

PERIYAR UNIVERSITY
PERIYAR PALKALAI NAGAR
SALEM 638 011



MASTER OF COMPUTER APPLICATIONS (M.C.A)
SEMESTER PATTERN
Under Choice Based Credit System

REGULATIONS AND SYLLABUS
FOR AFFILIATED COLLEGES
(Effective from the Academic year 2017-2018 onwards)

PERIYAR UNIVERSITY
PERIYAR PALKALAI NAGAR
SALEM 638 011

Regulations
(FOR AFFILIATED COLLEGES)
Effective from the academic year 2017 - 2018

1. OBJECTIVE OF THE PROGRAMME

Enable the students to pursue lifelong multidisciplinary learning, function effectively on teams to accomplish a common goal and become innovative through technical advancement.

To meet dynamic global needs, the syllabus is focused on technical concepts, to enrich the knowledge of students.

2. CONDITION FOR ADMISSION

Candidates who have passed in any one of the following or equivalent are eligible to apply:

- i) Bachelor's degree (under 10+2+3/4) in any subject with Mathematics at +2 level.
- ii) Bachelor's degree (under 10+2+3/4 or 10+3 year Diploma + 3 year later entry BE) in any subject with Mathematics / Business Mathematics / Statistics as one of the subjects.

3. DURATION OF THE PROGRAMME

The duration of the degree of Master of Computer Applications shall consist of three Academic years divided into six semesters.

4. EXAMINATIONS

The examination shall be of three hours duration for each course at the end of each semester. The candidate failing in any subject(s) will be permitted to appear in the subsequent examination.

The practical / project should be an individual work. The University examination for practical / project work will be conducted by the internal and external examiners jointly at the end of each semester.

5. STRUCTURE OF M.C.A PROGRAMME UNDER CBCS PATTERN FOR AFFILIATED COLLEGES (FROM 2017 AND THEREAFTER)

Curriculum and Scheme of Examinations

Courses	Number of Credits	Hours Per Week	Exam Duration (hrs)	Marks		
				CIA	EA	Total
Semester-I						
Core Course-I-17PCA01-Computer System Architecture	4	4	3	25	75	100
Core Course-II-17PCA02-Data Structures	4	4	3	25	75	100
Core Course-III-17PCA03-Programming in C	4	4	3	25	75	100
Core Course-IV-17PCA04-Structured System Analysis and Design	4	4	3	25	75	100
Core Course-V-17PCA05-Web Technologies	4	4	3	25	75	100
Core Course-VI - 17PCAP01-Lab – I - C Programming Lab	2	5	3	40	60	100
Core Course-VII- 17PCAP02-Lab - II Web Designing Lab	2	5	3	40	60	100
Semester-II						
Core Course-VIII-17PCA06-Object Oriented Programming with C++	4	4	3	25	75	100
Core Course-IX - 17PCA07-Unified Modeling Language	4	4	3	25	75	100
Core Course-X-17PCA08-Database Management Systems	4	4	3	25	75	100
Core Course-XI-17PCA09-Data Communications and Networking	4	4	3	25	75	100
Core Course-XII-17PCA10-Managerial Accounting	4	4	3	25	75	100
Core Course-XIII-17PCAP03-Lab – III C++ Programming Lab	2	4	3	40	60	100
Core Course-XIV-17PCAP04-Lab – IV RDBMS Lab	2	4	3	40	60	100
Core Course-XV-17PCAP05-Lab – V Financial Computing Lab	1	2	3	40	60	100

Courses	Number of Credits	Hours Per Week	Exam Duration (hrs)	Marks		
				CIA	EA	Total
Semester-III						
Core Course-XVI-17PCA11	4	4	3	25	75	100
Core Course-XVII-17PCA12	4	4	3	25	75	100
Core Course-XVIII-17PCA13	4	4	3	25	75	100
EDC-I	4	4	3	25	75	100
Elective Course-I-17PCAZ1_	4	4	3	25	75	100
Core Course-XIX-17PCAP06 Lab-VI	2	4	3	40	60	100
Core Course-XX-17PCAP07 - Lab-VII	2	4	3	40	60	100
Core Course-XXI-17PCAP08 - Lab-VIII	1	2	3	40	60	100
Semester-IV						
Core Course-XXII-17PCA14	4	4	3	25	75	100
Core Course-XXIII-17PCA15	4	4	3	25	75	100
Core Course-XXIV-17PCA16	4	4	3	25	75	100
Core Course-XXV-17PCA17	4	4	3	25	75	100
Elective Course-II-17PCAZ2_	4	4	3	25	75	100
Core Course-XXVI-17PCAP09 Lab-IX –	2	4	3	40	60	100
Core Course-XXVII – 17PCAP10 Lab-X	3	4	3	40	60	100
Human Rights	-	2	3	25	75	100*

Courses	Number of Credits	Hours Per Week	Exam Duration (hrs)	Marks		
				CIA	EA	Total
Semester-V						
Core Course-XXVIII-17PCA18	4	4	3	25	75	100
Core Course-XXIX-17PCA19	4	4	3	25	75	100
Core Course-XXX-17PCA20	4	4	3	25	75	100
Elective Course-III-17PCAZ3	4	4	3	25	75	100
Elective Course-IV-17PCAZ4	4	4	3	25	75	100
Core Course-XXXI-17PCAP11-LAB-XI	2	4	3	40	60	100
Core Course-XXXII-17PCAP12-LAB-XII	2	4	3	40	60	100
Core Course-XXXIII-17PCAP13-LAB-XIII	1	2	3	40	60	100
Semester-VI						
Core Course-XXXIV-17PCAPR1 Project Work and Viva-Voce	16	-	-	50	150	200
Total no. of Credits	120			1070	2430	3500
Core EDC	04			25	75	100
Elective	16			100	300	400
Human Rights	-			-	-	-*
Grand Total	140			1195	2805	4000

* Human Rights mark is excluded for aggregation

Electives

Elective Course -I

Course 17PCAZ11
Course 17PCAZ12
Course 17PCAZ13
Course 17PCAZ14

Elective Course -II

Course 17PCAZ21
Course 17PCAZ22
Course 17PCAZ23
Course 17PCAZ24

Elective Course -III

Course 17PCAZ31
Course 17PCAZ32
Course 17PCAZ33
Course 17PCAZ34

Elective Course -IV

Course 17PCAZ41
Course 17PCAZ42
Course 17PCAZ43
Course 17PCAZ44

EDC-EXTRA DISCIPLINARY COURSE

Students are expected to opt EDC (Non major elective) offered by other departments.

