MAHARSHI DAYANAND UNIVERSITY, ROHTAK

Master of Computer Applications (MCA)
(In Distance Education Mode).

The University has introduced from Jan., 2001 session various computer education programmes namely, Advanced Post Graduate Diploma in Computer Science and Applications (APGDCA), Advanced Post Graduate Diploma in Information Technology (APGDIT), M.Sc. (Computer Science) and Bachelor in Computer Application (BCA). The M.Sc. (Computer Science) course is designed in a way that after successful completion of first year the students will be awarded APGDCA/APGDIT and after successful completion of second year the students will be awarded M.Sc. (Computer Science). From the current session i.e. July, 2002 the University intends to introduce Master of Computer Applications (MCA) which is a three years course (Six Semester). The course has been created to cope with the ever increasing demand for computer personnel in almost all walks of life, especially in the industrial sector. During this course, apart from offering an intensive dose of the theoretical knowledge to the students, they would be imparted practical training in the computer laboratory and on job training in some reputed organisations also. The MCA programme is divided into six semesters as per scheme of examinations.

Eligibility

A candidate seeking admission to Master of Computer Application (MCA) should have three years Bachelor Degree (or equivalent there to) in any discipline. This course has also lateral entry scheme. A student who has done APGDCA/APGDIT/PGDCA/PGDCS or equivalent will get admission in MCA 3rd Semester directly and a student who has passed M.Sc. (Computer Science) or Master in Computer Science (MCS) or equivalent will get admission in MCA 5th Semester directly.

Duration

It is three years programme comprising six semesters.
### MAHARSHI DAYANAND UNIVERSITY, ROHTAK

#### Scheme of Examinations

Master of Computer Application (MCA) (Distance Mode)

**Duration:** Three Years

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<td>MCA-05/M.Sc.-05/ APGDCA-05</td>
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<td><strong>Second Semester</strong></td>
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<td>100/40</td>
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<td>3 Hrs. each</td>
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</table>

*These papers are applicable to those students who have done APGDIT course from M.D. University, Rohtak.

**Note:** Out of 100 marks for each paper, including Theory, Practicals & Project 25 marks are reserved for internal assessment with the following distribution:

- Assignments: 15 Marks
- Test(s): 10 Marks

### Fifth Semester

- MCA-21 | Internet Programming using C# | 100/40 | 3 Hrs. each |
- MCA-22 | Software Testing and Quality Assurance | 100/40 | 3 Hrs. each |
- MCA-23 | Windows Programming | 100/40 | 3 Hrs. each |
- MCA-24 | IT Management | 100/40 | 3 Hrs. each |
- MCA-25 | Software Lab Based on MCA-21 & MCA-23 | 100/40 | 4 Hrs. each |

### Sixth Semester

- MCA-26 | Major Project | 200 |

**Distribution of marks:** Thesis/Project: 125

**Viva-Voce Examination:** 50

Marks will be awarded on the basis of Viva-voce examination conducted by one examiner (External only) Thesis/Project Report will be submitted in triplicate (Hard Bound) with proper certification by the supervisor concerned who may be a person with five years working experience and must have Master's degree in relevant field or a regular teacher working in Govt./Semi-Govt. Institution/University/Engineering College.

Students are advised to come prepared for presentation/demonstration of their Thesis/Project at the time of their final viva-voce examination.
Note: Out of 100 marks for each paper, including Theory, Practical & Project 25 marks are reserved for internal assessment with the following distribution.

Assignments : 15 Marks
Test(s) : 10 Marks

FIRST SEMESTER
MCA-01/M.SC.-01/APGDCA-01
Foundation course in IT & MS-Office 2002
Max. Marks : 100
Time Allowed : 3 Hrs.

Note:

i) The examiner has to set 8 questions in all and students will have to attempt any 5 questions.

ii) All questions will carry equal marks.

Introduction: Historical evolution of computers. Classification of computers, Model of a digital computer; Functioning of a digital computer. Why computers are useful? Human being Vs computer. Computer as a tool. Applications of computers (desktop publishing, sports, design and manufacturing, research and design, military, robotics, planning & management, marketing, medicine & health care, arts, communications).

Number Systems and Boolean Algebra: What is Number system, necessity of binary number system, binary, octal and hexadecimal number system, inter-conversion of numbers, binary arithmetic, character codes, concepts of Boolean Algebra and its requirement.


Memory & Mass Storage Devices: Characteristics of memory systems, types of memory, RAM, ROM, magnetic disks-floppy disk, hard-disk; optical disks-CD, CD-I, CD-ROM; Magnetic tapes; Concepts of Virtual and Cache memory.

