

MCA (Master of Computer Applications) 2017-2018

S. No	Semester	Category	Paper Code	Title of the Course	Maximum Marks			Minimum Marks for Pass			Hours Week	Credits
					CIA	E.E	Total	CIA	E.E	Total		
1	I	Core	17P1CA1	C and C++ Programming	25	75	100	10	30	50	5	4
2		Core	17P1CA2	Data Structures and Algorithms	25	75	100	10	30	50	5	4
3		Core	17P1CA3	Digital Computer Fundamentals	25	75	100	10	30	50	5	4
4		Core	17P1CA4	Database Management System	25	75	100	10	30	50	5	4
5		Core	17P1CA5	Computer Graphics	25	75	100	10	30	50	4	3
6		Core-PL	17P1CAP1	C and C++ Lab	40	60	100	16	24	50	3	2
7		Core-PL	17P1CAP2	RDBMS Lab	40	60	100	16	24	50	3	2
8		Skill Elective-I	17P1CAS1	Grooming & Business Etiquette	40	60	100	16	24	50	3	2
9	II	Core	17P2CA6	Computer Networks	25	75	100	10	30	50	5	4
10		Core	17P2CA7	Operating System Design Principles	25	75	100	10	30	50	5	3
11		Core	17P2CA8	Computer Architecture	25	75	100	10	30	50	5	4
12		Core	17P2CA9	Java Programming	25	75	100	10	30	50	4	4
13		Core	17P2CA10	Microprocessors and their Applications	25	75	100	10	30	50	5	4
14		Core-PL	17P2CAP3	Java Programming Lab	40	60	100	16	24	50	3	2
15		Core-PL	17P2CAP4	Multimedia and Operating Systems Lab	40	60	100	16	24	50	3	2
16		Skill Elective-II	17P2CAS2	Presentation Skills	40	60	100	16	24	50	3	2
17	III	Core	17P3CA11	Internet and Web Technology	25	75	100	10	30	50	5	4
18		Core	17P3CA12	Accounting and Financial Management	25	75	100	10	30	50	5	4
19		Core	17P3CA13	Mathematical foundations of Computer Science	25	75	100	10	30	50	5	4
20		Core	17P3CA14	Organizational Behaviour	25	75	100	10	30	50	4	4
21		Core	17P3CA15	Software Engineering	25	75	100	10	30	50	5	4
22		Core-PL	17P3CAP5	Object Oriented Analysis and Design Lab	40	60	100	16	24	50	3	3
23		Core-PL	17P3CAP6	Web Design-Python Lab	40	60	100	16	24	50	3	3
24		Skill Elective-III	17P3CAS3	Group Communication	40	60	100	16	24	50	3	2

S. No	Semester	Category	Paper Code	Title of the Paper	Maximum Marks			Minimum Marks for Pass			Hours Week	Credits
					CIA	E.E	Total	CIA	E.E	Total		
25	IV	Core	17P4CA16	Optimization Techniques	25	75	100	10	30	50	5	5
26		Core	17P4CA17	Compiler Design	25	75	100	10	30	50	5	5
27		Core	17P4CA18	Big Data Analytics	25	75	100	10	30	50	5	4
28		Major Elective-1	17P4CAEL1A 17P4CAEL1B 17P4CAEL1C	Distributed Programming using J2EE Ubiquitous Computing Peer-to-Peer Computing	25	75	100	10	30	50	5	4
29		Major Elective-II	17P4CAEL2A 17P4CAEL2B 17P4CAEL2C	Enterprise Resource Planning Management Information System Software Project Management	25	75	100	10	30	50	4	4
30		Core-PL	17P4CAP7	Data Analytics Lab	40	60	100	16	24	50	3	2
31		Core -PL	17P4CAP8	Distributed Programming using J2EE lab	40	60	100	16	24	50	3	2
32		Skill Elective-IV	17P4CAS4	Interpersonal Skills	40	60	100	16	24	50	3	2
33	V	Core	17P5CA19	Cross Platform - Mobile Applications Development	25	75	100	10	30	50	6	4
34		Core	17P5CA20	Dot Net frame work with C# Programming	25	75	100	10	30	50	6	4
35		Major Elective-III	17P5CAEL3A 17P5CAEL3B 17P5CAEL3C	Soft Computing Internet of Things Human Computer Interaction	25	75	100	10	30	50	6	4
36		Major Elective-IV	17P5CAEL4A 17P5CAEL4B 17P5CAEL4C	Service Oriented Architecture Semantic Web Cloud Computing	25	75	100	10	30	50	5	4
37		Core -PL	17P5CAP9	Cross Platform – Mobile Applications Development Lab	40	60	100	16	24	50	3	3
38		Core-PL	17P5CAP10	C# Programming Lab	40	60	100	16	24	50	3	3
39		Skill Elective-V	17P5CAS5	Business Models - IT Industries	40	60	100	16	24	50	3	2
40	VI	Core	17P6CAPR	Project	40	60	100	16	24	50	6 Months	10
Total Marks - 4000										Credits – 140		

MASTER OF COMPUTER APPLICATIONS (MCA) 2017 – 2018

COURSES	TOTAL NO OF COURSES	TOTAL MARKS	TOTAL CREDITS
Core	31	3100	114
Major Elective	4	400	16
Skill Elective	5	500	10
Total	40	4000	140

**A.VEERIYA VANDAYAR MEMORIAL SRI PUSHPAM COLLEGE
(AUTONOMOUS),
POONDI, THANJAVUR DIST.**

**Question Pattern for UG and PG Programmes for students to be
admitted during 2017– 2018 and afterwards.**

Total Marks : 75

QUESTION PATTERN

**SECTION – A
(Question 1 to 10)**

10 x 2 = 20 Marks

1. Short Answer Questions.
2. Two Questions from each unit (All are answerable)

**SECTION – B
(Question 11 to 15)**

5 x 5 = 25 Marks

1. 5 Paragraph type questions with "either / or" type choice.
2. One question from each unit of the Syllabus.
3. Answer all the questions.

**SECTION – C
(Question 16 to 20)**

3 x 10 = 30 Marks

1. 5 Essay type questions – any three are answerable.
2. One questions from each unit of the Syllabus.

Semester	Subject code	Title of the course	Hours of Teaching /Week	No. of Credits
I	17P1CA1	C AND C++ PROGRAMMING	5	4

Objective

- ❖ To Understand programming Techniques in C and C++

Unit I**Hrs 15**

C- Language fundamentals: Program Structure - Identifiers - Data types - Integer - float - double - char - constants - variables - operators and expressions - managing input and output operations.

C control structures: Decision making with IF statement - IF.....ELSE statement - nested IF....ELSE statement-FOR statement- DO.....WHILE statement - WHILE.....DO statement - GOTO statement-SWITCH statement.

Unit II**Hrs 15**

C Functions: Mathematical functions-String functions-and user-defined functions.

Arrays and structures: Arrays, definitions, declarations, entering values in - manipulating arrays - examining and passing an array. Structure: definitions - assigning structure variable - assigning initial values - using a structures - structure arrays - structures and functions.

Pointers and File Operations: Understanding pointers - pointers and functions - File Operations: Understanding files - declaring a file - opening a file - closing a file - input and output functions - formatted input and output - working with structures adding data to a file - reading a printing a disk file.

Unit III**Hrs 15**

What is Object Oriented Programming? - C++ Console I/O- C++ comments- Classes: Some difference between C and C++ - Introducing Function Overloading - Constructor and Destructor Functions- Constructors take parameters- Introducing Inheritance - Object Pointers - Inline Functions.

Assigning Objects - Passing Object to Functions - Returning Object from Functions - An Introduction to friend functions- Arrays of objects - Using Pointers to Objects - Using new & delete - More about new & delete - references - Passing references to objects - Returning references- Independent References and restrictions.

Unit IV**Hrs 15**

Overloading Constructor Functions- Creating and Using a Copy constructor- Using default arguments- Overloading and ambiguity-Finding the address of an overload function- the basics of operator overloading.

Unit V**Hrs 15**

Base class access control -using protected members- Constructors, destructors and inheritance - multiple inheritance- virtual base classes - Some C++ I/O basics - formatted I/O - using I/O manipulators.

File I/O basics- unformatted, binary I/O- more unformatted I/O functions- random access- checking the I/O status- customized I/O and files- Pointers and derived classes- Introduction to virtual functions- more about virtual functions- applying polymorphism- Exception handling.

Text Books

1. E. Balagurusamy, "Programming in C", Tata McGraw Hill, 4th Edition, 2008.
2. S. Kumaravel, 'C For You', TiSSL Publications, 2016.
3. Herbert Schildt, "Teach Your self C++", III edition, Tata McGraw Hill, 2001.

References:

1. R.C. Hutchison & S. B. Just, "Programming using the C language", McGraw Hill, 1988.
2. Robert Lafore, "Object Oriented Programming in Turbo C++", Galgotia 2001
3. E.Balagurusamy "Object Oriented Programming with C++", Fourth Edition, TMH New Delhi, 2010

Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
I	17P1CA2	DATA STRUCTURES AND ALGORITHMS	5	4

Objective

- ❖ To understand various Data Structures and algorithms design principles.

Unit I**Hrs 15**

Introduction: Elementary Data structures, data structure Operation, Algorithm: complexity, Time space Tradeoff. Mathematical Notation and functions, Algorithm Notation, control structures, complexity of algorithm, Variables, Data Types, Basic Terminology, sorting strings, Character Data Type, string Operations, Word processing, pattern Matching Algorithms.

Unit II**Hrs 15**

Linear arrays, Representation of Linear Arrays in Memory, Traversing Linear Arrays, inserting and Deleting, sorting: Bubble sort, searching: Linear search, Binary search, Multidimensional Arrays, pointers: pointer Arrays, Record structures, Representation of Records in Memory: parallel Arrays, Matrices, sparse Matrices, Linked Lists, Representation of Linked Lists in Memory, Traversing a Linked List Memory Allocation: Garbage collection, insertion into a Liked List, Deletion form a Liked List, Header Linked List, Two- way Lists.

Unit III**Hrs 15**

Stacks, Array Representation of stacks, Arithmetic Expressions; polish Notation Quick sort, an Application of stacks, Recursion, Tower of Hanoi, Implementation of Recursive procedure by stacks, Queues, Deques, priority Queues, Binary Trees, Representation Binary Tress in Memory, Traversing Binary Trees, Traversing Algorithms Using stacks, Header Notes; Threads, Binary search Trees searching and inserting in Binary search Tree, Heap sort, path Length; Huffman's Algorithm, General trees.

Unit IV**Hrs 15**

Graph Theory Terminology, sequential Representation of Graphs; Adjacency Matrix; path matrix, warshall's Algorithm: shortest paths, Linked Representation of a Graph, operation on Graph, posets; Topological sorting. Sorting - Insertion sort, selection sort, Merging, Merge-sort, Radix sort, searching and data Modification, Hashing.

Unit V**Hrs 15**

Branch and bound: Least cost (LC) Search, Bounding- LC branch and bound - FIFO branch and bound - Traveling sales person problem.

References:

1. Seymour Lipschutz "Theory and problem of data structure", Tata McGraw Hill International Edition, 3rd Reprint, 2003.
2. E. Howrowitz and Sahni, "Fundamentals of Computer Algorithms", Galgotia Publications, 1998.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
I	17P1CA3	DIGITAL COMPUTER FUNDAMENTALS	5	4

Objectives:

To understand the basics of digital electronics.

UNIT-1**Hrs 15**

NUMBER SYSTEM: Binary, Decimal, Octal, Hexadecimal- conversion from one to another-Character and Codes – ASCII – Excess3 – Gray Code – Error Detecting Codes– Binary Addition – Subtraction – Multiplication – Division – Unsigned Binary Numbers – Sign Magnitude Number – Complements.

UNIT – 2**Hrs 15**

Basic Logic Gates – Boolean laws and theorems – Sum of Product – K- Map – Simplification Methods – Don't Care Conditions – Product of Sum – Data Processing Circuits – Multiplexers – Demultiplexers – Decoder – Encoder – Half Adder, Full Adder – Half Subtractor , Full Subtractor.

UNIT- 3**Hrs 15**

FLIP FLOP: RS – Clocked RS – Edge Triggered RS – JK – Master Slave Flip Flop – Registers – Shift Registers – Counters – Asynchronous Counters – Synchronous Counters.

UNIT – 4**Hrs 15**

D/A, A/D Conversion – DA Converter – DA Accuracy , Resolution – AD Converter – Simultaneous Conversion – Counter Method – Continuous Conversion – A/D Technique – Dual Slope A/D conversion – Slope Conversion – AD Accuracy and Resolution.

UNIT – 5**Hrs 15**

Processor design – Arithmetic Logic Unit – Design of arithmetic circuits – Design of logic circuits – Status register – Design of accumulator – Computer Design – System Configuration – Computer instructions – Design of Computer register – Design of Control – Computer console.

Text Books

1. Albert Paul Malvino, Donald P. Leach, "Digital Principles and Applications", McGraw Hill, 1996. (Unit1- Chapters 5,6; Unit2 – Chapters 2,3,4; Unit3 – 8,9,10,11 ; Unit4 - Chapter13).
2. Digital Logic and Computer design, M. Moris Mano, Prentice Hall of India, 1986. For Unit V.