1. Principles of Information Technology
2. Fundamentals of Computers and Communications
3. E-Commerce

CIA – CONTINUOUS INTERNAL ASSESSMENT

EA – EXTERNAL ASSESSMENT

6. EXAMINATIONS

6.1 THEORY

6.1.1 EVALUATION OF CONTINUOUS INTERNAL ASSESSMENT

Test	:	10 Marks
Seminar	:	05 Marks
Assignment	:	05 Marks
Attendance	:	05 Marks

Total	:	25 Marks

(No passing minimum)

6.1.2 EVALUATION OF EXTERNAL ASSESMENT QUESTION PAPER PATTERN

Time: 3 Hours

Max. Marks: 75

PART- A: 5x5 = 25 marks

Answer all the questions

One question from each unit (either or type)

PART- B: 5x10 = 50 marks

Answer all the questions

One question from each unit (either or type)

The Passing minimum shall be 50% out of 75 marks (38 marks)

6.2 PRACTICAL / SOFTWARE DEVELOPMENT

6.2.1 EVALUATION OF CONTINUOUS INTERNAL ASSESSMENT

Test 1	:	15 Marks
Test 2	:	15 Marks
Record	:	10 Marks

Total	:	40 Marks

(No passing minimum)

6.2.2 EVALUATION OF EXTERNAL ASSESSMENT

I) PRACTICAL

QUESTION PAPER PATTERN

Time: 3 Hours

Max. Marks: 60

There will be two questions with or without subsections to be asked for the practical examination. Every question should be chosen from the question bank prepared by the examiner(s). Every sixth student should get a new question i.e. each question may be used for at most five students.

Distribution of Marks

Each question	: 30 Marks
Problem Understanding	: 05 Marks
Program writing	: 10 Marks
Debugging	: 10 Marks
For Correct Results	: 05 Marks

II) SOFTWARE DEVELOPMENT

Viva-voce (jointly)	: 30 Marks
Modification	: 30 Marks

Students should write about their software development briefly.

- i. Aim
- ii. Features
- iii. Modules
- iv. Modification

III) PROJECT WORK

Continuous Internal Assessment	: 50 Marks
Evaluation (External)	: 50 Marks
Viva-voce (jointly)	: 100 Marks

7. REGULATIONS OF PROJECT WORK

- Students should do their Project work in Company / Institutions during the sixth semester.
- The Candidate should submit the filled in format as given in Annexure-I to the department for approval during the 1st Week of December.
- Periodically the project should be reviewed.
- The Student should submit three copies of their Project Work work.

- A Sample format is enclosed in Annexure-II.
- Format of the Title page and Certificate are enclosed in Annexure III.
- The students may use power point presentation during their viva voce examination.

8. PASSING MINIMUM

The candidate shall be declared to have passed in the Theory / Practical / Project Work examination, if the candidate secures not less than 50% marks in EA and also in Total of the prescribed marks. However submission of a record notebook is a must.

9. CLASSIFICATION OF SUCCESSFUL CANDIDATES

Candidates who obtain 75% and above in the aggregate shall be deemed to have passed the examination in **First Class with Distinction** provided they pass all the examinations prescribed for the programme at the first appearance. Candidates, other than the above, who secure not less than 60% of the aggregate marks in the whole examinations shall be declared to have passed the examination in **First Class**. The remaining successful candidates shall be declared to have passed in **Second Class**.

Candidates who pass all the examinations prescribed for the programme in first instance and within a period of three academic years from the year of admission are only eligible for **University Ranking**.

10. MAXIMUM DURATION FOR THE COMPLETION OF THE PROGRAMME

The maximum duration to complete the programme shall be three academic years after normal completion of the programme.

11. COMMENCEMENT OF THIS REGULATION

These regulations shall take effect from the academic year 2017-18, that is, for students who are admitted to the first year of the programme during the academic year 2017-18 and thereafter.

12. TRANSITORY PROVISION

Candidates who were admitted to the MCA programme of study before 2017-2018 shall be permitted to appear for the examinations under those regulations for a period of three years after completion of the programme. Thereafter, they will be permitted to appear for the examination only under the regulations then in force.

PERIYAR UNIVERSITY

Name of the College :
Programme :
Name of the Student :
Register Number :
Title of the Project Work :
Address of Organization / Institution :

Name of the External Guide :
Designation :

Place :

Date :

Signature of External Guide
(with seal)

Name of the Internal Guide :
Qualification :
Teaching Experience :

Place :

Date :

Signature of Internal Guide

Principal

[Approved or not Approved]

[University Use]

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	A. DATA FLOW DIAGRAM	
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A. Format of the title page

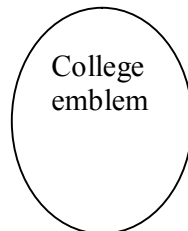
TITLE OF THE PROJECT WORK

A Project Work submitted in partial fulfillment of
the requirements for the degree of
Master of Computer Applications
to the
Periyar University, Salem - 11

By

NAME OF THE STUDENT

REG. NO.



COLLEGE NAME

(AFFILIATED TO PERIYAR UNIVERSITY)

PLACE with Pin Code

MONTH – YEAR

B. Format of the Certificate

Name and Address of the Internal Guide

Place

Date

CERTIFICATE

This is to certify that the Project Work entitled
..... submitted in partial fulfillment of the requirements of the degree of Master
of Computer Applications to the Periyar University, Salem is a record of bonafide work
carried out by Reg. No. under my supervision and guidance.

