BHARATHIDASAN UNIVERSITY, TIRUCHIRAPPALLI – 620 024
POST GRADUATE DIPLOMA IN COMPUTER APPLICATIONS
SUBJECT OF STUDY AND SCHEME OF EXAMINATION

(For the candidates to be admitted from the academic year 2016-2017 onwards)

Title	Instruction Hours	Practical Hours	Exam Hours	Marks IA	Marks UE	Total
Semester – I						
Paper – I – Programming with C++	7	-	3	25	75	100
Paper – II – Operating Systems	7	-	3	25	75	100
Paper – III – Computer Organization and Architecture	7	-	3	25	75	100
Paper – IV – C++ Programming Lab	-	5	3	40	60	100
Paper – V – Shell Programming Lab	-	4	3	40	60	100
Semester – II						
Paper – VI Programming in Java	7	-	3	25	75	100
Paper – VII – Data Base Systems	7	-	3	25	75	100
Paper – VIII Computer Graphics	7	-	3	25	75	100
Paper – IX – Java Programming Lab	-	5	3	40	60	100
Paper – X – Database Systems Lab	-	4	4	40	60	100

The Internal and External Marks to be awarded for any **Practical Course** is **40 & 60** respectively and for **Theory course**, it is **25 & 75** respectively for MCA, M.Sc (CS), M.Sc (IT) & PGDCA.

Note:

1. Theory   Internal   25 marks   External   75 marks

2. Practical   ”   40 marks   ”   60 marks

3. Separate passing minimum is prescribed for Internal and External

   a) The passing minimum for CIA shall be 40% out of 25 marks (i.e. 10 marks)
   b) The passing minimum for University Examinations shall be 40% out of 75 marks (i.e. 30 marks)
   c) The passing minimum not less than 50% in the aggregate.

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PAPER I

PROGRAMMING WITH C++

Objective :

To impart Object Oriented Programming skills using C++

Unit I

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 – In line Functions – Automatic in lining.

Unit II

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 III

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- overloading binary operators-overloading the relational and logical operators- overloading a Unary operator – using friend operator functions- a closer at the assignment operator- overloading the subscript() operator.

Unit IV

Base class access control –using protected members- Constructors, destructors and inheritance - multiple inheritance- virtual bas classes- Some C++ I/O basics-formatted I/O using width(), precision () and fill() – using I/O manipulators- Creating your own inserters- creating extractors.

Unit V

Creating your own 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 Book(s)

Herbert Schildt, "Teach Yourself C++", III edition, Tata McGraw Hill 5th Reprint 2000.

Reference(s)

1. Bjarne Stroustrup, The C++ Programming Language, Addison wesley,2013
2. E. Balagurusamy "Object Oriented Programming with C++ ", TMH New Delhi,2013
2. Robert Lafore, "Object Oriented Programming in Turbo C++", Galgotia 2001

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OPERATING SYSTEMS

Objective :

To present fundamental aspects of various managements in an operating

Unit I

Operating Systems Objectives and functions – Operating System and User /Computer Interface, Operating System as a Resource Manager: Evaluation of Operating Systems – Serial Processing, Sample Batch Systems, Time Sharing Systems.

Unit II

Process Description, Process Control – Processes and Threads. Concurrency – Principles of Concurrency, Mutual Exclusion – Software support, Dekker's Algorithm – Mutual Exclusion – Hardware support, Mutual Messages – Deadlock – Deadlock prevention, Deadlock Detection, Deadlock Avoidance – An Integrated deadlock Strategy.

Unit III

Memory Management – Memory Management Requirements – Fixed Partitioning, Placement Algorithm, Relocation in a Paging System – Sample Segmentation. Virtual Memory – Paging – Address Translation in a Paging System. Segmentation – Organization, Address Translation in a Segmentation System – Combined Paging and Segmentation – Virtual Memory – Operating System Software – Fetch Policy, Placement Policy and replacement Policy, Page buffering resident set
Management.

Unit IV

Scheduling – Types of Scheduling, scheduling Algorithms, scheduling criteria, FIFO, Round Robin, Shortest Process next, Shortest Remaining Time, Highest response ratio and Feedback scheduling Performance comparison – Fair – Share Scheduling. I/O Management and disk scheduling – Organization of the I/O function – the Evaluation of the I/O function, Logical structure of the I/O function, I/O Buffering, Disk Cache.

Unit V

File Management – Files, File Management Systems, File System Architecture, Functions of File Management File Directories – File Sharing – Secondary Storage Management – File allocation.

