M.C.A. (SEM - III)
OBJECT ORIENTED PROGRAMMING C++.
(DEC-18)

Total marks: 100

Note:

1. **Q1 is compulsory**
2. **Attempt any Four from remaining Six questions**

Q.1(a)	Explain different types of inheritance supported by C++ with examples of each.	**10**
(b)	Explain the use of 'new' and 'delete' operators. Explain their role in dynamic memory management.	**10**
Q.2(a)	Explain operator overloading. Write a program to overload relational operator.	**10**
(b)	Discuss the role of Constructors in a C++ program. Also explain the use of parameterized constructors with example.	**10**
Q.3(a)	What is a friend function? What is the need of friend function? Write a program to illustrate a class as a friend of another class.	**10**
(b)	Explain the difference between – 1) Function Overloading and Function Overriding 2) Associative and Sequence Containers	**10**
Q.4(a)	What are manipulators? Explain different manipulators with suitable examples.	**10**
(b)	Write a program to convert distance from meter to centimeter and centimeter to meter using object to object conversion.	**10**
Q.5(a)	Discuss the process of Exception Handling in C++ with suitable examples.	**10**
(b)	What is a template? Illustrate the use of class template with a suitable example.	**10**
Q.6(a)	What is polymorphism? Explain how polymorphism can be achieved during runtime.	**10**
(b)	Declare a class employee with emp_id,name,dept,salary.Write a program to access the object of employee class into and from binary file	**10**
Q.7	Write a short note on *any four* of the following: a) Data Types in C++ b) Namespaces c) this pointer d) command line arguments e) default argument	**20**

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M.C.A. (SEM - III)
DATA BASE MANAGEMENT SYSTEMS
(DEC-18)

(1) .... of remaining.
(2) All question carry equal marks.
(3) Answer to sub-questions should be grouped together.

Q1.	(a)	Design an E-R diagram for keeping track of the exploits of your favorite sports team. You should store the matches played, the scores in each match, the players in each match and individual player statistics for each match. Summary statistics should be modeled as derived attributes.	10
	(b)	Write schema definition and normalize all tables in 3NF for the above ER diagram.	10
Q2.	(a)	Write a detailed note on query optimization.	10
	(b)	Explain architecture of database system. What are roles and responsibilities of a DBA?	10
Q3.	(a)	What are different levels of data independence? Explain in detail.	10
	(b)	What is deadlock? Describe and compare deadlock detection and prevention techniques.	10
Q4.		Differentiate between the following	20
	(a)	Relational and network model	
	(b)	Strong and weak entity	
	(c)	structure and hash indexing	
	(d)	Ternary Relationship in E-R diagram and aggregation	
Q5.	(a)	What is bell la pedula model? Explain in detail.	10
	(b)	Define decomposition. Explain loss less and dependency preserving decomposition.	10
Q6.	(a)	What is an index on a file? What is search key for an index? Why do we need indexes?	10
	(b)	What is transaction? Explain ACID properties.	10
Q7.		Write short note on **any four** of the following	20

    (a) triggers
    (b) crash recovery and checkpoints
    (c) shadow paging
    (d) MVD
    (e) super and candidate keys

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M.C.A. (SEM - III)
DATA COMMUNICATION NETWORKS
(DEC-18)

(3 Hours)   **Total Marks: 100**

N.B. :   1) Question No.1 is **compulsory.**
              2) Attempt any **four** from the remaining **six** questions.
              3) Figures to the right indicate full marks.

Q1. (a) Explain OSI model and compare it with the TCP/IP.   [10]
     (b) Discuss RSA public key cryptosystem with example.   [10]

Q2. (a) Explain the 3-way handshake for TCP connection   [10]
     (b) Explain Ipv4 Header format in detail.   [10]

Q3. (a) What is Classful addressing? Discuss Class A, Class B, Class C, Class   [10]
          D and Class E addresses with its ranges in decimal dotted notation
          and example.
     (b) Describe the IEEE 802.3 and IEEE 802.5 standards for communication.   [10]

Q4. (a) What is congestion? Discuss various methods of preventing and   [10]
          reducing the congestion.