Head of the Department

Internal Guide

Date of Viva-voice:

Internal Examiner

External Examiner

SEMESTER I

Core Course-I-17PCA01- COMPUTER SYSTEM ARCHITECTURE

Credits:4

UNIT – I

Digital logic circuit: Logic gates - Boolean algebra - Maps simplification – Combinational Circuits – Flip Flops – Sequential Circuits. **Digital Components:** Integrated Circuits – Decoders – Multiplexers - Registers - Shift Registers – Binary Counters – Memory unit.

UNIT - II

Data representation: Data types –Complements -Other binary codes – Error detection code. **Register Transfer and Micro Operation:** Register Transfer – Bus and Memory transfer – Arithmetic Micro Operations – Logic Micro Operations – Shift Micro Operations – Arithmetic logic shift unit.

UNIT – III

Micro programmed Control: Control Memory – Address Sequencing. **CPU:** General Register Organization – Stack Organization – Instruction Format – Addressing Modes – Data transfer and Manipulation – Program Control – Reduced Instruction Set Computer.

UNIT - IV

Memory Organization : Memory Hierarchy – Associative memory – Cache memory – Virtual memory. **Computer Arithmetic :** Introduction – Addition and Subtraction – Multiplication Algorithms –Division Algorithms – Floating-point Arithmetic Operations – Decimal Arithmetic Unit – Decimal Arithmetic Operations.

UNIT – V

The Processor 8086 Architecture, Pin Diagram and Timing Diagram : Register Organisation of 8086 – Architecture – Signal Descriptions of 8086. **Recent Advances and Microprocessor Architecture :** Features of Pentium – System Architecture – Enhanced instruction set of Pentium – Intel MMX Architecture – MMX Instruction Set.

TEXT BOOKS

1. Morris Mano, “Computer System Architecture,” 3rd Edition, PHI,1995.
2. K.M.Bhurchandi, A.K.Ray, “Advanced Microprocessor and Peripherals,” 3rd Edition, TMH, 2012

REFERENCE BOOKS

1. A.P.Malvino, D.P.Leach, “Digital Principles and Applications,” TMH, Edn.1991.
2. J.P.Hayes, “Computer Organization and Architecture,” TMH, 2nd Edition, 1988.
3. William Stallings, “Computer Organization & Architecture – Designing for Performance”, Pearson Education, 6th Edition, 1997.
4. Mathur Sunil, “Micro processor 8086: Architecture, Programming and Interfacing,” PHI learning Pvt. Ltd.
5. Walter A.Tribel, “The 80386, 80486 and Pentium Microprocessor: Hardware, Software and Interfacing”, Simon & Schuster Trade, 1997.

Core Course-II - 17PCA02 - DATA STRUCTURES

Credits: 4

UNIT - I

Introduction to Data Structures: Need for Data structures - Definitions – Algorithm Analysis: Problem Solving – Modular Design - Implementation of Algorithms – Testing – Verification – Algorithm Analysis – Time Complexity Classes – Asymptotic Analysis. **Arrays:** Range of an Array – One-Dimensional Array – Two-Dimensional Array – Multidimensional Arrays – Special Types of Matrices – Strings.

UNIT - II

Linked Lists : Memory Allocation – Benefits - Limitations – Types – Basic Operations in Linked List – Singly Linked Lists – Circular Linked Lists – Doubly Linked Lists – Circular **Doubly Linked List:** Initialization of a Circular DLL – Header – Allocate a Node – Deallocation of a Node from the List – Initialization of a List – Insert a Node at the Head of a List – Insert a Value After a Given Key – Deletion of a Value from a List – Print the Values of a List – Multiply Linked Lists. **Stacks:** ADT Stack – Implementation of Stack – Linked List Implementation of Stack – **Applications of Stack :** Well Formedness of Parenthesis – Syntax Checking Using Stacks – Infix, Prefix and Postfix Forms of Expressions – Conversion of Infix Expression to Postfix Form – Steps in Conversion of Infix Expression to Postfix Notation – Evaluation of Postfix Expressions – Algorithm to Evaluate Postfix Expression – Evaluation of Recursive Functions.

UNIT - III

Queues: Implementation of Queues – Basic Operations on Array-Based Implementation of Queues - Basic Operations on Linked List-Based Implementation of Queues – **Queue Operations Using Stacks:** Enqueue Operation – Dequeue Operation – Priority Queue – Circular Queues. **Trees :** Binary Trees – **Types of Binary Trees :** Strictly Binary Tree – Complete Binary Tree – Skew Trees – **Number of Nodes in Binary Trees :** Strictly Binary Tree – Complete Binary Tree – Binary Trees – Operations on Binary Trees – Inorder Traversal – Preorder Traversal – Postorder Traversal – Breadth First Traversal – **Representation of Binary Trees :** Linear Representation – Linked Representation – Node Representation of Binary Trees – Applications of Binary Trees – Huffman Coding – Decoding – Heap – Properties of Heap – Operations of a Heap – Deletion – Expression Trees – Evaluating an Expression Tree – Representation of General Trees Using Binary Trees.

UNIT - IV

Balanced Search Trees : AVL Trees : Height of AVL Trees – Operations in AVL Trees – Single Right Rotation(SRR) – Single Left Rotation(SLR) – Double Left Right Rotation(DLR) - Double Right Left Rotation – Deletion of Node. **B-Trees :** Operations on B-Tree – B+ Tree. **Hashing :** Hash Functions – Collision Resolution Techniques – Hashing.

