

Seat No.	
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M.C.A. (Science) (Semester - I) (CBCS) Examination: Oct/Nov-2022
Object Oriented Programming Using C++

Day & Date: Wednesday, 15-03-2023
 Time: 11:00 AM To 02:00 PM

Max. Marks: 80

Instructions: 1) Question no. 1 and 2 are compulsory.
 2) Attempt any three questions from Q. No. 3 to Q. No. 7.
 3) Figure to right indicate full marks.

Q.1 A) Choose correct alternatives

10

- 1) Which of the following concepts means wrapping up of data and functions together?
 - a) Abstraction
 - b) Encapsulation
 - c) Inheritance
 - d) Polymorphism
- 2) Conditional operator are also known as _____.
 - a) Ternary operator
 - b) Relational operator
 - c) Assignment operator
 - d) Arithmetic operator
- 3) A constructor that accepts _____ parameters is called the default constructor.
 - a) One
 - b) Two
 - c) Three
 - d) No
- 4) Destructor has a same name as the constructor and it is preceded by _____.
 - a) ~
 - b) !
 - c) ?
 - d) \$
- 5) Setprecision requires which of the following header file?
 - a) stdlib.h
 - b) iomanip.h
 - c) console.h
 - d) conio.h
- 6) Array indexing always starts with the number _____.
 - a) 1
 - b) 0
 - c) 2
 - d) -1
- 7) Which concept is used to implement late binding?
 - a) Virtual functions
 - b) Operator functions
 - c) Constant functions
 - d) Static functions
- 8) How we can define member function outside the class?
 - a) Using scope resolution
 - b) Using structure
 - c) Using pointers
 - d) Using union
- 9) Which of the following approach is used by C++?
 - a) Top-down
 - b) Bottom-up
 - c) Left-right
 - d) Right-left
- 10) Which of the following cannot be a friend?
 - a) Function
 - b) Class
 - c) Object
 - d) Operator function

B) State True or False.**06**

- 1) We cannot have virtual constructors, but we can have virtual destructors.
- 2) The virtual function must be a member of some class.
- 3) Constructors should be declared in the private section.
- 4) Type specifier is optional when declaring a function.
- 5) Adding a derived class to a base class requires fundamental changes to the base class.
- 6) Pure virtual function has no implementation in the base class whereas virtual function may have an implementation in the base class.

Q.2 Answer the following.**16**

- a) What are the types of arrays? Briefly explain each.
- b) Explain difference between class and structure.
- c) Write a short note on static member function.
- d) Explain types of operators.

Q.3 Answer the following.**16**

- a) How run time polymorphism is achieved in C++? Explain with a program.
- b) What is array? Explain array of objects with example.

Q.4 Answer the following.**16**

- a) Write the difference between Single and Multiple inheritance with one example.
- b) Explain try, catch and throw with example.

Q.5 Answer the following.**16**

- a) What is Manipulator? Write a program to implement custom manipulator.
- b) What is operator overloading? Give the rules to overload an operator. Also write syntax and advantages of operator overloading.

Q.6 Answer the following.**16**

- a) Write a program for demonstrates the use of destructor and constructors.
- b) What are basic concepts of object-oriented programming? Explain in detail.

Q.7 Answer the following.**16**

- a) What is Template? Explain function template with suitable example.
- b) Explain the importance of pointers to object with example.

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M.C.A. (Science) (Semester - I) (CBCS) Examination: Oct/Nov-2022
Data Structures

Day & Date: Thursday, 16-03-2023
 Time: 11:00 AM To 02:00 PM

Max. Marks: 80

- Instructions:** 1) Question no. 1 and 2 are compulsory.
 2) Attempt any three questions from Q. No. 3 to Q. No. 7.
 3) Figure to right indicate full marks.

Q.1 A) Multiple choice questions.

10

- 1) The smallest element of an array's index is called its _____.
 a) Lower bound b) Upper bound
 c) Range d) Extraction
- 2) Stack is also called as _____.
 a) First in last out b) Last in first out
 c) Last in last out d) First in first out
- 3) What of the following is non-linear data structure?
 a) Stacks b) List
 c) Strings d) Trees
- 4) The number of edges from the root to the node is called _____ of the tree.
 a) Height b) Depth
 c) Length d) Width
- 5) What is the maximum number of children that a binary tree node can have?
 a) 0 b) 1
 c) 2 d) 3
- 6) What is an AVL tree?
 a) a tree which is balanced and is a height balanced tree
 b) a tree which is unbalanced and is a height balanced tree
 c) a tree with three children
 d) a tree with at most 3 children
- 7) What are the advantages of arrays?
 a) Objects of mixed data types can be stored
 b) Elements in an array cannot be sorted
 c) Index of first element of an array is 1
 d) Easier to store elements of same data type
- 8) The postfix form of the expression $(A + B) * (C * D - E) * F / G$ is?
 a) $AB + CD * E - FG / **$ b) $AB + CD * E - F ** G /$
 c) $AB + CD * E - * F * G /$ d) $AB + CDE * - * F * G /$
- 9) If the elements "A", "B", "C" and "D" are placed in a queue and are deleted one at a time, in what order will they be removed?
 a) ABCD b) DCBA
 c) DCAB d) ABDC

10) What is the worst case time complexity of inserting a node in a doubly linked list?

- a) $O(n \log n)$
- b) $O(\log n)$
- c) $O(n)$
- d) $O(1)$

B) State True Or False.

06

- 1) An array is a static data structure.
- 2) Binary search is used for searching in a unsorted array.
- 3) In the postfix form, the operator precedes the two operands.
- 4) Heap exhibits the property of a binary tree?
- 5) A normal queue, if implemented using an array of size MAX_SIZE, gets full when $\text{Front} = (\text{rear} + 1) \bmod \text{MAX_SIZE}$.
- 6) Reverse Polish Notation is the reverse of a Polish Notation.

Q.2 Answer the following

16

- a) Explain Circular linked list.
- b) Explain Priority Queue.
- c) Explain Abstract Data Type (ADT).
- d) Explain Applications of stack.

Q.3 Answer the following.

16

- a) Convert the following infix expression into postfix using stack. Infix Expression:
 $((a + b) + c * (d + e) + f) * (g + h)$.
- b) Differentiate between Array and Linked List.

Q.4 Answer the following.

16

- a) Define Array. Discuss representations and applications of single and multidimensional array with suitable examples.
- b) Explain tree traversal algorithm with suitable example.

Q.5 Answer the following.

16

- a) Explain Merge sort algorithm with example.
- b) Explain Dynamic programming with example.

Q.6 Answer the following.

16

- a) What is an AVL tree? Explain AVL rotations with example.
- b) What do you mean by algorithm? Give example.

Q.7 Answer the following.

16

- a) Define tree. Construct binary search tree of following series. Justify your answer. Series: 13, 4, 5, 14, 11, 2, 1, 8, 19, 7, 9, 18, 6 and 16.
- b) State and perform insertion sort algorithm to sort following numbers in ascending order. Series: 88, 55, 13, 105, 38, 23, 129, 65, 99, 28, 86, 66, 35, 18.

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Day & Date: Friday, 17-03-2023
Time: 11:00 AM To 02:00 PM

Instructions: 1) Question no. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7.
3) Figure to right indicate full marks.

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- Page 1 of 2

- 10) What is the main aim of software engineering?
- a) Reliable software
 - b) cost effective software
 - c) reliable & cost effective software
 - d) None of the above

B) State True or False.**06**

- 1) Fault is defect in program or mistake in program or error in the program.
- 2) Software design is an iterative generic process that may be applied without modification to any software project.
- 3) System development can cease after prototyping.
- 4) Level of data flow diagram is similar to context diagram.
- 5) Project risk affects the schedule or resources
- 6) Input and outputs in a data flow diagrams are actigrams

Q.2 Answer the following questions.**16**

- a) Differentiate Product and Process.
- b) Explain in brief architectural design.
- c) Explain in brief software crisis.
- d) Explain in brief software metrics indicators.

Q.3 Answer the following.

- a) Explain in detail data modeling and behavioral modeling.
- b) What are the communication techniques used in analysis?

08**08****Q.4 Answer the following.**

- a) What are the elements of analysis model?
- b) What is meant by software myths? Explain the types of myths?

08**08****Q.5 Answer the following.**

- a) Explain in detail data design and architectural design.
- b) Explain the evolutionary software process model.

08**08****Q.6 Answer the following.**

- a) What is meant by software quality assurance? Explain software quality assurance activities.
- b) What is software testing? Explain various software testing strategies.

08**08****Q.7 Answer the following.**

- a) Explain various elements used in object oriented software engineering.
- b) What are the stages of RAD model?

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Day & Date: Saturday, 18-03-2023
Time: 11:00 AM To 02:00 PM

Instructions: 1) Question no. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7.
3) Figure to right indicate full marks.

