Subject Code—4264

M.C.A. (First Year) EXAMINATION

June 2006

(5 Years Integrated Course)

MCA-101

COMPUTER FUNDAMENTALS

Time : 3 *Hours* *Maximum Marks :* 100

Note : Attempt any *Five* questions. All questions carry equal marks.

1. (a) Discuss the ways in which characters and fractional numbers are represented in computers.

   (b) Why Hexadecimal Representation of Numbers is important in computers ?

2. (a) Describe a digital computer with its basic components.

   (b) Why Random Access Memory is called so ? Differentiate between Static and Dynamic RAM.

P.T.O.

3. (a) Discuss the subtraction of numbers using 2's complement form. 10

(b) 48 and 8 are two numbers in Decimal numbers system. Convert them to Binary and carry out division and multiplication.

4. (a) What should be the characteristics of a good programming language ?

(b) Compare the advantages of Assembly Language and High Level Language.

5. (a) What are the functions of an Operating System ?

(b) Differentiate between Multiprogramming and Time Sharing.

6. (a) Discuss the various characteristics of First Generation of Computers.

(b) What are Distributed and Parallel Computer Systems ?

7. (a) Define the terms networks, internet, intranet.

(b) Discuss the characteristics of Twisted Pair and Optical Fibre.

8. (a) Write a note on Network Topologies.

(b) Differentiate between LAN, WAN, MAN.

Subject Code—4265

M.C.A. (First Year) EXAMINATION

June, 2006

(5 Years Integrated Course)

MCA-102

COMPUTER PROGRAMMING AND PROBLEM SOLVING USING 'C'

Time : 3 *Hours* *Maximum Marks :* 100

Note : Attempt any *Five* questions. All questions carry equal marks.

1. Differentiate between an algorithm and a flow chart ? Draw a flow chart to find the average of N numbers.

2. Explain the various characteristics of a good program. Also explain all the steps for the preparation and running of a complete C program with the help of exampes.

3. What do you mean by Data Types ? Why are data types needed in C language ? Explain the various types of data available in C with examples.

4. Differentiate between for.....loop, do.....while and while.....loop. Can break statement be used without any other loop ? Explain the importance of continue statement with the help of suitable examples.

5. What is an Array ? Which operations can you perform on arrays ? Write a program in C merge two sorted arrays.

6. (a) Distinguish between call by value and call by reference.

   (b) What are pre-processors ? Discuss the advantages of using pre-processors.

7. What do you mean by string procesing ? Write a program in C which reads a text and prints number of characters in a given text.

8. Write short notes on the following :

(a) Structure and Union

(b) I/O operations in C files

(c) Recursion

(d) Precedence of Operators.

Subject Code—4266

M.C.A. (First Year) EXAMINATION

June, 2006

(5 Years Integrated Course)

MCA-103

Mathematics—I

Time : 3 *Hours* *Maximum Marks :* 100

Note : Attempt any *Five* questions. All questions carry equal marks.

1. (a) Find the value of x :

$$\sqrt{3x^2 - 7x - 30} = (x + 5) - \sqrt{2x^2 - 7x - 5}$$

(b) Solve the following equations by Cramer's rule :

$$x + y + z = 9$$
$$2x + 5y + 7z = 52$$
$$2x + y - z = 0$$

2. (a) If matrices $A = \begin{bmatrix} 2 & 3 & 1 \\ 0 & 2 & -2 \end{bmatrix}$ and

$$B = \begin{bmatrix} 4 & -2 \\ 3 & 0 \\ -1 & 2 \end{bmatrix},$$

find product AB and BA. Is AB = BA ?

(b) Define transpose of a matrix and find inverse of the matrix :

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & 1 & 2 \\ 2 & 3 & 1 \end{bmatrix}$$

3. (a) Prove that :

$$2(\sin^6 x + \cos^6 x) - 3(\sin^4 x + \cos^4 x) + 1 = 0$$

(b) If $5 \tan \theta = 4$, find the value of $\dfrac{5 \sin \theta - 3 \cos \theta}{\sin \theta + 2 \cos \theta}$.

(c) Find the value of sin 15° and tan 15°.