Reference Book:

1. Thomas C. Bartee "Digital Computer Fundamentals" McGraw-Hill International Edition, New Delhi 1985.
2. B. Ram "Fundamentals of Microprocessors and Microcomputers" Dhanpat Rai Publication (P) LTD. Fifth Edition.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
I	17P1CA4	DATABASE MANAGEMENT SYSTEM	5	4

Objective

- ❖ To know concepts and techniques in DBMS.

Unit I**Hrs 15**

Introduction to Database system: Overview-View of Data-Data Models-History of Database system-E-R Model: Basic Concepts-Constraints-Keys-E-R Diagram-Weak Entity Sets-Extended E-R Features-Design of an E-R Data base Schema-Reduction to ER Schema.

Unit II**Hrs 15**

Relational Model-Structure of Relational Database-Relational Algebra-Extended, Additional Algebra Operations-Modification of Database-Other Relational Languages-Tuple Relational calculus-Domain Relational Calculus –SQL: Background-Basic Structure – Set Operations-Aggregate Functions-Null values-Nested Subqueries-View –Complex queries-Modification of Database-Joined Relations-Other Language: QBE and Datalog.

Unit III**Hrs 15**

Integrity and Security-Advanced SQL: domain integrity-Referential integrity-Assertion-Application Design and Development-Triggers-Encryption and Authentication-Relational Data base design-1NF-2NF-BCNF-3NF-5NF.

Unit IV**Hrs 15**

Storage and file Structures:- Overview of Physical storage media-Magnetic disks-RAID-Tertiary Storage-Storage Access-File Organization-organization of records in files-Data Dictionary Storage-Indexing and Hashing:- Basic concepts-Ordered indices-B+ tree index files-B-tree index files-Multiple key Access-Static Hashing-Dynamic Hashing-Index Definition in SQL.

Unit V**Hrs 15**

Transaction Concept-Transaction states-Implementation of Atomicity and Durability-Concurrent Executions-Serializability-Recoverability-Implementations of Isolation-Testing for Serializability. Concurrency Control:- Lock-Based Protocols-Timestamp-Based Protocols-Validation-Based Protocols-Multiple Granularity-Deadlock Handling-Recovery System-Failure Classification-Storage Structure-Recovery and Atomicity-Log-based Recovery-Recovery with Concurrent Transactions-Buffer management-Failure with Loss of Non-volatile Storage.

References:

1. "Database System concepts", Abraham Silber Schatz, Henk F. Korth, S. Sudarsan, Fifth Edition, 2006, Tata McGraw Hill.

General References:

1. Fred Mc Fadden, Jeffery A Hoffer, Mary B. prescott, "Modern Database Management", 5 Edition, Addison Wesley, 2000.
2. Elmasri, Navathe, "Fundamentals of Database System", Third Edition, Addison wesley, 2000.
3. Jeffrey D. Ulman, Jennifer Widom, "A First Course in Database System", Pearson Education Asia, 2001
4. Bipin C Desai, "An Introduction to Database System", Galgotia publications Pvt Limited, 2001.

Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
I	17P1CA5	Core – COMPUTER GRAPHICS	4	3

Objective

- ❖ To understand the various techniques in computer graphics.

Unit I

Hrs 15

Introduction to computer graphics and applications: Display devices – Raster scan and random scan systems – Input Devices – Hard Copy Device - Graphics Software and functions, Software standards, PHIGS workstation.

Unit II

Hrs 15

Output Primitives: Line-drawing, circle generating, ellipse-generating algorithms – Filled-Area primitives– Fill area functions, Cell array - character generation.

Unit III

Hrs 15

Attributes of output primitives: Line, curve, color and gray scale level, area-fill, character, text, marker and Bundled attributes – Inquiry function – Antialiasing techniques.

Unit IV

Hrs 15

Geometric Transformations and Viewing : Basic transformations – Homogeneous coordinates – Composite transformations – Reflection and shear – Window-to-View Port transformation – Viewing functions – Point, line, Polygon, curve, text, exterior clipping operations.

Unit V

Hrs 15

GUI and Input Methods : The User Dialogue – Graphical input devices – Input functions – Interactive Picture – Construction Techniques – Virtual Reality Environments.

Reference:

1. Donald Hearn and M. pauline Baker, "Computer Graphics, C version", Second Indian Reprint 2003, Pearson Education.
 - Unit I Chapters: 1,2
 - Unit II Chapters: 3
 - Unit III Chapters: 4
 - Unit IV Chapters: 5,6
 - Unit V Chapters: 8

General References:

1. "Computer Graphics"- Roy A.plastock Gordon kalley, Outline Series in Computer, International Editions.
2. "Principles of Interactive Computer Graphics" william Newman, Robert F.Sproull, (Second Edition McGraw Hill) International Editions, 2003.
3. "Computer Graphics" Second Edition By Dobald Hearn,M.pauline Baker, presentice Hall, 2008.
4. "Multimedia making it Word" Sixth Edition By Tay Vaughan Tata Mc Graw Hill pulishing Computer Ltd, New Delhi, 2004.

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
I	17P1CAP1	C AND C++ Lab	3	2

Objective

- ❖ To Understand and apply datastructures concepts in C and c++ programming.

C PROGRAMMING LAB

1. Write a C program to find the roots of Quadratic Equation and hence determine the roots.
2. Write a C program to find the sum of series using a) Sine b) Cosine c) Exponential Series.
3. Write a program in C to read the marks of a student in a particular subject and sort them in ascending order. Also display the lowest and highest marks obtained in the subject.
4. Write a C program to perform Addition, Subtraction and Multiplication for two matrices using Functions depending on user's choice..
5. Write a C program to find a) Mean b) Standard Deviation and c) Variance for a set of n numbers.
6. Write a C program to find the a) Factorial value b) Fibonacci series using Recursion.
7. Write a C program to perform String Manipulations using Pointers.
 - i. Finding the length of the String
 - ii. Joining two strings
 - iii. String Comparison
 - iv. Palindrome Checking
 - v. Counting the number of uppercase letter, Lowercase letter, digits, vowels, special characters, words and lines.
8. Prepare Payroll using sequential files in C. Use appropriate headings to print them in a neat format.
9. Write a C program to implement a Stack as a circular Linked list.
10. Write a C program to implement a Queue.
11. Write a C program to create a sorted Linked list and count the number of nodes in it.
12. Write a C program to implement a Doubly Linked list.
13. Write a C program for finding a number and determine its position if found, using Binary search.
14. Write a C program for creating a list of numbers using Arrays. Also perform insertion and deletion operation and arrange the numbers using Bubble sort.
15. Write a C program to create a Binary tree and eliminate the duplicate.

C++ PROGRAMMING WITH DATA STRUCTURE LAB

1. Create a simple program using class and object
2. Write a C++ program to illustrate the use of the following concepts
 - i) Default arguments and ii) Reference variable
3. Develop an object oriented to add two times. Assume that the time consists of the members hours, minutes and seconds. Use objects as arguments

M.C.A.

4. Develop a C++ program to create two classes "class1" with data member number 1 and "class 2" with data member number 2. Develop inline functions to get values for data members and use friend function to add number 1 and number2.
5. Write a C++ program to define a class employee with data members with relevant details and calculate DA, MA, HRA net pay (DA = 71% of basic pay, MA= 10, HRA = 0.5% of basic pay). Create arrays of objects for 10 employees.
6. Write a overload function to multiply two matrices and for multiplying all the elements of the matrix by a constant
7. Write a C++ program to read the following information from the keyboard.
 - i) Reg. No.
 - ii) Name of the Student
 - iii) Mark 1
 - iv) Mark 2
 - v) Mark 3Use default, parameterized and copy constructor to initialize the objects and display the same.
8. Write a program in C++ using pointer for the following
 - a) To copy the contents of one string to another string
 - b) To concatenate the given two strings into a one string
9. Design a base class 'person' with data members empcode, name. Derive two classes "account" with data members pay and "admin" class with data member experience. The class "master" derives information from both "account" and "admin". Write a C++ program to create and display the information contained in "master" object using virtual functions
10. Write a C++ program using all types of inheritance
11. Write C++ program using own Manipulators (example setw, setfill etc.)
12. Write a program in C++ to read a file and to
 - a) Display the contents of the file into the screen
 - b) Display the number of characters and
 - c) The number of line in the files
13. Write C++ program using command line arguments.

M.C.A.

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
I	17P1CAP2	RDBMS Lab	3	2

Objective

❖ To apply RDBMS features through Oracle.

1. Library information processing.
2. Students mark sheet processing.
3. Telephone directory maintenance.
4. Gas booking and delivering system.
5. Electricity bill processing.
6. Bank transaction (SB)
7. Pay roll processing.
8. Inventory.
9. Question database and conducting quiz.
10. Purchase order processing.

Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
I	17P1CAS1	Skill Elective – I GROOMING & BUSINESS ETIQUETTE	3	2

Objective

- ❖ **To acquire various expression skills**

Communication skills (Oral)

- Understanding the basics of effective communication.
- Understanding the barriers to communication.
- Overcoming those barriers that affect communication.
- Developing effective communication process.

Communication skills (written)

- written communication.
 - Report writing.
 - Email etiquette.

Listening skills

- Understanding the basics of effective Listening.
- Understanding the barriers to Listening.
- Overcoming the barriers to Listening .
- Developing effective Listening skill.

Presentation skills

- planning a presentation.
- Steps in presentation process.
- Handling audience.
- Understanding body language and delivery strategies.
- Over coming stage fear.

Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
II	17P2CA6	COMPUTER NETWORKS	5	4

Objective

- To know about various layers of computer network architecture.

Unit I

Hrs 15

Introduction To Networks And Communication Media: Uses - Network Hardware - Network software - Reference Models - Example Network - Network standardization. Basis for data communication - Transmission media - Wireless Transmission- Telephone system - Satellite Communication.

Unit II

Hrs 15

The Data Link Layer: Data Link Layer design issues - Error Detection and Correction Methods - Elementary Data Link protocols - sliding Window protocols - Verification Methods Channel Allocation- Multiple Access protocols- IEEE 802 Standards.

Unit III

Hrs 15

The Network Layer: Network Layer design issues - Routing algorithms- Congestion Control algorithms - Internetworking - Network Layer in Internet.

Unit IV

Hrs 15

The Transport protocols: Transport Service - Transport protocols - Internet Transport protocols UDP-TCP-performance issues.

Unit V

Hrs 15

The Application Layer : Application Layer design issues- Domain Names System - Electronic Mail - word wide web - Multimedia - other Application- Network Security- Basic Cryptography-DES-RSA.

References:

1. Andrews S.Tanenbaum, "Computer Networks", prentice Hall of India private Limited, (4Edition), 2003.

General References

1. Leon Garcia and Widjaja, "Communication Networks - Fundamental Concepts and key architecture", Tata McGraw Hill, 2001.

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
II	17P2CA7	OPERATING SYSTEM DESIGN PRINCIPLES	5	3

Objective

- ❖ To understand the design concepts of Operating system.

Unit I

Hrs 15

Introduction: Multiprogramming - Time sharing - Distributed System - real time System -I/O structure - Dual mode operation- Hardware protection- General system architecture- Operating System Services- system calls -System program- System Design and implementation.

Unit II

Hrs 15

Process management: process concept- Concurrent process- Scheduling concepts- CPU Scheduling - scheduling algorithms. Multi processor Scheduling.

Unit III

Hrs 15

Process synchronization: Critical Section - synchronization hardware - Semaphores, Classical problem of synchronization Inter process Communication- Deadlock- Characterization, prevention, Avoidance, Detection.

Unit IV

Hrs 15

Storage management: Swapping, Single and Multiple partition allocation -paging Segmentation, Virtual memory - Demand paging - page replacement algorithms- Thrashing - Secondary Storage management - Disk structure Free space management- Allocation methods- Disk Scheduling - performance and reliability improvements- Storage hierarchy.

Unit V

Hrs 15

Files and protection: File System organization- File operations - Access methods- Consistency semantics- Directory structure organization- File protection - Implementation issues- Security- Encryption - Case study -UNIX and windows NT- Introduction to distributed OS design.

References:

1. Silberschatz and Galvin, Operating System Concepts, 5 Edition, Addison wisely publishing Co. 2002.

General References:

1. Deital, An Introduction to Operation System, Addison Wesley publishing Co., 1985.
2. Milankovic. M.Operating System Concepts and Design, 2 Edition, Mc Grew Hill, 1992.
3. Madnick SE and Donovan JJ,Operating System, Mc Graw Hill, 1974.

M.C.A.

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
II	17P2CA8	COMPUTER ARCHITECTURE	5	4

Objective

- ❖ To know about computer organization and its architecture.

Unit I

Hrs 12

Basic computer Organization: Instruction Codes - Computer Registers - Computer Instructions- Timing and Control - Instruction Cycle - Control Memory - Address Sequencing.

Unit II

Hrs 12

CPU: General Register Organization - Stack Organization - Instruction Formats - Addressing Modes - program control.

Unit III

Hrs 12

Computer Arithmetic: Hardware implementation and Algorithm for Addition, Subtraction, Multiplication, and Division - Booth Multiplication Algorithm - Floating point Arithmetic.