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- Page 1 of 2

- 10) For Mutual exclusion to prevail in the system _____.
a) at least one resource must be held in a non sharable mode
b) the processor must be a uniprocessor rather than a multiprocessor
c) there must be at least one resource in a sharable mode
d) all of the mentioned

B) State True Or False.**06**

- 1) Most PC operating systems do not support multi-programming.
- 2) A process is identical to a thread.
- 3) Deadlock can never occur if no process is allowed to hold a resource while requesting another resource.
- 4) The more cache memory the machine has, better the performance it provides.
- 5) FIFO page replacement algorithms suffer from Belady's Anomaly.
- 6) Semaphore is an integer variable to solve the critical section problem.

Q.2 Write Short Notes on**16**

- a) Process states
- b) Multiprogramming
- c) Mutex
- d) Virtual Memory

Q.3 Answer the following.**16**

- a) What is a system call and explain in detail with one example?
- b) What is deadlock? Explain different conditions for resource deadlock?

Q.4 Answer the following.**16**

- a) Explain Client-Server model in detail.
- b) Explain scheduling algorithms in interactive system in detail.

Q.5 Answer the following.**16**

- a) What is page replacement algorithm? Explain any two page replacement algorithm in detail.
- b) Explain contiguous allocation and linked list allocation of files in detail.

Q.6 Answer the following.**16**

- a) Explain disk space management in detail.
- b) What is segmentation and explain in detail?

Q.7 Answer the following.**16**

- a) What is operating system? Explain roles of an operating system in detail.
- b) What is inter-process communication? Explain critical region in detail.

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Set **P**

M.C.A. (Science) (Semester - I) (CBCS) Examination: Oct/Nov-2022
Digital Circuits and Microprocessors

Day & Date: Monday, 20-03-2023
 Time: 11:00 AM To 02:00 PM

Max. Marks: 80

- Instructions:** 1) Question no. 1 and 2 are compulsory.
 2) Attempt any three questions from Q. No. 3 to Q. No. 7.
 3) Figure to right indicate full marks.

Q.1 A) Choose correct alternatives**10**

- 1) The output of an OR gate with three inputs, A, B, and C, is LOW when _____.
 a) $A = 0, B = 0, C = 0$ b) $A = 0, B = 0, C = 1$
 c) $A = 0, B = 1, C = 1$ d) All of the above
- 2) Which of the examples below expresses the associative law of addition:
 a) $A + (B + C) = (A + B) + C$ b) $A + (B + C) = A + (BC)$
 c) $A(BC) = (AB) + C$ d) $ABC = A + B + C$
- 3) A NOR gate with one HIGH input and one LOW input:
 a) will output a HIGH b) functions as an AND
 c) will not function d) will output a LOW
- 4) A small circle on the output of a logic gate is used to represent the:
 a) Comparator operation b) OR operation
 c) NOT operation d) AND operation
- 5) The NAND or NOR gates are referred to as "universal" gates because either:
 a) can be found in almost all digital circuits
 b) can be used to build all the other types of gates
 c) are used in all countries of the world
 d) were the first gates to be integrated
- 6) How much storage capacity does each stage in a shift register represent?
 a) One bit b) Two bits
 c) Four bits (one nibble) d) Eight bits (one byte)
- 7) The output of an exclusive-NOR gate is HIGH if _____.
 a) the inputs are same
 b) one input is HIGH, and the other input is LOW
 c) the inputs are different
 d) none of the above
- 8) A 2-input NOR gate is equivalent to a _____.
 a) negative-OR gate b) negative-AND gate
 c) negative-NAND gate d) none of the above
- 9) The logic gate that will have HIGH or "1" at its output when any one of its inputs is HIGH is a(n):
 a) NOR gate b) OR gate
 c) AND gate d) NOT operation

- 10) The output of a gated S-R flip-flop changes only if the:
- a) flip-flop is set
 - b) control input data has changed
 - c) flip-flop is reset
 - d) input data has no change

B) State True or False.**06**

- 1) The commutative of Boolean expression is $A + B = B + A$.
- 2) The pin configuration of 8086 is available in the 35 pin.
- 3) An integrated circuit is Fabricated on a tiny silicon chip.
- 4) Microprocessor 8085 have 16 bit address line.
- 5) 2's complement of binary number 0101 is 1011.
- 6) In a multiplexer the output depends on its Select inputs.

Q.2 Answer the following.**16**

- a) What is EU?
- b) What do you mean by Binary Number System?
- c) Define Integrated Circuits.
- d) What is De Morgan's Law?

Q.3 Answer the following.**16**

- a) Discuss Half adder with neat circuit diagram and function table.
- b) Explain in detail architecture of 8085 Microprocessor.

Q.4 Answer the following.**16**

- a) Discuss in detail Multiplexer and its various types with neat diagram.
- b) Explain in detail addressing modes of 8086 Microprocessor.

Q.5 Answer the following.**16**

- a) State and explain in detail S-R Flip Flop.
- b) Discuss in detail various instruction set of Microprocessor operations.

Q.6 Answer the following.**16**

- a) State and explain in detail truth table of Universal gates.
- b) What do you mean by registers? Discuss shift register with suitable example.

Q.7 Answer the following.**16**

- a) State and explain truth tables of basic and derived gates with neat diagram.
- b) Define K-Map. Discuss the k-map simplification method for the following boolean function.

$$F(x,y,z) = \sum (0, 1, 2, 3, 4, 6)$$

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M.C.A. (Science) (Semester - I) (CBCS) Examination: Oct/Nov-2022
Discrete Mathematical Structures

Day & Date: Tuesday, 21-03-2023
 Time: 11:00 AM To 02:00 PM

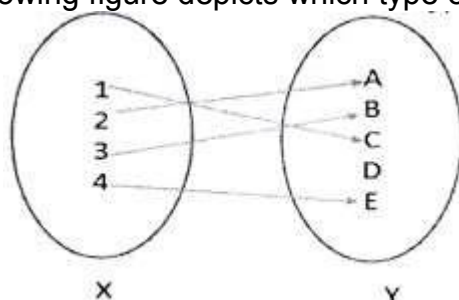
Max. Marks: 80

- Instructions:** 1) Question no. 1 and 2 are compulsory.
 2) Attempt any three questions from Q. No. 3 to Q. No. 7.
 3) Figure to right indicate full marks.

Q.1 A) Choose correct alternatives

10

- 1) Vertex degree are calculated based on the number of _____ that are incident on the vertex.
 - a) Vertex
 - b) Edges
 - c) Isolated vertex
 - d) All of these
- 2) A monoid is called a group if _____.
 - a) $a * b = b * a$
 - b) $a * b = a + b$
 - c) $a * b = a$
 - d) $a * c = c * a = e$
- 3) The following figure depicts which type of function?



- a) One-one
 - b) Many-one
 - c) Onto
 - d) Both one-one and onto
- 4) If A, B and C are three sets such that $A \cap B = A \cap C$ and $A \cup B = A \cup C$ then _____.
 - a) $A = B$
 - b) $A = C$
 - c) $B = C$
 - d) $A \cap B = d$
- 5) If A and B are square matrices of order 2, then $(A + B)^2 =$ _____.
 - a) $A^2 + 2AB + B^2$
 - b) $A^2 + AB + BA + B^2$
 - c) $A^2 + 2BA + B^2$
 - d) None of these
- 6) If the sets $A = \{1, 2, 3, 4\}$ and $B = \{3, 4, 5, 6\}$ then _____.
 - a) $A - B = \{1, 2\}$
 - b) $B - A = \{5\}$
 - c) $(A - B) \cup A = \{1, 2\}$
 - d) $[(A - B) - (B - A)] \cup A = \{3, 4\}$
- 7) A poset in which every pair of elements has both a least upper bound and a greatest lower bound is termed as _____.
 - a) Walk
 - b) Path
 - c) Lattice
 - d) Sublattice

- 8) In a graph, _____ refers to edges that can connect the same vertices over more than one edge.
- a) Multigraph b) Directed graph
c) Connected Graph d) Disconnected Graph
- 9) If p is true and q is false then _____.
a) $p \wedge q$ is true b) $p \vee q$ is true
c) $p \vee q$ is false d) None of these
- 10) The system of linear homogeneous equations are always _____.
a) inconsistent b) consistent
c) non-singular d) singular

B) Fill in the blanks.

06

- 1) If $A = \{a, b\}$ and $B = \{a, b, c\}$ then $A \cup B = ?$
- 2) _____ and _____ are the two binary operations defined for lattices.
- 3) The inverse of $-i$ in the multiplicative group $G = \{1, -1, i, -i\}$ is _____.
- 4) A function is said to be _____ if and only if $f(a) = f(b)$ implies that $a = b$ for all a and b in the domain of f .
- 5) For two invertible matrices A and B of suitable orders, the value of $(AB)^{-1}$ is _____.
- 6) Pendant vertex is a vertex with degree _____.