UNIT - V

Sorting and Searching : Sorting – **Classification of Sorting Algorithms :** Classification Based on Structure of Algorithm – Computational Complexity – Stability of Sorting – Memory Usage – Selection of Sorting Method – Selection Sort – Binary Tree Sort – Heap Sort – Shell Sort – Merge Sort – Radix Sort – Bucket Sort – Searching – Binary Search – Searching Using BST – **Graphs :** Representation of Graphs – Adjacency Matrix – Adjacency Lists – Operations on Graphs – Insertion – Deletion – Traversal – Breadth First Search(BFS)

– BFS Tree – Depth First Search(DFS) – DFS(G) – DFS_VERTEX(U) – Shortest Path Algorithm - Shortest Path in an Unweighted Graph - Shortest Path in an Weighted Graph – Dijkstra’s Algorithm.

TEXT BOOK:

1. A.Chitra, P.T.Rajan, “Data Structures,” Vijay Nicole Imprints Private Limited, 2nd Edition,2016

REFERENCE BOOKS:

1. Reema Thareja, “Data Structures using C,” Oxford Univ. Press, 2011.
2. D.Samantha, “Classic Data Structures”, Prentice-Hall of India Pvt. Limited, 2009.
3. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, Pearson Education, 2nd Edition, Reprint 2002.
4. John Paul Tremplay and Paul G.Sorenson, “An Introduction to Data Structures with Applications” ,TMH, 1995.
5. Horowitz.E., Sahni and Anderson Freed, “Fundamentals of Data Structures in C,” Universities Press, 2nd Edition, 2008.

Core Course-III-17PCA03- PROGRAMMING IN C

Credits: 4

UNIT – I

Introduction to programming and algorithm: Programs and programming – Programming Languages – Compiler, Interpreter, Loader and Linker – Program Execution- Classifications of Programming Languages- Algorithms. **Basics of C :** Introduction – Standardization of C Language- Developing Programs in C – A Simple C Program – Parts of C Program – Structure of a C program- Concept of a Variable – Data types in C – Program Statement – Declaration – Storage of data in memory – Token – Operators and Expressions.

UNIT – II

Input and Output: Introduction – Basic Screen and Keyboard I/O in C – Non formatted Input and Output – Formatted Input and Output functions. **Control Statements :** Introduction – Specifying test condition for selection and Iteration – Writing test expression – Condition execution and Selection – Iteration and Repetitive execution – Which loop should be used – Goto statement – Special Control Statements – Nested Loops.

UNIT – III

Arrays and Strings : Introduction – One Dimensional array – **Strings:** One dimensional Character Array – Multidimensional arrays – **Arrays of Strings :** Two dimensional Character Array. **Functions :** Introduction – Concept of Function – Using Functions – Call by value mechanism – Working with functions – passing Arrays to Functions – Scope and Extent – Storage Classes.

UNIT - IV

Pointer in C : Introduction – Understanding Memory Address – Address Operator(&) – Pointer – Void Pointer – Null Pointer – Use of Pointers – Arrays and Pointers – Pointers and Strings – Pointer Arithmetic – Pointers to Pointers – Array of Pointers – Pointers to an Array

– Two dimensional arrays and Pointers – Three dimensional arrays – Pointers to Functions – Dynamic Memory Allocation.

UNIT – V

User-Defined Data types and variables : Introduction – Structure – Union. Files in C: Introduction – Using Files in C – Working with text files – Working with binary files – Direct file Input and Output – Files of records – Random Access to files of records. **Advanced C**: Introduction – Bitwise Operators – Command Line Arguments – C Preprocessor.

TEXT BOOK:

1. Pradip Dey, Manas Ghosh, “Programming in C”, 2nd Edition, Oxford University Press, New Delhi, 2013.

REFERENCE BOOKS:

1. M.T.Somashekara, “Programming in C,” PHI, 2009
2. Kernighan.B.W and Ritchie.D.M, “The C Programming Language”, 2nd Edition, PHI, 2015.
3. Herbert Schildt, “C: The Complete Reference,” 4th Edition, TMH Edition, 2000.
4. Gottfried.B.S, “Programming with C,” Second Edition, TMH Pub. Co. Ltd., New Delhi 2012.
5. Kanetkar Y., “Let us C,” BPB Pub., New Delhi, 2010.

Core Course-IV-17PCA04- STRUCTURED SYSTEM ANALYSIS AND DESIGN

Credits:4

UNIT – I:

Basic System concepts: System Concepts and Theory – System Development Life Cycle – System Development Process Models – System Analysis and System Analyst. **Information Systems:** Management Information System Concepts.

UNIT – II:

Information Systems Planning: Project Initiation – Feasibility Study. **Information System Analysis:** System Analysis and Design Methods – Information Gathering Techniques – Information System Modeling.

UNIT – III:

Detailed Information Systems Design: Logical and Physical Design Concepts – Output Design – Input Design – File Organization and Database Design – Modular and Structured Design.

UNIT – IV:

Software Quality Assurance and Testing: Quality Assurance Procedure, Testing Strategies and Validations. **System Implementation and Operations:** System Implementation – System Security and Audit – System Operation and Maintenance.

UNIT- V:

Advanced Topics: Object Oriented Analysis and Design – UML Basics – CASE tools – Major Business Functions.

TEXT BOOKS:

1. ISRD Group, “Structured System Analysis and Design”, TMH Publishing Company Ltd., New Delhi, 2007.

REFERENCE BOOKS:

1. Preeti Gupta, “Structured System Analysis and Design”, Firewall Media, 2005
2. J.B. Dixit and Raj Kumar, “Structured System Analysis and Design”, Laxmi Publications, 2007.

Core Course-V-17PCA05 -WEB TECHNOLOGIES**Credits:4****UNIT - I**

Introduction to the Web: Understanding the Internet and WWW – History – Protocols Governing the Web – Creating Websites for Individuals and the Corporate World - Web Applications – Writing Web Projects – Identification of Objects – Target Users – Web Team – Planning and Process Development – Web Architecture – Major Issues in Web Solution Development – Web Servers – Web Browsers - Internet Standards – TCP/IP Protocols Suite IP Addresses – MIME - Cyber laws. **Hyper Text Transfer Protocol:** Introduction – Web Servers and Clients – Resources – URL and its Anatomy – Message Format – Testing HTTP using Telnet – Persistent and Non-Persistent Connections – Web Caching – Proxy.