Software Concepts: Introduction, types of software-System & Application software; Language translators - Compiler, Interpreter, Assembler; Operating system- Characteristics, bootstrapping, types of operating, operating system as a resource manager; BIOS; System utilities- Editor, Loader, Linker, File Manager. Concept of GUI, GUI standards.


Applications of Computers: Scientific, Education, Medicines & Health, Research, Sports, etc.

MS-Office 2000


MS-Excel: Introduction to MS-Excel, Working with Toolbars, Formatting, Formulas, Data Management, Graphs & Chart, Macros, and other additional Functions.


MS-Access: Introduction, Understanding Databases, Creating a Database and Tables Automatically, Creating and Customizing a Form, Adding, Editing, Sorting and Searching of Records, Creating and Printing Reports, Queries, Creating a Database and Application, Linking, Importing and Exporting Data, Form, Creating Reports, Creating Charts and Pivot Tables.

References

1. Essentials of Computer and Network Technology by: Nasib S. Gill (Khanna Book publishing Co.)
Public Networks, Public Networks: ISDN, PSTN, PSDN, Value Added Networks.

Connecting PCs: Simple switches, Printer sharing buffers, Zero-slot LANs, Media sharing LANs, Printer Servers, Client and Servers, Interface Cards, Media Access Control, Operating System features, OSI Model, TCP/IP Model, Data encoding & Communication Techniques, Multiplexing and Communication Hardware.

Network topology, Network Protocols, Applications of Computer Network, Distributed data processing, Teletext and Videotext Networks.

Communication Channels: Wire cables (Telegraph, telephone, twisted-pair, co-axial), Microwave, Fibre-optics, Communication satellites; Channel sharing, data-transmission.

Multimedia

Introduction to multimedia technology-Computers, Communication and Entertainment; Framework for multimedia system; M/M devices, presentation devices and the user interface; M/M presentation and authoring; Digital representation of sound and transmission; brief survey of speech recognition and generation; digital video and image compression; JPEG image compression standards; MPEG motion video compression; DVI technology; time-based media representation and delivery.

Audio Compression and Decompression, Audio Synthesis, MIDI, Speech Recognition & Synthesis, Video Capturing, Compression & Decompression, Real-time 3D, LANs and Multimedia.

Application of M/M ; Intelligent M/M system, Desktop Virtual Reality (VR), VR operating System, Virtual environment displays and orientation tracking; visually coupled system requirements; intelligent VR software systems.

Applications of environments in various fields viz. Entertainment, manufacturing, business, education, etc.

References

1. Essentials of Computer and Network Technology by Nasib S. Gill (Khanna Book Publishing Co.)
2. Inside the PC by Peter Norton (Prentice Hall India)
3. Using Networks by Frank Derfler (Prentice Hall India)
4. Introduction to Networking by Nance (Prentice Hall India)
5. Network Concepts & Architecture by Hancock (BPB Publications)
7. Multimedia: Sound & Video by Lozano (Prentice Hall India)
8. Multimedia: Production, Planning and Delivery by Villamil & Molina (Prentice Hall India)
9. Multimedia on the PC by Sinclair (BPB Publications)
10. Any other book/manual covering contents of this paper.

**MCA-03/M.SC.-03/APGDCA-03**

**Programming in C and Data Structure**

Max. Marks: 100

Time Allowed: 3 Hrs.

Note:

i) The examiner has to set 8 questions in all and students will have to attempt any 5 questions.

ii) All questions will carry equal marks.

**Algorithm Development**


**C Programming**

Basic concepts of Programming, problem solving, algorithm designing and flowcharting, concept of structured programming, evolution of C language, advantages of C, variables and constants, operators, expressions, loops, arrays, functions, structures, pointers, file-handling pre-processing, header-files.

**Data Structure**

Fundamental notations: Primitive and Composite data types. Time and Space complexity of algorithms.

Data Structure: Arrays, Stacks, Queues, Linked Lists, Trees and Graphs.


Sorting: Internal and External sorting. Searching techniques and Merging algorithms.

**References**

1. How to Solve it by Computer? by R.G. Dromey (Prentice Hall India)
2. Teach Yourself Data Structures and Algorithms by Robert Lafore (Techmedia)
4. C Programming by E. Balagurusamy (Tata McGraw-Hill)
5. C Programming by Gottfried (Schaum’s Outline Series: Tata McGraw-Hill)
6. Let Us C by Yeshwant Kanetkar (BPB Publications)
7. Data Structure and File Management by Loomis (Prentice-Hall India Ltd.)
8. Data Structure (Schaum’s Outline Series, Tata McGraw-Hill)

10. Any other book covering the contents of the paper.

   **MCA-04/M.Sc.-04/APGDCA-04**

   **Computer Organisation And Architecture**

   Max. Marks : 100

   Time Allowed : 3 Hrs.