Q.2 Answer the following.

16

- Show that $p \leftrightarrow q \equiv (p \vee q) \rightarrow (p \wedge q)$ using truth table.
- State and prove Handshaking lemma.
- Prove that for an associative algebraic structure, the inverse of every invertible element is unique.
- If $A = \begin{bmatrix} 2 & 3 \\ 6 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 7 \\ 4 & 4 \end{bmatrix}$ then find $(A + B)^2$?

Q.3 Answer the following.

16

- a) Show that every square matrix can be uniquely expressed as a sum of symmetric and skew-symmetric matrix.
- b) Explain the following terms with examples.
- 1) Relation
 - 2) Domain of function
 - 3) Range of function
 - 4) Function

Q.4 Answer the following.

16

- a) Construct a truth table for the following compound proposition.
- i) $p \wedge (\sim q \vee q)$
- ii) $\sim(p \vee q) \vee (\sim p \wedge \sim q)$
- b) Solve the system of equations by matrix method
- $$\begin{aligned} 3x - 5y + 4z &= 0 \\ 2x - y + 3z &= 0 \\ zx + y + 2z &= 0 \end{aligned}$$

Q.5 Answer the following.

- a) Define the following terms with examples:
- 1) Simple graph
 - 2) Directed graph
 - 3) Planar graph
 - 4) Subgraph
 - 5) Regular graph
- b) Write a short on Hasse diagram.

16

Q.6 Answer the following.

- a) If A, B and C are any three sets then show that,
- 1) $A \cup (B \cap C) = (A \cup B) \cap C$
 - 2) $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$
 - 3) $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$
 - 4) $(A \cup B)' = A' \cap B'$
- b) If $n_{p_r} = 1680$ and $n_{c_r} = 70$ then find n and r ?

16

Q.7 Answer the following.

- a) Find the inverse of the matrix $\begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$
- b) Prove that the following propositions are tautology
- 1) $\sim(p \wedge q) \vee q$
 - 2) $p \rightarrow (p \vee q)$

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Set P

M.C.A. (Science) (Semester - I) (CBCS) Examination: Oct/Nov-2022
Operation Research

Day & Date: Tuesday, 21-03-2023
 Time: 11:00 AM To 02:00 PM

Max. Marks: 80

- Instructions:** 1) Question no. 1 and 2 are compulsory.
 2) Attempt any three questions from Q. No. 3 to Q. No. 7.
 3) Figure to right indicate full marks.

Q.1 A) Choose the correct alternatives 10

- 1) Feasible solution satisfies _____.
 a) Only constraint b) Only non-negative restriction
 c) Both a and b d) Both a, b and optimum solution
- 2) When total supply is equal to total demand in a transportation problem, the problem is said to be _____.
 a) balanced b) unbalanced
 c) degenerate d) non-degenerate
- 3) What does PERT stand for in Industrial Management?
 a) Program Evaluation and Resource Tracking
 b) Project Evaluation and Review Technique
 c) Project Evaluation and Resource Tracking
 d) Program Evaluation and Review Technique
- 4) The solution to a transportation problem with 'm' rows (supplies) & 'n' columns (destination) is feasible if number of positive allocations are _____.
 a) $m + n$ b) $m * n$
 c) $m + n - 1$ d) $m + n + 1$
- 5) The application of assignment problems is to obtain _____.
 a) only minimum cost
 b) only maximum profit
 c) minimum cost or maximum profit
 d) assign the jobs
- 6) In a PERT distribution, the optimistic time is 4 days, expected time is 7 days and the pessimistic time is 11 days. The variance of the network is
 a) 8.17 b) 1.16
 c) 1.36 d) 5.44
- 7) Hungarian Method is used to solve a _____.
 a) transportation problem b) travelling salesman problem
 c) A LP problem d) Both a & b
- 8) Which statement characterizes standard form of a linear programming problem?
 a) Constraints are given by inequalities of any type
 b) Constraints are given by a set of linear equations
 c) Constraints are given only by inequalities of \geq type
 d) Constraints are given only by inequalities of \leq type

- 9) Which algorithm is used to solve a maximum flow problem?
 a) Prim's algorithm b) Kruskal's algorithm
 c) Dijkstra's algorithm d) Ford-Fulkerson algorithm
- 10) In graphical representation the bounded region is known as _____ region.
 a) Solution b) basic solution
 c) feasible solution d) optimal

B) Fill in the blanks.**06**

- 1) If any value in X_B column of final simplex table is negative, then the solution is _____.
- 2) If the i^{th} constraint of a primal (maximization) is equality, then the dual (minimization) variable ' y_i ' is _____.
- 3) _____ or _____ are used to "balance" an assignment or transportation problem.
- 4) A PERT network has 9 activities on its critical path, the standard deviation of each activity on the critical path is 3. The standard deviation of the critical path is _____.
- 5) In a transportation problem with 4 supply points and 5 demand points, how number of constraints are required in its formulation
- 6) Critical path method is good for _____.

Q.2 Answer the following.**16**

- a) Write the following Linear Programming Problem in standard form,
 Maximize $Z = 55x + 29y$ subject to
 $3x + 7y \leq 10$,
 $4x + y \geq 15$,
 $y \leq 4$,
 $x, y \geq 0$.
- b) Describe the unbalanced assignment problem.
- c) What is a critical activity and critical path?
- d) Define convex function and convex region.

Q.3 Answer the following.

- a) Define the following terms:

08

- a) Feasible solution
 b) Basic feasible solution
 c) Non-Degenerate basic feasible solution
 d) Degenerate basic feasible solution

- b) Explain the graphical solution method of Linear Programming Problem.

08**Q.4 Answer the following.**

- a) Distinguish between assignment problem and Transportation problem.
- b) Obtain a Kuhn-Tucker condition for a solution of the problem: $\text{Max } f(x) =$
 $P^T x + \frac{1}{2} x^T C x$, Subject to the constraints: $Ax = b$ and $x \geq 0$.

08**08****Q.5 Answer the following.**

- a) What are the limitations of Linear programming Problems?
- b) Solve by Big M method.

08**08**

$$\text{Maximize } Z = x_1 + 2x_2 + 3x_3 - x_4$$

$$\text{Subject to, } x_1 + 2x_2 + 3x_3 = 15$$

$$2x_1 + x_2 + 5x_3 = 20$$

$$x_1 + 2x_2 + x_3 + x_4 = 10$$

Q.6 Answer the following.

- a) Write a note on: **08**
i) Critical Path Method (CPM)
ii) Programme Evaluation and Review Technique (PERT)
- b) Write a note on Ford and Fulkerson's algorithm. **08**

Q.7 Answer the following.

- a) Draw the network and determine the critical path for the given data. Also calculate all the floats involved in CPM. **08**

Jobs	1-2	1-3	2-4	3-4	3-5	4-5	4-6	5-6
Duration	6	5	10	3	4	6	2	9

- b) State and prove Max-Flow Min-Cut theorem. **08**

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10) Java interacts with database using a common database application programming interface called as _____.

- a) Frame
- b) JDBC
- c) Table
- d) SQL

B) State True or False.

06

- 1) 'break' statement is used to terminate the execution of iteration statement.
- 2) Package is a container that stores related classes and interfaces.
- 3) 'javac' is an abstract computer which runs the compiled java programs.
- 4) Java performs release of memory occupied by unused objects (with no reference to the object) automatically, it is called garbage collection.
- 5) Wrapper class is used to encapsulate a primitive type value in an object.
- 6) Runtime error is analogous to grammatical error.

Q.2 Write short notes on

16

- a) Various operators in Java
- b) Types of inheritance
- c) Methods of Applet
- d) Scrollbar class

Q.3 Answer the following.

a) Explain how to create a new thread using the class Thread with suitable example.

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b) Explain the following

08

- 1) Class
- 2) Object
- 3) Method
- 4) Polymorphism

Q.4 Answer the following.

a) Describe GridLayout with example.

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b) What are different AWT controls? Explain any two in detail.

10

Q.5 Answer the following.

a) Explain static data and methods.

06

b) Explain how the constructors are called in inherited class with example.

10

Q.6 Answer the following.

a) Imagine a tollbooth. Cars passing by the booth are expected to pay Rs.2 as a toll. Government cars need not require to pay the toll. Write a program which calculates the total toll collected and number of cars passed (both govt, and private).

10

b) Describe how radio button (option button) is put on applet? Describe how an event generated by a radio button is handled

06

Q.7 Answer the following.

a) State various types of iterations statements in Java.

10

b) What is applet? Describe how to create and execute an applet.

