

**[SPDCA-101]**  
**MCA DEGREE EXAMINATION**  
**I YEAR**

**PROBLEM SOLVING AND PROGRAMMING**  
(Effective from the admitted batch 2009-10)

**Time: 3 Hours**

**Max.Marks: 70**

**Instructions:** All parts of the unit must be answered in one place only.  
Figures in the right hand margin indicate marks allotted.

1. Answer any **Four** of the following: 4x5 = 20
- a) Define flowchart. Draw a flowchart to find the sum of odd numbers of first 'N' natural numbers and print the result
  - b) Define keywords and identifiers. Differentiate between the two. Give examples for the two types
  - c) Classify broadly the data types of 'C' language
  - d) Mention the difference between character array and integer array
  - e) How a multidimensional array defined in terms of a pointer? Explain
  - f) List any five file operations. Give their C syntax
  - g) Distinguish between text mode and binary mode operation of a file

Answer all questions 5x10 = 50

2. a) i) Define an algorithm and write an algorithm to enter two numbers and find the smallest out of them 5
- ii) Write a C program to convert a given decimal number to binary 5

**OR**

- b) i) Determine the time complexity of the following algorithm 5
- ```
old = 1
new = 1
print old, new
n = 20
for i = 1 to n
a = old + new
print a
old = new
new = a
end for
```

- ii) Explain the notations for time complexity 5

3. a) Briefly explain about the various types of operators involved in formation of expression 10

**OR**

- b) Explain in detail about the following
- i) If else statement 2
  - ii) Switch statement 2
  - iii) do-while statement 2
  - iv) Break statement 2
  - v) Continue statement 2

4. a) i) Write a 'C' program to read matrix order M x N. Find the sum of secondary diagonal elements of the matrix and print the sum 6
- ii) Explain how 'C' string variables are declared and initialized 4

**OR**

- b) Write a program, which counts number of words, lines and characters in a given text 10

5. a) i) Distinguish between structure and union 2
- ii) Distinguish between basic data type and user defined data type 2
- iii) Create an array of structure for storing the details of employees name, age and salary 6

**OR**

- b) i) What is a pointer variable? What are the advantages and disadvantages of pointer variables? List the operations that are permitted on pointers 5
- ii) Declare two pointer variables a and b for two matrices and perform the addition operation on matrices a and b to get the output matrix C 5
- 6. a) Write short notes on
  - i) fopen and fclose 5
  - ii) fread and fwrite 5

**OR**

- b) Write a C-program to copy all even integers to an output file, where the input file consists of both odd and even numbers 10

[01/IY/210]

**[SPDCA-102]  
MCA DEGREE EXAMINATION**

**I Year**

**DISCRETE MATHEMATICS**

(Effective from the admitted batch 2009-10)

**Time: 3 Hours**

**Max.Marks: 70**

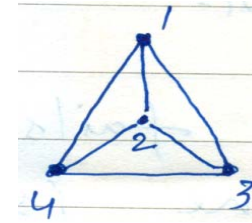
**Instructions:** All parts of the unit must be answered in one place only.  
Figures in the right hand margin indicate marks allotted.

**Section-A**

1. Answer any four of the following 4X5 = 20
  - a) Obtain the principal disjunctive normal form for  
 $(P \wedge Q) \vee (7P \wedge R) \vee (Q \wedge R)$
  - b) Symbolize and show that the following premises are inconsistent
    1. If jack misses many classes through illness, then he fails high school
    2. If jack fails high school, then he is uneducated
    3. If jack reads lot of books, then he is not uneducated
    4. Jack misses many classes through illness and reads a lot of books
  - c) If relations R and S are both reflexive, show that RUS and  $R \wedge S$  are also reflexive
  - d) Find the number of nonnegative Integral solutions to  
 $x_1 + x_2 + x_3 + x_4 + x_5 = 10$
  - e) Find the coefficient of  $X^{20}$  in  $(X^3 + X^4 + X^5 + \dots)^5$
  - f) Is there a simple graph with degree sequence  
 $(1, 1, 3, 3, 3, 4, 6, 7)$

g) Find the edge chromatic number for the following graphs

i)



- ii)  $K_3, 3$
- iii) The Petersen graph
- iv)  $K_n$

**Section-B**

Answer all the questions

5X10 = 50

2. a) Show that if  $A \leftrightarrow B$  is tautology then A is equivalent B i.e.  $A \leftrightarrow B$

**OR**

- b) Show that  $R \wedge (P \vee Q)$  is valid conclusion from the premises  $P \vee Q, Q \rightarrow R, P \rightarrow M$ , and  $\neg M$
3. a) Two equivalence relations R and S are given by their relation matrices  $M_R$  and  $M_S$ . Show that  $R \circ S$  is not an equivalence relation

$$M_R = \begin{bmatrix} 1 & 1 & 0 \\ 1 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \quad M_S = \begin{bmatrix} 1 & 1 & 0 \\ 1 & 1 & 1 \\ 0 & 1 & 1 \end{bmatrix}$$