**Note:**

i) The examiner has to set 8 questions in all and students will have to attempt any 5 questions.

ii) All questions will carry equal marks.

**Representation of Information:** Number Systems, Integer and Floating-point representation, Character codes - ASCII and EBCDIC.

**Basic Building Blocks and Circuit Design:** OR, AND, NOT, XOR Gates; De Morgan's theorem, Universal building blocks, laws and theorems of boolean algebra, Simplifying logic circuits- sum of product and product of sum form, algebraic simplification, Karnaugh simplification; arithmetic circuits; flip-flops, counters; shift registers; encoder, decoder, multiplexor, demulti-plexor circuits.


**Basic Computer Organization and Design:** Instruction and instructions Codes, Computer instructions, Timing and Control, Instruction Cycle, Memory Reference Instructions, Input-Output and Interrupts; Complete Computer Description.

**Programming the Basic Computer:** Machine Language, Assembly Language, The assembler, Program loops, programming Arithmetic and Logic, Subroutines, Inputs-Outputs programming. Micro-programmed Control; Control Memory, Address Sequencing, Micro-program Example, Design of Control Unit.

**Central Processing Unit:** General Register Organization Stack Organization Instruction Formats, Addressing Modes, Data and Transfer Manipulation, Program Control, Reduced Instruction Set Computer, Pipeline and Vector Processing parallel processing pipelining, Arithmetic Pipeline, RISC Ouncekbem Vector Processing, Arrays Processors.

**Computer Arithmetic:** Addition and Subtraction, Multiplication Algorithms, Division algorithm, Floating-Point Arithmetic Operations, decimal arithmetic Unit, Decimal Arithmetic Operations.

**Input-Output Organization:** Peripheral Devices, Input-Output interface, Asynchronous Data Transfer, Modes of transfer, Priority interrupt, Direct Memory Access (DMA), input-output processors (IOP), serial communication multi-processors, characteristics of multi-processors, Inter-connection structures, Inter-processor Arbitration, Inter-processor Communication and Synchronization, Cache Coherence.

**References**

1. Computer System Architecture by M.M. Mano (Prentice-Hall of India Ltd.)


4. Essentials of Computer and Network Technology by Nasib S. Gill (Khanna Book Publishing Co.)

5. Computer Organisatyon and Architecture by C.W. Gear (Prentice Hall of India Ltd.)

6. Any other book covering the contents of the course.

   **MCA-05/M.Sc.-05/APGDCA-05 Practical-I**

   (Based on MCA/M.Sc./APGDCA-01 & 03)

   Max. Marks : 100

   Time Allowed : 4 Hrs.

   • MS-Office 20000 (MS-World, MS-Excel, MS-Power Point, MS-Access)
**SECOND SEMESTER**

**MCA-06/M.Sc.-06/APGDCA-06**

**Visual C++**

- Max. Marks: 100
- Time Allowed: 3 Hrs.

**Note:**

1. The examiner has to set 8 questions in all and students will have to attempt any 5 questions.
2. All questions will carry equal marks.

Introduction to Visual C++, Getting started with Visual C++, Reading Keystrokes from the Keyboard, Handling mouse in VC++, Creating Menus, Toolbar Buttons, Status Bar prompts.

Dialog Boxes: Using Buttons and Text Boxes, Creating Check boxes and Radio Buttons, LIST Boxes, Combo Boxes and Sliders, File Handling, Multiple documents, and Multiple Views, creating Internet Programs including a Web Browser, Creating Active X controls.


**References**

1. **Teach yourself VC++ in 21 days** by Chapman (Techmedia).
2. **Practical Visual C++ 6** by Bates & Tompkins (Prentice-Hall of India)
3. **Special Edition Using Visual C++ 6** by Gregory (Prentice-Hall of India)

**Introduction to Oracle:** Overview of RDBMS, Getting started, Modules of Oracle, Invoking SQLPLUS, Data types, Data Constraints, Operators, Data manipulation-Create, Modify, Insert, Delete and Update; Searching, Matching and Oracle Functions.

**SQL* Forms:** Basic concepts, Form Construction, Creating default form, user-defined form, multiple-record form, Master-detail form.

**PL/SQL Blocks in SQL Forms:** PL/SQL Syntax, Data types, PL/SQL functions, Error handling in PL/SQl, package functions, package procedures, Oracle transactions.


**SQL* Menu:** Various menu styles, using pull-down & bar-menu, Authorisation of SQL* menu. Creating Oracle Menu, Granting Role Access, Generating & Executing Applications.
**Stored Procedures/Functions:** Stored procedures, How to create & execute procedures? Where to store functions? Where do procedures & functions reside?

