-1 (1 out of 2)	CSCA248	Fundamentals of Accountancy	3		3	2	
		CSCA249	Financial Management					
6	SEC-2	CSCA203	Accounting Tools		2*			2
7		CSCA250	Object Oriented Programming using Java Lab		2*			3
			TOTAL	**21**		**30**		

FIFTH SEMESTER

S.No	COURSE	SUBJECT CODE	Paper	CREDITS		HOURS		
				Th	Prac	L	T	P
1	DSC – 11	CSCA351	Visual Programming with C#	3		3	2	
2 3	DSE – 3 DSE – 4 (2 out of 5 streams)	CSCA352	Data Mining	3	1	3	1	2
		CSCA353	Neural Networks					
		CSCA354	Cryptography & Network Security					
		CSCA355	Introduction to Mobile Communication	3	1	3	1	2
		CSCA356	Software Testing					
4	OE-2 (1 out of 2)	CSCA357	Principles of Management	3		3	2	0
		CSCA358	Introduction to E-Business					
5	SEC-3 (1out of 2)	CSCA301	Mobile Application Development		2*			2
		CSCA302	Linux and shell programming					
6	SEC-4 (1 out of 3)	CSCA303	On Job Training		2*			2
		CSCA304	Online Certification Course					
		CSCA305	Two week Field Training					
7		CSCA359	Visual Programming Lab		2*			4
			TOTAL	**20**		**30**		

SIXTH SEMESTER

S.No	COURSE	SUBJECT CODE	Paper	CREDITS		HOURS		
				Th	Prac	L	T	P
1	DSC – 12	CSCA361	Web Technology	3		3	1	
2	DSC – 13	CSCA362	PROJECT		6*		1	10
3 4	DSE – 5 DSE - 6 (2 out of 5 streams)	CSCA363	Foundations of Data Analytics	3	1	3	1	2
		CSCA364	Soft Computing	3	1	3	1	2
		CSCA365	Ethical Hacking					
		CSCA366	Internet of Things					
		CSCA367	Software Quality Management					
5		CSCA368	Web Technology Lab		2*			3
			TOTAL	**19**		**30**		

*University Practical Exam/ Viva Should be conducted

Discipline Specific Core – List of University Practical Courses			
S.N0	**SUBJECT CODE**	**Paper Name**	**Credits** Practical
1	CSCA116	Programming in C Lab	2
2	CSCA117	Digital Electronics Lab	2
3	CSCA128	Python programming Lab	2
4	CSCA129	Data Structures & Algorithms Lab	2
5	CSCA237	Visual Basic and DBMS Lab	2
6	CSCA238	Computer Networks Lab	2
7	CSCA250	Object Oriented Programming using Java Lab	2
8	CSCA359	Visual Programming Lab	2
9	CSCA362	PROJECT	6
10	CSCA368	Web Technology Lab	2
Skill Enhancement Courses - List of University Practical Courses			
11	CSCA201	Office Automation tools	
12	CSCA202	Multimedia Tools	
13	CSCA203	Accounting Tools	
14	CSCA301	Mobile Application Development	
15	CSCA302	Linux and shell programming	
16	CSCA303/CSCA304/CSCA305	*One month On Job Training/ Online Certification Courses / 2 week Field Training/Mini Project	

Discipline Specific Core – Theory			
S.NO	**SUBJECT CODE**	**Paper Name**	**Credits**
			Theory
1	CSCA113	Introduction to problem solving using C	3
2	CSCA114	Digital Electronics	3
3	CSCA123	Python Programming	3
4	CSCA124	Data Structures and Algorithms	3
5	CSCA231	Programming with Visual Basic	3
6	CSCA232	Database Management Systems	3
7	CSCA233	Computer Networks	3
8	CSCA234	Software Engineering	3
9	CSCA241	Operating Systems	3
10	CSCA242	Object Oriented Programming with JAVA	3
11	CSCA351	Visual Programming using C#	3
12	CSCA361	Web Technology	3

Discipline Specific Elective				
Course Code	**Course**	**Paper Name**	**Credits**	
			Theory	**Practical**
Stream – I (Business Intelligence)				
CSCA243	DSE – 1 /DSE -2	Data Warehousing	3	1
CSCA352	DSE – 3/DSE - 4	Data Mining	3	1
CSCA363	DSE – 5 /DSE -6	Foundations of Data Analytics	3	1
Stream – II (Artificial Intelligence)				
CSCA244	DSE – 1 /DSE -2	Artificial Intelligence	3	1
CSCA353	DSE – 3/DSE - 4	Neural Networks	3	1
CSCA364	DSE – 5 /DSE -6	Soft Computing	3	1
Stream – III (Information Security)				
CSCA245	DSE – 1 /DSE -2	Principles of Information Security	3	1
CSCA354	DSE – 3/DSE - 4	Cryptography & Network Security	3	1
CSCA365	DSE – 5 /DSE -6	Ethical Hacking	3	1
Stream – IV (Wireless Communication)				
CSCA246	DSE – 1 /DSE -2	Wireless Communication Technologies	3	1
CSCA355	DSE – 3/DSE - 4	Introduction to Mobile Communication	3	1
CSCA366	DSE – 5 /DSE -6	Internet of Things	3	1
Stream – V (Software Engineering)				
CSCA247	DSE – 1 /DSE -2	IT Project Management	3	1
CSCA356	DSE – 3/DSE - 4	Software Testing	3	1
CSCA367	DSE – 5 /DSE -6	Software Quality Management	3	1

OPEN ELECTIVE - OE (Management)				
CSCA248 CSCA249	OE-1	1.Fundamentals of Accountancy 2. Financial Management	3	-
CSCA357 CSCA358	OE-2	1. Principles of Management 2. Introduction to E-Business	3	-

	General Elective – GE		
	Course	**Paper Name**	**Credits**
CSCA125 CSCA126	GE-1	1. Mathematics for Business 2. Probability and Statistics	3
CSCA235 CSCA236	GE-2	1. Discrete Mathematics 2. Operations Research	3

Skill Enhancement Courses		
Group – I		
Course Code	**Name of the course**	**Credits – Practical**
CSCA101	Office Automation tools	2
CSCA102	Multimedia Tools	2
CSCA201	Accounting Tools	2
CSCA202	Linux and shell programming	2
CSCA203	Mobile Application Development	2
CSCA301/CSCA302/CSCA303	**One month On Job Training/ Online Certification Courses / 2 week Field Training / Mini Project	2

****Compulsory**

Bachelor of Computer Applications

under *CHOICE-BASED CREDIT SYSTEM(CBCS)*

(Effective from the academic year 2017- 2018)

DISCIPLE SPECIFIC CORE - 1

Paper Code: CSCA113

INTRODUCTION TO PROBLEM SOLVING USING C

L	T	P	C
4	2	0	3

Prerequisite: - Basic knowledge of Mathematics and Computers

Objectives:

- To learn the concepts of " C " Programming
- To learn how to use develop software programs for day-to- day applications.

MODULE – I

Introduction to Computers - Characteristics of Computers, Uses of computers, Types and generations of Computers – Basic Computer Organization -Modules of a computer – Planning the Computer Program - Debugging, Types of errors - Documentation – Techniques of Problem Solving – Problem solving aspects – Top-Down aspects – Implementation of algorithms – Program verification - Flowcharting, decision table, algorithms, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming.

MODULE- II

C Programming Language- C Standard Library- C++ and Other C-based Languages- Object Technology- Introduction to C Programming - Memory Concepts-Decision Making - Secure C Programming - Structured Program Development in C- Algorithms- Pseudocode- Control Structures- if Selection Statement- while Repetition Statement - Assignment Operators- Increment and Decrement Operators- C Program Control- for Repetition Statement - switch Multiple-Selection Statement - do…while Repetition Statement - break and continue Statements-Logical Operators

MODULE – III

C Functions - Program Modules in C - Math Library Functions – Functions- Function Definitions -Function Prototypes: A Deeper Look - Function Call Stack and Stack Frames- Passing Arguments By Value and By Reference - Recursion vs. Iteration - C Arrays - Defining Arrays - Passing Arrays to Functions- Sorting Arrays- Searching Arrays - Multidimensional Arrays

MODULE – IV

Structure & Union - C Pointers- Pointer Variable Definitions and Initialization- Pointer Operators- Passing Arguments to Functions by Reference - sizeof Operator - Pointer Expressions and Pointer Arithmetic- Relationship between Pointers and Arrays - Pointers to Functions - C Characters and Strings – Character - Handling Library- String-Conversion Functions - Standard Input/Output Library Functions- String-Manipulation Functions -C Formatted Input/Output

MODULE –V

C File Processing - Files and Streams- Creating a Sequential-Access File- Reading Data from a Sequential-Access File - Random-Access Files - Creating a Random-Access File- Writing Data Randomly to a Random-Access File- Reading Data from a Random-Access File- C Preprocessor

Text Books:

1. P. K. Sinha & Priti Sinha,"Computer Fundamentals", BPB Publications, 2007.
2. R.G. Tromey, "How to solve it by computer", Prentice Hall, 1982.
3. Paul Deital & Harvey Deital, "C How to Program", 7th edition, Pearson Education, 2013.

Paper Code: CSCA116

L	T	P	C
0	0	3	2

PROGRAMMING IN C LAB

LIST OF EXERCISES

1. Simple C programs
2. Program to illustrate control statements
3. Program to illustrate FOR loop
4. Program to illustrate SWITCH & WHILE statements
5. Program to illustrate functions
6. Program to illustrate user-defined functions
7. Program to illustrate arrays
8. Program to illustrate usage of pointers
9. Program to illustrate character handling libraries.
10. Program to illustrate string manipulation
11. Program to illustrate creation of files & streams.
12. Program to illustrate creation, reading & accessing sequential & random files

DISCIPLE SPECIFIC CORE - 2

Paper Code: CSCA114

L	T	P	C
4	2	0	3

DIGITAL ELECTRONICS

Prerequisite: Basic knowledge about computers

Objectives:

- To introduce the fundamentals of digital system design.
- To lay strong foundation to the combinational and sequential logic.
- To educate from basic concepts to advanced system design.

MODULE – I

Number systems & Conversions – Arithmetic of number systems – binary codes – BCD – The excess – 3code – the gray code – ASCII – EBCDIC

MODULE – II

Introduction to Logic Circuits – logic functions & gates – Inversion – truth tables – logic gates – truth table of basics gates – timing diagrams of NOT, AND & OR gates – Boolean algebra – NAND& NOR logic gates - truth table of a logic circuit – de morgan's theorem

MODULE – III

Logic families – factors affecting performance of a logic family – register transistor logic – diode transistor logic – DCTL – ECL – TTL logic family – Karnaugh maps – two, three & four-variables K-map – loops in K-map – mapping of K-maps – don't care condition

MODULE – IV

Sequential logic circuits – sequential circuits – SR flip flop – D flip flop – JK flip flop – T flip flop – flip flop triggering – Shift registers – data movements in digital systems – serial-in serial-out shift register - serial-in parallel-out shift register - parallel-in-serial-out(PISO) shift register - parallel-in-parallel-out shift register – bidirectional shift register – counters – classification of counters – designing a counter

MODULE – V

Combinatorial logic circuits – designing procedure – code converters – multiplexers – multiplexer tree – demultiplexers/decoders – half & full adder – half & full subtractor – encoders – BCD adder – D/A & A/D conversions - D/A converter with binary-weighted registers – D/A converter with R & 2R resisters – A/D converter

TEXT BOOK:

1. S.S. Bhatti & Ragul Malhotra, "A Textbook of Digital Electronics", I.K. International publishing, New Delhi, 2013
2. Morris Mano M., "Digital Logic and Computer Design", Pearson Education, 1/e, 2010.