4. (a) If the points $(x, -1)$, $(2, 1)$ and $(4, 5)$ are on a straight line, then find the value of x.

(b) Find the locus of a point (x, y) which moves so that its distance from $(4, 0)$ and y-axis are equal.

(c) Find the equation of a straight line passing through $(3, 4)$ and having sum of intercepts as 14.

5. (a) If :

$$y = (a \sin x + b \cos x)$$

find $\frac{d^2y}{dx^2}$.

(b) Find nth derivative of $y = e^x . \log x$.

(c) Evaluate :

$$\int \frac{(x-1)}{(x+1)(x^2+1)} dx.$$

6. Solve the following differential equations :

(a) $ydx - xdy = xy\,dx$

(b) $(x + y)\,dx + (x - y)\,dy = 0$

(c) $\cos^2 x \frac{dy}{dx} + y = \tan x$

7. (a) Find Mean and Median from the following data :

Marks	No. of Students
0–10	3
10–20	5
20–30	7
30–40	10
40–50	12
50–60	15
60–70	12
70–80	6
80–90	2
90–100	8

(b) Compute standard deviation from the data :

Marks	No. of Students
0–10	3
10–20	16
20–30	26
30–40	31
40–50	16
50–60	8

8. (a) State and prove Baye's theorem for probability.

(b) Find first two moments of Binomial distribution. Hence find mean and variance.

(c) Calculate coefficient of correlation from the following data :

x	:	1	2	3	4	5
y	:	2	5	3	8	7

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Subject Code—4267

M.C.A. (First Year) EXAMINATION

(5 Years Integrated Course)

MCA-104

BUSINESS FLOW SYSTEMS

Time : 3 *Hours* *Maximum Marks* : 100

Note : Attempt any *Five* questions. All questions carry equal marks.

1. Explain the nature and components of business.

2. Is business system a part of economic system ? Point out the similarities and differences between the two.

3. Critically evaluate the partnership as a form of business organisation.

P.T.O.

4. What are the factors which determine the size of a firm ? Explain.

5. Write a detailed note on winding-up process of a company.

6. What do you mean by Public Utilities ? Discuss their rights and duties.

7. Define Management. Discuss the principles of management.

8. Write short notes on the following :
   (a) Scientific Management
   (b) Business Combination.

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Subject Code—4268

M.C.A. (First Year) EXAMINATION

(5 Years Integrated Course)

MCA-105

OPERATING SYSTEM—I

Time : 3 Hours *Maximum Marks : 100*

Note : Attempt any *Five* questions. All questions carry equal marks.

1. (a) Define an Operating System. Explain the functions of an operating system. 12

   (b) Explain the evolution process of operating systems. 8

2. Discuss the properties of the following operating systems : 5×4=20

   (a) Time Sharing System

   (b) Parallel System

   (c) Distributed System

   (d) Real Time System.

P.T.O.

3. What is a Virtual Machine ? What is a virtual machine operating system ? Also list the several advantages and disadvantages of the virtual machine concept. 20

4. (a) Explain the layered structure of an operating system. Discuss the various services provided by an operating system. 12

   (b) Define and discuss the purpose of system calls. 8

5. (a) Define Process. What is process scheduling ? Discuss the three schedulers—long-term, medium-term and short-term schedulers. 14

   (b) What are the various operations performed on processes ? Give the list. 6

6. (a) What is CPU Scheduling ? Explain the basic criteria for selecting good scheduling algorithm. 10

   (b) What are the pre-emptive and non-pre-emptive scheduling algorithms. Discuss the various scheduling algorithms of both the categories. 10

7. What is a Deadlock ? Discuss the necessary conditions for deadlock. Explain the deadlock detection and recovery techniques. 20

8. What is Memory Management ? Explain the demand paging memory management technique. 20

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Subject Code—4269

M.C.A. (First Year) EXAMINATION

June, 2006

(5 Years Integrated Course)

MCA-106

COMMUNICATION AND PRESENTATION SKILLS

Time : 3 Hours *Maximum Marks : 50*

Note : Attempt any *Five* questions. All questions carry equal marks.

1. How do Communication skills help in becoming an effective executive ? Bring out important pre-requisites of communication skills.