**Database Triggers:** Introduction, Use & type of database Triggers, Database Triggers Vs SQL* Forms, Database Triggers Vs. Declarative Integrity Constraints, How to apply Triggers? Before Vs. After Trigger Combinations, Creating a Trigger, Dropping a Trigger.

**Utilities:** Export/Import, SQL* Loader.

**References**

1. Using Visual Basic 6 by Reselman & Other (Prentice-Hall of India)
2. Visual Basic 6 from Scratch by Donald & Donald & Oancea (Prentice-Hall of India)
3. Using Oracle-8 by Austin (Prentice-Hall of India)
4. Oracle 8 by Ivan Bayross (BPB Publication)
6. Teach Yourself More VB in 21 days by Days Maver (Techmedia)

Any other book/manual covering contents of this paper.

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**System Analysis & Design**

Max. Marks: 100
Time Allowed: 3 Hrs.

**Note:**

i) The examiner has to set 8 questions in all and students will have to attempt any 5 questions.

ii) All questions will carry equal marks.

Overview of system analysis and design. Business systems concepts, system development life cycle, project selection, feasibility, analysis, design, implementation, testing and evaluation.

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**System Analysis and Design**

1. System Analysis and Design by E.M. Awad (Galgotia Publications)
2. System Analysis and Design by Award, E.Homeword (Irwin Press)
3. Systems Analysis and Design (Joint Volume) by Lee (NCC-Galgotia Publications)
5. Any other book covering the contents.
**Utilities:** Export/Import, SQL* Loader.

**References**

1. Using Visual Basic 6 by Reselman & Other (Prentice-Hall of India)
2. Visual Basic 6 from Scratch by Donald & Donald & Oancea (Prentice-Hall of India)
3. Using Oracle-8 by Austin (Prentice-Hall of India)
4. Oracle 8 by Ivan Bayross (BPB Publication)
6. Teach Yourself More VB in 21 days by Days Maver (Techmedia)
7. Any other book/manual covering contents of this paper.

**References**

1. System Analysis and Design by E.M. Awad (Galgotia Publications)
2. System Analysis and Design by Award, E.Homewood (Irwin Press)
3. Systems Analysis and Design (Joint Volume) by Lee (NCC-Galgotia Publications)
5. Any other book covering the contents.

**Notes:**

- The examiner has to set 8 questions in all and students will have to attempt any 5 questions.
- All questions will carry equal marks.

Overview of system analysis and design. Business systems concepts, system development life cycle, project selection, feasibility, analysis, design, implementation, testing and evaluation.
MCA-10/M.Sc.-10/APGDCA-10
Project Work, Report & Viva-Voce
(Based on any Language, Software Development Tool, etc.)

THIRD SEMESTER
MCA-11/MSc-11 : RDBMS
Max. Marks : 100
Time Allowed : 3 Hrs.

Note:
   i) The examiner has to set 8 questions in all and students will have to attempt any 5 questions.
   ii) All questions will carry equal marks.

Basic Concepts: Introduction, Database user, Data models, Scheme and Instances: DBMS Architecture and Data Independence, Database Language, Data modelling using E-R Model.

Relational Model: Relational Model concepts, Relational model "constraining, Update operations on relations. The relational Algebra, SQL-A relational; Database Language.


Concurrency Control: Concepts, Locking Techniques for concurrency control, Concurrency control based on Time stamp ordering, Multiversion concurrency control Techniques.

Distributed Database: Concepts, Overview of Client-server, Architecture, Data Fragmentation, Replication and Allocation Technique for Design Query Processing in Distributed Database.

References
1. C.J., "Data Base System", Sixth Editin Adedilson Wesley.


Any other book(s) covering contents.

MCA-12/MSc-12 : Software Engineering
Max. Marks : 100
Time Allowed : 3 Hrs.

Note:
   i) The examiner has to set 8 questions in all and students will have to attempt any 5 questions.
   ii) All questions will carry equal marks.


Planning and Software Project: Cost Estimation, COCOMO, Pulumu, Project Scheduling, Quality Assurance Plans, project Monitoring Plans.


Coding: Programming Pracilices, verification, Monitoring and Control.


process co-ordination problems; deadlock handling, interprocess communication.

**Unix Operating System:** Overview of UNIX OS in general and implementation of all above functions in Unix Operating System.

**References**

4. Any other book(s) covering contents.

**MCA-13/MSc-13 : *Programming in C and Data Structure**

Max. Marks : 100
Time Allowed : 3 Hrs.

**Note:**

i) The examiner has to set 8 questions in all and students will have to attempt any 5 questions.

ii) All questions will carry equal marks.