Paper Code: CSCA117

L	T	P	C
0	0	3	2

DIGITAL LAB

LIST OF EXERCISES

1. Study of Logic Gates
2. Design of Adder and Subtractor
3. Design and Implementation of Code Convertors
4. Design of 4-Bit Adder and Subtractor
5. Design and Implementation of Magnitude Comparator
6. 16 Bit Odd/Even Parity Checker and Generator
7. Design and Implementation of Multiplexer and Demultiplexer
8. Design and Implementation of Encoder and Decoder
9. Design and Implementation of 3 Bit Synchronous Up/Down Counter
10. Design and Implementation of Shift Register
11. Simulation of Logic Gates
12. Simulation of Adder and Subtractor
13. Design of 4-Bit Adder and Subtractor

DISCIPLE SPECIFIC CORE - 3

Paper Code: CSCA123

L	T	P	C
3	1	0	3

PYTHON PROGRAMMING

Prerequisite: Knowledge of any programming language

Objectives:

- To learn about the fundamentals of computers
- To learn how to install Python, start the Python shell
- To learn to perform basic calculations, print text on the screen and create lists, and perform simple control flow operations using if statements and for loops
- To learn how to reuse code with functions

MODULE – I

Computer Systems - Python Programming Language Computational Thinking - Python Data Types - Expressions, Variables, and Assignments – Strings – Lists – Objects & Classes – Python standard library

MODULE – II

Imperative programming – Python modules – print() function – functional eval() - Execution Control Structures – user-defined functions python variables & assignments parameter passing

MODULE – III

Text Data, Files & Exceptions – Strings revisited – formatted output – files – errors & exceptions - Execution Control Structures – decision control & the IF statement

MODULE – IV

Container and Randomness – Dictionaries – other built-in container types – character encodings & strings – module random

MODULE – IV

FOR loop & Iteration Patterns – two-dimensional lists- while loop – more loop patterns – additional iteration control statements- namespaces – encapsulation in functions – global vs local namespaces exceptional flow control – modules as namespaces

TEXT BOOKS:

1. LjubomirPerkovic, “Introduction to Computing Using Python: An Application DevelopmentFocus”, John Wiley & Sons, 2012

Paper Code: CSCA128

L	T	P	C
0	0	3	2

PYTHON PROGRAMMING LAB

LIST OF EXERCISES

1. Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. Program to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria :
   Grade A: Percentage >=80
   Grade B: Percentage>=70 and <80
   Grade C: Percentage>=60 and <70
   Grade D: Percentage>=40 and <60
   Grade E: Percentage<40
3. Program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
4. Program to display the first n terms of Fibonacci series.
5. Program to find factorial of the given number.
6. Program to find sum of the following series for n terms: 1 – 2/2! + 3/3! - - - - - n/n!
7. Program to calculate the sum and product of two compatible matrices.
8. Program to calculate the mass m in a chemical reaction. The mass m (in gms) disintegrates according to the formula m=60/(t+2), where t is the time in hours. Sketch a graph for t vs. m, where t>=0.
9. A population of 1000 bacteria is introduced into a nutrient medium. The population p grows as follows:
   $P(t) = (15000(1+t))/(15+ e)$
   where the time t is measured in hours. WAP to determine the size of the population at given time t and plot a graph for P vs t for the specified time interval.
10. Input initial velocity and acceleration, and plot the following graphs depicting equations of motion:
    I. velocity wrt time (v=u+at)
    II. distance wrt time (s=u*t+0.5*a*t*t)
    III. distance wrt velocity (s=(v*v-u*u)/2*a)

DISCIPLE SPECIFIC CORE - 4

L	T	P	C
3	1	0	3

Paper Code: CSCA124

DATA STRUCTURES AND ALGORITHMS

Pre-requisite: Knowledge of any programming language

O**bjectives:**

- To acquaint students with data structures used when programming for the storage and manipulation of data.
- The concept of data abstraction and the problem of building implementations of abstract data types are emphasized.
- Data Structure Algorithms for stack, queues, linked list, trees, graphs, sorting and searching.

MODULE-I

Definition of a Data structure - primitive and composite Data Types, Arrays, Operations on Arrays, Ordered lists - Stacks - Operations - Applications of Stack - Infix to Postfix Conversion.

MODULE-II

Recursion – Queue- operations - Singly Linked List – Operations - Application - Representation of a Polynomial - Polynomial Addition - Doubly Linked List - Operations.

MODULE-III

Trees: Binary Trees - Operations - Graph - Definition, Types of Graphs, Graph Traversal - DFS and BFS.

MODULE-IV

Basic Design and Analysis techniques of Algorithms, Correctness of Algorithm – Algorithm Design Techniques – Iterative techniques - Divide and Conquer -Dynamic Programming, Greedy Algorithms.

MODULE - V

Role of algorithms in computing - Sorting and Searching Techniques - Elementary sorting techniques –Bubble Sort, Insertion Sort, Merge Sort, Quick Sort

TEXT BOOKS

1. Ellis Horowitz, Sartaj Sahni and Anderson, “Fundamentals of Data Structure in C”, University Press, 2nd edition, 2008.

2. T.H.Cormen, CharlesE. Leiserson, Ronald L. Rivest, Clifford Stein. “Introduction to Algorithms, PHI, 3rd edition. 2009.

Paper Code: CSCA129

L	T	P	C
0	0	3	2

DATA STRUCTURES & ALGORITHMS LAB

LIST OF EXERCISES

1. Implementation of stack
2. Implementation of Queue
3. Implementation of Singly Linked List
4. Implementation of Doubly linked list
5. Implementation of Binary tree and traversals (BFS & DFS)
6. Implementation of Insertion sort
7. Implementation of Selection Sort
8. Implementation of Quick sort
9. Implementation of Merge sort
10. Implementation of Infix to Postfix & Infix to Prefix notations.

DISCIPLE SPECIFIC CORE – 5

Paper Code: CSCA231

PROGRAMMING WITH VISUAL BASIC

L	T	P	C
3	1	0	3

Pre-requisite: Knowledge of any programming language

Objectives:

1. To introduce the students to Event Driven programming.
2. To help the students in find solutions to real life problems using Visual Basic.
3. Students will learn about connecting and accessing databases.

MODULE –I

Introduction to GUI - Visual Basic: Starting and Exiting Visual Basic – Project Explorer – Working with Forms – Properties Window – Using the Toolbox – Toolbars – Working with Projects – Programming Structure of Visual Basic applications – Event and Event driven procedures

MODULE –II

Adding code and using events: Using literals – data types - declaring and using variables – using the operator – subroutines and functions – looping and decision control structures – if then else structure – select structure , for next, do.. loop and while.. wend.- Using intrinsic Visual basic Controls with methods and Properties: Label ,Text box, Command button, Frame, Checkbox, option button, List box, Combo box, Drive List box, directory List box and file list box – Formatting controls – control arrays, Tab order

MODULE –III

Functions and Procedure - Passing arguments by value and reference – Arrays, dynamic arrays – User defined data types – symbolic constants – using Dialog boxes: Input box, Message box functions - String functions, date and Time function, numeric functions

MODULE –IV

Menus: creating menus, adding code to menus, using MDI forms - MDI form basic – building MDI form – creating MDI Child Forms

MODULE –V

Database object (DAO) and properties – accessing Recordset objects – Move first, MoveLast, MovePrevious and MoveNext methods – accessing Microsoft Access files. Active Data Objects (ADO) ADO and OLE DB – Connecting to the database – Retrieving a recordset - Adding records – Editing records –closing the database connection**.**

TEXT BOOKS

1. Gary Cornwell “Visual basic 6”, Tata McGraw –Hill , 1998, reprint 2009

2. Scott warner “Teach yourself Visual basic 6”, Tata McGraw-Hill, 1998, digitized-2009

3. Noel Jerke “Visual Basic 6- The Complete Reference”, Tata McGraw-Hill, 1999, reprint 2009

4. Eric A. Smith, Valar Whisler, and Hank Marquis “Visual Basic 6 programming”

DISCIPLE SPECIFIC CORE – 6

L	T	P	C
3	1	0	3

Paper Code: CSCA232

DATABASE MANAGEMENT SYSTEMS

Prerequisite: Knowledge of data structures and file-handling

Objectives:

- To learn about the basics of database management systems (DBMS), with an emphasis on how to organize, maintain and retrieve efficiently, and effectively the information from a DBMS.
- To learn the fundamental concepts of the relational model, including relations, attributes, domains, keys, foreign keys, entity integrity and referential integrity.
- To learn how to normalize the data using 1^{st}, 2^{nd}& 3^{rd} normal forms
- To define and manipulate the relational databases in SQL.

MODULE - I

Overview of Database Management System - Introduction, file-based system, drawbacks of file-Based System,Data and information, Database, Database management System, Objectives of DBMS, Evaluation of Database management system, classification of Database Management System, DBMS Approach, advantages of DBMS, Anis/spark Data Model, data models, Components and Interfaces of Database Management System - Database Architecture, situations where DBMS is not Necessary - DBMS Vendors and their Products.

MODULE - II

Entity-Relationship Model - Introduction, the building blocks of an entity relationship diagram, classification of entity sets, attribute classification, relationship degree, relationship classification, reducing ER diagram to tables, enhanced entity-relationship model (EER model), generalization and specialization, ISA relationship and attribute inheritance, multiple inheritance, constraints on specialization and generalization, aggregation and composition - advantages of ER modeling.

MODULE - III

Relational Model –Introduction -ACID property - CODD Rules, relational data model, concept of key, relational integrity – primary key – foreign key - normalization – 1^{st} normal form, 2^{nd} normal form & 3^{rd} normal form.

MODULE - IV

Structured Query Language - Introduction, History of SQL Standard, Commands in SQL, Data Types in SQL, Data Definition Language, Data Manipulation Language, Data Control Language - Table Modification Commands – primary & foreign keys

MODULE - V

PL/SQL: Introduction, Shortcoming in SQL, Structure of PL/SQL, PL/SQL Language Elements, Data Types, Operators Precedence, Control Structure, steps to Create a PL/SQL, steps to create a Cursors, Procedure, Function, Packages, Exceptions Handling, Database Triggers, Types of Triggers.

TEXT BOOKS

1. Abraham Silberschatz, Henry Korth, and S. Sudarshan, "Database System Concepts", 6th edition, McGraw Hill, 2010,
2. Bulusu, "Oracle PL/SQL Programming", OReilly, 5th edition, 2009.
3. Steve Bobrowski, "Hands-On Oracle Database 10g Express Edition for Windows", Tata McGraw Hill, 2010.