2. Discuss the important points that are to be taken care of while participating in a meeting as convener and as a member.

P.T.O.

3. What factors are kept in mind while preparing a public speech ? How will you carry out audience analysis while delivering a speech ? Discuss.

4. How does the model of communication apply to non-verbal communication ? Discuss with illustrations the role of body's physical movements in effective communication.

5. What are different visual aids in communication ? How can they be used to assist in communication and how can they often be a barrier in communication ? Discuss.

6. What are the important features of power point ? Explain the procedure of preparing a presentation on power point.

7. What are the important elements and formats of a resume ? Draft your own resume using only assumed name.

8. What are the different types of reports ? Discuss the contents of a large size report with special reference to its presentation.

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Subject Code—4270

M.C.A. (Second Year) EXAMINATION

(5 Years Integrated Course) June, 2006

(Re-appear)

MCA-201

DATA STRUCTURE AND ALGORITHM

Time : 3 *Hours* *Maximum Marks :* 100

Note : Attempt any *Five* questions. All questions carry equal marks.

1. (a) What is a Data Structrue ? Differentiate between primitive and non-primitive data structure. 10

   (b) Explain the different operations performed on data structures. 10

P.T.O.

2. (a) What is an Array ? Explain the address calculation in single and multidimensional arrays. 12

(b) Write an algorithm to insert an element in an array. 8

3. What is the difference between sorting and searching ? Explain the searching techniques and their complexity analysis. 20

4. (a) What is the difference between array and linked list ? 5

(b) What is a Doubly Linked List ? How is it represented in memory ? 10

(c) How is a polynomial is represented using a linked list ? 5

5. (a) The following sequences represent preorder and inorder traversals of a tree T respectively :

Preorder : G B Q A C K F P D E R H

Inorder : Q B K C F A G P E D H R

Draw the diagram of tree. 10

(b) How do you represent the binary tree in Computer's Memory ? 10

6. Define with examples the following :

(a) Threaded Binary Tree 4

(b) Height Balanced Tree 4

(c) Heap 4

(d) Tree Traversals. 8

7. Define a Graph. Explain the graph traversals along with examples and write their algorithms. 20

8. (a) Define Minimum Spanning Tree. Explain the methods to draw a minimum spanning tree. 10

(b) What is Hashing ? Explain three techniques often built into hash functions. 10

Subject Code—4271

M.C.A. (Second Year) EXAMINATION

June, 2006

(5 Years Integrated Course)

(Re-appear)

MCA-202

DATABASE MANAGEMENT SYSTEM

Time : 3 *Hours* *Maximum Marks :* 100

Note : Attempt any *Five* questions. All questions carry equal marks.

1. (a) What are the structure of selection ? Explain.

   (b) What are the structure of projection ? Explain.

   (c) What is equi join ? Explain.

   (d) Explain the find and get statement.

   (e) What are the features of QBE ?

P.T.O.

2. Write short notes on any *three* of the following :

   (a) Conceptual Schema

   (b) Functional Dependency

   (c) Data Discription Language

   (d) Embedded SQL.

3. What is the need for normalisation of data ? What are the various techniques for normalisation in a relational database model ?

4. What are the various data models used in data bases. Explain access mechanism and the operations possible on each of them.

5. Given the following relations :
   Supplier (s#, Sname, City); S# as a key
   Parts (P, Pname, Weight, Quantity); P as a key
   Supply (S, P, Quantity); S, P as key
   Write the expression in SQL to answer the following quaries :

   (a) Find all part numbers being supplied.

   (b) Find part numbers and part names of parts held in quantity of less than 25.

(c) Find supplier names of suppliers who supply part number 3.

(d) Find supplier number of supplier who are located in the same city as the supplier named 'pink'.

(e) Find supplier numbers of supplier who supply a part other than number 3.

6. What are the various Query Optimization Technique ? Explain with examples.

7. Explain why locks are necessary in the concurrent operations on the database. Explain the algorithm for testing the serializability of a schedule.

8. What should be the objective of a distributive database system ? Explain the architecture of client server computing.

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Subject Code—4272

M.C.A. (Second Year) EXAMINATION

June 2006

(5 Years Integrated Course)

(Re-appear)

MCA-203

DIGITAL ELECTRONICS

Time : 3 Hours *Maximum Marks :* 100

Note : Attempt any *Five* questions. All questions carry equal marks.