**Algorithm Development**


**C Programming**

Basic concepts of programming, problem solving algorithm designing and flowcharting, concept of structured
programming, evolution of C language, advantages of C. Variables and constants, operators, expressions, loops, arrays, functions, structures, pointers, file-handling, pre-processing, header-files.

**Data Structure**

Fundamental Notations: Primitive and Composite data types, Time and Space complexity of algorithms.

Data structures: Arrays, Stacks, Queues, Linked Lists, Trees and Graphs.


Sorting: Internal and External sorting. Searching techniques and merging algorithms.

**References**

1. How to Solve it by Computer? by R.G. Dromey (Prentice Hall India)
2. Teach Yourself Data Structures and Algorithms by Robert Lafore (Techmedia)
3. Theory & Problems of Data Processing by Lepscutz & Lipschutz (Schaum’s Outline Series : Tata McGraw-Hill)
4. C Programming by E. Balagurusamy (Tata McGraw-Hill)
5. C programming Gottfried (Schaum’s Outline Series-Tata McGraw-Hill)
6. Let Us C by Yeshwant Kenetkar (BPB Publications)
7. Data Structure and File Management by Loomis (Prentice-Hall India Ltd.)
8. Data Structuree (Schaum’s Outline Series, Tata McGraw-Hill)
10. Any other book(s) covering the contents of paper.

**MCA-14/MSc-14 : Internet, Web programming and Java**

Max. Marks : 100

Time Allowed : 3 Hrs.

Note:

i) The examiner has to set 8 questions in all and students will have to attempt any 5 questions.

ii) All questions will carry equal marks.

Internet Beginning and Current State, Hardware and Software requirement, ISP and Internet accounts, Web-Home page, URL, Browser, Security on Web, Plugins and helpers Searching tools and Search engine FTP, Gopher, Telnet and e-mail.


**Javasctipt**

**Programming through JAVA:** JAVA History, Java Features, Java and Internet, Java and World Wide Web, Hardware and software requirements, Java environment, Java Program Structure, Java Tokens, Java Virtual Machine, Constants, Variables and Data Types, Operators and Expressions, Decision Making and Branching, Decision Making and looping Classes and Methods, Interfaces Packages, Managing Errors and Exceptions.

**Applet Programming**

Local and remote Applets and Applications, Applet life cycle, creating and Executable Applet, Applet, Passing Parameters to Applies.

**Java Beans, JDBC, CORBA, RMI.**

**Overview of CGI Programming**

References:

4. Any other book(s) covering contents.
MCA-14/MSc-14

*Computer Organisation and Architecture

Max. Marks : 100

Time Allowed : 3 Hrs.

Note:

i) The examiner has to set 8 questions in all and students will have to attempt any 5 questions.

ii) All questions will carry equal marks.

Representation of Information: Number Systems, Integer and Floating-Point representation, Character codes - ASCII and EBCDIC

Basic Building Blocks and Circuit Design: OR, AND, NOT, XOR Gates; De Morgan's theorem, Universal building blocks, laws and theorems of boolean algebra, Simplifying logic circuits, sum of product and product of sum form; algebraic simplification, Karnaugh simplification; arithmetic circuits; flip-flops, counters; shift registers; encoder, decoder, multiplexer, demultiplexer circuits.


Basic Computer Organization and Design: Instruction and Instructions Codes, Computer instructions, Timing and Control, Instruction Cycle, Memory Reference Instructions, Input-Output and Interrupts; Complete Computer Description.

Programming the Basic Computer: Machine Language, The assembler, program loops, programming Arithmetic and Logic, Subroutines, Inputs-Outputs programming, Micro-programmed Control; Control Memory, Address Sequencing, Micro-program example, Design of Control Unit.

Central Processing Unit: General Register Organization Stack Organization Instruction Formats, Addressing Modes, Data and Transfer Manipulation, Program Control, Reduced Instruction Set Computer, Pipelining and Vector Processing, Parallel Processing Pipeline, Arithmetic Pipeline, RISC,超标量 Vector Processing, Arrays Processors.


Input-Output Organization: Peripheral Devices, Input-Output interface, Asynchronous Data Transfer, Modes of transfer, Priority interrupt, Direct Memory Access (DMA), input-output processor (IOP), serial communication multi-processors, characteristics of multi-processors, Inter-connection structures, Inter-processor Arbitration, Inter-processor Communication and Synchronization, Cache Coherence

References

1. Computer System Architecture by M.M. Mano (Prentice Hall of India Ltd.)
4. Essentials of Computer and Network Technology by Nasib S. Gill (Khanna Book Publishing Co.)
5. Computer Organisation and Architecturer By C.W. Gear (Prentice Hall of India Ltd.)
6. Any other book covering the contents of the course.