Paper Code: CSCA237

VISUAL BASIC AND DBMS LAB

L	T	P	C
0	0	3	2

LIST OF EXERCISES:

Unit – I (Visual Basic)

1. Building simple applications
2. Working with intrinsic controls and ActiveX controls
3. Application with multiple forms
4. Application with dialogs
5. Application with Menus
6. Application using data controls
7. Application using Common Dialogs
8. Drag and Drop Events
9. Database Management
10. Creating ActiveX Controls

Unit – II (SQL)

Use the concepts like data normalization, link between table by means of foreign keys and other relevant database concepts for the following applications. The implementation of each should have necessary input screen (forms) Menu-driven query processing and reports. Necessary validations should be made for each table

1. Library information system
2. Students mark sheet processing
3. Telephone directory maintenance
4. Gas booking and delivering
5. Electricity bill processing
6. Bank Transaction
7. Pay roll processing
8. Personal information system
9. Question database and conducting Quiz

10. Personal diary

DISCIPLE SPECIFIC CORE - 7

Paper Code: CSCA233

COMPUTER NETWORKS

L	T	P	C
4	1	0	3

Prerequisite: Basic Knowledge of Computers

Objectives:

1. Given an environment, after analyzing the channel characteristics, appropriate channel access mechanism and data link protocols are chosen to design a network.
2. Given an environment, analyzing the network structure and limitations, appropriate routing protocol is chosen to obtain better throughput.
3. Given various load characteristics and network traffic conditions, decide the transport protocols and timers to be used.

MODULE –I

Introduction to Networks – Topology - Network Architecture - Reference Models - Example Networks – Transmission Medias

MODULE –II

Data link layer - Design Issues, Error Detection and Correction - Elementary Data link Protocols - Sliding Window Protocols - Network Layer - Design Issues, Routing Algorithms - Congestion Control Algorithms

MODULE –III

Internetworking - Transport Layer - The Transport Service – Service provided to the Upper Layers, elements of Transport Protocols – Addressing, Connection Establishment, Connection Release, Flow Control & Buffering - TCP - Introduction, TCP Service model, TCP Protocol, TCP Segment Header, TCP connection Establishment, TCP Connection Release, TCP Transmission Policy, TCP Congestion Control

MODULE –IV

Application layer - Domain Naming System - DNS Namespace, Resource Records, Name Servers - Electronic mail - Architecture and Services, The User Agent, Messages Formats, Message Transfer

MODULE –V

The World Wide Web - Architectural Overview, Static Web Documents, Dynamic Web Documents, Hyper Text Transfer Protocol (HTTP) - Introduction to Security.

TEXT BOOK

Andrew S. Tanenbaum, "Computer Networks", Prentice Hall India, 5th edition, 2010.

Paper Code: CSCA238

NETWORKS LAB

L	T	P	C
0	0	3	2

LIST OF EXERCISES:

1. Implementation of Error Detection / Error Correction Techniques
2. Implementation of Stop and Wait Protocol and sliding window
3. Implementation and study of Go back-N and selective repeat protocols
4. Implementation of High Level Data Link Control
5. Study of Socket Programming and Client – Server model
6. Write a socket Program for Echo/Ping/Talk commands.
7. To create scenario and study the performance of network with CSMA / CA Protocol and compare with CSMA/CD protocols.
8. Network Topology - Star, Bus, Ring
9. Implementation of distance vector routing algorithm
10. Implementation of Link state routing algorithm
11. Encryption and decryption.

DISCIPLE SPECIFIC CORE – 8

Paper Code: CSCA234

L	T	P	C
4	1	0	3

SOFTWARE ENGINEERING

Pre-requisite: Basic knowledge of programming

Objectives:

- Identify, formulate, and solve software engineering problems, including the specification, design, implementation, and testing of software systems that meet specification, performance, maintenance and quality requirements
- Elicit, analyze and specify software requirements through a productive working relationship with various stakeholders of a software project.
- Need to function effectively as a team member
- Understanding professional, ethical and social responsibility of a software engineer
- Participate in design, development, deployment and maintenance of a medium scale software development project.

MODULE – I

Introduction to Software Engineering – evolving role of software – defining software engineering – changing nature of software – software myths – terminologies – role of software development – software life cycle models – build & fix model – waterfall model – incremental model – evolutionary model – unified model – selection of a life cycle model

MODULE – II

Software Requirements: Analysis & Specifications – requirements engineering – type of requirements – feasibility studies – requirements elicitation – requirement analysis - – requirement documentation - – requirement validation - – requirement management – Case studies

MODULE – III

Software Project Planning – size estimation – cost estimation – models – Constructive cost model – software risk management – software design – what is design – modularity – strategy of design – function oriented design - object oriented design

MODULE – IV

Software Metrics – Software & Metrics: What & Why – token count – data structure metrics – information flow metrics – object oriented metrics – Use-Case metrics – metrics analysis - software reliability – basic concepts – software reliability models – capability maturity model

MODULE – V

Software testing – strategic approach to software testing – terminologies – functional testing – structural testing – levels of testing – validation testing – the art of debugging – testing tools

TEXT BOOK:

1. K.K. Aggarwal &Yogesh Singh, "Software Engineering", New Age International Publishers, 2012.

2. Roger S. Pressman, "Software Engineering: A Practitioner's Approach", McGraw Hill, 7th edition, 2010.

DISCIPLE SPECIFIC CORE - 9

Paper Code: CSCA241

OPERATING SYSTEMS

L	T	P	C
3	1	0	3

Pre-requisite: Knowledge of computers & computer organization

Objectives:

- To learn Structure and functions of OS
- To learn Processes and Threads, Scheduling algorithms
- To learn Principles of concurrency and Memory management
- To learn I/O management and File systems

MODULE - I

Introduction - Mainframe systems – Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems – Real Time Systems – Handheld Systems - Hardware Protection - System Components – Operating System Services – System Calls – System Programs - Process Concept – Process Scheduling – Operations on Processes – Cooperating Processes – Inter-process Communication.

MODULE - II

Threads – Overview – Threading issues - CPU Scheduling – Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Multiple-Processor Scheduling – Real Time Scheduling - The Critical-Section Problem – Synchronization Hardware – Semaphores – Classic problems of Synchronization – Critical regions – Monitors.

MODULE - III

System Model – Deadlock Characterization – Methods for handling Deadlocks -Deadlock Prevention – Deadlock avoidance – Deadlock detection – Recovery from Deadlocks - Storage Management – Swapping – Contiguous Memory allocation – Paging – Segmentation – Segmentation with Paging.

MODULE - IV

Virtual Memory – Demand Paging – Process creation – Page Replacement – Allocation of frames – Thrashing - File Concept – Access Methods – Directory Structure – File System Mounting – File Sharing – Protection

MODULE - V

File System Structure – File System Implementation – Directory Implementation – Allocation Methods – Free-space Management. Kernel I/O Subsystems - Disk Structure – Disk Scheduling – Disk Management – Swap-Space Management - Case Study: The Linux System & Windows

TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 6th edition, John Wiley & Sons, 2003.
2. Harvey M. Deitel, "Operating Systems", 2nd edition, Pearson Education, 2002.

DISCIPLE SPECIFIC CORE – 10

Paper Code: CSCA242

L	T	P	C
3	1	0	3

OBJECT ORIENTED PROGRAMMING USING JAVA

Prerequisite: Basic Knowledge of programming

Objectives:

- On successful completion of the course the students should have understood the object oriented programming in java
- Should have idea about GUI bases programming
- Should have idea about database programming

MODULE – I

Introduction – Introduction to java applications – Introduction to classes, objects, methods & Strings - Control statements - Arrays

MODULE – II

Class & Objects – constructor – function overloading & overriding - Inheritance - Polymorphism – Interface – package - exception handling - Introduction to Multithreading

MODULE – III

Exception Handling – GUI components – Introduction – Overview of Swing components – Swing vs AWT –SWING: Displaying Text and Images in a Window - Text Fields and an Introduction to Event Handling with Nested Classes - Common GUI Event Types and Listener Interfaces - How Event Handling Works – various event handling – layout manager

MODULE – IV

Files, Streams & Object Serialization – Introduction – Files & Streams – Sequential Access Text Files – Object Sterilization

MODULE – V

Applets & Java Web Start – applet life-cycle – sandbox security model – Java web start & Java Network Launch Protocol (JNLP) – Accessing databases with java database connectivity (JDBC)

Text Books:

Paul Deital& Harvey Deital, ”Java: How to Program”, Pearson Education, 10th edition, 2015.

Paper Code: CSCA250

L	T	P	C
0	0	3	2

OBJECT ORIENTED PROGRAMMING USING JAVA LAB

LIST OF EXERCISES

1. Program to illustrate various date types in Java.
2. Program to illustrate class and objects.
3. Program to illustrate control structures (if-then, while, switch).
4. Program to illustrate the concept of arrays (creation, initialization and processing).
5. Program to illustrate Multidimensional arrays.
6. Program to illustrate Constructor and its overloading.
7. Program to illustrate Inheritance and Packages.
8. Program to illustrate Interface and static methods.
9. Program to illustrate modifiers protected, this, final and super.
10. Program to illustrate Exception Handling Technique.
11. Program to illustrate to input/output streams.
12. Program to illustrate File handling technique.
13. Program to illustrate threading.
14. Program to illustrate simple Java applets.
15. Program to illustrate database programming

DISCIPLE SPECIFIC CORE – 11

Paper Code: CSCA351

L	T	P	C
3	2	0	3

VISUAL PROGRAMMING USING C#

Prerequisite: Knowledge of C language and DBMS

Objectives:

- To understand the various types of applications
- To get expertise in visual programming
- To understand the functionalities of middleware platform

MODULE – I

Introduction - C, C++, Objective-C, Java and C# - Extensible Markup Language (XML) - Introduction to Microsoft .NET - The .NET Framework and the Common Language Runtime - Introduction to Object Technology - Introduction to C# Applications - Creating a Simple Application in Visual C# Express - Formatting Text with Console.Write and Console.WriteLine - Another C# Application: Adding Integers – Arithmetic - Decision Making: Equality and Relational Operators - Strings and Characters

MODULE – II

Introduction to Classes and Objects – Introduction - Classes, Objects, Methods, Properties and Instance Variables - Declaring a Class with a Method and Instantiating an Object of a Class - Declaring a Method with a Parameter - UML Class Diagram with a Property - Software Engineering with Properties and set and get Accessors - Initializing Objects with Constructors - Floating-Point Numbers and Type decimal - Control Statements

MODULE – III

Classes and Objects: A Deeper Look – Introduction - Controlling Access to Members - Referring to the Current Object's Members with the this Reference – Indexers - Default and Parameterless Constructors – Composition - Garbage Collection and Destructors- static Class Members - Data Abstraction and Encapsulation - Object Initializers – Delegates Object-Oriented Programming: Inheritance - Polymorphism, Interfaces and Operator Overloading-Exception Handling

MODULE – IV

Graphical User Interfaces with Windows Forms – Introduction - Windows Forms - Control Properties and Layout - Labels, TextBoxes and Buttons - GroupBoxes and Panels - CheckBoxes and RadioButtons - NumericUpDown Control - Mouse-Event Handling- Keyboard-Event

Handling – Menus- various controls - Multiple Document Interface (MDI) Windows - Visual Inheritance - User-Defined Controls

MODULE – V

Databases and LINQ - Introduction - relational Databases - LINQ to SQL - Querying a Database with LINQ - Dynamically Binding Query Results - Retrieving Data from Multiple Tables with LINQ - Creating a Master/Detail View Application - Tools and Web Resources Case Study

TEXT BOOK:

Paul Deitel& Harvey Deitel, "C# 2010 for Programmers", Pearson Education, 4th edition, 2011.