UNIT - II

Hyper Text Markup Language: Introduction – Elements, Attributes and Tags – Basic Tags – Table – Cell Spacing and Cell Padding – Nested Tables – Forms – Form Elements – Frames – Images – Meta Tag – Planning of Web Page – Model and Structure for a Web Site – Designing Web Pages – Multimedia Content Frames.

UNIT - III

Cascading Style Sheet: Introduction – Advantages – Adding CSS – Browser Compatibility – CSS and Page Layout – **Selectors:** Grouping – Type Selectors – Universal Selectors – Descendant Selectors – Child Selectors – Pseudo Classes and Elements – Pseudo Elements – Attribute Selectors – Class Selectors – ID Selectors.

UNIT - IV

E-Commerce: Introduction: Basic elements – Electronic commerce vs traditional commerce – Electronic commerce framework – Various stakeholders in electronic commerce – Basic infrastructure – Players – Advantages and disadvantages – SWOT analysis. Electronic commerce software – **Security threats to electronic commerce:** Internet security issues – Intellectual property threats.

UNIT - V

Payment systems for E-Commerce – Inter organizational commerce and EDI – **Consumer oriented Electronic commerce:** Consumer oriented Applications – Website usability. **Internet business strategies:** M commerce – Virtual communities. **Software agents:** History of software agents – Characteristics and properties of software agents.

TEXT BOOK

1. Uttam K. Roy, “Web Technologies,” Oxford University Press, 2010.
2. Jibitesh Mishra, “E-Commerce”, Trinity press, 2017.

REFERENCE BOOKS

1. Faithe Wempen, “HTML and XHTML Step by Step”, Prentice- Hall of India Private Limited, 2006.
2. David R. Brooks, An Introduction to HTML and JavaScript for Scientists and Engineers,” New Age International (P) Ltd, 2010.
3. Jon Duckett, “Beginning HTML, XHTML, CSS, and JavaScript,” Wiley Pub. Inc. , 2010.
4. Dr.K.Abirami Devi, Dr.M.Alagammai, “E-Commerce”, Margham Publications, 2008.
5. Elias M. Awad, “Electronic Commerce,” PHI, 2008.

Core course-VI - 17PCAP01- LAB – I - C PROGRAMMING LAB

Credits:2

1. Perform various Operations on Single Dimensional Arrays. (SUM, AVERAGE etc.,)
2. Perform various Operations on Matrices. (ADDITION, SUBTRACTION & MULTIPLICATION etc.,)
3. Perform String Operations using String Library Functions.
4. Calculate Binomial coefficient using functions
5. Generate Fibonacci series using recursive functions
6. Create students database using Array of structures
7. Sorting a set of numbers using
 - a. Bubble sort
 - b. Merge sort
8. Perform addition of Sparse Matrices using arrays.
9. Evaluate the expression using Stack
10. Perform breadth-first search of a graph using Queue
11. Perform polynomial addition and multiplication using Linked lists
12. Implement Doubly Linked Lists to search and print the position of the number using
 - a. Linear search technique
 - b. Binary search technique

Core Course-VII- 17PCAP02- LAB - II WEB DESIGNING LAB

Credits: 2

Develop any five static web pages for the following, similar to the existing websites.

1. Education Institutions website
2. E-Banking website
3. Online shopping website
4. Match Making website
5. Travel & Tourism services website
6. Employment, Placement and Job market website

7. Electronic trading website
8. Healthcare website
9. Public service website

SEMESTER-II

Core Course-VIII-17PCA06-OBJECT ORIENTED PROGRAMMING WITH C++

Credits:4

UNIT - I

Introduction to C++: Key Concepts of OOP – Advantages – Object Oriented Languages – **Input and Output in C++:** Streams in C++ – Pre-Defined Streams – Unformatted Console I/O Operations – Formatted Console I/O Operations – C++ Declarations – **Control Structures:** Decision Making Statements – If...Else – Jump – GOTO – Break – Continue – Switch Case Statements – Loops in C++ – For – While – Do...While Loops – Functions in C++ - In Line Functions – Function Overloading.

UNIT - II

Class and Objects: Declaring Objects – Defining Member Functions – Static Member Variables and Functions – Array of Objects – Friend Functions – Overloading Member Functions – Bit Fields and Class. **Constructor and Destructors:** Characteristics – Calling Constructor and Destructors – Constructor and Destructor with Static Member.

UNIT - III

Operator Overloading: Overloading Unary - Binary Operators – Overloading Friend Functions – Type Conversion – **Inheritance:** Types of Inheritance – Single - Multilevel - Multiple - Hierarchical - Hybrid and Multi Path Inheritance – Virtual Base Classes – Abstract Classes.

UNIT - IV

Pointers: Declaration – Pointer to Class - Object – THIS Pointer – Pointer to Derived Classes and Base Classes – **Arrays:** Characteristics – Arrays of Classes – Memory Models – New and Delete Operators – Dynamic Objects – Binding - Polymorphisms and Virtual Functions.

UNIT - V

Files: File Stream Classes – File Modes – Sequential Read/ Write Operations – Binary and ASCII Files – Random Access Operation- Command Line Arguments – **Exception Handling:** Principles of Exception Handling- The Keywords try, throw and catch-Exception Handling Mechanism-Multiple Catch Statements-Catching Multiple Exceptions-Rethrowing Exception – **Strings:** Declaring and Initializing String Objects – String Attributes – Miscellaneous Functions.

TEXT BOOK

1. Ashok N Kamthane, "Object Oriented Programming with ANSI and Turbo C++," Pearson Education, 2006.

REFERENCE BOOKS

1. Balagurusamy E, "Object Oriented Programming With C++," TMH, 1998.
2. John R Hubbard, "Programming With C++," Schaum's outline series, TMH, 2nd edition 2000

Core Course-IX - 17PCA07- UNIFIED MODELING LANGUAGE

Credits: 4

UNIT I

Getting Started: Why We Model, Introducing the UML, Hello World.