1. (a) State and prove De-Morgan's Theorems. 6

   (b) Explain NAND and NOR logic operations. 5

   (c) Obtain AND, OR and NOT operations using NOR operations. 9

P.T.O.

2. Do as directed : 20

(i) $(1001 \cdot 0101)_2 = (?)_{10}$

(ii) $(10 \cdot 625)_{10} = (?)_2$

(iii) $(6A28)_{16} = (?)_8$

(iv) $(327 \cdot 89)_{10} = (?)_{\text{BCD CODE}}$

(v) $(1101 \cdot 0110111)_2 = (?)_8$

(vi) $(15)_{10} - (8)_{10} = (?)$

(Using one's complement)

(vii) Find 2's complement of 01101

(viii) $(1100010)_2 \div (111)_2 = (?)_2$

(ix) $(1101101)_2 \times (101)_2 = (?)_2$

(x) $(-48)_{10} - (23)_{10}$ using 2's complement.

3. Simplify the following using K-maps : 20

(a) f (A, B, C, D) = πM (4, 5, 6, 7, 8, 12)

d (1, 2, 3, 9, 11, 14)

(b) f (A, B, C, D) = Σm (0, 3, 5, 6, 9, 10, 12, 15)

Also realize them using minimum number of gates.

4. (a) A BCD message appears in four input lines of a switching circuit. Design an AND, OR, NOT gate network which produces an output '1' whenever input combination is 0, 2, 3, 5 or 8.

(b) Construct a 5 to 32 line decoder with four 3 to 8 line decoders with enable and one 2 to 4 line decoder. 10

5. (a) Explain the operation of master-slave J-K flip-flop with complete circuit arrangement and truth table. How the race around condition of J-K flip-flop is removed ? 15

(b) Show that J-K flip-flop can also be used as T and D flip-flops. 5

6. (a) Draw the diagram for universal shift register and explain its operation. 15

(b) Write a short note on Parity Generator/ Checker. 5

7. (a) Draw the diagram for 3 bit ripple counter and explain its operation with the help of waveforms. Use T flip-flop. 10

(b) Design a four bit decade counter (synchronous). Use J-K flip-flops. 10

8. (a) Explain various characteristics of digital IC's. 10

(b) Draw the circuit diagram for TTL Totem Pole NAND gate and explain its working. 10

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Subject Code—4273

M.C.A. (Second Year) EXAMINATION

June, 2006

(5 Years Integrated Course)

(Re-appear)

MCA-204

COMPUTER ORGANIZATION AND ARCHITECTURE

Time : 3 *Hours* *Maximum Marks :* 100

Note : Attempt any *Five* questions. All questions carry equal marks.

1. (a) Design a 4-bit combinational circuit decrementor using four full adder circuit.

   (b) Draw the flow chart for instruction cycle.

P.T.O.

2. (a) Explain the function of the following memory reference instructions :
   (i) STA
   (ii) BUN
   (iii) BSA
   (iv) LDA

   (b) Draw and explain the process of address selection for control memory in microprogrammed control unit.

3. Design a microprogrammed control unit along with microprogrammed sequencer.

4. (a) List out the instructions of each type of addressing modes available.

   (b) Differentiate between different types of interrupts available in CPU.

5. Differentiate between the following :
   (a) RISC and CISC
   (b) Hardwired and Microprogrammed Control Unit.

6. Explain the following modes of data transfer techniques in CPU :
   (a) Progammed I/O
   (b) Interrupt Driven I/O
   (c) DMA.

7. (a) Discuss different mapping techniques in cache memory system.

   (b) Explain the concept of virtual memory system for execution of program.

8. Write short notes on the following :

   (a) Stack Organization

   (b) Shift Microoperations

   (c) Auxiliary Memory.

Subject Code—4274

M.C.A. (Second Year) EXAMINATION

June, 2006

(5 Years Integrated Course))

(Re-appear)

MATHEMATICS—II

MCA-205

Discrete Mathematical Structures

Time : 3 *Hours* *Maximum Marks :* 100

Note : Attempt any *Five* questions. All questions carry equal marks.