Paper Code: CSCA359

L	T	P	C
0	0	3	2

VISUAL PROGRAMMING LAB

LIST OF EXERCISES

1. Implement Classes and Objects, Inheritance &Polymorphism
2. Implement Interfaces, Operator Overloading, Delegates and Events
3. Implement Exception Handling &Multi-Threading
4. Create Console application & Window Applications.
5. Create programs using SDI & MDI
6. Create program using Database Controls
7. Develop any TWO case studies listed below:
    I. Inventory Control
    II. Retail Shop Management
    III. Employee Information System
    IV. Personal Assistant Program
    V. Students' Information System

DISCIPLE SPECIFIC CORE - 12

L	T	P	C
3	1	0	3

Paper Code: CSCA361

WEB TECHNOLOGY

Pre-requisite: Knowledge of Operating system, computer network, DBMS, and Java language.

Objectives:

- To inculcate knowledge of web technological concepts and functioning of internet
- To learn and program features of web programming languages.
- To understand the major components of internet and associated protocols.
- To design an innovative application for web.

MODULE – I

Web Essentials: Clients, Servers, and Communication - Internet - Basic Internet Protocols - The World Wide Web - World Wide Web - HTTP Request Message - HTTP Response Message - Web Clients - Web Servers

MODULE - II

Markup Languages: XHTML - An Introduction to HTML - HTML's History and Versions - Basic XHTML Syntax and Semantics - Some Fundamental HTML Elements . - Relative URLs - Lists - Tables - Frames - Forms - Defining XHTML's Abstract Syntax: XML - Creating HTML Documents - Style Sheets: CSS- Introduction to Cascading Style Sheets - Cascading Style Sheet Features - CSS Core Syntax - Style Sheets and HTML - Style Rule Cascading and Inheritance - Text Properties - CSS Box Model

MODULE – III

Client-Side Programming: JavaScript Language - History and versions of JavaScript - Introduction to JavaScript - JavaScript in Perspective - Basic Syntax - Variables and Data Types - Statements . - Operators - Literals - Functions - Objects - Arrays - Built-in Objects - Host Objects: Browsers and the DOM - Introduction to the Document Object Model- Intrinsic Event Handling - DOM History and Levels

MODULE – IV

Server-Side Programming: Java Servlets- Model-View-Controller Paradigm - Servlet Architecture Overview - Servlets Generating Dynamic Content- Servlet Life Cycle - Parameter Data

MODULE – V

Sessions- Cookies - URL Rewriting- Servlets and Concurrency – database programming using Servlet.

TEXT BOOK:

1. Jeffery C. Jackson, “Web Technologies: A Computer Science Perspective”, Pearson Education, 2007.
2. Julie C. Meloni,”Sams Teach Yourself; HTML, CSS, and JavaScript All in One”, SAMS, 2014.

L	T	P	C
0	0	3	2

Paper Code: CSCA368

WEB TECHNOLOGY LAB

LIST OF EXERCISES

1. Creation of HTML Files
2. Working with Client Side Scripting
   2.1 JavaScript
3. Configuration of web servers
   3.1 Apache Web Server
   3.2 Internet Information Server (IIS)
4. Experiments in Servlet
   4.1 Implementing MVC Architecture using Servlets
   4.2 Data Access Programming (using ADO)
   4.3 Session and Application objects
   4.4 File System Management
5. Write programs in Java to create three-tier applications using servlets
   5.1 for conducting on-line examination.
   5.2 for displaying student mark list. Assume that student information is available in a database which has been stored in a database server.

DISCIPLINE SPECIFIC CORE - 13

Paper Code: CSCA362

PROJECT

L	T	P	C
0	1	10	6

The objective of the project is to motivate them to work in emerging/latest technologies, help the students to develop ability, to apply theoretical and practical tools/techniques to solve real life problems related to industry, academic institutions and research laboratories.

The project is of 2 hours/week for one (semester VI) semester duration and a student is expected to do planning, analyzing, designing, coding, and implementing the project. The initiation of project should be with the project proposal. The synopsis approval will be given by the project guides.

The project proposal should include the following:

- Title
- Objectives
- Input and output
- Details of modules and process logic
- Limitations of the project
- Tools/platforms, Languages to be used
- Scope of future application

The project work should be either an individual one or a group of not more than three members and submit a project report at the end of the semester. The students shall defend their dissertation in front of experts during viva-voce examinations.

GENERAL ELECTIVE –I PAPER I

Paper Code: CSCA125

MATHEMATICS FOR BUSINESS

L	T	P	C
3	1	0	3

OBJECTIVES:

- To enable students to learn and apply mathematics skills to a business setting.

MODULE - I

Ratio, Proportion and Percentage, Ratio- Definition, Continued Ratio, Inverse Ratio, Proportion, Continued Proportion, Direct Proportion, Inverse Proportion, Variation, Inverse Variation, Joint Variation, Percentage- Meaning and Computations of Percentages.

MODULE - II

Profit and Loss-Terms and Formulae, Trade discount, Cash discount, Problems involving cost price, Selling Price, Trade discount and Cash Discount. Introduction to Commission and brokerage, Problems on

Commission and brokerage.

MODULE - III

Interest -Simple Interest, Compound interest (reducing balance & Flat Interest rate of interest), Equated Monthly Installments(EMI), Problems

MODULE - IV

Matrices and Determinants (upto order 3 only)-Multivariable data, Definition of a Matrix, Types of Matrices, Algebra of Matrices, Determinants, Ad joint of a Matrix, Inverse of a Matrix via ad joint Matrix, Homogeneous System of Linear equations, Condition for Uniqueness for the homogeneous system, Solution of Non-homogeneous System of Linear equations (not more than three variables). Condition for existence and uniqueness of solution, Solution using inverse of the coefficient matrix, Problems.

MODULE - V

Linear Programming problem (L.P.P.)-Meaning of LPP, Formulation of LPP, and solution by graphical methods. Transportation problem (T.P.)-Statement and meaning of T.P. methods of finding initial basic feasible solution by North West corner Rule, Matrix Minimum method and Vogel's approximation

method. Simple numerical problems (concept of degeneracy is not expected).

REFERENCE BOOKS:

1. Business Mathematics by Dr. Amarnath Dikshit & Dr. Jinendra Kumar Jain.
2. Business Mathematics by V. K. Kapoor - Sultan chand & sons, Delhi
3. Business Mathematics by Bari - New Literature publishing company, Mumbai
4. Operations Research by Dr. S. D. Sharma – Sultan Chand & Sons.
5. Operations Research by Dr. J. K. Sharma – Sultan Chand & Sons.

GENERAL ELECTIVE –I PAPER II

Paper Code: CSCA126

PROBABILITY AND STATISTICS

L	T	P	C
3	1	0	3

Prerequisite: Knowledge in basic mathematics

Objectives:

- To learn how to handle situations involving more than one random variable and functions of random variables.
- To learn the notion of sampling distributions and have acquired knowledge of statistical techniques useful in making rational decision in management problems.
- To learn statistical methods designed to contribute to the process of making scientific judgments in the face of uncertainty and variation.

MODULE – I

Basic Probability - Random Experiments - Sample Spaces Events - The Concept of Probability - The Axioms of Probability - Some Important Theorems on Probability - Assignment of Probabilities -Conditional Probability -Theorems on Conditional Probability -- Independent Events -Bayes' Theorem or Rule Combinatorial Analysis - Fundamental Principle of Counting - Tree Diagrams -Permutations

MODULE – II

Random Variables and Probability Distributions - Random Variables - Discrete Probability Distributions -Distribution Functions for Random Variables - Distribution Functions for Discrete Random Variables - Continuous Random Variables – Graphical Interpretations Joint Distributions Independent Random Variables - Change of Variables - Probability Distributions of Functions of Random Variables – Convolutions – Conditional Distributions Applications to Geometric Probability

MODULE – III

Mathematical Expectation - Definition of Mathematical Expectation - Functions of Random Variables - Theorems on Expectation - Variance & Standard Deviation - Theorems on Variance - Standardized Random Variables - Special Probability Distributions - Binomial Distribution - Normal Distribution - Poisson Distribution

MODULE – IV

STATISTICS - Sampling Theory - Population and Sample - Statistical Inference- Sampling With and Without Replacement Random Samples - Random Numbers - Population Parameters - Sample Statistics -Sampling Distributions - Sample Mean - Sampling Distribution of Means - Sampling Distribution of Proportions - Sampling Distribution of Differences and Sums - Sample Variance - Sampling Distribution of Variances - Computation of Mean, Variance, and Moments for Grouped Data

MODULE – V

Curve Fitting, Regression, Correlation - Curve Fitting – Regression - The Method of Least Squares The Least-Squares Line -The Least-Squares Line in Terms of Sample Variances and Covariance - The Least-Squares Parabola - Multiple Regression Standard Error of Estimate The Linear Correlation Coefficient Generalized Correlation Coefficient Rank Correlation

Text books:

1. Murray R. Spiegel, John J. Schiller & R. Alu Srinivasan, "Probability and Statistics", Schaum outlines, McGraw Hill, 3rd edition, 2009.
2. S. P. Gupta, Statistical Methods, S. Chand and Sons.
3. S. C Gupta and V. K. Kapoor, "Fundamentals of Mathematical Statistics", 11th edition, S. Chand and Sons.

GENERAL ELECTIVE –II PAPER I

Paper Code: CSCA235

DISCRETE MATHEMATICS

L	T	P	C
3	1	0	3

OBJECTIVES:

1. Ability model data sets as mathematical functions and solve.
2. Ability to understand and model the discrete structures such as graphs and trees.

MODULE –I

Matrices – definition – special types of matrices – operations – symmetric matrices – skew symmetric matrices – Hermitian and skew Hermitian matrices – Inverse – Orthogonal matrices – Solutions of Simultaneous equations – Rank of a matrix – Eigen values and eigenvectors – Cayley Hamilton Theorem.

MODULE –II

Mathematical Logic – Connectives – Statement Forms – Paranthesis – Truth Table – Tautology and Contradiction/Logical Implications and equivalences – Disjunctive and Conjunctive normal forms.

MODULE –III

Sets – Relation – functions – Poset – Hasse Diagram – Lattice and its Properties – Boolean Algebra – Properties – Karnaugh Map (Two, Three and Four Variables Only).