Unit IV

Hrs 12

I/O and Memory Organization: I/O Interface- Asynchronous Data Transfer - Modes of I/O Transfer - priority Interrupt - Direct Memory Access - Memory Hierarchy - Main Memory - Auxiliary Memory - Associative Memory - Cache Memory - Virtual Memory.

Unit V

Hrs 12

Advanced processing: RISC, CISC Characteristics - parallel processing - pipe Lining- Vector processing - Array processors - Multi processors - Interconnections structures.

Reference:

1. M.Morris Mano, "Computer System Architecture" Third edition, Reprint 2003, Pearson Education.

Unit I Chapters: 5.1to 5.5, 7.1to 7.2

Unit II Chapters: 10.1to 10.5

Unit III Chapters: 8.1to 8.5, 8.7

Unit IV Chapters: 11.2 to 11.6, 12.1to 12.6

Unit V Chapters: 8.8, 9.1, 9.2, 9.7, 13.1, and 13.2

General References:

1.Computer Architecture and organization, J.P.Hayes, Tata McGraw Hill, 1993.

2.Computer Organization, Hamachar V.C.Vranesic.Z.G.zaky. S.G.Tata McGraw Hill, 1978.

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
II	17P2CA9	Core –Java Programming	4	4

Objective

To provide an exposure on network programming in Java, how to interface with swing, the basic database connectivity, how to develop client-server programming model using servlets and JSP and also deals with component programming using Java beans.

UNIT- I

Hrs 12

Networking Basics - Socket Programming - Proxy server - TCP/IP Sockets - Net address- datagrams.

UNIT- II

Hrs 12

Introducing Swing: swing- components and containers - the swing packages - Painting in a Swing - Exploring Swing: JLabel and ImageIcon - JTextField - The Swing Buttons – Jtabbed - Pane - Jscroll Pane - Jlist - JComboBox - Trees- Jtable.

UNIT- III

Hrs 12

Java Database Connectivity: JDBC Architecture - Installing the ODBC Driver - Connecting to a Database - Structured Query language. JDBC programming concept: Database URL— Executing the action commands - Query with JDBC - Populating a Database - Executing Queries - Metadata - Scrollable and Updatable Result Sets.

UNIT- IV

Hrs 12

Introduction to Servlets- Servlets: Java Servlets: Servlet Life Cycle – Generic and HTTP Servlet - A simple Servlets - The servlet API - Servlet Package - Handling HTTP Request and Response – Servlet with Database Connectivity- Session Tracking: Hidden Form Fields – URL Rewriting – The Cookie Class – The Session Tracking class.

UNIT- V

Hrs 12

Bean Development Kit - Jar Files - Introspection - Design Pattern for properties, events and methods - Constrained Properties - Persistence – Customizers.

Books for Study:

1. Herbert Schildt, **"The Complete Reference Java"**, Tata McGraw Hill Publishing Company Limited, Edition 7, 2007,ISBN: 9780070636774 .
2. Cays Horstmann and Gary Cornell, **"Core Java"**, Volume II, Pearson Edition, 2001, ISBN: 978-0137081899 and 978-0137081608

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
II	17P2CA10	MICROPROCESSORS AND THEIR APPLICATIONS	5	4

Objective

- ❖ To understand concepts and applications of Microprocessors.

Unit-I

Hrs 15

Microprocessors and Assembly Language:Microprocessors-Microprocessor introduction set and computer languages-From large computer to single chip microcomputer-Application: Microprocessor controlled Temperature system.

Introduction to 8085 Assembly language programming:The 8085 Programming Model-Instruction classification-Instruction data format and storage-How to write Assemble and Execute a simple program-Overview of the 8085 Instruction set-Writing and hand Assembling a program.

Unit - II

Hrs 15

Microprocessor Architecture and Microcomputer systems:Microprocessor Architecture and Its Operations-Memory-Input and Output(I/O) Devices-Example of a Microcomputer system.

8085 Microprocessor Architecture and memory Interfacing:The 8085 MPU-Example of an 8085 based microcomputer -Memory interfacing-Interfacing the 8155 Memory Segment.

Unit-III

Hrs 15

General purpose Programmable Peripheral Devices:The 8255 A Programmable Peripheral Interface-The 8259 A Programmable Interrupt Controller-8237 DMA Controller and Direct Memory Access-8251 Communication Programmable Interface.

Unit-IV

Hrs 15

The 8086-Family Architecture-Organization of 8086-CPU-Addresses memory location-Physical and Logical-Memory Grouping 8086-Registers into a BIU and EU-Addressing-Mode.

Unit-V

Hrs 15

Introduction to Embedded Systems-Application Areas-Catogories of Embedded Systems-Overview of Embedded Systems Architecture-Specialities of ES-Recent Trends in Embedded Systems. Hardware Architecture-Software Architecture.

Text books:

1."Microprocessors Architecture Programming and Application with the 8085" Ramesh Gaonkar, 5th Edition, penram International Publishing Pvt Ltd-2007.

Unit-I : Chapter 1,1.1,1.2,1.3,1.4,2,2.1,2.2,2.3,2.4,2.5,2.6.

Unit-II : Chapter 3,3.1,3.2,3.3,3.4,4,4.1,4.2,4.3,4.4.

Unit-III : Chapter 15,15.1,15.2,15.5,15.6,15.6

Unit-IV : 2."The 8086 Microprocessor programming and Interfacing the PC" Kenneth J- Ayala Delmar Publisher : Chapter 3,3.6,3.7,3.8,3.9,4.3

Unit-V : 3."Embedded Real time Systems: Concept Design and Programming" Black Book by Dr.K.V.K.K.Prasad dreamteh-press : Chapter 1.1 to 1.6 ,2.1,2.2.

M.C.A.

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
II	17P2CAP3	JAVA PROGRAMMING LAB	3	2

OBJECTIVES

1. Java program to demonstrate the use of Java Swing components, namely, buttons, text boxes, lists/combos, menus etc
2. Java program to store, delete and update data in a database with the support of JDBC-ODBC connectivity
3. Java program with Servlets to create a dynamic HTML form to accept and display user name and password with the help of 'get()' and 'post()' methods
4. Java Servlet program for 'auto refreshing' the webpage after given period of time
5. Java Servlet program to demonstrate the use of cookies
6. Java Servlet program to demonstrate the use of session
7. Java program with Servlets to store only valid data in a database with the support of JDBC-ODBC connectivity

Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
II	17P2CAP4	MULTIMEDIA AND OPERATING SYSTEM LAB	3	2

Objective

- ❖ Learn to use Multimedia technologies
 - ❖ To apply O.S concepts using UNIX Programming.
-

Multimedia technologies

1. Study about timeline concepts. Insert text, image, use scaling rotation alignment, Add effects (predefined and user defined)
2. Study masking concepts. Use audio in the movie.
3. Add buttons, menus, and actions to the movie.
4. Export movie, Use multiple scenes.
5. Insert text, image, and sprite to the movie.

UNIX Programming

6. Write a shell program to create a menu for copy, edit, rename and delete a file.
7. Write a shell program for merging a file.
8. Write a shell program for file checking and formatting and difference between two files.
9. Write a shell program for sorting the file depends upon the primary key.
10. Write a UNIX program to find whether the given number is palindrome number or not.
11. Write a shell program to generate a Fibonacci series.
12. Write a UNIX program to find out the sum of digits.
13. Write a shell program to generate the use of pipeline and tree command.
14. Write a shell program to demonstrate the use of grep command.
15. Write a program to find the given number is prime or not.

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
II	17P2CAS2	Skill Elective – II Presentation Skills	3	2

Objective

- ❖ To acquire skills for facing interviews

Resume writing Skills

- Self - analysis
- Facts about resume
- Types of resume
- Creating a winning resume and preparing an effective covering letter.

Facing Interviews

- Understanding the basics of an interview and types of interview.
- Company's expectation in candidate.
- Preparing for an interview and the stages of an interview.
- Concept of body language in an interview.
- Grooming for an interview
- Do's and don'ts of facing an interview
- Handling questions.

Participating in the Group Discussion

- Understanding the Basics of a group discussion.
- Types of group discussion and Group discussion topics.
- The stages of a group discussion
- Company's Expectation in a Candidate
- Do's and dont's of a group discussion

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
III	17P3CA11	INTERNET AND WEB TECHNOLOGY	5	4

Objective

- ❖ To Understand HTML, Java script, VB script, ASP, PHP and MYSQL concepts.

Unit I**Hrs 15**

HTML: Introduction-SGML-Outline of an HTML Document-Head Section-Body section-HTML Forms. DHTML: Introduction-CSS-DHTML Document Objects Model and collections-Event Handling-Filters and Transitions – Data Binding.

Unit II**Hrs 15**

JAVASCRIPT: Introduction-Language Elements objects of Java script-Other objects. VBSCRIPT: Introduction-Embedding VBScript code in an HTML Document-Comments-Variables-Operators-Procedures-Conditional Statements-Looping Constructs-object and VBScript-Cookies.

Unit-III**Hrs 15**

Python : A Tutorial Introduction – Lexical Convention and Syntax – Types and Objects –operators and expressions – Control Flow – Functions and Functional Programming – Python-Classes and Object oriented Programming – Modules and Packages – Input and output – execution – environment

Unit-IV**Hrs 20**

Python Library – Build in functions and exceptions –python run time services– mathematics– data structures and algorithm– string and text handling– data management and object persistence – file handling– operating system services– threads.

UNIT V**Hrs 25**

Python network programming – internet application protocols – internet data handling and encoding – cryptographic services – miscellaneous modules – debugging, profiling and testing.

Text Books:

1. N.P Gopalan,J.Akilandeswari, "Web Technology" A Developer's Perspective, Prentice Hall of India Private Limited, New Delhi, 2008.
2. K. Meena , R. Sivakumar , A.B. Karthick Anand Babu "Web programming using PHP and MySQL" - Himalaya Publishing House – 2011.
3. David Beazley, Python Essential Reference, Sams Publishing, Third Edition.

Reference books:

1. Chuekmvsiano and Bill Kennedy,'HTML the Definite Guide', O'Reily Publications 2002.
2. Joseph Schmulter, 'Dynamic HTML', Bpb Publications 2000.
3. Michael Dawson, Programming with Python A Users Book, Cengage Learning , India Edition ,2007

M.C.A.

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
III	17P3CA12	ACCOUNTING AND FINANCIAL MANAGEMENT	5	4

Objective :

- To present the whole range of book keeping & accountancy and to give comprehensive coverage to management accounts.

Unit I

Accounting Principles and Concepts – Double entry book keeping- Income and expenditure- Accounting record and system- assets and liabilities- Depreciation, Depletion and Amortization - Accounting for depreciation.

Unit II

Journal – Ledger- Trial Balance- Trading, Manufacturing and profit and Loss account – Balance sheet with Adjustments.

Unit III

Analysis and interpretation of financial statements –Ratio Analysis.

Unit IV

Cost Accounting- Methods and Techniques of Cost Accounting- classifications of cost - Material Cost- Labour Cost – Overhead- fixed and variable cost- Cost- volume – profit analysis- marginal costing and decision making.

Unit V

Budgeting and budgetary control – types of budgets-Preparation of various functional budgets- Preparations of Production Budget –Purchase Budget – Sales Budget -cash budgets-flexible budgets- Advantages of Budgeting and Budgetary control.

Text Book(s):

1. T.S. Grewal, "Double Entry Book Keeping", All India Sultan Chand (Recent Edition)
2. S.N. Maheswari "Principles of Management Accounting ", Sultan Chand, New Delhi (Recent Edition)
3. Shukla, Grewal& Gupta, "Advanced Accounts" Sultan Chand Publications

Reference(s):

1. S.K. Gupta & R.K. Sharma- Practical Problems in Management Accounting (Recent edition)
2. Khan and Jain "Financial Management" Tata McGraw Hill (Recent Edition)

Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
III	17P3CA13	MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	5	4

Objectives:

- To know about Mathematical techniques required for computer science.

Unit I

Mathematical logic: statements and notation – connectives – normal forms – the theory of inference for the statements calculus – the predicate calculus - inference theory of the predicate calculus.

Unit II

Relations and ordering: relations – properties of binary relations in a set-relation matrix and the graph of a relation – partition and covering of a set-equivalence relations – compatibility relations – composition of binary relations- partial ordering – partially ordered set; representation and associated terminology-
Functions: Definition and introduction – composition of function – inverse functions- binary and n-array operations.

Unit III

Algebraic structures: Algebraic systems: examples and general properties – definition and examples – some simple algebraic systems and general properties – Semi groups and monoids: definition and examples – homomorphism of semi groups and monoids – sub-groups and submonoids - Grammars and languages: discussion of Grammars – formal definition of a language.

Unit IV

Graph theory: Basic concepts of graph theory: Basic definitions – paths, reachability and connectedness – matrix representation of graphs – trees – storage representation and manipulation of graphs: Trees: their representation and operations.

Unit V

Vector Spaces: Introduction – Definitions and examples – subspaces – linear transformations – span of a set – linear independence – **Theory of Matrices:** Simultaneous linear equations – characteristic equation and Cayley Hamilton Theorem – Eigen values and Eigen vectors.