1. (a) Give group axioms. Show that the set Z of all integers ....., – 5, – 4, – 3, – 2, – 1, 0, 1, 2, 3, 4, 5, ... is a group with respect to the operation of addition of integers.

P.T.O.

(b) Define a Subgroup. Let H be a subgroup of G, then prove that the right cosets Ha form a partition of G.

(c) Explain the following :

(i) Normal subgroup

(ii) Semi-group and Free semi-group.

2. (a) Define a grammar and language of a grammar. Discuss also various types of grammars.

(b) Define a finite-state machine. Design a finite-state machine that performs serial addition.

(c) Describe the following :

(i) Finite graph

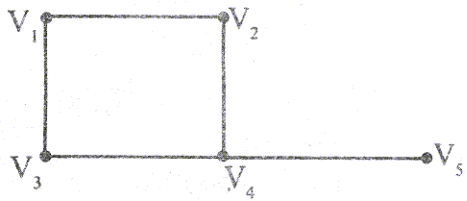
(ii) Length of path

(iii) Cut points and bridges

(iv) Subgraphs.

3. (a) If a simple graph G with n vertices has more than $\frac{1}{2}(n-1)(n-2)$ edges, then prove that G is connected.

(b) Use adjacency matrix to represent the graph shown in figure :



4. (a) Draw the graph represented by the incidence matrix :

$$\begin{array}{c} \\ a \\ b \\ c \\ d \\ e \end{array} \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 1 \\ 0 & 1 & 1 & 0 & 1 & 0 \\ 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 1 & 1 \end{bmatrix}$$

(b) Describe an efficient algorithm for comparing distances in graphs.

(c) Describe Infix, Prefix and Postfix form of an algebraic expression in trees.

5. (a) Define partially ordered sets. Consider P(s) as the power set, show that the inclusion relation $\subseteq$ is a partial ordering on the powerset P(s).

(b) Explain bounded lattice and Hasse diagram. Draw the Hasse digram of $(P(A), \subseteq)$, where :

(i) $A = \{0, 1\}$

(ii) $A = \{0, 1, 2, 3\}$

6. (a) What do you mean by Boolean Algebra ? Prove the following for Boolean Algebra :

(i) The zero and unit elements are unique

(ii) The complement of an element is unique.

(b) Prove that :

(i) $a + (\bar{a}.b) = a + b$ and

$$a.(\bar{a} + b) = a.b$$

(ii) $(a+b).(\bar{b}+c) + b.(\bar{a}+\bar{c}) =$

$$a.\bar{b} + a.c + b$$

7. (a) Show that $(p \wedge q) \rightarrow (p \vee q)$ is a tautology.

(b) With the help of truth tables, prove that :

$$p \vee \sim q = (p \vee q) \wedge \sim (p \wedge q)$$

(c) Write a short note on gate circuits.

8. (a) Explain an integral domain and a finite field.

(b) Show that the set S of all matrices of the form $\begin{pmatrix} a & b \\ -b & a \end{pmatrix}$, where $a, b \in R$ is a field with respect to matrix addition and matrix multiplication.

(c) Let $f(t) = t^4 - 3t^3 + 3t^2 + 3t - 20$. Find all the roots of $f(t)$ given that $t = (1 + 2i)$ is a root.

E- JUN 2006

Subject Code—4275

M.C.A. (Second Year) EXAMINATION

June, 2006

(5 Years Integrated Course))

(Re-appear)

MCA-206

COMMUNICATION SKILLS—SCIENTIFIC AND TECHNICAL WRITING

Time : 3 *Hours* *Maximum Marks :* 50

Note : Attempt any *Five* questions. All questions carry equal marks.

1. Throw light on flow of communication in any scientific organisation.

2. What steps will you follow to popularise science ?

3. What are the various precautionary measures in scientific writing ?

P.T.O.

4. Throw light on media coverage of scientific and technical writing.

5. How will you write a science feature ?

6. How will you prepare to interview a scientist ?

7. Being a scientist, how will you face a Press Conference ?

8. What are the steps of delivering a public speech on science ?