06

Seat No.	
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Set **P**

M.C.A. (Science) (Semester-II) (CBCS) Examination: Oct/Nov-2022
Advanced DBMS

Day & Date: Thursday, 16-03-2023
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

Instructions: 1) Question no. 1 and 2 are compulsory.
 2) Attempt any three questions from Q. No. 3 to Q. No. 7.
 3) Figure to right indicate full marks.

Q.1 A) Multiple choice questions. 10

- 1) Which of the following is known as a set of entities of the same type that share same properties, or attributes?
 - a) Relation set
 - b) Tuples
 - c) Entity set
 - d) Entity Relation model
- 2) In SQL, which command is used to make permanent changes made by statements issue since the beginning of a transaction?
 - a) ZIP
 - b) PACK
 - c) COMMIT
 - d) SAVE
- 3) Which one of the following keyword is used to find out the number of values in a column?
 - a) TOTAL
 - b) COUNT
 - c) SUM
 - d) ADD
- 4) Which one of the following commands is used to modify a column inside a table?
 - a) Drop
 - b) Update
 - c) Alter
 - d) Set
- 5) In a relation database, every tuples divided into the fields are known as the _____.
 - a) Queries
 - b) Domains
 - c) Relations
 - d) All of the above
- 6) Which of the following commands is used to save any transaction permanently into the database?
 - a) Commit
 - b) Rollback
 - c) Savepoint
 - d) None of the above
- 7) Rows of a relation are known as the _____.
 - a) Degree
 - b) Tuples
 - c) Entity
 - d) All of the above
- 8) Which of the following is generally used for performing tasks like creating the structure of the relations, deleting relation?
 - a) DML(Data Manipulation Language)
 - b) DDL(Data Definition Language)
 - c) Relational Schema
 - d) None of these
- 9) Which of the following keys is generally used to represents the relationships between the tables?
 - a) Primary key
 - b) Foreign key
 - c) Secondary key
 - d) None of the above

- 10) A type of query that is placed within a WHERE or HAVING clause of another query is called _____.
a) super query b) sub query
c) master query d) multi query

B) State True Or False.

06

- 1) It is possible that two or more attributes can form a single key.
- 2) A foreign key is an attribute in a table that is a primary key in another table.
- 3) Data redundancy means reducing data duplication.
- 4) A trigger is a stored procedure in database which automatically invokes whenever a special event in the database occurs.
- 5) Whenever DML statements are executed, a temporary work area is created in the system memory and it is called a cursor.
- 6) Atomicity ensures that the result or effect of a committed transaction persists in case of a system failure.

Q.2 Answer the following

16

- Explain BCNF.
- Explain ERD
- Explain order by clause with example.
- Explain the term Relation, Tuple and Domain with example.

Q.3 Answer the following.

16

- Explain two phase commit protocol.
- Explain the purpose of query processing system in DBMS.

Q.4 Answer the following.

16

- Explain Steps in Query Processing.
- Explain the concept of nested queries with example.

Q.5 Answer the following.

16

- Explain group by and order by clause with example.
- Explain having clause and distinct.

Q.6 Answer the following.

16

- Explain Trigger.
- Explain Grant, Revoke and Commit.

Q.7 Answer the following.

16

- What is DBMS? Explain architecture of DBMS.
- Explain DDL, DML and DCL in detail.

Seat No.	
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Set P

M.C.A. (Science) (Semester - II) (CBCS) Examination: Oct/Nov-2022
Computer Communication Network

Day & Date: Friday, 17-03-2023
Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) Question no. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7.
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternatives

10

- 1) If routing information is automatically updated by routers when network configuration changes is called _____.
a) dynamic routing b) fixed routing
c) static routing d) distributed routing
- 2) A _____ set of rules that govern data communication.
a) Standards b) Protocols
c) Servers d) RFCs
- 3) _____ layer provides the services to user.
a) session layer b) application layer
c) presentation layer d) physical layer
- 4) A 4 byte IP address consists of _____.
a) only network address
b) only host address
c) network address & host address
d) network address & MAC address
- 5) _____ address belongs class A.
a) 121.12.12.248 b) 130.12.12.248
c) 128.12.12.248 d) 129.12.12.248
- 6) Transport layer protocols deals with _____.
a) application to application communication
b) process to process communication
c) node to node communication
d) man to man communication
- 7) In FTP protocol, client contacts server using _____ as the transport protocol.
a) user datagram protocol
b) transmission control protocol
c) datagram congestion control protocol
d) stream control transmission protocol
- 8) _____ is not an application layer protocol.
a) SMTP b) HTTP
c) FTP d) TCP
- 9) _____ protocol is used for remote terminal connection service.
a) TELNET b) UDP
c) FTP d) RARP

- 10) In _____, in which every incoming packet is sent out on every outgoing line except the one it arrived on.
- a) optimality principle
 - b) shortest routing
 - c) hierarchical routing
 - d) flooding

B) State True or False.**06**

- 1) HTTP protocol is used to transport all information between Web servers and clients.
- 2) In Segmentation, too many packets present in the network causes packet delay and loss that degrades performance.
- 3) Distance vector routing algorithm operates by having each router maintain a table giving the best known distance to each destination and which link to use to get there.
- 4) ICMP is a data link layer protocol.
- 5) Protocols in which the sender sends one frame and then waits for an acknowledgement before proceeding are called stop and wait.
- 6) In ARP, physical address is found for a given logical address.

Q.2 Answer the following.**16**

- a) What is LAN?
- b) What is E-mail?
- c) What is ARPANET?
- d) What is Gateway?

Q.3 Answer the following.**16**

- a) What is OSI? Explain Network layer in detail?
- b) What is CRC? Explain in detail?

Q.4 Answer the following.**16**

- a) Explain Shortest Path Routing algorithm in detail.
- b) Explain Transmission Control Protocol (TCP) in detail.

Q.5 Answer the following.**16**

- a) What is TCP/IP? Explain TCP/IP reference model in detail?
- b) Explain Client-Server model in detail.

Q.6 Answer the following.**16**

- a) Explain Leaky Bucket algorithm in detail.
- b) What is Tunneling and explain in detail?

Q.7 Answer the following.**16**

- a) Explain Internet Control Message Protocol (ICMP) in detail.
- b) Explain Hypertext Transfer Protocol (HTTP) in detail.

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Set **P**

M.C.A. (Science) (Semester-II) (CBCS) Examination: Oct/Nov-2022
System Software

Day & Date: Saturday, 18-03-2023
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

Instructions: 1) Question no. 1 and 2 are compulsory.
 2) Attempt any three questions from Q. No. 3 to Q. No. 7.
 3) Figure to right indicate full marks.

Q.1 A) Multiple choice questions.**10**

- 1) The output of lexical analyzer is _____.
 a) A set of regular expressions
 b) Syntax Tree
 c) Set of Tokens
 d) String Character
- 2) Macro assemblers can perform _____.
 a) Translation
 b) Macro-expansion
 c) Both (a) and (b)
 d) None of these
- 3) Which of the following is not a type of assembler?
 a) one pass
 b) two pass
 c) three pass
 d) load and go
- 4) Macro processor is an inbuilt function of _____.
 a) Assembler
 b) Loader
 c) Linker
 d) Editor
- 5) A program in execution is called _____.
 a) Process
 b) Instruction
 c) Procedure
 d) Function
- 6) The dynamic linking postpones linking function until _____.
 a) Load
 b) Execution
 c) Compile
 d) None of these
- 7) Storage mapping is done by _____.
 a) Loader
 b) Linker
 c) OS
 d) Compiler
- 8) The computer architecture aimed at reducing the time of execution of instructions is _____.
 a) CISC
 b) RISC
 c) ISA
 d) ANNA
- 9) Binder performs the functions of _____.
 a) allocation
 b) relocation
 c) linking
 d) All of these
- 10) In operator precedence parsing, precedence relations are defined _____.
 a) to delimit the handle
 b) for all pair of non-terminals
 c) for all pair of terminals
 d) none of these

B) State True Or False.**06**

- 1) The translator used by second generation languages is assembler.
- 2) The main data structures involved in a one-pass macro processor are DEFTAB, NAMTAB and ARG TAB.
- 3) Input of Lex is Set to regular expression.
- 4) A processor is the device where information is stored.
- 5) Loaders that allow for program relocation is called Bootstrap Loaders.
- 6) CISC architecture is power efficient.

Q.2 Write Short Notes on**16**

- a) Program Blocks
- b) Symbol Defining Statements
- c) Bootstrap Loaders
- d) Macro Processing within Language Translators

Q.3 Answer the following.**16**

- a) Explain Ultra SPARC Architecture in detail.
- b) Explain a general description of the functions of the two passes of simple assembler.