Text Book:

1. Discrete mathematical structures with application to computer science, J.B.Tremblay and R.Manohar, McGraw-hill international edition, 2004.
 - Unit – I** : Chapter.1 (Sec: 1.1 to 1.6)
 - Unit – II** : Chapter.2 (Sec: 2.3, Sec: 2.4.1 to 2.4.4)
 - Unit – III** : Chapter.3 (Sec: 3.1 to 3.3.2)
 - Unit – IV** : Chapter.5 (Sec: 5.1 to 5.2.1)
2. Modern Algebra, Arumugam.S, Isaac.A.T, Scitech publications, 2014.
 - Unit – V** : Chapter.5 (Sec: 5.0 to 5.5), Chapter.7 (Sec: 7.6 to 7.8)

General Reference:

1. Applied Discrete structures for computer science, D.Alan, L.Lenneth, Galgotia publication, New Delhi, 1983.
2. Formal languages and their relations to automata, J.E.Hopcroft and A.D.Ullman, Addison – Wesley publishing company, 1969.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
III	17P4CA14	ORGANIZATIONAL BEHAVIOUR	4	4

Objective:

- ❖ This Course aims at providing in depth Knowledge in Organizational Behavior to enhance the problem formulation in solving skills with a focus on Human Relations aspects.

UNIT 1**Hrs 15**

Nature of Organizational Behaviour: Concept of Organization –concept of organization behaviour-challenges and opportunities for organizational behaviour – Applying OB knowledge to management practices. **Foundations of organizational Behaviour:** Classical Approach – Neoclassical approach-modern approach-Organizational behaviour models.

UNIT II**Hrs 15**

Nature of Human Behaviour: Concept of behaviour – Process of behaviour – Individual differences-Models of Man. **Personality:** Concept of Personality -Personality measurement. **Perception:** Concept of Perception-Interpersonal perception – Developing Perceptual Skills.

UNIT III**Hrs 15**

Learning: Concept of Learning – Learning theories – Reinforcement-organizational behaviour modification-Learning organization-Knowledge management. **Interpersonal Behaviour:** Nature of Inter personal behaviour –Transactional Analysis. **Group Dynamics:** Concept of group dynamics-Formal groups-Informal group or organization – Group behaviour-Group decision making – Intergroup behaviour.

UNIT IV**Hrs 15**

Power and Politics: Concept of Power -Politics. **Leadership:** Concept of Leadership – Leadership theories-Leadership styles – Leadership styles in Indian organizations- Contemporary issues in Leadership.

UNIT V**Hrs 15**

Communication: Concept of Communication – Communication symbols-Communication network- Barriers in communication- Making communication effective-Communication pattern in Indian organization. **Conflict Management:** Concept of conflict- Individual level conflict –Group level conflict- Organizational level conflict-Managing conflict- Negotiation.

Text Book:

1. L.M.Prasad "Organizational Behaviour" Sultan Chand & Sons Educational Publishers, New Delhi, Fifth Edition 2011.

References:

1. Fred Luthans "Organizational Behaviour" McGraw Hill Publishers.
2. Huges J. Arnold, Daniel C.Feldman "Organizational Behaviour" McGraw Hill Publishers.
3. Stephen P.Robbins , Nancy Langton "Organizational Behaviour" Pearson Education series.

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
III	17P3CA15	SOFTWARE ENGINEERING	5	4

Objective

- ❖ To understand advances in developing software.

Unit I

Hrs 15

A Generic view of Process: Layered Technology-Process Framework-Capability Maturity Model Integration-Process Patterns-Process Assessment-Personal and Team Process Models-Process Technology-Product and Process. **Process Models:** Waterfall Models-Incremental Process Model-Evolutionary Process Model-Specialized Process Model-Unified Process.

Unit II

Hrs 15

Requirement Engineering: Tasks-Initiating Requirement Engineering Process-Eliciting Requirements-Developing Use case-Building Analysis Model-Negotiating Requirements-Validating Requirements. **Building Analysis Model:** Requirement Analysis –Analysis Modeling Approaches-Data Modeling Concepts-Object Oriented Analysis-Scenario Based Modeling-Flow Oriented- Class Based –Behavioral Model.

Unit III

Hrs 15

Design Engineering: Context of Software Engineering –Design Process and Design Quality-Design Concepts-Design model-Pattern Based Design. **Architectural Design:** Software Architecture-Data Design-Architectural Styles and Pattern-Architectural Design-Alternate Architectural Design-Mapping Data Flow. **User Interface Design:** Golden Rules-User Interface Analysis and Design-Interface Analysis-Interface Design- Design Evaluation.

Unit IV

Hrs 15

Testing Strategies: Strategic Approach-Strategic Issues-Strategic for Conventional Software-Strategic for Object Oriented Software-Validation Testing-System Testing-Art of Debugging. **Testing Tactics:** Testing fundamentals-Black box Testing-White Box Testing-Basis Path Testing-Control Structure Testing-Object Oriented Testing-Testing Methods Applicable-Interclass Test Case Design-Testing for Specialized Environments-Testing Patterns.

Unit V

Hrs 15

Project Management: Management Spectrum – People –Product-Process-Project-W5HH Principle-Critical Practices. **Quality Management:** Quality Concepts-Software quality Assurance-Software Reviews-Technical Reviews –Statistical SQA-Software Reliability-ISO 9000 Quality Standards-SQA Plan. **Change Management:** Software Configuration management-SCM Repository-SCM Process-Configuration Management for Web Engineering.

Reference:

1. Software Engineering (Sixth Edition) by ROGER S. PRESSMAN, McGraw-Hill International Edition.
2. Richard E.Fairley, "Software Engineering Concepts", McGraw-Hill Book Company - 1985.

M.C.A.

Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
III	17P3CAP5	OBJECT ORIENTED ANALYSIS AND DESIGN LAB	3	3

OBJECTIVES

- Introduction to UML notations and diagrams.
- Hands on exposure of “Visual Paradigm software for UML” involving analysis and design with UML diagrams.

1. use case, class diagrams in online ticket reservation systems
2. use case, class diagrams in hotel reservation systems
3. use case, class diagrams in student information system
4. use case, class diagrams in sales & marketing system
5. use case, class diagrams in banking system and inventory tracking system.
6. Behavioural diagrams for application systems
7. state chart diagram for application systems
8. component diagrams for systems
9. deployment diagrams for systems – Test cases,
10. integration test cases for systems

Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
III	17P3CAP6	WEB DESIGN-PYTHON LAB	3	3

Objective

- ❖ To apply Web technology concepts.
1. Using for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4... 1/10.
 2. Write a program using a for loop that calculates exponentials. Your program should ask the user for a base base and an exponent exp, and calculate baseexp
 3. Write a method fact that takes a number from the user and prints its factorial.
 4. Write a function roots that computes the roots of a quadratic equation. Check for complex roots and print an error message saying that the roots are complex.
 5. Write a Python script to generate Password
 6. Python script to parse XML/HTML code
 7. Tweet Search using Python
 8. Geo Location of an IP Address
 9. Log Checker in Python
 10. Write a Python script to get all the links from a website

Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
III	17P3CAS3	Skill Elective – III GROUP COMMUNICATION	3	2

Objective

- ❖ To acquire Dynamic Skills for developing Personality.

Goal Setting

- Benefits of goal setting
- Steps involved in setting goals.
- Setting goals on six areas of life and Living with goals.

Time Management

- Understanding the time wasters.
- Planning and scheduling using four quadrants.
- Developing daily schedules.

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
IV	17P4CA16	OPTIMIZATION TECHNIQUES	5	5

Objectives:

- To understand different techniques to optimize for decision making

Unit I

Linear Programming: Introduction – solved examples – modeling in OR – Methodology in OR – Applications and limitations in OR – Formulation of LPP – Model formulation – solved problems – Graphical solution method – solved problems.

Unit II

Game Theory: Introduction – optimal solution of to person zero sum game – rules for determining a saddle point – solved problems – Games with mixed strategy – The graphical method – Use of dominance property.

Unit III

Queuing Problems: Introduction – Classification of queues – the Queueing problems (M/M/1) : (∞ /FCFS) model – (M/M/1) : (N/FCFS) model – (M/M/C) : (∞ /FCFS) model – (M/M/C) : (N/FCFS) model – solved problems

Unit IV

Inventory Models: Introduction – Deterministic models – purchasing problem with no shortages – production problems with no shortages - purchasing problem with shortages – production problems with shortages – solved problems.

Unit V

Replacement Theory: Introduction – Replacement policy for equipment which deteriorates gradually – replacement of items that fail suddenly – Individual Replacement policy – Group Replacement Policy – problems in mortality and staffing – solved problems.

Textbook:

Problems in Operations Research - PK. GUPTA and MANMOHAN, Sultan Chand & Sons (Fourteenth Edition), 2014.

Unit – I : Chapters 0, 1, 2 (Pages: 1 – 19, 43 – 53)

Unit – II : Chapters 20 (Pages: 471 – 486)

Unit – III : Chapters 22 (Pages: 535 – 550)

Unit – IV : Chapters 23 (Pages: 571 – 583)

Unit – V : Chapters 24 (Pages: 619 – 635)

Reference:

1. Operation Research, Kanthi Swarub, P. K. Gupta and Manmohan, Sultan Chand & Sons, New Delhi, 1982.
2. Operation Research – Principles and Practice, Don T. Philips, A. Ravindran, James J. Solberg, John Wiley & Sons, 1976.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
IV	17P4CA17	COMPILER DESIGN	5	5

Objective

- To know the concepts and techniques for designing compiler.

Unit I**Hrs 15**

Introduction to compilers: Compilers and Translators, Structure of a Compiler, Compiler Writing tools, programming Languages. High Level programming Languages, Definitions of programming Languages, Lexical and Syntactic structure of a Languages - Finite Automata and Lexical analysis, Role of a lexical analyzer, Regular expressions, Finite Automata Minimizing the number of syntactic specification of programming languages.

Unit II**Hrs 15**

Context free grammars, derivations and parse trees, capabilities of context free grammars-Basic parsing techniques: Shift reproduce parsing-Operator precedence parsing-Top down parsing-predictive parsers-Automatic Construction of efficient parsers. LR parser - Constructing SLR - Canonical LR and LALR parsing Tables - Using Ambiguous Grammars -Automatic parser Generator - Implementation of LR parsing Tables.

Unit III**Hrs 15**

Syntax Directed Translation: Schemes - Implementation - Intermediate Code - postfix Notation - parse Tree and Syntax Trees - Three Address Code- Quadruples and Triples - Translation of Assignment Statements - Boolean Expression - postfix Translations - Translation with a Top - Down parser.

Unit IV**Hrs 15**

Symbol Tables, Contents data Structures, representing scope information. Runtime Storage Administration, Implementation and Storage allocation and of simple stack allocation schemes and block structured languages, Error detection and recovery, Lexical phase Error, Syntactic phase error, Semantic errors.

Unit V**Hrs 15**

Introduction to Code Optimization, principle Sources of Optimization, Loop Optimization, DAG Representation of basic blocks, Global data flow Analysis, Code generation, problems in Code Generation Register allocation and Assignment, Code Generation from DAG' s, peephole Optimization.

Reference:

1. Alfred V. Aho and Jeffrey D. Ullman, "principles of Compiler Design", Addison Wesley, Narosa ISE, 1991Reprint.

General References:

1. William A.Barret, Rodney M. Bates, David A.Gustafon and D.Couch - "Complier Construction Theory and practice", Galgotia publishing Co,1990.
2. Jeaan - paul Tembly and paul G. Sorenson, - "The Theory and John D.Couch - "The Theory and practice of Complier writing", Mc Graw Hill 1985.

Semester	Subject code	Title of the course	Hours of Teaching /Week	No. of Credits
IV	17P4CA18	Big Data Analytics	5	4

Objectives:

1. To provide an overview of an exciting growing field of big data analytics.
2. To introduce the tools required to manage and analyze big data like Hadoop, NoSql Map- Reduce.
3. To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.
4. To enable students to have skills that will help them to solve complex real-world problems in for decision support.

Unit I : Introduction to Big Data, Hadoop and NoSQL**Hrs 15**

Introduction to Big Data, Big Data characteristics, types of Big Data, Traditional vs. Big Data business approach, Case Study of Big Data Solutions - What is Hadoop? Core Hadoop Components; Hadoop Ecosystem; Physical Architecture; Hadoop limitations - What is NoSQL? NoSQL business drivers - NoSQL case studies - NoSQL data architecture patterns: Key-value stores, Graph stores, Column family (Bigtable) stores, Document stores, Variations of NoSQL architectural patterns - Using NoSQL to manage big data: What is a big data NoSQL solution? - Understanding the types of big data problems - Analyzing big data with a shared-nothing architecture - Choosing distribution models: master-slave versus peer-to-peer - Four ways that NoSQL systems handle big data problems

Unit II: MapReduce and the New Software Stack**Hrs 15**

Distributed File Systems : Physical Organization of Compute Nodes, Large-Scale File-System Organization - **MapReduce**: The Map Tasks, Grouping by Key, The Reduce Tasks, Combiners, Details of MapReduce Execution, Coping With Node Failures - **Algorithms Using MapReduce**: Matrix-Vector Multiplication by MapReduce , Relational-Algebra Operations, Computing Selections by MapReduce, Computing Projections by MapReduce, Union, Intersection, and Difference by MapReduce, Computing Natural Join by MapReduce, Grouping and Aggregation by MapReduce, Matrix Multiplication, Matrix Multiplication with One MapReduce Step.