UNIT II

Basic Structural Modeling: Classes, Relationships, Common Mechanisms.

UNIT III

Basic Structural Modeling : Diagrams, Class Diagrams .

UNIT IV

Basic Behavioral Modeling: Interactions, Use Cases, Use Case Diagrams.

UNIT V

Basic Behavioral Modeling : Interaction Diagrams , Activity Diagrams.

TEXT BOOK

1. Grady Booch, James Rumbaugh and Ivar Jacobson, "The Unified Modeling Language User Guide," Pearson Edition, 1999.

REFERENCE BOOKS:

1. James Rumbaugh, Ivar Jacobson, and Grady Booch, "The unified modeling language reference Manual," 2nd edition, Addison-Wesley, 2005.
2. Bruce Powel Douglass, "Real Time UML: Advances in the UML for Real-Time systems," 3rd edition, Pearson, 2004.

Core Course-X-17PCA08- DATABASE MANAGEMENT SYSTEMS

Credits:4

UNIT – I

File Systems and Databases: Introducing the Database – The Historical Roots of the Database: Files and File Systems – A File System Critique – Database Systems – Database Models – **Wrap-Up:** The Evolution of Data Models. **The Relational Database Model:** A Logical view of data – Keys – Integrity Rules Revisited – Relational Database Operators – The Data Dictionary and the System Catalog – Relationships Within the Relational Database – Data Redundancy Revisited.

UNIT – II

Entity Relationship (E-R) Modeling: Basic Modeling Concepts – **Data Models:** Degrees of data Abstraction – The Entity Relationship (E-R) Model – Normalization of Database Tables: Database Tables and Normalization – Higher-Level Normal Forms – Denormalization.

UNIT – III

Relational Databases: Structured Query Language – Other Relational Languages - **Transaction Management and Concurrency Control:** What is a Transaction – Concurrency Control – Concurrency Control with Locking Methods – Concurrency Control with Time Stamping Methods – Concurrency Control with Optimistic Methods – Database Recovery Management. **Distributed Database Management Systems:** The Evolution of Distributed Database Management Systems – Distributed Processing and Distributed Databases – Functions of Distributed Database Management System- DDBMS Components – Levels of Data and Process Distribution – Distributed Database Transparency Features –

Distribution Transparency – Transaction Transparency – Performance Transparency and Query Optimization – Distributed Database Design – Data Fragmentation – Data Replication – Data Allocation – Client/Server vs. DDBMS – C.J. Date’s Twelve Commandments for Distributed Databases.

UNIT – IV

Query Processing: Overview – Measures of Query Cost – Selection Operation – Sorting – Join Operation – Other Operations – Evaluation of Expressions. **Query Optimization:** Overview – Estimating Statistics of Expression Results – Transformation of Relational Expressions – Choice of Evaluation Plans – Materialized Views. **Distributed Databases:** Homogeneous and Heterogeneous Databases – Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency control in Distributed Databases – Availability – Distributed Query Processing – Heterogeneous Distributed Databases – Directory Systems.

UNIT – V

Object Oriented Databases: Object-Oriented Concepts - Characteristics of an Object-Oriented Data Model – **ODM and Previous Data Models:** Similarities and Differences – Object-Oriented Database Management Systems – How Object Orientation Affects Database Design – **OODBMS:** Advantages and Disadvantages – OO Concepts in Relational Model – The Next Generation of Database Management Systems. Advanced Data Types and New Applications: Motivation – Time in Databases – Spatial and Geographic data – Multimedia Databases – Mobility and Personal Databases.

TEXT BOOKS:

1. Peter Rob Carlos Coronel, “Database Systems – Design, Implementation and Management”, Thomson Course Technology, 5th Edition, 2002.
2. Abraham Silberschatz, Henry F.Korth, S.Sudarshan, “Database System Concepts”, McGraw-Hill, 4th Edition, 2002.

REFERENCE BOOKS:

1. Alexis Leon, Mathews Leon, “Essentials of Database Managements Systems”, Vijay Nicole imprints pvt Ltd, 2006.
2. C.J.Date, “An Introduction to Database Systems”, 7th Edition, Pearson.
3. Raghu Ramakrishnan and Johannes gehrke, “Database Mangement System”, McGraw Hill, 2000.
4. Gerald V.Post, “Database Management Systems –Designing & Building Business Applications”, Mc Graw Hill, 2000.

Core Course-XI-17PCA09- DATA COMMUNICATIONS AND NETWORKING

Credits:4

UNIT -I

Introduction: Data communications –components, Data Representation, Data Flow; Networks – Network criteria, Physical Structures, Network types-Local area network, Wide area network, switching, The Internet. **Network Models:** Protocol Layering- **TCP/IP Prtocol Suite:** Layered architecture, Layers in the TCP/IP protocol suite, Description of

Each layer, Encapsulation and Decapsulation, Addressing, Multiplexing and Demultiplexing.

OSI model: OSI versus TCP/IP, Lack of OSI model's success.

UNIT - II

Data and Signals: Analog and Digital – data, signals, periodic and nonperiodic; Digital signals; Transmission Impairments – Attenuation, Distortion, Noise; Data rate limits – Nyquist Bit Rate, Shannon Capacity; Performance; **Digital Transmission** : Digital-to-Digital conversion-Line coding, Line coding schemes; **Analog-to-Digital conversion** : PCM.

UNIT - III

Error detection and correction : Introduction, Block coding, Cyclic codes – CRC, Polynomials; Checksum; **Data link control:** Data Link Control Services: Framing, Flow & error control, Connectionless and Connection Oriented; **Data link layer Protocols:** Simple Protocol, Stop-and-wait protocol; **Media Access Control:** Random Access, Controlled Access and Channelization.