Q.4 Answer the following.**16**

- a) What are the basic functions of one-pass compiler? Explain any two of them.
- b) Explain Conditional Macro Expansion with example.

Q.5 Answer the following.**16**

- a) Discuss the problems and solutions which involved in compiling a block-structured language.
- b) Explain MASM Macro Processor.

Q.6 Answer the following.**16**

- a) Discuss some common options that can be selected at the time of loading and linking.
- b) Describe compiler-writing system, which use software tools to automate the process of compiler construction.

Q.7 Answer the following.**16**

- a) Differentiate One-Pass Assembler and Multi-Pass Assembler.
- b) Write an algorithm for Pass 2 of assembler.

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Set P

M.C.A. (Science) (Semester - II) (CBCS) Examination: Oct/Nov-2022
UML

Day & Date: Monday, 20-03-2023
Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) Question no. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7.
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternatives.

10

- 1) A Class consists of which of these abstractions?
 - a) Set of the objects
 - b) Operations
 - c) Attributes
 - d) All of the mentioned
- 2) Which of the following statement is false?
 - a) A note is a dog-eared box connected to any model element by a dashed line
 - b) The main way to extend UML is by constraints, properties, etc.
 - c) A dependency relation holds between two entities D and I where change in I does not affect D
 - d) All of the mentioned
- 3) What is a collection of model elements called?
 - a) Box
 - b) Dependency
 - c) UML packages
 - d) Package members
- 4) Components can be represented by which of the following?
 - a) Component symbols
 - b) Stereotypes
 - c) Rectangular boxes
 - d) Component symbols & Stereotypes
- 5) Which of these are types of nodes used in the deployment diagram?
 - a) Device
 - b) Execution Environment
 - c) Artifact
 - d) Device & Execution Environment
- 6) What are the notations for the Use case Diagrams?
 - a) Use case
 - b) Actor
 - c) Prototype
 - d) Use case and Actor
- 7) The dynamic aspects related to a system are shown with the help of _____.
 - a) Sequence diagrams
 - b) Interaction diagrams
 - c) Deployment diagrams
 - d) Use case diagrams
- 8) In UML diagrams, the relationship between the object and component parts is represented by
 - a) Ordination
 - b) Aggregation
 - c) Segregation
 - d) Increment
- 9) Super class represents _____ abstractions.
 - a) Generalized abstractions
 - b) Specialization abstractions
 - c) Both (a) and (b)
 - d) None of the above

10) Which diagram in UML shows a complete or partial view of the structure of a modeled system at a specific time?

- a) Sequence diagram b) Collaboration diagram
- c) Class diagram d) Object diagram

B) State True or False.

06

- 1) Structure diagrams emphasize the things that must be present in the system being modeled.
- 2) Artifacts instances and types have same names.
- 3) Association lines may be unlabeled or they may show association name.
- 4) A physical architecture is the configuration of product's major constituents.
- 5) Low-level design is the activity of filling in small details at the lowest levels of abstraction.
- 6) Use case diagram is a dynamic model of interaction between actors and product in a use case.

Q.2 Answer the following.

16

- a) What is template class? How it is represented in UML?
- b) Describe the structural part of the collaboration.
- c) Explain software development life cycle.
- d) What are the stereotypes applied to dependency relations?

Q.3 Answer the following.

16

- a) Explain behavioral things and grouping things in detail.
- b) Explain generalization and specialization in detail with example.

Q.4 Answer the following.

16

- a) Explain the processes and threads used in modeling techniques.
- b) Explain building blocks of UML. Also explain importance of modeling.

Q.5 Answer the following.

16

- a) Draw an activity diagram for college admission system.
- b) What is an interface? Discuss the ways that element realizes an interface with suitable example.

Q.6 Answer the following.

16

- a) Draw class diagram and object diagram for hospital management system.
- b) Explain various modeling techniques for component diagram.

Q.7 Answer the following.

16

- a) Explain various terms and concepts used in sequence diagrams.
- b) What is package? How it is represented in UML? Describe importing and exporting of package.

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Set **P**

**M.C.A. (Science) (Semester -III) (New) (CBCS) Examination: Oct/Nov-2022
. NET Technology**

Day & Date: Monday, 13-02-2023
Time: 11:00 AM To 02:00 PM

Max. Marks: 80

Instructions: 1) Question 1 and 2 are compulsory.
2) Attempt any Three questions from Q.No.3 to Q.No.7
3) Figures to the right indicate full marks.

- Q.1 A) Choose Correct Alternative. 10**
- 1) The data members of a class by default are?
 - a) protected, public
 - b) private, public
 - c) Private
 - d) Public
 - 2) Which of the classes provide the operation of reading from and writing to the console in C#.NET?
 - a) System.Console
 - b) System.Array
 - c) System.Output
 - d) System.ReadLine
 - 3) What Is CTS?
 - a) Common type specification
 - b) Common type-safe
 - c) Compiler type structure
 - d) Common type system
 - 4) Which property will you use to process different sever paths in a page?
 - a) Request
 - b) Response
 - c) Server
 - d) Application
 - 5) Which of the following is not an ASP.NET page event?
 - a) PreInit
 - b) Import
 - c) UnLoad
 - d) None of the above
 - 6) Which programming model should you implement if you want to separate your server-side code from your client-side layout code in a Web page?
 - a) Single-file model
 - b) Code-behind model
 - c) Inline model
 - d) Client-Server model
 - 7) What is the base class from which all Web forms inherit?
 - a) Page Class
 - b) Master Class
 - c) Session Class
 - d) None of the above
 - 8) Which language is not a true object-oriented programming language?
 - a) VB.NET
 - b) CPP
 - c) VB 6
 - d) JAVA
 - 9) Which of the following ASP.NET object encapsulates the state of the client?
 - a) Session object
 - b) Application object
 - c) Response object
 - d) Server object
 - 10) _____ contains information about the assembly and the resources that it depends on
 - a) MSIL
 - b) Assembly manifest
 - c) GAC
 - d) Type metadata

B) Write true/false**06**

- 1) Session is client side state management techniques
- 2) Client side state management techniques store data at server memory.
- 3) @master page directive is used for master page
- 4) Father of C# programming language is Denies Richards
- 5) Every master page has 2 content controls.
- 6) Page directive is the first statement for every web page.

Q.2 Answer the following.**16**

- 1) Short note on JIT Compiler
- 2) Explain need of Web Parts in website
- 3) Short note on Page Life Cycle
- 4) Explain need of Common Language Specification

Q.3 Answer the following.

- a) What is page? Explain different page directives. **08**
- b) What is state management? Explain Server side state management techniques. **08**

Q.4 Answer the following.

- a) Explain the architecture of ASP.NET **08**
- b) Design a windows application and write C# code to inserts emp record. **08**

Q.5 Answer the following.

- a) What is the need of Custom Control? Explain it with example. **08**
- b) What is .NET framework? Explain components of .NET Framework. **08**

Q.6 Answer the following.

- a) What is nested master page? Write stepwise process of creating nested master page. **08**
- b) What is C#? Explain general and programming features of it. **08**

Q.7 Answer the following.

- a) What is Validation? Explain Custom Range Validator, RequiredFieldValidator and Validations Summary **08**
- b) What is the use of Application in ASP.NET? Explain with example **08**

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Set P

M.C.A (Science) (Semester - III) (New) (CBCS) Examination: Oct/Nov-2022
Digital Image Processing

Day & Date: Tuesday, 14-02-2023
 Time: 11:00 AM To 02:00 PM

Max. Marks: 80

- Instructions:** 1) Q. Nos. 1 and. 2 are compulsory.
 2) Attempt any three questions from Q. No. 3 to Q. No. 7
 3) Figure to the right indicate full marks.

Q.1 A) Choose correct alternatives.

10

- 1) Image enhancement approaches in _____ category are based on direct manipulation of pixels in an image.
 - a) Spatial domain
 - b) Frequency domain
 - c) both a and b
 - d) none of these
- 2) The difference between two sets A and B is given by _____.
 - a) $A - B = \{w/w \in A, w \notin B\}$
 - b) $A - B = \{w/w \in B, w \notin A\}$
 - c) $A - B = \{w/w \in B, w \in A\}$
 - d) None of these
- 3) Image segmentation algorithms generally based on _____.
 - a) Discontinuity of intensity values
 - b) Similarity of intensity values
 - c) Either discontinuity or similarity of intensity values
 - d) none of these
- 4) _____ procedure is used to obtain images of blood vessels.
 - a) PET
 - b) Angiography
 - c) Lithography
 - d) None of these
- 5) _____ means digitizing the co-ordinate values.
 - a) Sampling
 - b) Quantization
 - c) Segmentation
 - d) Compression
- 6) An image is represented by $f(x, y)$. The values x, y and f are all _____.
 - a) zero
 - b) Finite
 - c) Infinite
 - d) either finite or infinite.
- 7) Origin of digital image lies at _____.
 - a) right bottom
 - b) top right corner
 - c) top left corner
 - d) left bottom
- 8) DFT stands for _____.
 - a) Digital Fourier Transform
 - b) Discrete Fourier Table
 - c) Discrete Fourier Transform
 - d) Digital Fourier Table
- 9) _____ are particularly effective in the presence of impulse noise, also called salt-and-pepper noise
 - a) Gaussian filter
 - b) Median filter
 - c) Gaussian noise
 - d) Smoothing linear filter

10) _____ processing techniques of image enhancement are based on modifying the Fourier domain transform of an image.