Text Books

1. William Stallings, "Operating Systems", Second edition, Maxwell McMillan, International Editions, 1997.
2. Charles Crowley, "Operating Systems-A Design Oriented Approach", IRWIN Publications Chicago, 1997.

References

1. Ann McIver McHoes and Ida M. Flynn, Understanding Operating Systems, Sixth Edition, Course Technology, Cengage Learningm2011
2. Ann McHoes, Ida M. Flynn ,**Understanding Operating Systems, Seventh Edition,** Cengage Learning, 2013.
3. Deital H.M. "An Introduction to Operating Systems", Addison Wesley Publishing

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PAPER III
COMPUTER ORGANIZATION AND ARCHITECTURE

Objective:

To understand the principles of digital computer logic circuits and their design. To understand the working of a central processing unit architecture of a computer

Unit I

Number Systems – Decimal, Binary, Octal and Hexadecimal Systems – Conversion from one system to another – Binary Addition, Subtraction, Multiplication and Division – Binary Codes– 8421, 2421, Excess-3, Gray, BCD – Alphanumeric Codes – Error Detection Codes.

Unit II

Basic Logic Gates – Universal Logic – Boolean Laws and Theorems – Boolean Expressions – Sum of Products – Product of Sums – Simplification of Boolean Expressions –Karnaugh Map Method (up to 4 Variables) – Implementation of Boolean Expressions using GateNetworks.

Unit III

Combinational Circuits – Multiplexers – Demultiplexers – Decoders – Encoders – Arithmetic Building Blocks – Half and Full Adders – Half and Full Subtractors – Parallel adder –2's Complement Adder – Subtractor – BCD Adder.

Unit IV

Sequential Circuits – Flip Flops – RS, Clocked RS, D, JK, T and Master-Slave Flip Flops –Shift Register – Counters – Asynchronous, MOD-n and Synchronous Counters – BCD Counter –Ring Counter.

Unit V

Central Processing Unit: General Register Organization – Stack Organization – Instruction Formats – Addressing Modes – Data Transfer and Manipulation – Program Control – Reduced Instruction Set Computer – CISC characteristics – RISC Characteristics.

Text Books:

1. Donald P. Leach, Albert Paul Malvino and GoutamSaha, *Digital Principles and Applications*, TataMcGraw Hill, Sixth Edition, Third Reprint, 2007.
   Unit:I : Chapter-5 Section (5.1-5.8)
   Unit:II : Chapter-2 Section (2.1-2.2), Chapter-3 Section (3.1, 3.2, 3.5, 3.7)
   Unit: III: Chapter-4 Section (4.1-4.3, 4.6), Chapter-6 Section (6.7, 6.8)
2. Thomas C. Bartee, *Digital Computer Fundamentals*, Tata McGraw-Hill, Sixth Edition, Twenty FifthReprint, 2006.
   Unit:III : Chapter-5 Section (5.1, 5.3, 5.10, 5.11)
   Unit:IV : Chapter-4 Section (4.1-4.9)
3. Morris Mano M, *Computer System Architecture*, Prentice Hall of India, Third Edition,2008.
   Unit: I: Chapter-3 Section (3.5-3.6)
   Unit: V: Chapter-8 Section (8.2-8.8)

Books for Reference:

1. Morris Mano. M, *Digital Logic and Computer Design*, Prentice Hall of India, 2008.
2. Linda Null, Julia Lobur, The Essentials of Computer Organization and Architecture, Fourth Edition2014

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PAPER IV

C++ Programming Lab
(Applied to Data Structures and Algorithms)

Objective:

To get hands on experience in developing Programs using C++ for Data Structures applications.

1. Implement Array Merging, sorting of array elements [Integer elements & character Elements]
2. Implement sorting of array of English words (in Dictionary order)
3. Implement Stack Data Structures and Operations on it (push, pop)
4. Implement Singly linked list Data structure and operations on it (insert, delete, print, navigate, search)
5. Implement sorting operation on a singly linked list data structure
6. Implement doubly linked list data structure and operations on it (insert, delete, print, navigate, search)
7. Implement Sorting operation on a doubly linked Data Structure
8. Implement Queue Data Structure and operations on it
9. Implement table Data structure and operations on it (insert, delete, print, navigate, search)
10. Implement binary tree data structure and operations on it (node insertion, deletion)
11. Implement pre-order, in-order, post-order traversal of binary tree and print node contents

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PAPER V

SHELL PROGRAMMING LAB

Objective:

To get hands on experience in developing Shell Programs.