UNIT - IV

Network Layer: Network Layer Services: Packetizing, Routing and Forwarding; Packet Switching; Network Layer Performance; **IPV4 Addresses:** Address Space, Classful Addressing, Classless Addressing; **Forwarding of IP packets:** Forwarding Based on Destination Address, Forwarding Based on Label; **Network Layer Protocols:** Internet Protocol.

UNIT - V

Transport Layer: Introduction: Transport-Layer Services, Connectionless and Connection-Oriented Protocols; Transport layer Protocols: Simple Protocol, Stop-and-wait Protocol, Go-Back-N protocol(GBN), Selective-Repeat Protocol. **Bidirectional Protocol:** Piggybacking; **Application Layer:** Introduction: Providing Services, Application- Layer Paradigms; **Client-Server Programming:** Application Programming Interface, Using Services of the Transport Layer, Iterative Communication using UDP, Iterative Communication using TCP, Concurrent Communication

TEXT BOOK:

1. Behrouz A. Forouzan, "Data Communications and Networking," 5th Edition, Tata McGraw-Hill, 2014.

REFERENCE BOOKS:

1. Bhushan Trivedi, "Data Communication and Networks," Oxford Higher Education, 2014.
2. Andrew Tanenbaum, "Computer Networks," 5th edition, Pearson New International Edition, 2013.
3. James F.Kurose, Keith W.Ross, "Computer Networking – A top down Approach," 6th edition, 2013.

Core Course-XII-17PCA10 - MANAGERIAL ACCOUNTING

Credit: 4

UNIT – I

Financial Accounting: Definition – Objectives - Branches of Accounting - Accounting Concepts and Conventions - Groups Interested in Accounting Information - Accounting

Rules – Journal - Ledger - Trial Balance – Preparation of Final Accounts / Financial Statements.

UNIT -II

Management Accounting: Definition – Objectives – Distinction between Financial Accounting and Management Accounting. **Analysis and Interpretation of Financial Statements-I :** Tools used - Comparative Statement - Common Size Statement and Trend Percentage. **Ratio Analysis:** Meaning - Advantages and Limitations - Computation of various Ratios – Solvency – Profitability - Activity and Capital Structure Ratios.

UNIT - III

Analysis and Interpretation of Financial Statements-II: Fund Flow Analysis: Concept of Funds - Fund Flow Statement - Uses and Limitation - Preparation of Fund Flow Statement. **Cash Flow Analysis:** Computation of Cash from operation and Preparation of Cash Flow Statement.

UNIT - IV

Budgeting and Budgetary Control: Meaning – Advantages and limitations - Classification of Budgets - Preparation of Production, Sales, Cash and Flexible Budgets. **Capital Budget:** Meaning and Importance - Methods of Ranking Investment Proposals - Pay-Back, Average Rate of Return and Discounted Cash Flow Methods.

UNIT - V

Marginal Costing: Meaning - Advantages and Uses - Cost Volume - Profit Analysis – Measurement of Break-even Point - Decisions Involving Alternative Choices.

TEXT BOOKS

1. Shukla M.C. & Grewal T.S., "Advanced Accounts," S.Chand 1991
2. Dr.S.N.Maheswari, "Principles of Management Accounting," Sultan Chand & sons,2005.

REFERENCE BOOKS:

1. S.P.Jain, K.L.Narang, "Advanced Accountancy – Part-I," Kalyani Publishers,1991.
2. Gupta R.L, Radhasamy M., "Advanced Accounts" (Vol.II), S.Chand, 1991.
3. R.K.Sharma, Shasi K.Gupta, "Management Accounting – Principles And Pratices," Kalyani publishers, 1992.
4. Man mohan, S.N.Goyal, "Principles Of Management Accounting," Agra, Sahithya Bhawan, 1987.
5. Hingorani N.L., Ramanathan A.R., "Management Accounting," S. Chand, 2nd edition, 1982.

Core Course-XIII-17PCAP03- LAB – III C++ PROGRAMMING LAB

Credits:2

1. Program using Classes & Objects.
2. Program using Function Overloading
3. Program using Friend function
4. Program using Operator overloading functions
5. Program using String Manipulation functions
6. Program using Inheritance

7. Program using Pointers
8. Program using Virtual Function
9. Program using Templates
10. Program to perform Insertion - Deletion and Updation using files.
11. Program which takes a file as argument and copies in to another file with line numbers using Command Line Arguments.

Core Course-XIV-17PCAP04 - LAB – IV RDBMS LAB

Credits: 2

1. Creation of a database and writing SQL queries to retrieve information from the database.
2. Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions.
3. Creation of a database and perform the operations Views, Synonyms, Sequence, Indexes, Save point.
4. Creating an Employee database to set various constraints.
5. Creating relationships between the databases.
6. Write a PL/SQL block for a database and retrieve records from the database using cursor.
7. Write a PL/SQL block to satisfy some conditions by accepting input from the user.
8. Write a PL/SQL block that handles all types of exceptions.
9. Creation of Procedures for a database and perform some operations.
10. Creation of database and perform the following operations :
 - a. Insert a record to a database using triggers
 - b. Group the records from a database using functions.

Core Course-XV-17PCAP05 - LAB V - FINANCIAL COMPUTING LAB

Credit: 1

1. Create a Single Ledger using display and alter commends
2. Create a Multiple Ledger using display and alter commends
3. Create Single group using display and alter commends
4. Create a multiple groups using display and alter commends
5. Create a voucher types like contra, credit & debit notes, purchase, sales, receipt and delivery notes.
6. Create a single stock group.
7. Create a multiple stock groups
8. Create balance sheet for various items
9. Create profit and loss account for various aspects
10. Prepare various types of vouchers like accounting, inventory, and import transaction

**EXTRA DISCIPLINARY PAPERS
COMPUTER SCIENCE**

List of **Extra Disciplinary Courses** (Non-Major Electives) offered by the Department of Computer Science/Applications for other PG programmes

PAPER – I PRINCIPLES OF INFORMATION TECHNOLOGY

Credits: 4

UNIT-I

Business Environment: Business and Information technology – business in the information age – about information technology – what is an information system – Information Technology in the Modern Organization.