Unit III: Finding Similar Items and Mining Data Streams**Hrs 15**

Applications of Near-Neighbor Search, Jaccard Similarity of Sets, Similarity of Documents, Collaborative Filtering as a Similar-Sets Problem - **Distance Measures**: Definition of a Distance Measure, Euclidean Distances, Jaccard Distance, Cosine Distance, Edit Distance, Hamming Distance - **The Stream Data Model**: A Data-Stream-Management System, Examples of Stream Sources, Stream Query, Issues in Stream Processing - **Sampling Data in a Stream** : Obtaining a Representative Sample , The General Sampling Problem, Varying the Sample Size - **Filtering Streams**: The Bloom Filter, Analysis - **Counting Distinct Elements in a Stream**: The Count-Distinct Problem, The Flajolet-Martin Algorithm, Combining Estimates, Space Requirements - **Counting Ones in a Window**: The Cost of Exact Counts, The Datar-Gionis-Indyk-Motwani Algorithm, Query Answering in the DGIM Algorithm, Decaying Windows.

Unit IV: Link Analysis and Frequent Itemsets

Hrs 15

PageRank Definition, Structure of the web, dead ends, Using Page rank in a search engine, Efficient computation of Page Rank: Page Rank Iteration Using MapReduce, Use of Combiners to Consolidate the Result Vector - Topic sensitive Page Rank, link Spam, Hubs and Authorities - **Handling Larger Datasets in Main Memory:** Algorithm of Park, Chen, and Yu, The Multistage Algorithm, The Multihash Algorithm - **The SON Algorithm and MapReduce - Counting Frequent Items in a Stream:** Sampling Methods for Streams, Frequent Itemsets in Decaying Windows

Unit V: Clustering, Recommendation Systems and Mining Social-Network

Graphs

Hrs 15

CURE Algorithm - Stream-Computing- A Stream-Clustering Algorithm - Initializing & Merging Buckets - Answering Queries - A Model for Recommendation Systems- Content-Based Recommendations - Collaborative Filtering - Social Networks as Graphs- Clustering of Social-Network Graphs - Direct Discovery of Communities - SimRank- Counting triangles using Map-Reduce

Text Books:

1. Anand Rajaraman and Jeff Ullman "Mining of Massive Datasets", Cambridge University Press,
2. Alex Holmes "Hadoop in Practice", Manning Press, Dreamtech Press.
3. Dan McCreary and Ann Kelly "Making Sense of NoSQL" - A guide for managers and the rest of us, Manning Press.
4. Study Material for "Big Data Analytics" based on Stanford Info-Lab Manual, Compiled by ANURADHA BHATIA, Mumbai University.

References:

1. Bill Franks , "Taming The Big Data Tidal Wave: Finding Opportunities In Huge Data Streams With Advanced Analytics", Wiley
2. Chuck Lam, "Hadoop in Action", Dreamtech Press

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
IV	17P4CAEL1A	Major Elective - I Distributed Programming using J2EE	5	4

Objective:

To impart knowledge about the distributed environment, its architecture, application development with RMI, Java Servlets, Java Server Pages, Struts and EJB using J2EE technologies.

Unit – I**Hrs 15**

Distributed Hardware Architecture: Evolution of Personal Computer – PC to PC Communication – Local Area Network – File Server Architecture – Client-Server Architecture – Database Server Architecture – Corporate Network – Intranet – Wide Area Network – Internet. Distributed Software Architecture: Mainframe – File Server - Client-Server Architecture: Single–two tier–three tier–N-tier Architecture–Distributed Application.

Unit – II:**Hrs 15**

Distributed Computing using RMI: Introduction - RMI Architecture– RMI Exceptions – Developing Applications with RMI –RMI with Database Connectivity. Evolution of the Web Application--Overview of the HTTP - JSP: JSP Overview– JSP syntax and semantics- Expressions.

Unit – III:**Hrs 15**

Java Server Pages: JSP Basic Concepts – JSP Elements – Expressions – Scriptlets – Request and Response Objects – Redirection and Forwarding –JSP with Database Connectivity - Session Tracking: Hidden Form Fields – URL Rewriting – The Cookie Class – The Session Tracking Class

Unit IV:**Hrs 15**

The Struts Framework: Introduction - J2EE Platform: J2EE Architecture – Containers – J2EE Technologies: Component – Service – Communication Technologies – Developing J2EE Application- EJB Architecture and Design: Introduction to EJB – The EJB Container and its Services

Unit – V:**Hrs 15**

Working with EJB – Session Bean and Business Logic – Entity Bean and Persistence.

Books for Study:

1. Ivan Bayross, “ **Web Enabled Commercial Applications Development using Java 2**”, Edition 2000, BPB Publications.
2. Jason Hunter with William Crawford, “**Java Servlet Programming**”, Shroff Publishers & Distributors Pvt. Ltd
3. Phil Hanna, “**JSP 2.0 The Complete Reference**”, Tata McGraw Hill Publishing Company Limited.
4. James Holmes, “**Struts :The Complete Reference**”, Second Edition, Tata McGraw Hill Publishing Company Limited..
5. Subrahmanyam Allamaraju, “**Professional Java Server Programming – J2EE Edition Volume 1**”, Shroff Publishers & Distributors Pvt. Ltd..

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
IV	17P4CAEL1B	Major Elective- I UBIQUITOUS COMPUTING	5	4

Objectives

To understand the advances in pervasive computing.

Unit – 1

Hrs 18

An Introduction to Ubiquitous Computing: Founding Contributions to Ubiquitous Computing - Ubiquitous Computing in U.S. Universities - Ubiquitous Computing in European Laboratories and Universities - Modern Directions in Ubiquitous Computing - The Research Community Embraces Ubiquitous Computing - The Future of Ubiquitous Computing

Unit - 2

Hrs 18

Ubiquitous Computing Systems: Ubicomp Systems Topics and Challenges - Creating Ubicomp Systems-Implementing Ubicomp Systems-Evaluating and Documenting Ubicomp Systems.

Unit – 3

Hrs 18

Privacy in Ubiquitous Computing: Understanding Privacy - Technical Solutions for Ubicomp Privacy - Address Privacy. Ubiquitous Computing Field Studies: Three Common Types of Field Studies - Study Design - Participants- Data Analysis - Steps to a Successful Study

Unit – 4

Hrs 18

Ethnography in Ubiquitous Computing - From Ethnography to Design - Design-Oriented Ethnography in Practice. From GUI to UUI: Interfaces for Ubiquitous Computing: Interaction Design-Classes of User Interface-Input Technologies.

Unit – 5

Hrs 18

Location in Ubiquitous Computing: Characterizing Location Technologies - Location Systems. Context-Aware Computing : Context-Aware Applications - Designing and Implementing Context-Aware Applications - Issues to Consider when Building Context-Aware Applications- Challenges in Writing Academic Papers on Context Awareness

Reference:

Ubiquitous Computing Fundamentals-Edited by John Krumm Microsoft Corporation Redmond, Washington, U.S.A.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
IV	17P4CAEL1C	Major Elective- I PEER-TO-PEER COMPUTING	5	4

Objective

- To know about the Peer-to-Peer computing techniques.

UNIT-I**Hrs 15**

Overview of Peer-to-Peer: Introduction – Batch Modes – On-Line Modes – Client Server – Peer-to- Peer System. File-Sharing Peer-to-Peer System: Introduction – Famous Napster Model – Gnutella –BitTorrent – Common Features – Legal Challenges – The need for More Powerful Computers: Introduction –Problem of Parallel Computers – CPU Power Sharing Examples – Need for Parallel Algorithms – Metrics in Parallel Systems – Problems – Desirable Characteristics of P2P Systems – Enabling Technologies – Overview of Our Solution – Comparison

UNIT - II**Hrs 15**

Web Server and Related Technologies – Introduction – Web Servers – Apache Tomcat – Starting the Tomcat Server – Better Development Environment – Directories – Mapping Between URL and Servlet – Selection of Web Servers – Introduction to Servlet: Servlets – Servlet Lifecycle – Servlet Collaboration – Basic Structure of Servlet – Sending and Receiving Information – Testing Second Servlet (Without html File) Further Tests – Compiling the Servlet – Java Network Programming – Introduction – URL Connection – Socket Communication – datagram – Difference – Testing and Enhancements of Servlets:Introduction – Debugging Techniques – Global Parameters – Synchronization – Tips to Speed Testing – Troubleshooting.

UNIT - III**Hrs 15**

Power Server: Model1: Introduction – Model Without Web Server – Model1 – First Test – Second Test TroublesShopoting – Further Tests. PowerServer: Model 2 Introduction – Power Server with Seb Server – Model 2 – Server Side Programs – Phase 1 Testing – invokeServer Program – Phase 2 Testing – Power Server: Model 3 – Server Program of Model 3 –Client Program of Model 3 – divide. Java Module –Sgare2.java Module- Share2.java – Testing – Comparison with Model1.

UNIT-IV**Hrs 15**

Power Server: Model 4 - Introduction –Power Server with Web Server – Model 4 –Server Side Program – Testing the invokeServer2 Program – Testing the system. Power Server – Model 5: Introduction – Poiwer Server –model5- Server Side Program – Client side Program – Testing – Comparison with Model 4 – Further Tests – Other Improvements. Wireless P2P System: Introduction – IEEE802 Standards – Bluetooth – Iwreless LAN – Wireless Routers – Internet-EnabledDevices – Internet- Enabes Devices – Problems of Mobile Phones- Extending the Power of Mobile Phones – Wireless P2P Systems with Mobile Phones – Implementation of Wireless P2P Systems- Introduction – Client-Mobile Phone- Tier 1 Server Program –phoneServlet.java – Tier 2 Server Side

Program – Tools for Mobile Phone Development – Testing for mobile Phone Development
– Testing the Wireless P2P – Experiments with More Sub-tasks.

UNIT-V

Hrs 15

Computer Architecture – Introduction - Classification of Computer Architectures – Granularity –General or Specially Designed Processors - Processor Networks – Shared Networks – Shared Memory Connection . Distributed and Parallel Algorithm – Introduction – Overview of Serial Sorting – Characteristics of Sortin Algorithms – Parallel Sorting Algorithms for MIMD with shared Memory – Parallel Sorting Algorithms for MIMD with Distuibuted Memory – Infrastructure and Future Development – - Infrastructure –Incentives – Maintenance – Future P2P Development – Problems of Data –Sharing P2P System –Efficient Parallel Algorithms – Re-Visiting Speed Up –Applications- Further Improvements.

REFERENCE BOOK

1. Alfred Wai-Sing Loo, "Peer-to-Peer Computing"- Springer International Edition 2010.

M.C.A.

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
IV	17P4CAEL2A	Major Elective – II ENTERPRISE RESOURCE PLANNING	4	4

Objective

- * To know about the Peer-to-Peer computing techniques.

Unit I

Hrs 12

Integrated Management Information - seamless Integration - Supply Chain Management - Integrated data Model - Benefits of ERP - Business Engineering and ERP - Definition of Business engineering - principles of business engineering - Business engineering with information technology.

Unit II

Hrs 12

Building the Business model - ERP implementation - an Overview - Role of Consultant, Vendors and Users, Customization - precautions - ERP post implementation options - ERP Implementation Technology - Guidelines for ERP Implementation.

Unit III

Hrs 12

ERP domain - MPG / PRO - IFS /Avalon - Industrial and financial System - Baan IV SAP - Market Dynamics and dynamic strategy.

Unit IV

Hrs 12

Description - Multi - Client Server solution - Open technology - User Interface - Application Integration.

Unit V

Hrs 12

Basic architectural Concepts- The system control interfaces- Services- presentation interface - Database Interface.

Reference:

1. Vinod kumar Garg and N.K. Venkita krishnan, "Enterprise Resource Planning - Concepts and practice", PH,1998.

General Reference:

1. Jose Anonio Fernandez, "The SAP R/3 Handbook", Tata Mc Graw Hill publications, 1998.

M.C.A.

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
IV	17P4CAEL2B	Major Elective – II MANAGEMENT INFORMATION SYSTEM	4	4

Objective

- To know about various information systems required to design MIS.

Unit – I

Hrs 12

Foundation of Information Systems in business: Foundation concepts: Information systems in business – Foundation concepts: The component of Information systems.

Unit – II

Hrs 12

Competing with Information Technology: Fundamentals of Strategic Advantage – Using Information Technology for Strategic Advantage.
E-Business systems: E-Business systems – Functional Business systems.

Unit – III

Hrs 12

Enterprise Business Systems: Getting All the Geese Lined Up: Managing at the Enterprise Level – Customer Relationship Management: The Business Focus – Enterprise Resource Planning: The Business Backbone – Supply Chain Management: The Business Network.

Unit – IV

Hrs 12

Electronic Commerce Systems: Electronic Commerce Fundamentals – E-Commerce Applications and Issues.

Unit – V

Hrs 12

Decision Support Systems: Decision Support in Business – Artificial Intelligence Technologies in Business.