Write Shell Programs to

1. Find whether number given is even or odd
2. Reverse the digits of the integer
2. Search for a given number from the list of numbers provided using binary search method
3. Concatenate two strings and find the length of the resultant string
4. Find the position of substring in given string
5. Find the gcd for the 2 given numbers
6. Check whether a given string is palindrome or not.
7. Count number of words, characters, white spaces and special symbols in a given text
8. Sum of all the digits in a given 5 digit number
9. Average of numbers given at command line
10. Accept a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.
11. Delete all lines containing a specified word in one or more files supplied as arguments to it.
12. Display a list of all files in the current directory to which the user has read, write and execute permissions.
13. Receive any number of file names as its arguments, checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file, the number of lines on it is also reported.
14. Receive any number of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.

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PAPER VI
PROGRAMMING IN JAVA

Objective :

To Impart sound knowledge in Object Oriented Programming skills in JAVA

UNIT I

An overview of Java – Java Buzzwords- Data Types, Variables and Arrays - Operators – Control Statements- Introducing Classes: Class Fundamentals – Declaring Objects – Introducing Methods – Constructors – The this keyword – Garbage Collection – Overloading Methods – Call by value, Call by reference – Recursion– Understanding static – final – Nested and Inner classes.

UNIT II

Inheritance: Inheritance Basics – Using super – Method overriding –Dynamic Method Dispatch- Using Abstract Classes - Final with Inheritance- Object class. Packages and Interfaces:Declaring Packages – #Access Protection# – Importing Packages – Defining, Implementing, Applying Interfaces - Exception Handling: Exception Types – try, catch – throw – throws – finally –multiple catch and nested try statements- Creating User-defined Exception classes.

UNIT III

Multithreaded Programming: The Java Thread Model – Creating a Thread –Creating Multiple Threads-Thread Priorities- Synchronization – #Inter-thread communication. String Handling# –The Collection Interfaces and Collection Classes: List,Set,Map,Enumeration and Iterator interfaces-ArrayList, LinkedList, Vector, Stack,Properties,HashTable, StringTokenizer, and Date classes.

UNIT IV

Files and IO Streams: File – The Byte Streams: InputStream, Output Stream, FileInputStream,FileOutputStream, PipedInputStream and PrintStream – The Character Streams: Reader, Writer. FileReader and FileWriter – Serialization. Networking- Networking classes and interfaces: InetAddress class -TCP/IP Client and Server sockets–Datagrams – URL and URLConnection classes.

UNIT V

Introduction to Applet class- Applet Architecture- The HTML APPLET tag – Passing parameters to Applets – Event handling: The Delegation Event Model, Event Classes, Event Listener Interfaces - Working with Graphics, Color and Font classes - Understanding Layout managers- Swing Component classes: JApplet, JFrame and JDialog - Text Fields, Buttons, Combo boxes, List ,Tabbled and Scroll Panes.Understanding Layout managers.

Text Book:

1. Herbert Schildt, *The Complete Reference Java 2,* Fifth Edition, TMH Education Pvt. Ltd.,2009.
   UNIT I : Chapter 1 to 7
   UNIT II : Chapter 8 to 10
   UNIT III : Chapter 11,13, and 15, 16
   UNIT IV : Chapter 17 and 18
   UNIT V : Chapter 19 to 22, and 26

Books for Reference:

1. Herbert Schildt with Joe O' Neil, *Java – Programmer's Reference,* TMH, 2000.

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PAPER VII

DATABASE SYSTEMS

Objective:

To impart knowledge about relational database and distributed database.

Unit I

Introduction – purpose of database systems – Data Abstraction – Data models – Instances and schemes – Data independence – DDL – DML – Database users – ER model – Entity sets – Keys – ER diagram – relational model – Structure – Relations Algebra – Relational Calculus – Views.

Unit II

SQL – QBE – QUEL – Basic structure – various Operations – Relational database design problems in the relational data base design – Normalisation – normalization using functional, Multi value and join dependencies.

Unit III

File and system structure – overall system structure – file Organization – data dictionary – Indexing and hashing – basic concept B and B+ tree indices – Static and Dynamic hash functions.

Unit IV

Recovery and atomicity – failures classification and types – Transaction model and Log based recovery, schedules – serial and non-serial types – Serialization of schedules and views – testing for seriability – lock based protocols – time based protocols – validation techniques – multiple Granularity – multiversion schemes – insert and delete Operations.

Unit V

Distributed data bases – structure of distributed databases – Trade offs in Distributing the database – Transparency and autonomy – distributed query processing – recovery in distributed systems – commit protocols – security and integrity violations – authorization and views – security specification – encryption – Statistical databases.