**OR**

- b) If X and Y are finite sets, find a necessary condition for the existence of one – to – one mappings from X to Y
4. a) Use the binomial identities to evaluate the sum  
 $1.2.3. + 2.3.4 + \dots + (n-2)(n-1)n$

**OR**

- b) Suppose that 200 faculty members can speak French and 50 speak Russian, while only 20 can speak both French and Russian. How many faculty members can speak either French or Russian
5. a) Write a generating function for the number of ways of obtaining the sum  $n$  when tossing  $g$  distinguishable dice. Then find  $a_{25}$

**OR**

- b) Solve the recurrence relation  $a_n - 7a_{n-1} + 10a_{n-2} = 0$  for  $n \geq 2$
6. a) State and Prove Grinberg theorem

**OR**

- b) Write Kruskal's Algorithm for finding minimal spanning tree

[5/IIIIS/210]

**[SPDCA-103]**  
**MCA DEGREE EXAMINATION**

**I Year**

**COMPUTER ORGANISATION**  
(Effective from the admitted batch 2009-10)

**Time: 3 Hours**

**Max.Marks: 70**

**Instructions:** All parts of the unit must be answered in one place only.  
Figures in the right hand margin indicate marks allotted.

**Section-A**

1. Answer any four of the following 4X5 = 20
- a) Write any six Basic relation of Borean algebra
  - b) Write the logic diagram of a full subtractor circuit and explain its working
  - c) Construct a 4 by 16 Decoder using two 3 by 8 decoder. Draw the logic diagram
  - d) Explain the working of a bus system with multiplexer circuits. Draw the derailed block diagram
  - e) Explain any five instructions of a Basic computer using Register transfer language
  - f) Explain fetch cycle using Register transfer language statements
  - g) What are vectored intercepts. Explain

**Section-B**

Answer all the questions 5X10 = 50

2. a) Obtain the simplified Boolean functions of the full-adder in sum of products form and draw the logic diagram using NAND gates

**OR**

- b) The difference between a full-adder and a full-subtractor is in the Boolean function that generates the carry or borrow. Use a control variable  $w$  and obtain the logic diagram of a circuit that functions as a full-adder when  $w = 0$  and as a full-subtractor when  $w = 1$ .

3. a) Draw the logic diagram of a 3 by 8 decoder with enable input and explain its working

**OR**

- b) Explain the working of a 3 bit bidirectional shift Register with parallel load capability. Draw the required logic diagram

4. a) Explain the working of a DMA Controller

**OR**

- b) Explain the working of a virtual memory system. Explain how virtual address is mapped to physical address

5. a) Explain how the operations

- i) Addition
- ii) Addition with carry
- iii) XOR
- iv) Complement A are performed in an ALU. Draw the required Logic diagrams

**OR**

- b) Explain the working of a stack organized CPU. What are zero address instructions. Explain

6. a) Explain different micro instruction formats.

- What are (i) Horizontal microinstructions  
(ii) Vertical microinstructions. Explain

**OR**

- b) Explain the following :

- i) Hardwired control
- ii) Dynamic micro programming
- iii) Control memory
- iv) Micro operation
- v) Micro program

**[SPDCA-104]**  
**MCA DEGREE EXAMINATION**  
**I YEAR**

**DATA STRUCTURES**  
 (Effective from the admitted batch 2009-10)

**Time: 3 Hours**

**Max.Marks: 70**

**Instructions:** All parts of the unit must be answered in one place only.  
 Figures in the right hand margin indicate marks allotted.

1. Answer any **Four** of the following: 4x5 = 20

- a) What is Analysis? What are the cases to consider during Analysis?
- b) Explain Multi-dimensional array
- c) Describe different types of linked lists
- d) Explain stack and queue. Give at least two applications of each
- e) Draw the binary tree, whose traversals are as follows:

|           |   |   |   |   |   |   |   |   |   |
|-----------|---|---|---|---|---|---|---|---|---|
| Pre-order | A | B | D | G | C | E | H | I | F |
| In-order  | D | G | B | A | H | E | I | C | F |

- f) Give the algorithm for depth first traversal of a graph
- g) Explain linear and binary search methods

Answer all questions 5x10 = 50

2. a) Write a program to subtract two sparse matrices implemented as an array

**OR**

b) Define doubly linked list. Write a program in C to perform the following operations in a doubly linked list

- i) Insert
- ii) Delete
- iii) Display

3. a) What is a stack? Explain two different representations of a stack. List the operations performed on a stack and write an algorithm for implementing these operations