Reference:

1. "Management Information Systems " , James A O'Brien, George M Marakas, Ramesh Behl, Ninth Edition, TMH Publications, 2010.

General Reference:

1. "Management Information System", Gordon B. Davis Margre the H.Olson, Mc Graw Hill, 3rd Reprint 2000.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
IV	17P4CAEL2C	Major Elective – II SOFTWARE PROJECT MANAGEMENT	4	4

Objective

- ❖ To know about various information systems required to design MIS.

UNIT-I**Hrs 12**

Conventional Software Management: The waterfall model, conventional software Management performance. Evolution of Software Economics: Software Economics, pragmatic software cost estimation.

UNIT-II**Hrs 12**

Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections. The old way and the new: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

UNIT-III**Hrs 12**

Life cycle phases: Engineering and production stages, inception, Elaboration, construction, transition phases. Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts. Model based software architectures: A Management perspective and technical perspective. Work Flows of the process: Software process workflows, Iteration workflows.

UNIT-IV**Hrs 12**

Checkpoints of the process: Major mile stones, Minor Milestones, Periodic status assessments. Iterative Process Planning: work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning. Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations. Process Automation: Automation Building blocks, The Project Environment.

UNIT-V**Hrs 12**

Project Control and Process instrumentation: The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation. Tailoring the Process: Process discriminants. Future Software Project Management: modern Project Profiles, Next generation Software economics, modern process transitions.

TEXT BOOKS:

1. Software Project Management, Walker Royce: Pearson Education, 2005.

REFERENCE BOOKS:

1. Software Project Management, Bob Hughes and Mike Cotterell: Tata McGraw- Hill Edition.
2. Software Project Management, Joel Henry, Pearson Education.
3. Software Project Management in practice, Pankaj Jalote, Pearson Education.2005

M.C.A.

Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
IV	17P4CAP7	Data Analytics Lab	3	2

1. Study of Hadoop ecosystem
2. Programming exercises on Hadoop
3. Programming exercises in No SQL
4. Implementing simple algorithms in Map- Reduce (3) - Matrix multiplication, Aggregates, joins, sorting, searching etc.
5. Implementing any one Frequent Itemset algorithm using Map-Reduce
6. Implementing any one Clustering algorithm using Map-Reduce
7. Implementing any one data streaming algorithm using Map-Reduce
8. Mini Project: One real life large data application to be implemented (Use standard Datasets available on the web)
 - a. Twitter data analysis
 - b. Fraud Detection
 - c. Text Mining etc.

Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
IV	17P4CAP8	Distributed Programming using J2EE Lab	3	2

Objectives:

- To learn the usage and implementation of distributed application development packages.
 - Distributed applications using RMI
 - a. Simple RMI application
 - b. RMI application with a server and more than one clients
 - c. RMI application with Database Connectivity
 - Web based distributed application in J2EE platform with Java Servlets Web based distributed application in J2EE platform with JSP
 - Enterprise Java Beans
 - a. Session Bean
 - i. Stateless Session Bean
 - ii. Stateful Session Bean
 - b. Entity Bean
 - i. Container Managed Persistence
 - ii. Bean Managed Persistence

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
IV	17P4CAS4	Skill Elective – IV INTERPERSONAL SKILLS	3	2

Interpersonal Skills

Understanding others

- Fundamentals of assertiveness
- Understanding difficult people
- Understanding body language
- Steps in understanding others and relationship building

Team building

- Building team and working in teams
- Dos and don'ts in team work
- Roles played by members and by team leaders

Problem solving techniques

- Steps involved in problem solving
- Methods in problem solving
- Creative thinking
- Overcoming problems using creative thinking exercise.

Semester	Subject code	Title of the course	Hours of Teaching /Week	No. of Credits
V	17P5CA19	Cross Platform - Mobile Applications Development	6	4

Unit I **Hrs 18**
Mobile Development Using Xamarin

What is Xamarin – What’s new: Mobile Development Techniques – Mobile UI – Xamarin Forms Custom Renderers – Building Mobile User Interfaces – Xamarin Forms Architecture – Platform UI Specification Approach – Xamarin Forms or a Platform-Specific UI.

Unit II **Hrs 18**
Xamarin Views

Xamarin Forms - Creating Xamarin Forms Solution –Adding Xamarin.Forms views – UI Design Using Layouts – Xamarin Forms Layouts – Android Layout – iOS Layout

Unit III **Hrs 18**
Xamarin Controls

Xamarin.Forms Views – Android controls – iOS controls – Making a Scrollable List – Data Adapters – Xamarin. Forms Listview – Android Listview – iOS TableView

Unit IV **Hrs 18**
Navigation & Database

Navigation Patterns – Xamarin. Forms Navigation – android Navigation – iOS Navigation – Data Access with SQLite and Data Binding.

Unit V **Hrs 18**
Custom Renderers & Cross – Platform Architecture

Custom Renderers – Preparing custom renderers – Creating Custom renderers – android, iOS, Windows phone custom renderers – Cross platform Architecture – Shared code and Platform specific code – Core Library – PCL – Dependency Injection.

Text book:

Xamarin Mobile Application Development: Cross-Platform C# and Xamarin. Forms Fundamentals 2015 by Dan Hermes, Apress

Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
V	17P5CA20	DOT NET FRAMEWORK WITH C# PROGRAMMING	6	4

Objective

- To understand Programming techniques in c#.

UNIT – I

Hrs 18

The NET Architecture:

The Vision and goals of .NET – The Building blocks of .NET – An overview of .NET framework: The .NET Evolution – Design goals of the .NET framework – The .NET framework Architecture – An overview of .NET application.

UNIT – II

Hrs 18

Class overview:

Introduction to C# - Data types - Operators - Flow Control - Methods and Parameters - Fields - Instance Methods.

UNIT – III

Hrs 18

Advanced of Class:

Access Modifier - Static - Extension Methods - Nested Class - Partial Class - Inheritance - Interface - Value Types.

UNIT – IV

Hrs 18

Exception Handling - Generics (Basic, Methods) - Delegates and Lambda Expressions - Events Delegates & Lambda Expressions

UNIT – V

Hrs 18

Building Custom collections - More collection interfaces - Primary collections class - Multithreading (Basic, Working with System. Threading, Asynchronous Tasks - Cancelling a Task, Thread Synchronization)

Reference Book

Essential C# 6.0, 5th Edition - **Mark Michaelis & Eric Lippert**

Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
V	17P5CAEL3A	Major Elective - III SOFT COMPUTING	6	4

Objective

- ❖ To Understand Artificial Intellegence, Neural network and Fuzzy system concepts.

UNIT – I**Hrs 15**

Problems, Problem Spaces and Search: Defining the Problem as a State Space Search – Production Systems – Problem Characteristics – Production System haracteristics – Issues in the Design of Search Programs – Additional Problems.
Heuristic Search Techniques: Generate and Test – Hill Climbing – Best-First Search – Problem Reduction – Constraint Satisfaction – Means-Ends Analysis.

UNIT - II**Hrs 15**

Knowledge Representation Issues: Representing and Mappings – Approach to Knowledge Representation – Issues in Knowledge Representation – The Frame Problem.
Using Predicate Logic: Representing Simple Facts in Logic – Representing Instance and Isa Relationships – Computable Functions and Predictions – Resolution.
Representing Knowledge using Rules: Procedural versus Declarative knowledge – Logic Programming–Logic Programming–Forward versus Backward Reasoning–Matching.

UNIT - III**Hrs 15**

Artificial Neural Networks: Concepts –Neural Attributes –Modeling-basic model of a Neuron-Learning in Artificial Neural Networks-Characteristics of ANNs-Important ANNs Parameter-Artificial Neural Network Topology-Learning Algorithm-Discrimination ability-ANN adaptability-The Stability-Plasticity Dilemma. **Neural Network Paradigms:** McCulloch-Pitts Model-The Perceptron

UNIT - IV**Hrs 15**

ADALINE and MADALINE Models:-Winner-Takes-All Learning Algorithm-Back-Propagation Learning Algorithm-Cerebellum Model Articulation controller(CMAC)-Adaptive Resonance Theory(ART) Paradigm-Hopfield Model-Competitive Learning Model-Memory Type Paradigms-Linear Associative Memory (LAM) – Real Time Models – Linear Vector Quantization(LVQ) Self-Organizing Map(SOM) Probabilistic Neural Network(PNN) – Radial Basis Function(RBF) – Time –Delay Neural Net(TDNN) Cognitron and Necognitron Models- Simulated Annealing – Boltzmann Machine- Other Paradigm.

UNIT - V**Hrs 15**

FUZZY LOGIC: Propositional Logic – The Membership function – Fuzzy logic – Fuzzy Rule Generation – Defuzzication of Fuzzy Logic – Time- Dependent Fuzzy Logic – Temporal Fuzzy Logic(TFL) - Applying Temporal Fuzzy Operators – Defuzzification of Temporal Fuzzy Logic – Example: Applicability of TFL in Communications Systems- Fuzzy Neural Networks – Fuzzy Artificial Neural Network(FANN) Fuzzy Neural Example- Neuro-Fuzzy Control- Fuzzy Neural Net –A Reality? **Applications:** Signal Processing –Image Data Processing–Communication Systems- Intelligent Control- Optimization Techniques-Other Applications – Tools and Companies.

Text Book:

1. Stamatios V.KartaLopoulos , "understnading Neural Networks and Fuzzy logic". Prentice –Hall of India Private Limited, New Delhi, 2000.
2. Elaine Rich and KevinKnight,"Artificial Intelligence" Second Edition, Tata McGraw – Hill publishing Computing ltd. NewDelhi,1999.

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
V	17P5CAEL3B	Major Elective - III Internet of Things	6	4

OBJECTIVES:

- To Understand the concepts and techniques of IoT.

UNIT I**Internet of Things Strategic Research and Innovation Agenda:**

Internet of Things Vision – Internet of Common Definition – IoT Strategic Research and Innovation Directions – IoT Strategic Research and Innovation Directions – IoT Application and Use Case Scenarios – IoT Functional View – Application Areas - IoT Smart-X Applications – Smart Cities – Smart Energy and the Smart Grid - Smart Mobility and Transport – Smart Home , Smart Buildings and Infrastructure – Smart Factory and Smart manufacturing – Smart Health – Food and Water Tracking and Security – Participatory Sensing - Smart Logistics and Retail

UNIT II**Internet of Things and Related Future Internet Technologies:**

Cloud Computing –IoT and Semantic Technologies – Networks and Communication – Networking Technology – Communication Technology - Processes – Adaptive and Event- Driven Processes – Processes Dealing with Unreliable Data – Processes dealing with unreliable resources – Highly Distributed Processes – Data Management – Data Collection and Analysis (DCA) – Big Data – Semantic Sensor Networks and Semantic – Annotation of data – Virtual Sensors –Security , Privacy & Trust – Trust for IoT – Security for IoT – Privacy for IoT – Device Level Energy Issues –Low Power Communication – Energy Harvesting – Future Trends and Recommendations – Related Standardization – The Role of Standardization Activities – Current Situation – Area for Additional Consideration – Interoperability in the Internet-of -Things – IoT Protocols Convergence – Message Queue Telemetry Transport (MQTT) - Constrained Applications Protocol (CoAP) – Advanced Message Queuing Protocol (AMQP) - Java Message Service API (JMS) – Data Distribution Service (DDS) – Representational State Transfer (RESET) – Extensible Messaging and Presence Protocol (XMPP)

UNIT III**Internet of Things Global Standardisation – State of Play:**

Introduction – General –IoT Vision –IoT Drivers _IoT Definition – IoT Standerdisation Landscape – CEN\ISO and CENELEC/IEC – ETSI – IEEE – IETF – ITU-T - OASIS - OGC – oneM2M – GS1 – IERC Research Projects Positions – BETaas – Advisory Board Experts Position – IoT6 Position.

UNIT IV**Dynamic Context-Aware Scalable and Trust-Based IoT Security, Privacy Framework:**

Introduction – Background Work – Main Concept and Motivation of the Framework – Identity Management – Size and Heterogeneity of the System – Anonymization of user Data and Metadata - Action's Control – Privacy by Design Context Awareness – summary – A policy-based framework for Security and Privacy in Internet of

Things – Deployment in a Scenario – Policies and Context Switching – Framework Architecture and Enforcement–Conclusion and Future Developments – Acknowledgments.

Scalable Integration Framework for Heterogeneous Smart Object , Applications and Services: Introduction – IPv6 Potential – IoT6 – IPv6 for IoT – Adapting IPv6 to IoT Requirements – IoT6 Architecture- DigCovery – IoT6 Integration with the Cloud and EPICS – Enabling Heterogeneous Integration – IoT6 Smart Office Use-case – Scalability Perspective – Conclusions.

UNIT V

Internet of Things Applications- Form Research and Innovation to Deployment:

Introduction – Open IoT – Project Design and Implementation – Execution and Implementation Issues- Project Results – Acceptance and Sustainability – Compose – Project Design and Implementation – The IoT Communication Technology - Execution and Implementation Issues – Expected Project Results.

Text Book:

Internet of Things – From Research and Innovation to Market Deployment by Ovidiu Vermesan and Peter Friess.