MCA-15/MSc-15

Practical - III

(Based on MCA/M.Sc./APGDCA-11 & 14)

Max. Marks : 100

Time Allowed : 3 Hrs.

Internet, Web programming & Java : 60 Marks
Viva-Voce : 15 Marks
FOURTH SEMESTER
MCA-16/MSc-16
Artificial Intelligence
Max. Marks : 100
Time Allowed : 3 Hrs.

Note:

i) The examiner has to set 8 questions in all and students will have to attempt any 5 questions.

ii) All questions will carry equal marks.

Scope of AI
Games theorem proving, natural language processing, vision and speech processing robotics, expert systems, All techniques. Search knowledge, abstraction.

Problem Solving
State space search: Production systems, Search space control. Depth first search, unknown search—Hill climbing best first search, branch and bound. Best First Search, Problem Reduction, Constraints, Satisfaction, Means End Analysis.

Knowledge Representation
Predicate logic: Skolemizing queries, Unification, modus ponens, Resolutin, dependency directed back tracking.

Rule Based Systems: Forward reasoning Conflict resolution, Backward reasoning. Use of non back track.

Structured Knowledge Representation Semantic net: Slots exceptions and defaults frames Handling uncertainty.

Probabilities reasoning, Use of certainty factor, Fuzzy logic.

Learning
Concept of learning, learning automation, genetic algorithm, learning by induction, neural nets back propagation.

Experts Systems
Need and justification for expert systems, Knowledge acquisitions, Case studies MYCIN, RI.

References:
3. Any other book(s) covering contents.

MCA-17/MSc-17
Computer Graphics
Theory : 100 Marks
Time : 3 Hrs.

Note:

i) The examiner has to set 8 questions in all and students will have to attempt any 5 questions.

ii) All questions will carry equal marks.

Overview of Computer Graphics:
Interactive graphics, passive graphics, Advantages of Interactive Graphics.

Display Devices:
Refresh CRT, Random-Scand and Raster Scan Monitor, Colour CRT Monitors DVST Prasma, Penel Displays, LED and LCD monitors, Hard copy devices.

Scan Conversion:
Scan converting a point, line, circle and ellipse.

2-D graphics transformations
(Rotations, Scaling, Translations, Reflecting Shearing), Composite 2D graphics transformations, 2-D viewing and clipping, Windowing concepts, clipping algorithms (Line, Area and Tex-Sutherland-Cohen, Mid-point subdivision), Window to view port transformation Primitive and attributes, Exerior and Interior clipping.

Interactive Graphics:
Concept of Positioning and Pointing, Interactive Graphio Devices (Key Boards, Touch Panels, Light Pens, Graphic tablets, Joysticks, Mouse, Voice Systems), Interactive Graphical
Techniques. Basic Positioning Methods, Constraints, Grid, Gravity field, Rubber Bond Methods, Sketching, Drgging, Inking and Painting.

**Computer Graphics Software:**
Introduction, GKS (primitive, attributes and Viewport, Display subroutines), PHIGS/PHIGS +

**3-D Graphics:**
3D Graphics transformations (Rotation, Rotation aboout an arbitrary line Scaling, Translation), Parallel and Perspective Projections, Concepts of Hidden Line, Hidden Line and Surface elimination methods (Z-Buffer, Scan-line, Painter's Subdivision), 3-D viewing and clipping 3-D Object Representation: Wireframe, model Bezier Curves and Surfaces.

**References:**
3. Any other book(s) covering contents.

**MCA-17/MSc-17**

* System Analysis & Design
Max. Marks : 100
Time Allowed : 3 Hrs.

**Note:**
1. The examiner has to set 8 questions in all and students will have to attempt any 5 questions.
2. All questions will carry equal marks.

Overview of system analysis and design. Business system concepts, system development life cycle, project selection, feasibility, analysis, design, implementation, testing and evaluation.

Project Selection: Source of Project requests, managing project review and selection, preliminary investigation.

**Syllabus Master of Computer Applications (In Distance Education Model)**

System requirement specification and Analysis: Fact finding techniques, Data flow diagrams, data dictionaries, process organisation and interactions, decision analysis, decision trees and tables.

Detailed design modularisation, modula specification, file design, system development involving data bases.

System Control and Quality: Assurance 4-Design objectives reliability and maintenance, software design and documentation tools top down, bottom up and variants, Units and intergration testing, testing practices and plans. System Controls, Audit trails.

System Administration and Training: coversion, and operation plans.

Hardware and Software Selection: Hardware acquisition, memory process, peripherals, bench marking, vendor selection, software selection-operating system languages, language process, performance and acceptance criteria.