MODULE –IV

Graph Theory: Introduction – application of graphs – Finite and Infinite Graphs – Incidence and Degree – Isolated Vertex, Pendant Vertex and Null Graph. Paths and Circuits – Connected Graph, Disconnected Graphs and components – Euler Graphs – Operations on Graphs – Hamiltonian Paths and Circuits

MODULE –V

Trees and Fundamentals Circuits: Trees – Some properties of Trees – Pendant Vertices in a Tree – Distance and Centers in a Tree – Rooted and Binary Trees – On Counting Trees – Spanning Trees – Fundamental Circuits

TEXT BOOKS

1. Manicavachagom Pillay and others," Algebra",11th Revised edition. Vol II., S.V. Publications, (Unit – 1)
2. Narsingh Deo, "Graph Theory with applications to Engineering and Computer Science", PHI, 1997. (Unit –4, 5)
3. Trembly & Manohar, "Discrete Mathematics for Computer Science", TMH, 1997 (Units – 2, 3).

GENERAL ELECTIVE –II PAPER II

Paper Code: CSCA236

L	T	P	C
3	1	0	3

OPERATIONS RESEARCH

OBJECTIVES:

1. Ability to analyze the given data set using mathematical models.
2. Ability to represent the dataset and solve using techniques such as linear programming, Game theory, PERT and CPM.

MODULE –I

Introduction to Operations Research - Principal components of decision problems - phases of OR study.

MODULE –II

Linear Programming - graphical solution - simplex method including artificial variable technique - duality.

MODULE –III

Transportation and assignment models - Sequencing

MODULE –IV

Game theory - optimal solution of two-person zero-sum games - mixed strategies - graphical solution of (2 X n) and (m X 2) games - solution of (m X n) games by linear programming.

MODULE – V

PERT and CPM - network diagrams - determination of the floats and critical path - probability considerations in project scheduling.

TEXT BOOKS

1. Treatment as in Hamdy A.Taha "Operations Research - An introduction (III edition)", chapters 1, 2, 3 (omit 3.4), 4 (omit 4.4, 4.5), 5 (omit 5.4), 11 (omit all sections except 11.4 only), 12 (omit 12.3, 12.5).
2. R.L. Ackoff and M.W.Sasieni "Fundamentals of O.R.". (For Sequencing)

DISCIPLE SPECIFIC ELECTIVE

SPECIALIZATION STREAM I (BUSINESS INTELLIGENCE) – PAPER I

Paper Code: CSCA243

DATA WAREHOUSING

L	T	P	C
3	1	2	4(3+1)

Pre-requisite: Knowledge of database management system

Objectives:

- To learn the fundamentals of designing large-scale data warehouses using relational technology.
- To study the design aspects, planning and development.

MODULE - I

Introduction – Data warehouse delivery method – system process – typical process flow within a data ware house – query management process – process architecture – meta data-data mart.

MODULE - II

Design aspects – Designing dimension tables – Designing star flake schema – Multi dimensional schema – partitioning strategy aggregations – Data mart- Meta data – System Data warehouse process manager.

MODULE - III

Hardware and operational design – server hardware, network hardware – parallel technology – Security input on design of Hardware – backup and recovery – Service level Agreement – Operating the data warehouse.

MODULE IV

Planning and Development - Capacity planning – Estimating the load – Tuning the data warehouse – Assessing performance –Tuning the data load and queries – Testing data warehouse – Development of test plan – Testing the data base and operational environment.

MODULE - V

Case Studies - Data Warehousing in the Tamil Nadu Government - Data Warehouse for the Ministry of commerce- Data Warehouse for the government of Andhra Pradesh- Data Warehousing in Hewlett –Packard- Data Warehousing in Levi Strauss- Data Warehousing in the World Bank- HARBOR, A Highly available Data Warehouse-A typical Business data Warehouse for a Trading company.

TEXT BOOKS:

1. Sam Anahory & Dennis Murray, "Data Warehousing in the real world", Pearson Education.
2. Prabhu C.S.R, "Data Warehousing: Concepts, Techniques, Products and Applications", PHI Learning, 3rd edition, 2009.

DISCIPLE SPECIFIC ELECTIVE – STREAM I – PAPER II

Paper Code: CSCA352

DATA MINING

L	T	P	C
3	1	2	4(3+1)

Prerequisite: Knowledge of database management system

Objectives:

- To understand the concepts of Data Mining.
- To learn about Classification, prediction and cluster analysis techniques.
- To learn about applications of Data and knowledge mining.

MODULE - I

An Introduction to Data Mining - Introduction - The Data Mining Process - The Basic Data Types - The Major Building Blocks - Association Pattern Mining- Data Clustering - Outlier Detection- Data Classification - Impact of Complex Data Types on Problem Definitions- Scalability Issues and the Streaming Scenario - Some Application Scenarios

MODUEL – II

Data Preparation – Introduction - Feature Extraction and Portability- Data Cleaning - Data Reduction and Transformation

MODULE – III

Similarity and Distances- Introduction- Multidimensional Data- Text Similarity Measures - Temporal Similarity Measures - Graph Similarity Measures- Supervised Similarity Functions

MODULE – IV

Association Pattern Mining – Introduction- Frequent Pattern Mining Model - Association Rule Generation Framework - Frequent Item set Mining Algorithms- Brute Force Algorithms - Apriori Algorithm - Enumeration-Tree Algorithms - Pattern Summarization

MODULE – V

Cluster Analysis – Introduction - Feature Selection for Clustering - Representative-Based Algorithms - Hierarchical Clustering Algorithms - Cluster Validation Clustering Categorical Data - Outlier Analysis – Introduction - Extreme Value Analysis - Clustering for Outlier Detection - Distance-Based Outlier Detection

TEXT BOOK:

1. Charu C. Aggarwal**,** Data Mining: The Textbook, Springer, 2015.

DISCIPLE SPECIFIC ELECTIVE – STREAM I – PAPER III

Paper Code: CSCA363

FOUNDATIONS OF DATA ANALYTICS

L	T	P	C
3	1	2	4(3+1)

OBJECTIVES:

- To learn to explore data, sample and model them
- To understand R language
- To generate reports

MODULE - I

Introduction to Data Science - Data science process – roles, stages in data science project – working with data from files – working with relational databases – exploring data – managing data – cleaning and sampling for modeling and validation – introduction to NoSQL.

MODULE - II

Modeling Methods - Choosing and evaluating models – mapping problems to machine learning, evaluating clustering models, validating models – cluster analysis – K-Means algorithm, Naïve Bayes – Memorization Methods – Linear and logistic regression – unsupervised methods.

MODULE - III

Introduction to R - Language: Reading and getting data into R – ordered and unordered factors – arrays and matrices – lists and data frames – reading data from files – probability distributions – statistical models in R - manipulating objects – data distribution.

MODULE - IV

Map Reduce: Introduction – distributed file system – algorithms using map reduce, MatrixVector Multiplication by Map Reduce – Hadoop - Understanding the Map Reduce architecture - Writing Hadoop Map Reduce Programs - Loading data into HDFS – Executing the Map phase.

MODULE - V

Delivering Results - Documentation and deployment – producing effective presentations– Introduction to graphical analysis – plot() function – displaying multivariate data – matrix plots – multiple plots in one window - exporting graph - using graphics parameters. Case studies.

TEXT BOOKS:

1. Nina Zumel, John Mount, “Practical Data Science with R”, Manning Publications, 2014.
2. Jure Leskovec, Anand Rajaraman, Jeffrey D.Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2014.

3. Mark Gardener, “Beginning R - The Statistical Programming Language”, John Wiley & Sons, Inc., 2012.
4. W. N. Venables, D. M. Smith and the R Core Team, “An Introduction to R”, 2013.

DISCIPLE SPECIFIC ELECTIVE

SPECIZATION STREAM II (ARTIFICIAL INTELLIGENCE) – PAPER I

Paper Code: CSCA244

ARTIFICIAL INTELLIGENCE

L	T	P	C
3	1	2	4(3+1)

Pre-requisite: Knowledge of predicate calculus and programming

Objectives:

- To study the concepts of Artificial Intelligence and Methods of solving problems using Artificial Intelligence
- To understand the basic techniques of knowledge representation and their use and components of an intelligent agent
- To be able to implement basic decision making algorithms, including search based and problem solving techniques, and first-order logic.
- To know the basic issues in machine learning

MODULE - I

Introduction to Al & Production Systems - Introduction - AI problems, foundation of AI and history of AI intelligent agents -Agents and Environments - the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

MODULE - II

Searching Techniques - Searching-Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Greedy best first search- A* search Game Playing- Adversial search, Games, minimax, algorithm, optimal decisions in multiplayer games, Alpha-Beta pruning, Evaluation functions, cutting of search.

MODULE - III

Representation of Knowledge - Knowledge Representation & Reasons logical Agents, Knowledge – based Agents, the Wumpus world, logic, propositional logic, Resolution patterns in propositional logic, Resolution, Forward & Backward Chaining

MODULE - IV

First order logic - Inference in first order logic, propositional vs. first order inference, unification & lifts forward chaining, Backward chaining, Resolution - Learning - Learning from observations – forms of learning

MODULE - V

An Overview of Prolog - An example program: defining family relations - Extending the example program by rules -A recursive rule definition - How Prolog answers questions -

Declarative and procedural meaning of programs - Syntax and Meaning of Prolog Programs - Lists, Operators, Arithmetic - Using Structures: Example Programs

TEXT BOOKS:

1. Rich E, Knight K, "Artificial Intelligence", 2nd edition, TMH, 2005.
2. Stuart Russel, Peter Norvig"AI – A Modern Approach", 2nd edition, Pearson Education, 2007.
3. Ivan Bratka, "PROLOG Programming for Artificial Intelligence", Addison Wesley, 1986

DISCIPLE SPECIFIC ELECTIVE – STREAM II – PAPER II

L	T	P	C
3	1	2	4(3+1)

Paper Code: CSCA353

NEURAL NETWORKS

Pre-Requisite: Knowledge of Artificial Intelligence

Objectives:

- To understand the Concept of Artificial Neural Networks
- To study various algorithms and their implementation in real life and in different domains

MODULE I

Introduction - Overview of biological neurons: Structure of biological neurons relevant to Artificial Neural Networks (ANNs).

MODULE II

Learning Process – Supervised, Unsupervised and reinforced - Error Correction Learning, Memory based learning, Hebbian learning rule, The Boltzman machine, Competitive learning, Credit assignment problem, memory, adaptation, statistical nature of learning process.

MODULE III

Single layer Perceptrons: Classification model, Features & Decision regions; training & classification using

discrete perception, algorithm, single layer continuous perception networks for linearly separable classifications.

MODULE IV

Multi-layer Feed Forward Networks: linearly non-separable pattern classification, Delta learning rule for multi-

perceptron layer, generalized delta learning rule, Error back propagation training, learning factors, Examples.

MODULE V

Single layer feedback Networks: Basic Concepts, Hopfield networks, Training & Examples, associative memories

TEXT BOOKS:

1. T.N. Shankar, “Neural Networks”, 2008, University Science Press.
2. Kevin L. Priddy & Paul E. Keller, “Artificial Neural Networks”, 2005, Internal Society for Optical Engineering
3. B. Yegna Narayana, “Artificial Neural Networks”, 2006, PHI

DISCIPLE SPECIFIC ELECTIVE – STREAM II – PAPER III

Paper Code: CSCA364

SOFT COMPUTING

L	T	P	C
3	1	2	4(3+1)

PRE-REQUISITE: Knowledge in Neural Networks

OBJECTIVES:

- To introduce about incorporating more mathematical approach (beyond conventional logic system) into the artificial intelligence approaches for problem solving such as fuzzy logic, genetic algorithms, etc.