UNIT-II

Computer Hardware – Significance of Hardware – Central Processing Unit – Computer Memory – Computer Hierarchy – Input Technologies – Output Technologies – Strategic Hardware issues. Computer Software: Software History and Significance – System Software – Application Software – Software issues – Programming languages – Enterprise Software.

UNIT-III

Managing Organizational Data and Information: Basics of Data arrangement and Access – Traditional file environment – modern approach: database management systems – logical data models – data warehouses – Telecommunications and Networks: The telecommunication system – Networks – Telecommunications applications – Internet- Evolution of the Internet – Operation of the Internet – WWW- Intranets and Extranets.

UNIT-IV

Functional, Enterprises, and Interorganizational Systems: Information system to support business functions – transaction processing information systems – accounting and finance system – marketing and sales system – production and operations management system – Integrated information system and enterprises resource planning – interorganizational / Global information system. - Electronic Commerce

UNIT-V

Information Systems Development: Information system planning – Traditional systems development life cycle – alternative methods for system development –system development outside the IS department – building Internet and Intranet applications – Implementing: Ethics, Impacts and Security.

TEXT BOOK

1. Turban, Rainer, Potter "Introduction to Information Technology," 2nd edition, Wiley India, 2007

REFERENCE BOOK

1. V. Rajaraman, "Introduction to Information Technology," Prentice Hall of India, 2007

PAPER - II FUNDAMENTALS OF COMPUTERS AND COMMUNICATIONS

Credits: 4

UNIT- I

Introduction : What is computer – Components of Computers – Advantages and Disadvantages of using computers – Computer Software – Categories of Computers - Elements of an information Systems. The Components of the Systems Unit: Processor – Data representation – Memory – Expansion Slot and Adapter Cards – Ports and Connectors - Buses – Bays – Power Supply – Mobile Computers and Devices.

UNIT – II

Input and Output Device:: What is input - what are input devices – keyboard –pointing device – mouse – other pointing devices – controllers for gaming and media players – Voice input – Input for PDAs, Smart phones and Tablet Pcs- Digital Cameras – Video input – Scanners and Reading devices Terminals – Biometric input - Input devices for physically challenged users- Output: What is output – display devices – Flat panel displays – CRT monitors – Printers – Speakers, Headphones and Ear phones – other out put devices – output device for physically challenged users – Storage devices.

UNIT-III

Operating Systems and Utility Programs: System software – Operating system – Operating system functions – operating system utility programs – types of operating systems – stand alone operating systems – network operating systems – embedded operating system – Standalone utility programs. Application Software: Application software – Business software – Graphics and Multimedia Software – Application software for Communication.

Unit-IV

Internet and World Wide Web: Internet – History of the Internet – How the Internet works – WWW – E-commerce – Other Internet Services – Netiquette. Communications and Networks: Communications – Uses of Computer Communications – Networks – Network communication standards – Communication software – Communication over the telephone network – Communication devices – Home networks – Communications Channel – Physical transmission media and Wireless transmission media.

Unit-V

Database Management: Databases, Data and Information, The Hierarchy of data – Maintaining data – File processing versus databases – database management systems – relational, object oriented and multidimensional databases – web databases – database administration. Computer Security : Computer security risks – Internet and network attacks – Unauthorized access and use.

TEXT BOOK:

1. Gary B. Shelly, Thomas j. Cashman, Misty E.Vermaat, "Introduction to Computers," Cengage Learning, 2008

REFERENCE BOOKS

1. Reema Thareja, "Fundamentals of Computers," Oxford Univ. Press, 2015
2. Deborah Morley, Charles S. Parker, "Understanding Computers- Today and Tomorrow", 14th Edition, Thomson Course Technology, 2012
3. Alexis Leon, Mathew's Leon, "Fundamentals of Computer Science and Communication Engineering", Vikas Publishing House, New Delhi, 1998.

PAPER - III E-COMMERCE

Credits: 4

UNIT - I

Electronic Commerce- Electronic Commerce Framework-The Anatomy of Electronic Commerce Applications- Electronic Commerce Consumer Applications- Electronic Commerce Organization Applications- Components of I-Way – Network Access Equipment.

UNIT - II

Architecture Framework for Electronic Commerce- World Wide Web as the Architecture – Consumer Oriented Applications – Mercantile Process Models – Mercantile Models from the Consumer’s Perspective and Merchant’s Perspective.

UNIT - III

Electronic Payment Systems: Types of Electronic Payment Systems – Digital Token based Electronic Payment Systems – Smart Card and Credit Card Based Electronic Payment Systems – Risk and Electronic Payment Systems – Designing Electronic Payment Systems.

UNIT - IV

Electronic Data Interchange – EDI Applications in Business – EDI: Legal, Security and Privacy issues EDI and Electronic Commerce – Standardization and EDI – EDI Software Implementation.

UNIT – V

Internet and World Wide Web: origin of the Internet – New uses for the Internet – Commercial use of the Internet – Growth of the Internet- Advertising on the Internet.

TEXT BOOKS

1. Kalakota and Whinston, "Frontiers of Electronic Commerce," Pearson Education, 2004.
2. Gray P. Scheider, "Fourth Annual Edition Electronic Commerce," Thomson Course Technology, 2003.

REFERENCE BOOKS

1. Kamallesh K. Baja, Debjani Nag, "E-Commerce – The Cutting Edge of Business," TMH Publications, 2005.
2. Agarwala, K.N, Deeksha Agarwala, "Business on the Net: What’s and How’s of E-Commerce;" Macmillan, New Delhi.
3. Parag Diwan, Sunil Sharma, "Electronic Commerce: A Manager's Guide to E-Business," Excel books, 2005.