**References**
1. System Analysis and Design by E.M. Awad (Galgotia Publications)
3. System Analysis and Design (Joint Volume) by Lee (NCC-Galgotia Publications)
5. Any other book covering the contents.

**MCA-18/MSc-18**

Object-Oriented Analysis And Design

Theory : 100 Marks
Time : 3 Hrs.

**Note:**
1. The examiner has to set 8 questions in all and students will have to attempt any 5 questions.
ii) All questions will carry equal marks.

Abstract Data Types:
Model of Real World, Autonomy, Generation of correct Applications, Resusability Classes, Instance Values, Methods and Messages, Creating and Destroying Objects, Constraints on object and Instance Variables, Pre and Post conditions of Methods.

Inheritance:
Subsets as Subtypes, Subtyping of Structured Types Contrasting in inheritance with subtyping, Implicit Subtyping verses Explicit inheritance, Subtyping and dynamic binding class inheritance Redefining Instance variables, Hiding Instance Variables inheriting methods, Method Overriding, Invoking Superclass Method, Constrained Overriding, Inheriting the Interface, Excluding Super class Methods metaclasses, Explicit Support, Implicit of hidden Metaclasses, Object Oriented Languages without Metaclasses, Prototype Systems and Deligation, Multiple inheritance.

Polymorphism, Object Identity, Object Modelling concepts, Object Oriented Design, Object Oriented Programming Languages, Object Oriented Database, Object Oriented User Interface.

Overview C++
Linkaes, How to make a Library, Functions, Macros.

Class and Objects:
Data Members, Member Functions, Private and Public Members, Default Labels, Data hiding and Encapsulation, Arrays within a class, Class Function Definition and pass values.

Operator Overloading:
Operator Function, User Defined Type Conversion Literal, Large Objects, Assignments and Initialisation, Subscripting, Function Call, Deferencing, Increment and Decrement A string Class, Friends and Members.

Inheritance through Extending C:
Concept of Inheritance Visibility Modes Private Public Protected Single Inheritance: Privacy derived, Publically derived.

Streams, Templates and Design of Libraries:
Output, Input, Formatting, Files, and Streams, Design of libraries.

Object Oriented Analysis and Design:
Object Oriented Development, System Design, Object Design, Entity Relationship Model, Overview of Existing methodologies.

Semantic and Entity Relationship Modeling:
Contrasting Design for Data bases and OOA/OOD.

Overview of Existing Methodologies:
Object Oriented Analysis, Object Oriented Design, Object Diagram, Dynamic Model, Functional Model.

References
1. Object-Oriented Modeling and Design by Rambaugh & Others (Prentice Hall)
3. Object Oriented Programming using C++ by E. Balagurusamy (Tata McGraw Hill)
5. Any other book(s) covering contents.

MCA-18/MSc-18

*Micro-processor & Assembly Language

External Marks: 75
Internal Assessment: 25
Time: 03 hrs.

Evolution of micro-processor; Overview of Intel Pro-pentium, Motorola 68000 series, Power PC, DEC-Alphachip: RISC and CISC architecture.
Basic microprocessor architecture and interface: internal architecture, external system bus architecture, memory and input/output interface.

Programming mode: general-purpose registers: pointer and index register; flag; segment registers, program invisible registers; memory addressing and addressing modes. Memory interfacing: memory address decoding; cache memory and cache controllers.

Basic I/O interface; I/O mapped I/O, memory mapped I/O; basic input/output and handshaking input/output port address decoding; 8255 programmable peripheral interface; 8279 programmable keyboard and display interface; 8254 programmable timer; 8251 programmable/communication interface; interrupts-interrupt vector, vector tables, hardware and software interrupts, 8259 programmable interrupts controller; real-time clock; direct memory access, 8237/8257 DMA controller; 8086/8088 Assembly Language Programming.

(This course should be taught in the context of 8086/8088 and its assembly language).

Note: The examiner is requested to set 8 questions covering the whole syllabus out of which the candidates will be required to attempt any 5 questions and no full program is to be asked in this theory paper.

Reference Books
1. Introduction to Microprocessors by A.P. Mathur (Tata McGraw Hill)
2. The 8086 and 8088 Microprocessors (Programming, Interfacing, Software, Hardware, and Applications) by Walter A. Triebel & Avtar Singh (PHI)
3. Fundamentals of Assembly Language Programming by Detmer (Galgotia Publications).
4. IBM MPC Assembly Language Programming by Abel (PHI).
5. Any other book covering the contents of paper.

MCA-19/MSc-19
Practical - IV
(Based on MCA/M.Sc./APGDCA-17 & 18)
Max. Marks: 100
Time: 4 Hrs.