MODULE I

INTRODUCTION: Comparison of soft computing methods: neural networks, fuzzy logic, genetic algorithm with conventional artificial intelligence (hard computing).Least - square methods for system identification, recursive least square estimator; LSE for nonlinear models; derivative based optimization: descent methods, Newton‟s method,
conjugate gradient methods; nonlinear least-squares problems: Gauss Newton method, Levenberg-Marquardt method.

MODULE II

NEURAL NETWORKS: Different architectures; back-propagation algorithm; hybrid learning rule; supervised learning - perceptrons, back -propagation multilayer perceptrons, radial basis function networks; unsupervised learning –competitive learning network, Kohonen self-organizing networks, the Hopfield network.

MODULE III

FUZZY SET THEORY: Basic definition and terminology; basic concepts of fuzzy logic; set theoretic operators; membership functions: formulation and parameterization; fuzzy union, intersection and complement; fuzzy rules and fuzzy reasoning; fuzzy inference systems: Mamdani and Sugeno fuzzy models.

MODULE IV

NEURO-FUZZY MODELLING:Adaptive neuro-fuzzy inference systems; neuro-fuzzy controller-feedback control; Back propagation through time and realtime recurrent learning; gradient-free optimization.

MODULE V

GENETIC ALGORITHMS: Genetic algorithm, Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross

over, inversion & deletion, mutation operator, Bitwise operator, Applications & advances in GA, Differences & similarities between GA & other traditional method

TEXT BOOKS

1. Rajase, Kharan S. and VijayalakshmiPai S. A., "Neural Networks, Fuzzy Logic & Genetic Algorithms", Prentice-Hall of India, 2003
2. Kecman Vojislav, "Learning and Soft Computing", MIT Press, 20013.
3. Konar Amit, "Artificial Intelligence and Soft Computing –Behavioural and Cognitive Modeling of the Human Brain", Special Indian Edition, CRC Press, 2008
4. Goldberg David E., "Genetic Algorithms", Pearson Education, 2003.

DISCIPLE SPECIFIC ELECTIVE

SPECIALIZATION STREAM III (INFORMATION SECURITY) – PAPER I

L	T	P	C
3	1	2	4(3+1)

Paper Code: CSCA245

PRINCIPLES OF INFORMATION SECURITY

Prerequisite: Basic knowledge of computers

Objectives:

- To provide an understanding of principal concepts, major issues, technologies and basic approaches in information security.
- Develop an understanding of information assurance as practiced in computer operating systems, distributed systems, networks and representative applications.
- Gain familiarity with prevalent network and distributed system attacks, defenses against them and forensics to investigate the aftermath.

MODULE – I

Introduction – History of Information Security – defining security – CNSS Security Model – Components of an Information Security – Approaches to Information Security Implementation – System Development Life Cycle - Security Systems Development Life Cycle -Security Professionals and the Organization - Information Security: Is it an Art or a Science?

MODULE – II

The Need for Security – Introduction - Business Needs First – Threats – Attacks Secure Software Development

MODULE – III

Legal, Ethical, and Professional Issues in Information Security - Law and Ethics in Information Security - Relevant U.S. Laws - International Laws and Legal Bodies -Ethics and Information Security - Codes of Ethics and Professional Organizations

MODULE – IV

Risk Management - Introduction - An Overview of Risk Management - Risk Identification - Risk Assessment - Risk Control Strategies - Selecting a Risk Control Strategy - Quantitative Versus Qualitative Risk Control Practices - Risk Management Discussion Points

MODULE – V

Planning for Security – Introduction - Information Security Planning and Governance - Information Security Policy, Standards, and Practices - Security Education, Training, and Awareness Program- Continuity Strategies - Implementing Information Security - Information

Security Project Management - Technical Aspects of Implementation. - Nontechnical Aspects of Implementation - Information Systems Security Certification and Accreditation

TEXT BOOK:

1. Michael E. Whitman & Herbert J. Mattord, "Principles of Information Security", Course Technology, Cengage Learning, 4th edition, 2011.

DISCIPLE SPECIFIC ELECTIVE – STREAM III – PAPER II

Paper Code: CSCA354

CRYPTOGRAPHY AND NETWORK SECURITY

L	T	P	C
3	1	2	4(3+1)

Prerequisite: Knowledge of mathematics, information security & computer networks.

Objectives:

- To learn about network security
- To learn Computer Network Vulnerabilities
- To learn how to deal with Network Security Challenges
- Develop a basic understanding of cryptography, how it has evolved and some key encryption techniques used today.
- Develop an understanding of security policies (such as authentication, integrity and confidentiality)
- To learn about network security threats and countermeasures

MODULE – I

Computer Network Fundamentals - Introduction - Computer Network Models- Computer Network Types - Data Communication Media Technology - Network Topology Network Connectivity and Protocol - Network Services - Network Connecting Devices- Network Technologies

MODULE – II

Understanding Network Security - Defining Network Security - Security Services - Security Standards - Elements of Security - Security Threats to Computer Networks- Sources of Security Threats - Security Threat Motives - Security Threat Management - Security Threat Correlation

MODULE – III

Computer Network Vulnerabilities - Sources of Vulnerabilities- Vulnerability Assessment - Cyber Crimes and Hackers - Cyber Crimes – Hacker - Dealing with the Rising Tide of Cyber Crimes

MODULE – IV

Dealing with Network Security Challenges - Access Rights - Access Control Systems – Authorization - Types of Authorization Systems – Authentication - Multiple Factors and Effectiveness of Authentication - Authentication Elements Types of Authentication - Authentication Methods Developing an Authentication Policy

MODULE – V

Cryptography – Definition - Block Ciphers - Symmetric Encryption - Public Key Encryption - Key Management: Generation, Transportation, and Distribution - Public Key Infrastructure (PKI) - Hash Function - Digital Signatures – Firewalls - Types of Firewalls - Configuration and Implementation of a Firewall - Firewall Forensics - Firewall Services and Limitations - Computer Network Security Protocols and Standards - Application Level Security -Security in the Transport Layer Security in the Network Layer

TEXT BOOKS:

1. Kizza& Joseph Migga**, "**Computer Network Security", Springer, 2005.
2. William Stallings, "Cryptography & Network Security", Pearson Education, 4th edition, 2010.

DISCIPLE SPECIFIC ELECTIVE – STREAM III – PAPER III

Paper Code: CSCA365

ETHICAL HACKING

L	T	P	C
3	1	2	4(3+1)

Prerequisite: Knowledge of cryptography & information security

Objectives:

- To understand how intruders escalate privileges in a system.
- To understand Intrusion Detection, Policy Creation, Social Engineering, DDoS Attacks, Buffer Overflows and Types of Attacks and Protections.
- To learn Classification and Mechanism of Ethical Hacking.
- To learn the basic principles, instrumentation and applications of Ethical Hacking

MODULE I

Data Theft in Organizations, Elements of Information Security, Authenticity and Non-Repudiation, Security Challenges, Effects of Hacking, Hacker – Types of Hacker, Ethical Hacker, Hacktivism - Role of Security and Penetration Tester, Penetration Testing Methodology, Networking & Computer Attacks – Malicious Software (Malware), Protection Against Malware, Intruder Attacks on Networks and Computers, Addressing Physical Security – Key Loggers and Back Doors

MODULE II

Web Tools for Foot Printing, Conducting Competitive Intelligence, Google Hacking, Scanning, Enumeration, Trojans & Backdoors, Virus & Worms, Proxy & Packet Filtering, Denial of Service, Sniffer, Social Engineering – shoulder surfing, Dumpster Diving, Piggybacking.

MODULE III

Physical Security – Attacks and Protection, Steganography – Methods, Attacks and Measures, Cryptography – Methods and Types of Attacks, Wireless Hacking, Windows Hacking, Linux Hacking

MODULE IV

Routers, Firewall & Honeypots, IDS & IPS, Web Filtering, Vulnerability, Penetration Testing, Session Hijacking, Web Server, SQL Injection, Buffer Overflow, Reverse Engineering, Email Hacking, Incident Handling & Response, Bluetooth Hacking, Mobile Phone Hacking

MODULE V

Social Engineering, Host Reconnaissance, Session Hijacking, Hacking - Web Server, Database, Password Cracking, Network and Wireless, Trojan, Backdoor, UNIX, LINUX, Microsoft, Buffer Overflow, Denial of Service Attack.

TEXT BOOKS:

1. Patrick Engebretson, "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy", Syngress Basics Series – Elsevier, 2011.
2. Michael T. Simpson, Kent Backman, James E. Corley, "Hands-On Ethical Hacking and Network Defense", Second Edition, CENGAGE Learning, 2010.

DISCIPLE SPECIFIC ELECTIVE

SPECIALIZATION STREAM IV (WIRELESS COMMUNICATIONS) – PAPER I

Paper Code: CSCA246

WIRELESS COMMUNICATION TECHNOLOGIES

L	T	P	C
3	1	2	4(3+1)

Pre-Requisite: Data Communication and Networks

Objectives:

- To know about the various frequency Spectrum and Signals for wireless communication
- To Know the concept of Infrared, Cordless and WLL
- To understand the concepts wireless communication technologies such as Wireless LAN, WiMAX, Bluetooth and Wi-Fi

MODULE –I

Introduction to Protocols and the TCP/IP Suite - The Need for a Protocol Architecture, The TCP/IP Protocol Architecture, The OSI Model, Inter-networking. Wireless Communication Technology- Antennas and Propagation- Antennas, Propagation Modes, Line-of-Sight Transmission, Fading in the Mobile Environment.

MODULE –II

Signal Encoding Techniques- Signal Encoding Criteria, Digital Data- Analog Signals, Analog Data-Analog Signals, Analog Data-Digital Signals, The Concept of Spread Spectrum- Frequency Hopping Spread Spectrum, Direct Sequence Spread Spectrum, Code Division Multiple Access, Generation of Spreading Sequences.

MODULE –III

Wireless Networking - Satellite Communications- Satellite Parameters and Configurations, Capacity Allocation-Frequency Division, Capacity Allocation-Time Division Cellular Wireless Networks- Principles of Cellular Networks, First-Generation Analog, Second-Generation - TDMA, CDMA, Third-Generation Systems

MODULE –IV

Cordless Systems and Wireless Local Loop- Cordless Systems, Wireless Local Loop - Wireless LANs- Wireless LAN Technology – Overview, Infrared LANs, Spread Spectrum LANs, Narrowband Microwave LANs.

MODULE –V

IEEE 802.11 Wireless LAN Standard- IEEE 802 Protocol Architecture, IEEE 802.11 Architecture and Services, IEEE 802.11 Medium Access Control. Introduction to Wi-Fi and Bluetooth Technologies (Only Overview).