- a) Frequency domain
- b) Spatial domain
- c) both a and b
- d) None of these

B) State whether true or false.

06

- 1) Max filter is used to find the brightest points in an image.
- 2) Mathematically morphology is graph theory.
- 3) Each pixel in an image has maximum two diagonal neighbors.
- 4) The Hit-or-Miss transformation is defined in terms of two structuring elements.
- 5) The 0th percentile filter is the min filter.
- 6) Segmentation should stop when the objects of interest in an application have been isolated.

Q.2 Write short notes.

16

- a) Dilation operation
- b) Notch filter
- c) Boundary extraction
- d) Order statistics filter

Q.3 Answer the following.

- a) What is image averaging? What is the use of image averaging?
- b) Describe morphological opening and closing.

08

08

Q.4 Answer the following.

- a) What are the components of digital image processing system?
- b) Describe inverse filtering approach to image restoration.

08

08

Q.5 Answer the following.

- a) Explain the following morphological algorithms -
 - i) Boundary extraction
 - ii) Thickening
- b) What do you mean by smoothing spatial filters? Explain

08

08

Q.6 Answer the following.

- a) What is electromagnetic spectrum? Explain any three fields that use digital image processing.
- b) What are the steps involved digital image processing?

08

08

Q.7 Answer the following.

- a) What are the three basic types of gray-level transformations? Describe.
- b) Explain dilation and erosion operations.

08

08

Seat No.	
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- 9) Which of the following protocol enables access to the internet from a mobile device?
- a) HTTP (Hypertext Transfer Protocol)
 - b) TCP/IP (Transmission Control Protocol)
 - c) ISD (International Subscriber Dialing)
 - d) WAP (Wireless Application Protocol)
- 10) For the transmission purpose, which of the following code is applied because of its special characteristics?
- a) CDMA
 - b) GSM
 - c) GPRS
 - d) None of these

B) State True Or False.**06**

- 1) The function of the GPRS register (GR) is to store all GPRS-relevant data.
- 2) In the minimum encapsulation technique, a minimal forwarding header is defined for datagrams that are fragmented prior to the encapsulation.
- 3) In DHCP, a server sends requests using MAC broadcasts to reach all devices in the LAN.
- 4) Mobile Terminated Call (MTC) is a situation in which a station calls a mobile station.
- 5) IEEE 802.11 does specify any special nodes that support routing, forwarding of data, or exchange of topology information.
- 6) Satellite-based cellular phones are also an example of an infrastructure-based networks.

Q.2 Answer the following**16**

- a) Near and Far terminal Problem.
- b) Android Views and Layouts.
- c) Pinconet
- d) SDMA

Q.3 Answer the following.**16**

- a) Explain how the managing active connections of WiFi.
- b) Draw and explain the IP packet delivery in detail.

Q.4 Answer the following.**16**

- a) Write the different services provided by Bluetooth and also write how to control Bluetooth Devices.
- b) Write a note on traditional TCP.

Q.5 Answer the following.**16**

- a) Explain with diagram the protocol architecture in GSM.
- b) What is modulation? Explain and compare the Amplitude & Frequency modulation.

Q.6 Answer the following.**16**

- a) Explain the PRMA and Demand assigned multiple access protocol in detail.
- b) Explain the Authentication and Encryption mechanism in GSM.

Q.7 Answer the following.**16**

- a) Write a note on application priority and process states.
- b) What is signal propagation? Explain the path loss of radio signal with diagram.

Seat No.	
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10) _____ is the name of the computer program that simulates the thought processes of human beings.

- a) Human logic
- b) Expert reason
- c) Expert system
- d) Personal information

B) Fill in the blanks.

06

- 1) Alpha-beta pruning is a modified version of the _____ algorithm.
- 2) _____ is the first AI programming language.
- 3) _____ search will not get trapped exploring a blind alley.
- 4) The problem of representing the facts that change as well as those that do not is known as _____.
- 5) In _____, information is represented as a set of nodes connected to each other by a set of labelled arc, which represents relationships among the nodes.
- 6) _____ is the study of how to make computer do things which at the moment people can do better.

Q.2 Answer the following

16

- a) What is Expert System?
- b) Explain Inheritable Knowledge.
- c) What is Mundane Task?
- d) What are the different applications of A.I.?

Q.3 Answer the following.

16

- a) What is Semantic Net? Explain with example.
- b) What is Script? Explain in detail.

Q.4 Answer the following.

16

- a) Differentiate between LOGIC and PROLOG in A.I.?
- b) What is Matching? Explain Indexing matching in detail?

Q.5 Answer the following.

16

- a) Explain Stepest-Assent Hill Climbing algorithm in detail?
- b) Explain different characteristic of an Artificial Intelligence Problem in detail?

Q.6 Answer the following.

16

- a) Explain Depth-First Search algorithm in detail.
- b) What is Artificial Intelligence? Explain different tasks in A.I.

Q.7 Answer the following.

16

- a) Explain Procedural verses Declarative knowledge in A.I.
- b) Explain Certainty Factors and Rule based system in detail.

Seat No.	
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Set **P**

M.C.A. (Science) (Semester-III) (New) (CBCS) Examination: Oct/Nov-2022
Data Warehouse and Mining

Day & Date: Monday, 20-02-2023
 Time: 11:00 AM To 02:00 PM

Max. Marks: 80

Instructions: 1) Question 1 and 2 are compulsory.
 2) Attempt any Three questions from Q.No.3 to Q.No.7
 3) Figures to the right indicate full marks.

Q.1 A) Choose the correct alternative: 10

- 1) A divisive hierarchical clustering method employs a _____ strategy.
 - a) Random
 - b) Bottom-up
 - c) Top-down
 - d) Alternate
- 2) Multidimensional association rules with repeated predicates are called _____.
 - a) Interdimensional association rules
 - b) Hybrid-dimensional Association rules
 - c) Multidimensional Association rules
 - d) None of these
- 3) _____ include concept description, association, classification, prediction and clustering.
 - a) Task Relevant data
 - b) Interestingness measure
 - c) Background Knowledge
 - d) Kinds of Knowledge
- 4) Which of the following is an essential process in which the intelligent methods are applied to extract data patterns?
 - a) Data Mining
 - b) Warehousing
 - c) Text Mining
 - d) Data Selection
- 5) The _____ operation performs aggregation on a data cube, either by climbing up a concept hierarchy for a dimension or by dimension reduction.
 - a) Roll-up
 - b) Drill-down
 - c) Drill-rotate
 - d) Rule-up
- 6) Choose the incorrect property of the data warehouse.
 - a) Subject oriented
 - b) Collection from heterogeneous sources
 - c) Volatile
 - d) Time variant
- 7) The process of filling the missing values is referred to as _____.
 - a) Refresh
 - b) Cleaning
 - c) Transformation
 - d) Sorting
- 8) The deeper the abstraction level, the smaller the corresponding threshold.
 - a) Minimum support
 - b) Same support
 - c) Uniform support
 - d) Reduced Support

- 9) _____ which converts data from legacy or host format to warehouse format.
- a) Data Transformation b) Refresh Data
c) Data Cleaning d) Data Extraction
- 10) An _____ collects all of the information about subjects spanning the entire organization.
- a) Virtual warehouse b) Data Mart
c) Enterprise warehouse d) Refresh

B) State True or False**06**

- 1) An OLAP typically adopts either a star or a snowflake model.
- 2) The fact constellation schema is a variant of the star schema model.
- 3) The slice operation define a sub cube by performing a selection on two or more Dimensions.
- 4) A virtual warehouse is a set of views over operational databases.
- 5) Data extraction, which detects errors in the data and rectifies them when possible.
- 6) Clustering is the process of partitioning a set of data objects (or observations) into subsets.

Q.2 Answer the following.**16**

- a) What is Noisy data? Explain Binning techniques to remove noise.
- b) What is classification? Explain different issues regarding with classifications.
- c) Explain set-grouping hierarchies with example.
- d) What is supervised learning? Explain with suitable example.

Q.3 Answer the following.

- a) Explain k-means algorithm with suitable example.
- b) Explain decision tree induction method with example.