     (b) Explain GEO, MEO and LEO categories of satellite.   [10]

Q5. (a) Explain the operation of CSMA/CD .Discuss various Persistent   [10]
          algorithm used.

     (b) What is the need of Routing Algorithm? In which layer it is   [10]
          implemented? Discuss Shortest Path Routing Algorithm.

                                                                                                     [10]
Q6. (a) Explain the concept sliding window Protocol .What is the difference   [10]
          between Go Back N ARQ and Selective Repeat ARQ.
     (b) Explain DES cipher Algorithm in detail.   [10]

Q7.   Write Short notes on any **four** of the following: [20]
     (a) Tunneling
     (b) FTP
     (c) ICMP
     (d) DNS
     (e) ARP

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M.C.A. (SEM - III)
OPERATION RESEARCH
(DEC-18)

Marks: 100

Note:
- Question 1 is compulsory
- Answer any 4 from the remaining 6 questions
- Figures to the right indicate marks
- Use of scientific calculator is allowed

Q1 a) Solve the Following Problem using Graphical Method [10]

$$\text{Maximize } Z = 3X_1 + 2X_2$$
$$\text{Subject to } 2X_1 + X_2 <= 40$$
$$X_1 + X_2 <= 24$$
$$2X_1 + 3X_2 <= 60$$
$$\text{and } X_1, X_2 >= 0$$

b) Suppose the following estimates of activity times (days) are provided [10]

Activity	Optimistic time	Most Likely time	Pessimistic time
1-3	1	3	5
1-2	3	4	5
3-5	4	5	6
2-4	3	5	7
4-5	5	6	13
5-6	4	7	10
4-6	6	8	10

i) Draw a network
ii) Find the expected duration and variance for each activity.
iii) Find the critical path of the project

Q2 a) Write short notes on the following. [10]
i) Different costs associated with inventory problem.
ii) Redundant constraints in LPP.

b) The data collected in running a machine, the cost of which is Rs.60,000 are given below: [10]

Year	1	2	3	4	5
Resale Value (Rs.)	42000	30000	20400	14400	9650
Cost of spare(Rs.)	4000	4270	4880	5700	6800
Cost of labour(Rs.)	14000	16000	18000	21000	25000

Determine the optimum period of replacement of the machine?

Q3 a) Solve the following LPP by Simplex Method   [10]
Maximize Z = 4x1 + 10x2
Subject to   2x1 + x2 ≤ 10
                2x1 + 5x2 ≤ 20
                2x1 + 3x2 ≤ 18
                x1,x2 ≥ 0

b) 6 jobs are to be processed at three machines A, B and C in the order ABC. The time   [10]
taken by each job on the three machines is given below. Each machine can process one
job at a time. Determine the optimal sequence of jobs and the minimum total elapsed
time. Find the idle time of each machine.

Jobs	A	B	C
1	8	3	8
2	3	4	7
3	7	5	6
4	2	2	9
5	5	1	10
6	1	6	9

Q4 a) Reduce the game by dominance property and solve   [10]

		Player B				
		I	II	III	IV	V
	I	1	3	2	7	4
Player A	II	3	4	1	5	6
	III	6	5	7	6	5
	IV	2	0	6	3	1

b) Using two-phase method solve the following LPP   [10]

Maximize $Z = 2x_1 + 3x_2 - 5x_3$

subject to $x_1 + x_2 + x_3 = 7$

                $2x_1 - 5x_2 + x_3 \geq 10$

and $x_1, x_2, x_3 \geq 0$

Q5 a) Solve the following assignment problem and find the optimum assignment that will result in minimum man hours needed. [10]

Jobs

	A	B	C	D
I	5	3	2	8
II	7	9	2	6
III	6	4	5	7
IV	5	7	7	8

Workers

b) Find the initial basic feasible solution using Vogel's Approximation Method (VAM) for the following transportation problem. [10]

Distribution Centre

	A	B	C	D	Supply
1	2	3	11	7	6
2	1	0	6	1	1
3	5	8	15	9	10
Requirement	7	5	3	2	

Plant

Q6 a) Solve the following LPP using Big M method [10]