**OR**

b) Write a program to represent a dequeue using linked list. Also write functions to add and delete elements from the dequeue

4. a) Write Non-recursive implementation of tree traversal algorithms

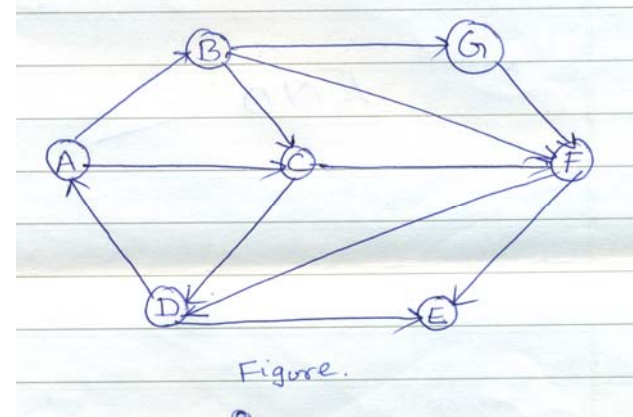
**OR**

b) What is a binary search tree? Write an algorithm to delete a node from a binary search tree

5. a) Write Dijkstra's algorithm to find shortest path

**OR**

b) Obtain the strong components of the digraph given below, and explain the methods of determining the Strong component in a digraph



6. a) Discuss the quick sort. Derive the efficiency of the quick sort in the best and worst cases

**OR**

b) What is a heap? Show how would you perform a heap sort using heap? Work out the efficiency factor of the heap sort

**[SPDCA-105]**  
**MCA DEGREE EXAMINATION**  
**I YEAR**

**DATABASE MANAGEMENT SYSTEMS**  
(Effective from the admitted batch 2009-10)

**Time: 3 Hours**

**Max.Marks: 70**

**Instructions:** All parts of the unit must be answered in one place only.  
Figures in the right hand margin indicate marks allotted.

1. Answer any **Four** of the following: 4x5 = 20
- a) Procedural and non-procedural DMLs
  - b) Weak entity types
  - c) Armstrong's axioms for functional dependencies
  - d) View materialization
  - e) Unrepeatable read
  - f) UNDO-type and REDO-type log entries
  - g) Distribution transparency

Answer all questions 5x10 = 50

2. a) Describe the three-schema architecture. Why do we need mappings between schema levels?

**OR**

- b) Describe the two alternatives for specifying structural constraints on relationship types. What are the advantages and disadvantages of each?
3. a) Discuss the purpose of Boyce-Codd normal form and describe how BCNF differs from and is stronger than 3 NF. Illustrate your answer with an example

**OR**

- b) Why should NULLs in a relation be avoided as far as possible? Discuss the problem of spurious tuples and how we may prevent it
4. a) Explain how GROUP By clause works? What is the difference between WHERE and HAVING clause?

**OR**

- b) How does SQL implement the entity integrity and referential integrity constraints of the relational data model? Explain with an example
5. a) Discuss the problem of deadlock and starvation and different approaches to dealing with these problems

**OR**

- b) Explain the implementation of shadow paging technique
6. a) What is a fragment of a relation? What are the main types of fragments? Why is fragmentation a useful concept in distributed database design?

**OR**

- b) What are the software components in a client-server DDBMS? Compare the two-tier and three-tier client-server architectures

[01/IY/210]

**[SPDCA-106]**  
**MCA DEGREE EXAMINATION**  
**I YEAR**

**COMMUNICATION SKILLS**  
(Effective from the admitted batch 2009-10)

**Time: 3 Hours**

**Max.Marks: 70**

**Instructions:** All parts of the unit must be answered in one place only.  
Figures in the right hand margin indicate marks allotted.

1. Answer any **Four** of the following: 4x5 = 20
- a) Written Communication
  - b) Note-taking
  - c) Conference calls
  - d) Format of Minutes
  - e) Visual Aids
  - f) Body Language
  - g) Oral communication

Answer all questions 5x10 = 50

2. a) What are the various barriers towards effective communication? How are they overcome?
- OR**
- b) Write an essay on the different types of communication
3. a) What are the steps involved in the process of preparation for an interview?
- OR**
- b) How is an effective curriculum vitae prepared?
4. a) What is the role of a successful manager in an effective and successful organization?
- OR**
- b) What are the effective leadership models?

**UNIT-IV**

5. a) Discuss the importance of body language in presentations
- OR**
- b) What are the salient features of an effective presentation?

**UNIT-V**

6. a) Write an essay on the importance of vocabulary while also suggesting measures towards effective vocabulary building
- OR**
- b) Discuss the importance of grammar, usage and pronunciation

[01/IY/210]