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
V	17P5CAEL3C	Major Elective – III HUMAN COMPUTER INTERACTION	6	4

Objective

- ❖ To Understand the concepts and techniques for effective interaction between Human and Computers

Unit I:**Hrs 15**

Cognitive Psychology and Computer Science - Capabilities of Human-Computer Interaction (HCI)-Goals of Human-Computer Interaction (HCI)-Roles of Human, Computer and Interaction in HCI- Basic User Interfaces - Advanced User Interfaces - Justification of Interdisciplinary Nature - Standard Framework of HCI -HCI Design Principles -Interface Levels in HCI- Steps in Designing HCI Applications-Graphical User Interface Design -Popular HCI Tools-Architecture of HCI Systems- Advances in HCI- Overview-HCI Sample Exercises **Usability Engineering** -Introduction-HCI and Usability Engineering -Usability Engineering Attributes-Process of Usability-Need for Prototyping.

Unit II**Hrs 15**

Modelling of Understanding Process- Introduction- Goals, Operators, Methods and Selection Rules (GOMS) - Cognitive Complexity Theory (CCT) - Adaptive Control of Thought-Rational (ACT-R) - State, Operator, and Result (SOAR) -Belief-Desire-Intention (BDI) - ICARUS-Connectionist Learning with Adaptive Rule Induction On-line (CLARION) -Subsumption Architecture -**Spoken Dialogue System** - Introduction -Factors Defining Dialogue System - General Architecture of a Spoken Dialogue System-Dialogue Management (DM) Strategies -Computational Models for Dialogue Management-Statistical Approaches to Dialogue Management - Learning Automata as Reinforcement Learners -Case Study: Learning Dialogue Strategy Using Interconnected Learning Automata -Software and Toolkits for Spoken Dialogue Systems Development.

Unit III**Hrs 15**

Recommender Systems- Introduction- HCI Study Based on Personalisation - Personalisation in Recommender Systems -Relation between Information Filtering and Recommender Systems -Application Areas of Recommender Systems-Recommender System Field as an Interdisciplinary Area of Research-Phases of Recommender Systems -User Profiling Approaches-Classification of Recommendation Techniques -Advantages and Disadvantages of Recommender System Approaches -Need of Software Agent-based Approach in Recommender Systems-Evaluating Recommender Systems-Integrated Framework for Recommender Systems-Case Study: Music Recommender System .

Unit IV**Hrs 15**

Advanced Visualisation Methods - Ontology Definition -Ontology Visualisation Method -Space Dimensions of Ontology Visualisation -Ontology Languages -Ontology Visualisation Tools -Ontology Reasoning -Reasoner Case Study 1: Teaching Ontology with C Programming Language -Case Study 2: Activity for Ontology Creation with a Case of a Software Company Scenario -Case Study 3: Activity for History Ontology Creation.

Unit V

Hrs 15

Ambient Intelligence: The New Dimension of Human-Computer Interaction - Introduction - Ambient Intelligence Definition-Context-aware Systems and Human-Computer Interaction -Middleware - Modelling Data for AmI Environment - Development of Context-awareness Feature in Smart Class Room— A Case Study - Context-aware Agents for Developing AmI Applications—A Case Study.

Text book:

1. K. Meena, R. Sivakumar, "Human-Computer Interaction", PHP Learning Private limited Delhi-110092, 2015.

Reference:

1. "Alan Dix, Janet Finlay, Gregory D.Abowd, Russell Beale", "Human-Computer Interaction", 3rd Edition, Pearson publications, 2008.

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
V	17P5CAEL4A	Major Elective –IV Service Oriented Architecture (SOA)	5	4

Objectives:

- To understand software architecture and technologies related to SOA
- To learn Service oriented Analysis and Design
- To know about SOA implementation
- To understand metadata management
- To know about SOA in mobile research

Unit – I**Hrs 15**

Software Architecture – Types of IT Architecture – SOA – Evolution – Key components – perspective of SOA – Enterprise-wide SOA – Architecture – Enterprise Applications – Solution Architecture for enterprise application – Software platforms for enterprise Applications – Patterns for SOA – SOA programming models.

Unit – II**Hrs 15**

Service-oriented Analysis and Design – Design of Activity, Data, Client and business process services – Technologies of SOA – SOAP – WSDL – JAX – WS – XML WS for.NET – Service integration with ESB – Scenario – Business case for SOA –stakeholder objectives – benefits of SPA – Cost Savings.

Unit – III**Hrs 15**

SOA implementation and Governance – strategy – SOA development – SOA governance – trends in SOA – event-driven architecture – software s a service – SOA technologies – proof-of-concept – process orchestration – SOA best practices.

Unit – IV**Hrs 15**

Meta data management – XML security – XML signature – XML Encryption – SAML – XACML – XKMS – WS-Security – Security in web service framework – advanced messaging.

Unit – V**Hrs 15**

Transaction processing – paradigm – protocols and coordination – transaction specifications – SOA in mobile – research issues.

Books for Study:

1. Shankar Kambhampaly, "**Service –Oriented Architecture for Enterprise Applications**", Wiley India Pvt Ltd, 2008.
2. Eric Newcomer, Greg Lomow, "**Understanding SOA with Web Services**", Pearson Education.
3. Mark O' Neill, et al. , "**Web Services Security**", Tata McGraw-Hill Edition, 2003

Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
V	17P5CAEL4B	Major Elective – IV Semantic Web	5	4

Objective

* To know about the Semantic Web Applications.

UNIT – I

Hrs 18

RDF and RDF Schema: Introduction – XML Essential-RDF-RDF Scheme-A Summary of RDF /RDF Scheme vocabulary.

UNIT - II

Hrs 18

OWL: Introduction-Requirements for Web Ontology Description Languages-Header Information, versioning and Annotation Properties-Properties-Classes Individuals Data types- A Summary of the OWL vocabulary.

UNIT - III

Hrs 18

Rule Languages: Introduction-Usage Scenarios for Rule Language-Data log-Rule ML-SWRL-TRIPLE-**Semantic Web services**-Introduction-Web service Essential-OWLs Service Ontology-An OWLs Example.

UNIT - IV

Hrs 18

Ontology Sources: Introduction – Metadata Upper Ontologies – Other Ontologies of Interest – Ontology Libraries. **Semantic Web Software Tools:** Introduction – Metadata and Ontology Editors - Reasoners – Other tools.

UNIT - V

Hrs 18

Applications: Software Agents – Introduction – Agent Forms – Agent Architecture – Agent in the Semantic Web Context – **Semantic Desktop:** Introduction – Semantic desktop meta data – Semantic Desktop Ontologies - Semantic Desktop Architecture - Semantic Desktop Related Applications.

Ontology Applications In Art: Introduction – Ontologies for the Description of Works of Art – Meta data Schemas for the Description of Works of Art- Semantic Annotation of Art Images.

Text Books:

1. "Semantic Web: Concepts, Technologies and applications" K.K. Breitman, M.A. Casanova and W. Truszkowski Springes-verlag London Limited, 20907, India
Reprint by Rakmo press(p) Ltd, New Delhi 2010.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No.of Credits
V	17P5CAEL4C	Major Elective - IV Cloud Computing	5	4

Objectives:

- To understand various types of clouds
- To learn cloud computing architecture
- To learn Cloud security and its importance to real time applications.

Unit - I:

Hrs 18

Introduction to Cloud Computing: Roots of Cloud Computing - Layers and Types of Cloud – Features of a cloud-Infrastructure Management-Cloud Services-Challenges and Risks. Migrating into a Cloud: Approaches –Seven Step Model. Integration as a service Paradigm for the cloud Era: Introduction-Evolution of SaaS - Integration Methodologies – SaaS Integration Products and Platforms-SaaS Integration Services.

Unit - II:

Hrs 18

The Anatomy of Cloud Infrastructure- Distributed Management of Virtual Infrastructures- Scheduling Techniques for Advance Reservation of Capacity- RVWS Design – Cluster as a Service: The Logical Design – Cloud Storage : from LANs TO WANS - Technologies for Data Security in Cloud Computing.

Unit - III:

Hrs 18

Collaborating on Project Management: Understanding Project Management - Exploring Project Management Applications - Collaborating on Word Processing: How Web-Based Word Processing Works - Exploring Web-Based Word Processors - Collaborating on Spreadsheets: How Web-Based Spreadsheets Work - Exploring Web-Based Spread-sheets - Collaborating on Databases: Understanding Database Management - Exploring Web-Based Databases - Collaborating on Presentations: Preparing Presentations Online - Evaluating Web-Based Presentation Applications.

Unit - IV:

Hrs 18

Storing and Sharing Files and other online contents: Understanding Cloud Storage - Evaluating Online File-Storage and Sharing Services - Exploring Online Bookmarking Services - Sharing Digital Photographs: Exploring Online Photo- Editing Applications - Exploring Photo-Sharing Communities - Controlling it all with web based Desktops: Understanding Web-Based Desktops - Evaluating Web Based Desktops - Collaborating via web based Communication Tools: Evaluating Web Mail Services – Evaluating Instant Messaging Services - Evaluating Web Conferencing Tools.

Unit - V:

Hrs 18

Grid and Cloud- HPC in the Cloud: Performance related Issues –Data Security in the Cloud- The Current State of Data Security in the Cloud- Homo Sapiens and Digital Information- Risk- Identity- The Cloud, Digital Identity and Data Security – Content Level Security: Pros and Cons- Legal Issues in Cloud Computing – Data Privacy and Security Issues- Cloud Contracting models.

Books for Study:

1. RajkumarBuyya, James Broberg, and AndrzejGoscinski. **“Cloud Computing Principles and Paradigms”** 2011edition (UNIT I, II, V)
2. Michael Miller, **“Cloud Computing: WebBased Applications that change the way You work and collaborate online”**, Pearson Education, 2009 edition. (UNIT III,IV) , ISBN: 9788131725337

Book for Reference:

1. George Reese” **Cloud Application Architectures”** Shroff/O' Reilly,2009.edition
ISBN: 8184047142

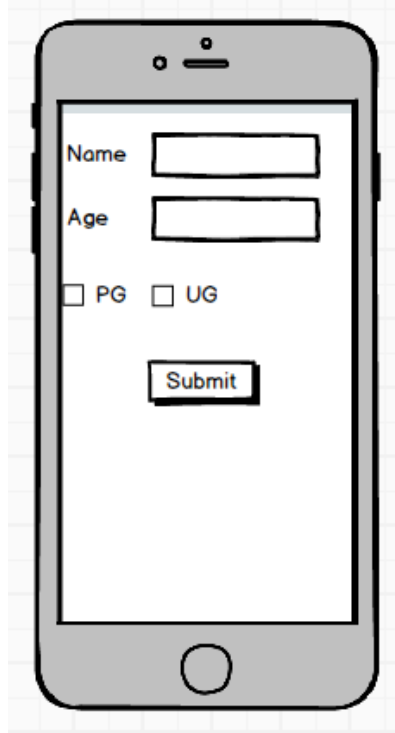
Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
V	17P5CAP9	Core PL Lab IX Cross Platform – Mobile Applications Development Lab	3	3

OBJECTIVES

- Building mobile applications.
- Availing variety of mobile brands and models for testing objectives in same location.
- Pushing the innovation in mobile applications.

Perform the experiments in J2ME / Android SDK framework

1. Timer: Create a Page, change the background and Foreground colour randomly using Xamarin Timer
2. Platform Specific: Create a form like below based on the platform change the Font Name, Font Size and display the form information in the Message Box.



3. Zoom: Using Pinch gesture class to Zoom the image in Xamarin Forms.
4. Animation: Create a button, using button click event animate images in Xamarin Forms.
5. Dependency Service: Using Dependency Service find the sum of a number, which enters by the user in the Xamarin Forms.
6. Android DB: Store & Retrieve the Form data into the SQLite.
7. Windows Phone DB: Store & Retrieve the Form data into the SQLite.
8. Navigation: Implementing Navigation using Pushing and Popping and Handling the Back button.
9. Master Detail Page: Create Navigation drawer using the MasterDetailPage.
10. Tabbed Page: Using Tabbed page load different page based on Tab click, one tab form should be implemented Pop up menu handling.

Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
V	17P5CAP10	Core –PL-Software Lab – C# PROGRAMMING LAB	3	3

Objective

- To understand Programming techniques in c#.

Programs

1. C# program for Ascending & Descending order.
2. C# Program for Matrix Multiplication.
3. C# program for stack and queue collections.
4. C# Program to perform various string operations.
5. Write a program in C# Sharp to find the factorial of a given number using recursion.
6. Writing a C# program using Extension Methods to generate Random File Nameconcept into Date Time class, File Copy concept into the Directory Info class.
7. Writing a C# Program to find the sum of Number using Delegates to print each step
8. Writing a C# program to change Background and Foreground of the colour using Events in C# (One event change background colour, one event change foreground colour), both events should be call every 3 seconds
9. Writing a C# program Copy one folder into another folder using Task functionality
10. Writing a C# program create a "File Copy command" using coping file via Command line arguments

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
V	17P5CAS5	Skill Elective – V Business Models –IT Industries	3	2

Objective

- ❖ To Know about industries and to get orientation in standards of quality and process.