TEXT BOOKS

1. William Stallings, "Wireless Communications and Networks" 2nd edition, Pearson Prentice Hall, 2005. (Chapters 4, 5, 6, 7, 9, 10,11, 13, 14, 15.1)

REFERENCES

1. Steve Rackley, "Wireless Communication Technology", Elsevier, 2007
2. C. Siva Ram Murthy and B.S.Manoj, "Adhoc WirelessNetworks-Architechture and Protocols", Pearson Prentice Hall, 2004

DISCIPLE SPECIFIC ELECTIVE – STREAM IV – PAPER II

Paper Code: CSCA355

INTRODUCTION TO MOBILE COMMUNICATION

L	T	P	C
3	1	2	4(3+1)

Pre-Requisite: Knowledge in Wireless communication Technologies.

Objectives:

- To understand the concepts of Telecommunication Systems such as GSM, DECT, TETRA, UMTS and UTRAN.
- To understand the Mobile Network Layer and Transport Layer.

MODULE I

Introduction – Applications, a short history of wireless communication, a market for mobile communications, Telecommunications systems – GSM- Mobile services, System architecture, Radio interface, protocols, Localization and calling, Handover, Security, New data services, Introduction to DECT, TETRA, UMTS and IMT-2000 & UTRAN.

MODULE II

Satellite systems – History, Applications, Basics, GEO, LEO, MEO, Routing, Localization, Handover, Examples.

MODULE III

Broadcast systems – Overview, Cyclical repetition of data, Digital audio broadcasting, Multi-media object transfer protocol, Digital video broadcasting, DVB data broadcasting, DVB for high-speed internet access, Convergence of broadcasting and mobile communications

MODULE IV

Mobile communications - Radio layer Baseband layer Link manager protocol L2CAP Security SDP Mobile network layer - Mobile IP, Goals, assumptions and requirements, Entities and terminology, IP packet delivery, Agent discovery, Registration, Tunneling and encapsulation, Optimizations, Reverse tunneling, IPv6, IP micro-mobility support.

MODULE V

Mobile Transport layer - Traditional TCP- Congestion control, Slow start, Fast retransmit/fast recovery, Implications of mobility, Classical TCP improvements - Indirect TCP , Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission/time-out freezing, Selective retransmission, Transaction-oriented TCP, TCP over 2.5/3G wireless networks, Performance enhancing proxies

TEXT BOOK

1. Jochen H. Schiller, “Mobile Communications”, 2nd edition, Addison Wesley, 2003 (Chapter 1, 4, 5, 6, 8.1, 9)

DISCIPLE SPECIFIC ELECTIVE – STREAM IV – PAPER II

Paper Code: CSCA366

INTERNET OF THINGS

L	T	P	C
3	1	2	4(3+1)

Pre-Requisite: Knowledge in Wireless and mobile communication Technologies.

Objectives:

- Vision and Introduction to IoT.
- Understand IoT Market perspective.
- Data and Knowledge Management and use of Devices in IoT Technology.
- Understand State of the Art – IoT Architecture.
- Real World IoT Design Constraints, Industrial Automation and Commercial Building Automation in IoT.

MODULE- I

M2M to IoT-The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, A use case example, Differing Characteristics.

MODULE- II

M2M to IoT – A Market Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. **M2M to IoT-An Architectural Overview**– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

MODULE- III

M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management

MODULE- IV

IoT Architecture-State of the Art – Introduction, State of the art, **Architecture Reference Model-** Introduction, Reference Model and architecture, IoT reference Model

MODULE- V

IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. **Real-World Design Constraints-** Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control. **Industrial Automation-** Service-oriented architecture-based device integration, SOCRADES: realizing the enterprise integrated Web of Things, IMC-AESOP: from the Web of Things to the Cloud of Things, **Commercial Building**

Automation- Introduction, Case study: phase one-commercial building automation today, Case study: phase two- commercial building automation in the future.

TEXT BOOK:

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.

REFERENCE BOOKS:

1. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1stEdition, VPT, 2014.
2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013

DISCIPLE SPECIFIC ELECTIVE

SPECIALIZATION STREAM V(SOFTWARE ENGINEERING) – PAPER I

L	T	P	C
3	1	2	4(3+1)

Paper Code: CSCA247

IT PROJECT MANAGEMENT

Pre-Requisite: Knowledge in Software Engineering

Objectives:

- To understand the Nature of IT projects
- To design Project plans and write Project proposals.
- To understand the Project Development Life Cycle.

MODULE –I

The Nature of Information Technology Projects – Conceptualizing the IT Project - Developing the Project Charter and Baseline Project Plan

MODULE –II

The Human Side of Project Management - Defining and Managing Project Scope

MODULE –III

The Work Breakdown Structure and Project Estimation - The Project Schedule and Budget - Managing Project Risk

MODULE –IV

Project Communication, Tracking and Reporting– IT Project Quality Management

MODULE –V

Managing Organizational Change, Resistance and Conflict – Project Implementation, Closure and Evaluation.

TEXT BOOK

1. Jack T.Marchewka, “Information Technology and Project Management”, John Wiley & sons P.Ltd,2003.

DISCIPLE SPECIFIC ELECTIVE – STREAM V – PAPER II

Paper Code: CSCA356

SOFTWARE TESTING

L	T	P	C
3	1	2	4(3+1)

PRE-REQUISITE: Knowledge in Software Engineering, Project Management

Objectives:

- To understand the Concepts of Software Testing.
- Introducing the students to various Testing Strategies and Testing Tools.

MODULE I

Introduction: Software-Testing, Terminology and Methodology, Verification and Validation.

MODULE II

Dynamic Testing: Black Box Testing Techniques, White Box Testing Techniques, Static Testing, Validation Activities, Regression Testing.

MODULE III

Test Management, Software Metrics, Testing Metrics for Monitoring and Controlling the Testing Process, Efficient Test Suite Management.

MODULE IV

Testing Object Oriented Software - Testing Web Based Systems - Debugging.

MODULE V

Overview of Testing Tools, Testing an Application using Win Runner, Test Script Language, Architecture and use of Silk Test, Use of LoadRunner and JMeter, Source Code Testing Utilities in Unix/Unix Environment.

REFERENCES:

1. Naresh Chauhan, “Software Testing Principles and Practices”, Oxford University Press, 2010.
2. Dr.K.V.K.K.Prasad, Software Testing Tools, Dreamtech press, 2008.
3. William E. Perry, Effective Methods for Software Testing,Third Edition, Wiley & Sons, 2006.
4. Srinivasan Desikan, Gopalaswamy Ramesh, Software Testing: Principles and Practices, Pearson Education, 2006.

DISCIPLE SPECIFIC ELECTIVE – STREAM V – PAPER II

Paper Code: CSCA367

L	T	P	C
3	1	2	4(3+1)

SOFTWARE QUALITY MANAGEMENT

Prerequisite: Knowledge of software engineering

Objectives

- To learn quality assurance plans
- To learn how to apply quality assurance tools & techniques
- To learn about standards and certifications
- To learn how to describe procedures and work instructions in software organizations

MODULE - I

Introduction - Software Quality Challenge - Software Quality Factors - Components of the Software Quality Assurance System - Pre-Project Software Quality Components - Contract Review - Development and Quality Plans

MODULE - II

SQA Components in The Project Life Cycle - Integrating Quality Activities in the Project Life Cycle – Reviews - Software Testing – Strategies - Software Testing –Implementation - Assuring the Quality of Software Maintenance - Assuring The Quality of External Participants' Parts – Case Tools and their effect on Software Quality.

MODULE - III

Software Quality Infrastructure Components - Procedures and Work Instructions – Supporting Quality Devices - Staff Training- Instructing and Certification - Preventive and Corrective Actions – Configuration Management - Documentation and Quality Records Controls.

MODULE - IV

Software Quality Management Components - Project Progress Control - components of project progress control- Progress control of internal projects and external participants- Implementation of project progress control

MODULE - V

Software Quality Metrics - Objectives of quality measurement- Process metrics- Product metrics - Software Quality Costs - Objectives of cost of software quality metrics- classic model of cost of software quality - Maturity Models - Basic Idea in Software Process - Capability Maturity Mode Capability Maturity Model

TEXT BOOKS:

1. Daniel Galin, "Software Quality Assurance: From Theory to Implementation" - Pearson Addison-Wesley, 2012.
2. KshirasagarNaik and Priyadarshi Tripathy, "Software Testing and Quality Assurance", John Wiley, 2008.
3. Allen Gilles, "Software quality: Theory and management", 2nd edition, Cengage Learning, 2003.

OPEN ELECTIVE -1

SPECIALIZATION STREAM(MANAGEMENT) – PAPER I

Paper Code: CSCA248

FUNDAMENTALS OF ACCOUNTANCY

L	T	P	C
3	2	0	3

Pre-requisites: Basic knowledge in mathematics

Objectives:

- To understand the basic Accountancy.
- To understand concepts of cash maintenance and Cost Accounting.

MODULE -I

Accounting – Introduction-Meaning-Accounting and book keeping distinguished-objectives of accounting-Branches of accounting-accounting concepts and conventions-accounting standards in India-systems of Accounting

MODULE - II

Double entry system-personal accounts, real accounts, nominal accounts-journal-ledger-preparation of trial balance-rectification of errors.

MODULE –III

Subsidiary books including cash book, bank Reconciliation statement

MODULE –IV

Preparation of trading account- preparation of profit and loss account and balance sheet- Final accounts with adjustments

MODULE –V

Basics of cost Accounting – Basic Concepts- Elements of cost – prime cost – works cost – cost of production – concept of inventory – reorder level – minimum level – maximum level – average level – safety stock

Ratio Analysis – Liquidity ratios – activity ratios – structural ratios – Profitability ratios – dupont analysis

TEXT BOOKS

1. S.N. Maheswari, “Advanced Accountancy Vol I”, Vikas Publishing
2. R.L. Gupta, “Advanced accounting”, S. Chand & Co. New Delhi
3. Pillai and Baghawati, “Cost Accounting”
4. Jam and Narang, “Cost Accounting”, Kalyani Publications

5. T.S. Reddy & Murthy, “Financial Accounting”
6. Jain & Narang, “Financial Accounting”
7. M. C. Shukla & T.S.Grewal, “Financial Accounting”

Note:

Theory 20 Marks; Problem 80 Marks

OPEN ELECTIVE - 1 – PAPER II

Paper Code: CSCA249

FINANCIAL MANAGEMENT

L	T	P	C
3	2	0	3

Pre-requisite: Basic knowledge in mathematics and accounts

Objectives:

- To understand the Indian financial systems and stock market
- To understand the financial services and financial management.