Maximize $Z = 3x_1 + 2x_2$

Subject to

$$2x_1 + x_2 \leq 1$$
$$3x_1 + 4x_2 \geq 4$$

And

$$x_1, x_2 \geq 0$$

b) Draw the network diagram. Find total, free and independent floats. [10]

Activity	1-2	1-3	1-4	2-4	2-5	3-6	4-6	5-7	6-7	6-8	7-8	8-9
Duration	4	12	10	8	6	8	10	10	0	8	10	6

Q7 a) Use the dual simplex method to solve the following problem.   [10]

Minimize $Z = x1 + 2x2 + 3x3$

Subject to $2x1 - x2 + x3 \geq 4$

$x1 + x2 + 2x3 \leq 8$

$x2 - x3 \geq 2$

$x1, x2, x3 \geq 0$

b) Solve using Gomory's cutting plane method   [10]

Maximize $Z = 7x1 + 9x2$

subject to $-x1 + 3x2 \leq 6$

$7x1 + x2 \leq 35$

and $x1, x2 \geq 0$ and $x2$ is integer

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M.C.A. (SEM - III)
SOFTWARE ENGINEERING
(DEC-18)

(3 Hours)　　　　[Total Marks: 100

N.B: 1) Question No. 1 is compulsory

2) Attempt any four questions from remaining six questions

3) Illustrate answers with sketches wherever required and use of pencil should be done for drawing sketches

Q.1	A	What is software reliability? Explain Capability Maturity Model	10
	B	Explain COCOMO-I in detail.	10
Q.2	A	What is requirement engineering? List and explain steps in requirement engineering.	10
	B	What do you understand by system testing? List and Explain the different types of system testing.	10
Q.3	A	Define Software Configuration Items. Explain how they are used in SCM process.	10
	B	Define degree of rigor. Explain how degree of rigor is calculated based on TSS.	10
Q.4	A	What are size metrics? How is a function point metrics advantageous over LOC metric? Explain.	10
	B	What are the different steps to manage risks. List & Explain types of software risks & general risks	10
Q.5	A	Explain Putnam Resource Allocation Model in detail.	10
	B	Define SRS. Explain in detail.	10
Q.6	A	Define Structure Chart. Also explain different types of structured charts with example.	10
	B	Define Work Breakdown Structure. Explain difference between activity network diagram and work breakdown structure.	10
Q.7		Write Short Notes on : (any four)	20
	a.	Status Reporting	
	b.	Make Buy decision	
	c.	RMMM plan	
	d.	Configuration audit	
	e.	Software Reviews	

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M.C.A. (SEM - III)
MANAGEMENT INFORMATION SYSTEM
(DEC-18)

Time: 3 Hrs   Total. Marks: 100

NOTE:

I. Question No. 1 is **Compulsory**.
II. Attempt any four out of remaining six
III. Elaborate each answer with the help of an **example**

1.	(A)	What are the different types of CASE Tools in MIS	10
	(B)	List The Management Challenges In Building, Maintaining & Operation Of Information System.	10
2.	(A)	What are the principles of organization structure? Explain in detail.	10
	(B)	List And Explain organization behavioral factors.	10
3.	(A)	Discuss in brief Porter's Competitive Model.	10
	(B)	How The Challenges And Threats In Implementing MIS Are Overcome? Discuss With Suitable Example?	10
4.	(A)	Discuss The Role Of Information System In Globalization Of Education.	10
	(B)	Differentiate Between MIS And Electronic Data Processing (EOP).	10
5.	(A)	What Are The Characteristics Of MIS & How Does MIS Differ From TPS & DSS?	10
	(B)	What Are The Parameters Of Quality Measurement? List And Explain In Brief How We Can Call Information As A Quality Product?	10
6.	(A)	What do you mean by decision making? What are its types?	10
	(B)	Explain Levitt's ModelIn Detail.	10
7.		Explain Any Four Of The Following Terms :	20

    (A) Role Of MIS In Procurement
    (B) Value Chain Model
    (C) Role Of Operational Models In Development Of MIS
    (D) EDP
    (E) Supply Chain Management

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