Industry Verticals/ Domains

- Fundamentals of business.
- Types of businesses like Manufacturing, Retail, Telecom, Banking, Insurance, Logistics / SCM, Public Sector etc.

Quality Orientation

- ❖ Students should be exposed to various quality standards that are followed by the industries like ISO, CMM, PCMM, CMMI, BS7799 and TickIT.

Process Orientation

- ❖ Students should be exposed to various process standards that are followed by the industries like Six sigma, Five S, Lean, TQM, TPM, Kaizen, Kanban etc.

M.C.A.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
VI	17P6CAPR	Project	Six months	10

Main Project

Objective

- To master technical and Software Development Skills.
- Students have to undergo industrial Software Development projects using recent technologies.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
		Core Option - SECURITY PRACTICE	5	4

COURSE OBJECTIVES

- Understand the concepts and models of security in computing. Understand the cryptographic techniques used.
- Explain the security standards followed at the network level and at the application level.
- Estimate the level of security risk faced by an organization and the counter measures to handle the risk.
- Learn secured software development.

UNIT I

SECURITY – OVERVIEW - The Threat Environment – attackers and attacks – Security Planning and Policy – risk analysis – governance frameworks.

UNIT II

CRYPTOGRAPHY- Elements of cryptography – ciphers – encryption systems – symmetric/ asymmetric - DES, AES, RSA – key management – authentication – cryptographic systems - standards – secure networks VPNs, SSL/TLS, IPSec, LAN security.

UNIT III

ACCESS CONTROL - Physical access control – access cards – authentication mechanisms – directory servers – Firewalls – packet filtering – stateful packet inspection – NAT – IDS – Firewall architectures.

UNIT IV

HOST AND DATA SECURITY- Host Hardening – OS hardening – managing vulnerabilities, permissions - data protection – Application security – issues – e-commerce security – e-mail security - Incident and Disaster Response

UNIT V

SECURE CODING - OWASP/SANS Top Vulnerabilities - Buffer Overflows - Incomplete mediation - XSS - Anti Cross Site Scripting Libraries anomalous Data Format - Command Injection - Redirection - Inference – Application Controls - C Secured Software Development Life Cycle - Testing, Maintenance and Operation - Evaluation of Security Systems.

REFERENCE BOOKS:

1. Raymond R.Panko, "Corporate computer and network security", Second edition, Pearson, 2012.
2. Wade Trappe, Lawrence C Washington, "Introduction to Cryptography with Coding and Theory", Second Edition, Pearson, 2007.
3. Matt Bishop, "Computer Security: Art and Science", Pearson, 2003.
4. Charles Pfleeger, Shari Lawrence Pfleeger, Devin N Paul, "Security in Coding", Pearson, 2007.
5. Wenbo Mao, "Modern Cryptography Theory and Practice", Pearson, 2004.

Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
		Core Option - SECURITY LAB	5	4

COURSE OBJECTIVES

- Understand the application number theory in security. Study the symmetric key and public key algorithms. Understand the compression techniques for security.

EXPERIMENTS IN THE FOLLOWING TOPICS:

1. Write programs to implement the following number theory concept Prime and Relatively Prime Numbers Arithmetic Modulo 8 and Multiplication Modulo 8 Fermat's Theorem and Euler's Totient Function
2. Write programs to implement the following cryptography algorithms Playfair cipher and Hill cipher
Simplified DES algorithm
RSA algorithm
3. Write programs to implement the following hash a MD5
SHA-1
4. Write programs to implement the following Authentication Digital Signature and Digital Certificate
Kerberos System X.509
5. Write a program to implement Hacking windows. BIOS Passwords.
Windows login password Internet explorer users Changing windows visuals
Accessing restricted drives.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
		Core Option - ETHICAL HACKING & CYBER FORENSICS	5	4

COURSE OBJECTIVES

- To understand the hacking techniques of computer forensics.
- To learn about data recovery methods.
- To identify the threats in computer forensics.

UNIT I

ETHICAL HACKING - Foundation for Ethical Hacking-Ethical Hacking in Motion-Hacking Network Hosts-Hacking Operating Systems-Hacking Applications.

UNIT II

TYPES OF COMPUTER FORENSICS - Computer Forensics Fundamentals – Types of Computer Forensics Technology – Types of Vendor and Computer Forensics Services.

UNIT III

DATA RECOVERY - Data Recovery – Evidence Collection and Data Seizure – Duplication and Preservation of Digital Evidence – Computer Image Verification and Authentication.

UNIT IV

ELECTRONIC EVIDENCE - Discover of Electronic Evidence – Identification of Data – Reconstructing Past Events – Networks.

UNIT V

THREATS - Fighting against Macro Threats – Information Warfare Arsenal – Tactics of the Military – Tactics of Terrorist and Rogues – Tactics of Private Companies.

REFERENCE BOOKS:

1. John R. Vacca, "Computer Forensics", Firewall Media, 2004.
2. Kevin Beaver, "Hacking For Dummies", John Wiley & Sons, 2012.
3. Chad Steel, "Windows Forensics", Wiley India, 2006.
4. Majid Yar, "Cybercrime and Society", Sage Publications, 2006.
Robert M Slade, "Software Forensics", Tata McGrawHill, 2004.

Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
		Core Option - GAME PROGRAMMING	5	4

- To get subsequent understanding of game design and development, which includes the processes, mechanics, issues in game design, game engine development, modeling, techniques, handling situations, and logic. At the end, the student will be in a position to create interactive games.

UNIT I

3D GRAPHICS FOR GAME PROGRAMMING - Coordinate Systems, Ray Tracing, Modeling in Game Production, Vertex Processing Rasterization, Fragment Processing and Output Merging, Illumination and Shaders, Parametric Curves and Surfaces, Shader Models, Image Texturing, Bump Mapping, Advanced Texturing, Character Animation, Physics-based Simulation.

UNIT II

GAME DESIGN PRINCIPLES - Character development, Story Telling, Narration, Game Balancing, Core mechanics, Principles of level design, Genres of Games, Collision Detection, Game Logic, Game AI, Path Finding.

UNIT III

GAMING ENGINE DESIGN - Renderers, Software Rendering, Hardware Rendering, and Controller based animation, Spatial Sorting, Level of detail, collision detection, standard objects, and physics.

UNIT IV

GAMING PLATFORMS AND FRAMEWORKS - Flash, DirectX, OpenGL, Java, Python, XNA with Visual Studio, Mobile Gaming for the Android, iOS, Game engines - Adventure Game Studio, DXStudio, Unity.

UNIT V

GAME DEVELOPMENT - Developing 2D and 3D interactive games using OpenGL, DirectX – Isometric and Tile Based Games, Puzzle games, Single Player games, Multi Player games.

REFERENCE BOOKS:

- David H. Eberly, "3D Game Engine Design, Second Edition: A Practical Approach to Real- Time Computer Graphics" Morgan Kaufmann, 2 Edition, 2006.
- JungHyun Han, "3D Graphics for Game Programming", Chapman and Hall/CRC, 1st edition, 2011.
- Mike McShaffrfy, "Game Coding Complete", Third Edition, Charles River Media, 2009.
- Jonathan S. Harbour, "Beginning Game Programming", Course Technology PTR, 3 edition, 2009.
- Ernest Adams and Andrew Rollings, "Fundamentals of Game Design", Prentice Hall 1st edition, 2006.
- Roger E. Pedersen, "Game Design Foundations", Edition 2, Jones & Bartlett Learning, 2009.
- Scott Rogers, "Level Up!: The Guide to Great Video Game Design", Wiley, 1st edition, 2010.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
		Core Option - RESOURCE MANAGEMENT TECHNIQUES	5	4

COURSE OBJECTIVES

- Understand the Linear Programming models.
- To understand assignment and transportation problem.
- To understand the concepts of project scheduling.

UNIT I

LINEAR PROGRAMMING MODELS - Mathematical Formulation - Graphical Solution of linear programming models - Simplex method - Artificial variable Techniques- Variants of Simplex method.

UNIT II

TRANSPORTATION AND ASSIGNMENT MODELS-Mathematical formulation of transportation problem- Methods for finding initial basic feasible solution - optimum solution - degeneracy - Mathematical formulation of assignment models - Hungarian Algorithm - Variants of the Assignment problem.

UNIT III

INTEGER PROGRAMMING MODELS - Formulation-Gomory's IPP method - Gomory's mixed integer method - Branch and bound technique.

UNIT IV

SCHEDULING BY PERT AND CPM - Network Construction - Critical Path Method - Project Evaluation and Review Technique - Resource Analysis in Network Scheduling.

UNIT V

QUEUEING MODELS - Characteristics of Queuing Models - Poisson Queues - (M / M / 1) : (FIFO / ∞ / ∞), (M / M / 1) : (FIFO / N / ∞), (M / M / C) : (FIFO / ∞ / ∞), (M / M / C) : (FIFO / N / ∞) models.

REFERENCE BOOKS:

1. Taha H.A., "Operations Research : An Introduction " 7th Edition, Pearson Education, 2008.
2. A.M.Natarajan, P.Balasubramani, A.Tamilarasi, "Operations Research", Pearson Education, Asia, 2005.
3. Prem Kumar Gupta, D.S. Hira, "Operations Research", S.Chand & Company Ltd, New Delhi, 3rd Edition , 2003.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
		Core Option - Software Testing	5	4

COURSE OBJECTIVES

- To introduce the basics and necessity of Software testing.
- To introduce various testing techniques along with software production.
- To introduce the concepts of Software bugs and its impact.

UNIT I

Hrs 12

INTRODUCTION - Software Testing background – software bugs- cost of bugs- software testing realities- Testing Axioms – Precision and Accuracy-verification and validation- quality and reliability-testing and quality assurance.

UNIT II

Hrs12

SOFTWARE TESTING METHODOLOGY - Functional testing- Structural testing – Static and Dynamic testing – low level specification test techniques – Equivalence Partitioning – Data testing – State Testing – formal reviews – coding standards and guidelines – code review checklist – data coverage- code coverage.

UNIT III

Hrs 12

SOFTWARE TESTING TECHNIQUES - Configuration testing – Compatibility testing – foreign language testing – usability testing – testing the documentation - testing for software security – website testing.

UNIT IV

Hrs 12

AUTOMATED TESTING AND TEST TOOLS - Benefits of automation and tools – viewers and monitors – drivers – stubs – stress and load tools – analysis tools- software test automation – random testing – beta testing.

UNIT V

Hrs 12

TEST DOCUMENTATION - Goal of Test Planning – test phases – test strategy – resource requirements – test schedule – writing and tracking test cases- Bug tracking systems – metrics and statistics- risks and issues.

REFERENCE BOOKS:

1. Glenford J.Myers, Tom Badgett, Corey Sandler, "The Art of Software Testing",3rd edition, John Wiley & Sons publication, 2012.
2. Ron Patton, "Software testing", second edition, Pearson education, 2009.
3. Boris Beizer, "Software testing techniques", Dream Tech Press, 2009.
4. Srinivasan Desikan, Gopaldaswamy Ramesh, "Software testing- Principles and Practices", Pearson education, 2009.

Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
		Core Option - Rapid Application Development using Python	6	5

Objectives:

This course aims to give a broad idea about Python Programming Language and its feature and its applications to RAD programming.

Unit-I:

Introduction – history of Python – features – Python Interpreter - Basic Syntax - Constants –Variable - Operators and Expressions – Strings

Unit-II:

Control Statements – if – while - for - continue – break statements – Data Structures- Lists –Tuples – Dictionary – Sequence - Reference Data types.

Unit-III:

Functions – Parameters – Arguments – return statement - Modules – Import Statement - Files I/O.

Unit-IV:

Object Oriented Methodology – Classes and Object – methods – Inheritance –Exceptions – errors – raising exception - Library Functions

Unit-V:

Applications of Python Programming - Scientific Programming – Web Programming- Graphics/Image Processing – Network Programming.

Books for Study:

1. Swaroop C H, "**A Byte of Python**" , 2003-2005 , Under Creative Commons Attribution-NonCommercial-ShareAlike License 2.0.
2. Allen Downey, Jeffrey Elkner, Chris Meyers, "**How to Think Like a Computer Scientist:**

Learning with Python", Green Tea Press, 2002.,ISBN-10: 0971677506; ISBN-13:978-0971677500 .

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
		Core Option - Haskell Programming	6	5

Objectives :

To make students to have a depth knowledge in Haskell programming

Unit I:

Getting Started – Lists – Strings and Characters – Type System – Function Application – Writing Simple functions – Understanding evaluations – Defining new Data types – Algebraic data types – Pattern matching.

Unit – II:

Functional Programming – Infix functions – Working with Lists – Think about loops – Lambda functions – Writing a Library – Working with JSON data- Anatomy of Haskell module – Pointing JSON Data.

Unit – III:

Using Type Classes – Built in Type Class – Type Classes at work – I/O – Classic I/O – Working with files – Lazy I/O – I/O Monad – Buffering.

Unit – IV:

File processing – Regular Expressions – Pattern matching – Writing Lazy Function – I/O case study – Find – Naïve finding system – Predicates.

Unit – V:

Data Structures – Association Lists – maps – Monads – Monad type class using new monad – State Monad.

Book for Study:

1. "**Real World Haskell**", O'Reilly, ISBN: 0596514980 9780596514983