08**08****Q.4 Answer the following.****16**

- a) Explain how association rules are constructed in multi-level hierarchy.
- b) What is Association Rule? Explain 'mining in multidimensional associations'?

Q.5 Answer the following.**16**

- a) What is cluster analysis? Explain various typical requirements of clustering in data mining.
- b) Explain different types of hierarchical clustering methods.

Q.6 Answer the following.**16**

- a) Explain three-tier Data warehouse architecture with well labelled diagram
- b) What is data cube? Explain different schemas for multidimensional model.

Q.7 Answer the following.**16**

- a) What is Data mining? Explain various data mining applications.
- b) Explain Bayesian classification algorithm with suitable example

Seat No.	
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Set **P**

MCA (Science) (Semester – III) (New) (CBCS) Examination: Oct/Nov-2022
Finite Automata

Day & Date: Monday, 20-02-2023

Max. Marks: 80

Time: 11:00 AM To 02:00 PM

- Instructions:** 1) Question 1 and 2 are compulsory.
 2) Attempt any Three questions from Q.No.3 to Q.No.7
 3) Figures to the right indicate full marks.

Q.1 Choose Correct Alternative. 10

- 1) _____ take queue as an auxiliary storage.
 - a) Finite automata
 - b) Turing Machine
 - c) Push down automata
 - d) All of these
- 2) Finite automata require minimum _____ number of stacks.
 - a) 1
 - b) 2
 - c) 0
 - d) None of these
- 3) NFA, in its name has 'non-deterministic' because of _____.
 - a) The result is undetermined.
 - b) The state to be transited next is non-deterministic.
 - c) The choice of path is non-deterministic.
 - d) All of these
- 4) Which of the following statement is true about Turing machine?
 - a) The tape of Turing machine is infinite.
 - b) The tape of Turing machine is finite.
 - c) The tape of Turing machine is infinite when the language is regular.
 - d) The tape of Turing machine is finite when the language is non-regular.
- 5) Function which mapping one to one from input to output such function is known as _____ function
 - a) Machine
 - b) Both (a) and (b)
 - c) State
 - d) None of these
- 6) If the PDA does not stop on an accepting state and the stack is not empty, the string is _____.
 - a) Rejected
 - b) Goes into loop forever
 - c) Accepted
 - d) None of the above
- 7) A PDA machine configuration (p, w, y) can be represented by _____.
 - a) (unprocessed input, stack content, current state)
 - b) (current state, stack content, unprocessed input)
 - c) (current state, unprocessed input, stack content)
 - d) (stack content, unprocessed input, current state)
- 8) Regular expression are _____.
 - a) Type 0 language
 - b) Type 2 language
 - c) Type 1 language
 - d) Type 3 language

- 9) If grammar G is unambiguous, the grammar G' produced after the removal of Unit production will be
- a) Unambiguous b) Ambiguous
c) Finite d) Cannot be said
- 10) _____ number of productions to be removed immediately as Unit productions from following grammar
- $$S \rightarrow aA \quad A \rightarrow a|A \quad B \rightarrow B$$
- a) 0 b) 1
c) 2 d) 3

B) Write True or False.

06

- 1) A Turing machine does not consist of state register.
- 2) The total number of states required to accept string "solapur" using DFA would be 8.
- 3) A string is accepted by a PDA when stack is empty and at acceptance state.
- 4) A CFL is not closed under intersection.
- 5) The (a | b) is rule used for conversion of RE to NFA with ϵ -moves is used for alternative.
- 6) The Turing Machine is defined using 7 tuples.

Q.2 Answer the following: -

16

- a) Find the CFG generating following language: -
 $L = \{ a^i b^j c^k \mid i = j + k ; j, k \geq 1 \}$
- b) Construct FA for the following Regular Expression: -
 $a(a+b)^*b + b(a+b)^*a$
- c) Define PDA.
- d) Give the applications of Finite Automata.

Q.3 Answer the following: -

- a) Find a grammar in GNF for the given CFG.
 $S \rightarrow AA \mid a$
 $A \rightarrow SS \mid b$

10

- b) Give a PDA to accept the language
 $L = \{ 0^n 1^m \mid n < m \}$
 - 1) Through Empty Stack
 - 2) Through Final State

06

Q.4 Answer the following: -

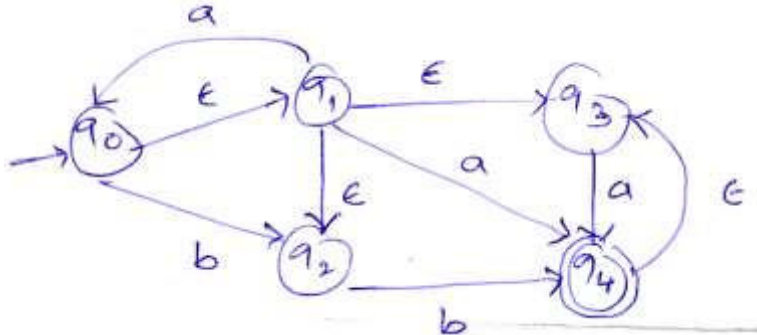
- a) Design a TM to check whether a string over {a, b} contains equal number of a's and b's. **10**
- b) Convert the grammar given below to its equivalent CNF. **06**
 $S \rightarrow PQP$
 $P \rightarrow 0P \mid \epsilon$
 $Q \rightarrow 1Q \mid \epsilon$

Q.5 Answer the following: -

- a) Prove that the following language is not regular. **10**
 $L = \{ W W^R \mid W \in \{ 0, 1 \}^* \}$
- b) Construct a NF A that accepts a set of all strings over { a, b } ending in "aba". Use this NFA to construct DFA accepting the same set of strings. **06**

Q.6 Answer the following: -

- a) Find an equivalent DFA for the ϵ -NFA given in the following figure.

10

- b) Consider the string "ibtibtaea". Check whether the following grammar is ambiguous or not, for the given string. If found ambiguous, remove the ambiguity and rewrite an equivalent unambiguous grammar.
 $S \rightarrow iCtS \mid iCtSeS \mid a$

06**Q.7 Answer the following: -**

- a) Prove that Modified PCP reduces PCP.
- b) prove that Regular Language is closed under Union and Concatenation.

10**06**

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Set **P**

M.C.A. (Science) (Semester - II) (CBCS) Examination: Oct/Nov-2022
Office Automation

Day & Date: Tuesday, 21-03-2023
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) Question no. 1 and 2 are compulsory.
 2) Attempt any three questions from Q. No. 3 to Q. No. 7.
 3) Figure to right indicate full marks.

Q.1 A) Choose the correct alternatives **10**

- 1) Microsoft word is _____ software.
 - a) Application
 - b) Compiler
 - c) System
 - d) Programming
- 2) A _____ is an electronic device which can accept the data, process the data and store the data.
 - a) keyboard
 - b) printer
 - c) UPS
 - d) Computer
- 3) A formula in Excel always begins with an _____.
 - a) Colon
 - b) Equal sign
 - c) Comma
 - d) Space
- 4) Which of the following is called as page to create a presentation in PowerPoint?
 - a) Sheet
 - b) Paper
 - c) Slide
 - d) None of the above
- 5) A number of letter that appears little above the normal text is called _____.
 - a) Superscript
 - b) Subscript
 - c) Supertext
 - d) text
- 6) Which bar shows the current position as far the text goes?
 - a) Title bar
 - b) Menu bar
 - c) Scroll bar
 - d) Status bar
- 7) What are the basic rectangular building blocks of a spreadsheet?
 - a) Cell
 - b) Zoom slider
 - c) Help button
 - d) All of these
- 8) Which of the following command in powerpoint is used to bring the user directly to the first slide of the presentation?
 - a) Ctrl + Home
 - b) Alt + Home
 - c) Shift + Home
 - d) Home
- 9) Which of the following is the shortcut key to insert a new slide between the current presentation?
 - a) Ctrl + N
 - b) Ctrl + K
 - c) Ctrl + M
 - d) Ctrl + O
- 10) Which of the following is the extension of Notepad?
 - a) .txt
 - b) .xls
 - c) .ppt
 - d) .bmp

B) State True or False.**06**

- 1) Data is the collection of raw fact, figures & symbols.
- 2) In second generation of computers, Vacuum tubes were used.
- 3) Hardware is a program or set of instructions.
- 4) Monitor is an Input device.
- 5) In MS-Word Ctrl + V is used to cut the selected text.
- 6) Spreadsheet displays data in the form of rows and columns.

Q.2 Answer the following.**16**

- a) Define Computer. Explain advantages of computer.
- b) What is software? Explain different types of software.
- c) What is Operating System? Explain various features of Windows operating system.
- d) What is Output Device? Explain the use of Input Device with example.

Q.3 Answer the following.

- a) Explain Block diagram of computer.
- b) Explain silent features of MS-Word.