MODULE –I

Indian Financial System – India Capital market – India Money Market – Their characteristic features – Commercial Banks and reserve bank of India – Their functions – Developmental Financial Institutions – UTI – IDBI – IFCI – ICICI – SIDBI

MODULE –II

Stock exchange – functioning – SEBI – Powers and functions of SEBI – Merchant banking underwriting – stock broking and trading systems - OTCEI

MODULE –III

Management of financial services – Factoring – Forfeiting – Leasing – credit and credit rating – Mergers, restructuring takeovers – venture capital financing – project financing

MODULE –IV

Financial Management – Meaning – Objectives – Importance – Capital Budgeting – Traditional Techniques – discounted cash flow Techniques – NPV Vs IRR cost capital – Leverage – EBIT – EPs analysis

MODULE –V

Working capital management – Operating cycle – Inventory management – EOQ – Cash management – Accounts receivables management

TEXT BOOKS

1. M. Y. Khan and Jain, “Financial Management”, TMH, New Delhi
2. I. M. Pandey, “Financial Management”, Vikas New Delhi
3. S. N. Maheswari, “Financial Management”, Sultan Chand & Sons
4. Prasanna Chandra, “Financial Management, Theory and Practice”, Tata Graw Hill
5. Ramachandran & Srinivasan, “Management Accounting – Theory & practice”

Note:

Theory 60 Marks; Problem 40 Marks

OPEN ELECTIVE - 2 - PAPER I

L	T	P	C
3	2	0	3

Paper Code: CSCA357

PRINCIPLES OF MANAGEMENT

OBJECTIVES:

1. To understand the importance and functions of management
2. To understand the purpose of planning and leadership

MODULE –I

Meaning, Definition and importance of Management-Functions of a Manager-Management process- Role of a Manager-Social responsibility of Management-Co-Ordination-Meaning and scope requirements of effective co-ordination-problems in co-ordination.

MODULE –II

Meaning and purpose of planning – steps in planning Process-Limitations-Types of plans, objectives, Strategies, policies, procedures, programmes, management by objectives (MBO) – Decision making- Types of decisions-process of decision making-difficulties in decision making

MODULE –III

Nature and purpose of organizations-different forms of organizations-merits and demerits – linear and staff concepts- organisational charts- departmentations - bases for departmentation - product, function and territory-span of management

MODULE –IV

Authority-responsibility-accountability-delegation of authority-principles of delegation-unity of command – centralization and decentralization –advantages and disadvantages

MODULE –V

Nature and scope of direction-motivation meaning-major theories of motivation – Maslow's theory - Herbertg's two factor Theory-Leadership Styles-Nature and purpose of controlling

TEXT BOOK

1. Kathiresan and Radha, " Business Management", Bhavani publications, Chennai

OPEN ELECTIVE - 2 – PAPER II

Paper Code: CSCA358

L	T	P	C
3	2	0	3

INTRODUCTION TO E-BUSINESS

OBJECTIVES

- This course introduces students to various aspects and models for e-business.
- At the end of the course, students should have an understanding of the impacts which e-business is having on society, markets and commerce.
- Students should also become aware of the global nature of e-commerce and how traditional means of doing business will need to change in the electronic age.

MODULE I

Introduction to e-Business and e-Commerce- Define the e-Commerce and e-Business - Define E-commerce Types of EC transactions - Define e-Business Models - Internet Marketing and e-Tailing - Elements of e-Business Models- Explain the benefits and limitations of e-Commerce.

MODULE II

E-Marketplaces: Structures, Mechanisms, Economics, and Impacts- Define e-Marketplace and Describe their Functions- Explain e-Marketplace types and their features - Describe the various types of auctions and list their characteristics - Discuss the benefits, limitations and impacts of auctions - E-Commerce in the wireless environment - Competition in the DE and impact on industry

MODULE III

e-Business Applications, e-Procurement and e-Payment Systems - Integration and e-Business suits - ERP, eSCM, CRM - e-Procurement definition, processes, methods and benefits - e-Payment - Discuss the categories and users of smart cards - Describe payment methods in B2B EC.

MODULE IV

The Impact of e-Business on Different Fields and Industries - e-Tourism - Employment and Job Market Online - Online Real Estate - Online Publishing and e-Books - Banking and Personal Finance Online - On-Demand Delivery Systems and E-Grocers - Online Delivery of Digital Products, Entertainment, and Media

MODULE V

e-Learning and Online Education- Define electronic learning-Discuss the benefits and drawbacks of e-Learning.

· The e-Learning Industry- Discuss e-Content development and tools-Describe the major technologies used in e-Learning- Discuss the different approaches for e-Learning delivery-How e-Learning can be evaluated. Future Trends-e-Government- Definition of e-Governments-Implementation-E-Government Services- Challenges and Opportunities- E-Government Benefit.

TEXT BOOK

1. Electronic Commerce: A Managerial Perspective, Turban, E. et al., Prentice Hall 2008.

REFERENCES

1. Electronic Business and Electronic Commerce Management, 2nd edition, Dave Chaffey, Prentice Hall, 2006
2. e-Learning Tools and Technologies, Horton and Horton, Wiley Publishing.

SKILL ENHANCEMENT COURSES

Paper Code: CSCA201

L	T	P	C
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OFFICE AUTOMATION TOOLS

OBJECTIVES:

1. To practically learn to use Microsoft word, excel and powerpoint
2. To be able to work as an office assistant

MODULE – I

MS-WORD: Learning Word Basics – Formatting a Word Document – Working with Longer Document.

MODULE – II

MS-EXCEL: Creating a Simple Spreadsheet – Editing a Spreadsheet – Working with Functions and Formula – Formatting Worksheets – Completing Your Spreadsheet – Creating Charts

MODULE – III

MS-POWERPOINT: Creating and Viewing Presentations – Editing a Presentation – Working with Presentation Special Effects

TEXT BOOK:

1. Microsoft Office XP – fast & easy, DIANE KOERS Publisher: Prentice Hall of India Private Limited, New Delhi, 2001

SKILL ENHANCEMENT COURSES

L	T	P	C
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Paper Code: CSCA202

MULTIMEDIA TOOLS

OBJECTIVES:

- Understanding the key principles of animation using FLASH.
- Understanding the concept of timing for animation and its application as a means of communication.
- Ability to creatively manipulate frame time as a means of emphasizing and actualizing action and expressing an idea.

MODULE – I

Flash - Action Scripting Using actions to control a timeline - Using frame labels - Creating button symbols - Creating animated buttons using movie clips – Movie Clip Controls – Browser / network.

MODULE - II

Advanced Animation Methods Creating movies playing within movies (movie clips and .swf) - Controlling multiple timelines (movies) through action scripting - Critique storyboards.

MODULE - III

Streamlining Files for Use on the Web, Publishing Files to the Internet & Pre loaders Pre loaders - Controlling sound with script - Exploring types of output - Work on final project in class - Importing video - Publishing demo (video) reels on web - Publishing and exporting files - Trouble shooting sites.

REFERENCE BOOKS

1. The Illusion of Life: Disney Animation by Frank Thomas, Ollie Johnston (Contributor), Collie Johnston.
2. Adobe Flash CS3
3. The Animator's Survival Kit: A Manual of Methods, Principles, and Formulas for Classical, Computer, Games, Stop Motion, and Internet Animators by Richard Williams

SKILL ENHANCEMENT COURSES

L	T	P	C
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Paper Code: CSCA203

ACCOUNTING TOOLS

OBJECTIVES:

1. To learn about basics entries in Tally
2. To work withTally Accounting Software for maintaining accounts

MODULE -I

Basics of Accounting-Types of accounts-Golden rules of accounting -Accounting Principles - Concepts and conventions -Double entry system of Book keeping-Mode of Accounting-Financial Accounting -Recording Transactions. Fundamentals of Tally - Creation / Setting up of Company in Tally- Accounting masters in Tally -F11: Features - F12 Configurations -Setting up of Account Heads.

MODULE II

Inventory in Tally-Stock Groups–Stock Categories -Godowns / Locations –Units of Measure–Stock Items –Creating Inventory Masters for National Traders. Voucher Entry in Tally-Accounting Vouchers –Inventory Vouchers –Invoicing.

MODULE III

Advanced Accounting in Tally-Billwise details –Cost Centers and Cost Categories –Voucher class and Class Center Class –Multiple Currencies –Bank Reconciliation –
Interest Calculations.

TEXT BOOK

1. Tally .ERP 9 in Simple Steps, Kogent Learning Solution

SKILL ENHANCEMENT COURSES

Paper Code: CSCA301

MOBILE APPLICATION DEVELOPMENT

L	T	P	C
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OBJECTIVES:

1. Create a simple application that runs under the Android operating system.
2. Access and work with the Android file system.
3. Create an application that uses multimedia under the Android operating system.
4. Access and work with databases under the Android operating system.

MODULE - I

What is Android, Android Tools, Your First Android Application, Anatomy of Android Application, Workspaces, Editors in Eclipse, Eclipse Perspective, Refactoring - Creating Android Emulator, Creating Snapshot, SD Card Emulation, Sending SMS Messages to the Emulator, Transferring Files into and out of the Emulator, Resetting the Emulator

MODULE - II

Activity, Linking Activity using Intent, Fragments, Calling Build-In Application using Intent, Notifications

Components of a Screen, Display Orientation, Action Bar, listening for User Inter

MODULE - III

Basic Views, Picker Views, List View, Specialized Fragment, Gallery and Image View, Image Switcher, Grid View, Options Menu, Context Menu, Clock View, Web view

REFERENCE BOOKS:

1. Android Programming: The Big Nerd Ranch Guide (Big Nerd Ranch Guides) By: Bill Philips & Brian Hardy
2. Android Design Patterns: Interaction design solutions for developers by Greg Nudelman
3. Android User Interface Design: Turning Ideas and Sketches into Beautifully Designed Apps By: Ian G. Clifton
4. Android Recipes: A Problem-Solution Approach By: Dave Smith & Jeff Friesen
5. Hello, Android: Introducing Google's Mobile Development Platform (Pragmatic Programmers) By: Ed Burnette

SKILL ENHANCEMENT COURSES

Paper Code: CSCA302

LINUX AND SHELL PROGRAMMING

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OBJECTIVE:

- It aims to introduce about open source operating system as we can use Linux as Server OS or as standalone OS on our PC, Shell scripting & IPC etc.

MODULE - I

UNIX UTILITIES: Introduction to UNIX file system; vi editor; file handling utilities; security by file permissions; process utilities; disk utilities; networking commands; cp; mv; In; rm; unlink; mkdir; rmdir; du; df; mount; unmount; find; ps; who; w; finger; arp; ftp; telnet; rlogin; text processing utilities and backup utilities; detailed commands to be covered are cat; tail; head; sort; nl; uniq; gerep; egrep; fgrep; cut; paste; join; tee; pg; comm.; cmp; diff; tr; awk; tar; cpio.

MODULE - II

PROBLEM SOVING APPROACHES IN UNIX: Using single commands; using compound commands; shell scripts; C programs; building own command library of programs; working with the Bourneshell : what is a shell; shell responsibilities; pipes and input redirection; output redirection; shell script examples.

MODULE – III

UNIX FILES: UNIX file structure; directories; files and devices; system calls; library functions; usage of open; creat; read write; close; Ileek; stat; fstat; octl; umask; dup; dup2; the standard I/O (fopen; fclose; fflush; fseek; fgetc; getc; getchar; fputc; putc; putchar; fgets; gets); formatted I/O; strem errors; streams and file descriptors; file and directory maintenance (chmod; chown; unlink; link; symlink; mkdir; rmdir; chdir; getcwd).

TEXT BOOKS:

W. R. Stevens, “Unix Network Programming”, Pearson/PHI.

REFERENCE BOOKS:

Sumitabha Dass,”Unix Concepts and Application”, 3rd Edition, Tata McGraw Hill.