Text Book(s):

Henry F.Korth, and Abraham Silberschatz,,Sudarshan "Database system Concepts", McGraw Hill, 4th Edition, 2002

References:

1. Hector Garcia Molina, Jeffrey D Ullman, JenniferWisdom,Database Systems: The Complete Book., Pearson Education 2013.
2. Pipin C. Desai, "An Introduction to data base systems", Galgotia Publications Private Limited, 1991.
3. C.J. Date, "An Introduction to Database Systems", 3rd Edition, Addison Wesley 1983.

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PAPER VIII

COMPUTER GRAPHICS

Objective:

To present concepts on basic graphical techniques, raster graphics, two dimensional and three dimensional graphics.

Unit I

A survey of computer graphics – Overview of Graphic systems- output primitive (Mathematical functions for creating graphic output) – setting attribute of Output primitives

Unit II

Two dimensional geometric transformations – Two dimensional viewing

Unit III

Graphic structures – Hierarchical modeling – Graphical user interfaces and interactive input methods

Unit IV

3D Concepts – 3D- object Representation – 3D Geometric and Modeling Transformations.

Unit V

Visible surface detection methods – Illumination models – Computer Animation

TEXT BOOK:

1. **Hearn Donald, Baker Paulin M.,** Computer graphics – C version**,** Second edition, Pearson education, 2006. (ISBN 81-7758-765-X)

REFERENCE BOOK:

1. Rajiv Chopra, Computer Graphics: A Practical Approach, Concepts, Principles, Case Studies, S Chand 2011.
2. **Newman William M., &Sproull Robert F**., Principles of interactive computer graphics, Second edition, Tata –McGraw Hill, 1 (ISBN 0-07-463293-0)
3. Fundamentals of Computer Graphics, Peter Shirley, Michael Ashikhmin, Steve Marschner, 2009

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PAPER IX

JAVA PROGRAMMING LAB

Objective: To get hands on experience in developing Programs using Java.

1. Assume that a bank maintains 2 kinds of account for its customers' one called savings account and the other current account' The savings account provides compound interest and withdraw facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account falls below this level a service charge is imposed. Create a class Account that stores customers name' account number and type of account. From this derive the classescurr-acct and sav-acct to make them more specific to their requirements. Introduce the necessary methods in order to achieve the following tasks:
   a. Accept deposit form a customer and update the balance.
   b. Display any deposit interest
   c. Compute and deposit interest.
   d. Permit withdrawal and update the balance.
   e. Check for the minimum balance' impose penalty' if necessary and update the balance.
2. Use constructors and methods to initialize the class members.
   Write a program that accepts a shopping list of five items from the command line and stores them in a vector and accomplish the following:
   a. To delete an item in the list.
   b. To add an item at a specified location in the list.
   c. To add an item at the end of the list.
   d. To print the contents of the vector.
3. Implementation of the concept of multiple inheritance using interfaces and design a package to contain the class students and another package to contain the interfaces sports.
4. Develop a simple real-life application program to illustrate the use of multithreads.
5. Create a try block that is likely to generate three types of exception and then incorporate necessary catch blocks to catch and handle them appropriately.
6. Write a Java applet' which will create the layout below:
   FORMAT
   Enter your Name:
   Enter your Age:
   Select City: *Delhi *Madras
   Select SIW: *Oracle *Visual Basic *Java
   OK CANCEL
   Handle the following simple validations.
   The name entered should be less than 25 characters wide.
   Age entered should be done as the user exits the fields as well as when OK button is pressed. Hint use the Boolean action (Event evt' object arg).
7. Write an Applet which will play two sound notes in a sequence continuously use the play ( ) methods available in the applet class and the methods in the Audio clip interface.

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PAPER X

DATABASE SYSTEMS LAB

Objective:

To get hands on experience in developing queries and designing forms using RDBMS software..

1. SQL - Data Definition Language
   Table Creation with Constraints
   Table Alteration (Add Column, Modify size and data type, Drop Column)
   Drop Table

2. SQL - Data Manipulation Language
   Data Insertion
   Data Updation
   Data Deletion
   Ordering Tuples
   Tuple Variable
   Pattern Matching
   Build-in Function
   Set Operations
   Join Operations
   Nested Subqueries
   Views

3. PL/SQL Procedure
   3.1 Reverse the string.
   3.2 Delete any record and count it.
   3.3 Student Mark Sheet Preparation
   3.4 Pay Roll preparation.
   3.5 Excess record stored in separate files.
   3.5 Split a table in to two tables.
   3.6 Joining two tables in to one table.
   3.7 Find factorial number using recursive function.
   3.8 Find Fibonacci series using recursive function.

4. SQL Forms
   Student Mark System
   Pay Roll Preparation
   Income Tax Calculation
   Train Reservation System

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