⇒ Computer Graphics: 30 Marks
⇒ Object Oriented Programming using C++: 30 Marks
⇒ Viva-Voce & Practical Records: 15 Marks

MCA-20/MSc-20
Project Report
Max. Marks: 100
Time: 4 Hrs.

- A candidate is required to undergo for 2 months for developing a reasonable-size Industrial (preferably) project based on their hand-on experience in the relevant Software Development Tools. After the completion of the project, the students has to submit a Project Report (Three Copies) and the external examiner will evaluate the Project Report and thereafter viva-voce will be conducted.

- Distribution of Marks
  ⇒ Project Report: 55 Marks
  ⇒ Viva-Voce: 20 Marks

FIFTH SEMESTER

MCA-21: INTERNET PROGRAMMING USING C#
Max. Marks: 75
Time: 3 Hrs.

Note:
Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions.

Introduction to Internet, understanding the Internet, A tower of the Internet Hardware requirement to connect to the Internet, S/W requirement and Internet Service products.
Internet Address, Mail using mail form shell account.
Understanding the web, using the web, Advanced topics using web from a shell A/c.

Introduction to use net file types used on the Internet, Mailing lists, Telnet Talk: using talk from a shell A/c, IRC Basics, TCP/IP.

Internet Programming with C# creating applets, applications, security etc; DB connectivity options, Internet Applications, DB access, User Interface classes.

**Suggested Readings:**

2. Gunnerson Eric : A Programmer's Introduction to C#, IDG Books India (P) Ltd.

5. Any other book(s) covering the contents of the paper in more depth.

*Note:* Latest and good books may be added from time to time.

**MCA-22: SOFTWARE TESTING AND QUALITY ASSURANCE**

Max. Marks : 75
Time : 3 Hrs.

*Note:*
Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions.

Testing and the related concepts: significance and postential; Testability and features of Test cases.
Software Testing techniques; WBT, BBT, Ticking Box Testing; static analysis, symbolic testing, program mutation testing.

*Input space, partitioning, functional program testing, data guided testing.*

*Software testing Strategies: Approach, Issues, integration, incremental, System, alpha, Beta testing etc; Comparative evaluation of techniques; Testing tools; Dynamic analysis tools, test data generators, Debugers, test drivers etc.*

*Technical Metrics for Software: Quality Factors, framework; Metrics for analysis, design, testing source code etc.*

*Object Oriented Testing: OOT strategies and issues; Test Case design, interface testing.*

*Quality Assurance: concept, importance and essence; FTR, structured walk through technique etc.*

*SW Reliability, validation, safety and Hazards Analysis; Features affecting quality of software; SOA Plan.*

*Quality models: ISO 9000 and SEI-CMM and their relevance.*

**Suggested Readings:**

3. Pressman : Software Engineering, TMH.
7. Any other book(s) covering the contents of the paper in more depth.

*Note:* Latest and good books may be added from time to time.
MCA-23:  WINDOWS PROGRAMMING

Max. Marks : 75
Time : 3 Hrs.

Note:
Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions.

Windows basic concepts, window API, DEF, Files, creating window, message, x-windows; Mouse and Keyboard.

Introduction to resources, designing and creating menus, pop-up menus, user defined resources.

Bitmaps and dialogues; Windows animation; Font basics; Window controls; Font display, static controls, edit controls, list boxes; Psychic windows.

Overview and structure of windows programming, coding conventions; Displaying text, mouse, graphics device interfaces.

Suggested Readings:
1. Any other book(s) covering the contents of the paper in more depth.

Note:- Latest good books will be suggested and added from time to time.

MCA-24:  IT MANAGEMENT

Max. Marks : 75
Time : 3 Hrs.

Note:
Total 8 questions may be set covering the whole syllabus and the candidate will be required to attempt any 5 questions.

Concept of Management and administration Management as art and profession; IT and Management: Role, Relationship, etc.

IT in Management: Function of management; planning, organizing, staffing, directing, control, leadership communication;

Organizations: Forms, principles, functional areas of management, finance, personnel, producation and marketing.

Special issues of IT Management and Experiences; Interaction between R & D and Engineering activities, Transfer of New product developments into manufactureing Technology planning and approaches; Efficient linking of user and developer.

Approaches for technological upgradation and change.

Suggested Readings:
1. Any other book(s) covering the contents of the paper in more depth.

Note:- Latest good books will be suggested and added from time to time.

MCA-25
Practical - V
(Based on MCA 21 & 23)

Max. Marks : 100
Time : 4 Hrs.

➢ Internet Programming using C# : 30 Marks
➢ Windows Programming : 30 Marks
➢ Viva-Voce & Practical Records : 15 Marks
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