10**06****Q.4 Answer the following.**

- a) Explain procedure for creating table in MS-Word and formatting commands.
- b) What is mail merge? Explain the procedure for mail merge facility.

08**08****Q.5 Answer the following.**

- a) State and explain any four useful functions in Excel.
- b) How can alphabetical sorting order in Microsoft word? Explain with example

08**08****Q.6 Answer the following.**

- a) What do you mean by Bullets and Numbering? Explain with example.
- b) What is the use of Formatting tool bar? Explain any three operations of formatting on document.

08**08****Q.7 Answer the following.**

- a) How to create presentation in Microsoft Power point? Explain how transitions can be added in it.
- b) What is MS-Access? Explain data types used in it.

08**08**

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Set **P**

M.C.A. (Science) (Semester - II) (CBCS) Examination: Oct/Nov-2022
Fundamental in Mathematics

Day & Date: Tuesday, 21-03-2023
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

Instructions: 1) Question no. 1 and 2 are compulsory.
 2) Attempt any three questions from Q. No. 3 to Q. No. 7.
 3) Figure to right indicate full marks.

Q.1 A) Choose correct alternatives.**10**

- 1) A matrix in which there is exactly one row but any number of column is known as _____.
 a) Column matrix b) Row matrix
 c) Null matrix d) Square matrix
- 2) If A and B are two matrices then $(A.B)^T =$ _____.
 a) $A^T.B^T$ b) $(B.A)^T$
 c) $A^T + B^T$ d) $B^T.A^T$
- 3) A square matrix A is said to be an upper triangular matrix if _____.
 a) $a_{ij} = 0 ; i > j$ b) $a_{ij} = 0 ; i < j$
 c) $a_{ij} = 0 ; i = j$ d) $a_{ij} = 1 ; i > j$
- 4) Solution of simultaneous equations, $4x - 5y = 17$ and $x - 5y = 8$?
 a) $x = 3, y = -1$ b) $x = 2, y = 3$
 c) $x = 4, y = 1$ d) $x = 5, y = 4$
- 5) Every field is a vector space over its _____.
 a) Super field b) Subfield
 c) Ring d) Group
- 6) If W_1 and W_2 are subspaces of a vector space $V(F)$ then,
 $L(W_1 \cup W_2) =$ _____.
 a) $W_1.W_2$ b) $W_1 - W_2$
 c) $W_1 + W_2$ d) W_1
- 7) A set containing zero vector is _____.
 a) always linearly dependent
 b) never linearly dependent
 c) always linearly independent
 d) may be linearly dependent
- 8) If $T : U(F) \rightarrow V(F)$ is a linear transformation, then dimension of range space of T is known as _____.
 a) Rank (T) b) Nullity (T)
 c) Basis d) Linear span
- 9) A necessary condition for $T : U(F) \rightarrow V(F)$ to be one-one and onto is that _____.
 a) $\dim U \leq \dim V$ b) $\dim V \leq \dim U$
 c) $\dim U < \dim V$ d) $\dim U = \dim V$

- 10) Vector $(2,3)$ expressed in term of standard basis as _____.
 a) $(2,3) = (2,0) + 3(0,1)$ b) $(2,3) = 2(1,0) + (0,3)$
 c) $(2,3) = 2(1,0) + 3(0,1)$ d) $(2,3) = (1,0) + (2,3)$

B) Fill in the blanks.**06**

- 1) If X_1 and X_2 are solutions of $AX = B \neq 0$ then $k_1x_1 + k_2x_2$ is solution of $AX = B$ iff _____.
- 2) If a system of linear equations has a solution then it is said to be _____.
- 3) If $T: V_1 \rightarrow V_2$ is one-one then $\text{Ker}(T) =$ _____.
- 4) If any two rows of a determinant are identical then value of the determinant is _____.
- 5) Any homogeneous system of linear equations has _____ solution.
- 6) If A is 3×2 matrix and B is 2×3 matrix, then AB is _____ matrix.

Q.2 Answer the followings.**16**

- a) If matrix $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ then find A^{-1} ?
- b) Show that $T: R^3(R) \rightarrow R^3(R)$ defined by $T(x, y, z) = (x + y, y - x, x - z)$ is linear transformation
- c) Find value of α where $(3, 1, \alpha)$ is Linear combination of $(1, 0, 1)$ and $(1, 1, 2)$.
- d) Show that $(1, 2, 1), (2, 1, 4), (4, 5, 0)$ are Linearly independent.

Q.3 Answer the followings.**16**

- a) Determine whether or not the following vectors forms a basis of R^3 .
 $(1, 1, 2), (1, 2, 5), (5, 3, 4)$.
- b) Express the following matrix as a sum of a symmetric and skew symmetric matrix.

$$\begin{bmatrix} -1 & 7 & 1 \\ 2 & 3 & 4 \\ 5 & 0 & 5 \end{bmatrix}$$

Q.4 Answer the followings.**16**

- a) Define the following terms:
 - i) Linear transformation
 - ii) Null space of linear transformation
 - iii) Range space of linear transformation
 - iv) Invertible operator
- b) Find the inverse of the matrix $\begin{bmatrix} 1 & 2 & 7 \\ 2 & 1 & 0 \\ 0 & 1 & 3 \end{bmatrix}$

Q.5 Answer the followings.**06**

- a) Show that the mapping $T: R^3 \rightarrow R^3$ defined by
 $T(x, y, z) = (z, y + z, x + y + z)$ is linear.
- b) Solve the system of equation by matrix method.
 $x + 2y + 3z = 4, x + 4y + 9z = 6, x + y + z = 3$

10**Q.6 Answer the followings.****16**

- a) If $A = \begin{bmatrix} 3 & -1 & 2 \\ 4 & 0 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 2 \\ 3 & -4 \\ 5 & 0 \end{bmatrix}$, verify that $(AB)' = B'A'$, where A' and B' denote the transpose matrix of A and B respectively.
- b) Prove that the union of two subspaces is a subspace if one is contained in the other.

Q.7 Answer the following.

- a) If $A = \begin{bmatrix} 1 & 2 \\ 3 & -1 \end{bmatrix}$, $B = \begin{bmatrix} 0 & 1 \\ 2 & 3 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ then show that

$$A(B + C) = AB + AC.$$

- b) Use matrix method to examine the following system of equations for consistency and inconsistency and solve the equations.

$$x + 2y = 4, 3x + 6y = 12$$

Seat No.	
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Set **P**

M.C.A. (Science) (Semester - II) (CBCS) Examination: Oct/Nov-2022
Statistical Methods

Day & Date: Tuesday, 21-03-2023
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) Question no. 1 and 2 are compulsory.
 2) Attempt any three questions from Q. No. 3 to Q. No. 7.
 3) Figure to right indicate full marks.

Q.1 A) Choose the correct alternatives**10**

- 1) Mean is affected by _____.
 a) Extreme values b) Only minimum values
 c) Only maximum values d) Only odd numbers
- 2) Which of the following is not measure of central tendency?
 a) Mean deviation b) Quartile deviation
 c) Coefficient of variation d) None of these
- 3) _____ is the measure of central tendency.
 a) Mean b) Mode
 c) Median d) All the above
- 4) The arithmetic mean of 10, 12, 13, 15, 17 is _____.
 a) 15.5 b) 16.4
 c) 13.4 d) 12.8
- 5) Correlation coefficient lies in the range _____.
 a) [0, 1] b) [-1, 1]
 c) (-1,1) d) (0, 1)
- 6) In scatter plot, it shows that all points lies on a straight line, then it is _____.
 a) positive correlation b) perfect positive correlation
 c) negative correlation d) perfect negative correlation
- 7) Probability of an event always lies in the range _____.
 a) [0, 1] b) [-1,1]
 c) (-1,1) d) (1,2)
- 8) Let $X \sim \text{Binomial}(n, p)$ then $E(X)$ and $V(X)$ are _____.
 a) np and $np(1-p)$ b) np^2 and $np-1$
 c) np and $2np$ d) np^3 and np^2
- 9) Type I error is _____.
 a) Reject H_0 when it is true b) Accept H_0 when it is false
 c) Reject H_1 when it is false d) None of these
- 10) Which of the following is discrete probability distribution
 a) Binomial b) Standard Normal distribution
 c) Beta distribution d) Gamma distribution.

B) Fill in the blanks.**06**

- 1) If $U \sim U(0, 1)$ then mean of X is _____.
- 2) Symmetric distribution has skewness _____.
- 3) Let E be the experiment of tossing a single coin then sample space is _____.
- 4) Let A and B are two events then $P(A \cup B) =$ _____.
- 5) Run test is used to test _____.
- 6) Let $X \sim N(\mu, \sigma^2)$ then $E(X^2) =$ _____.

Q.2 Answer the followings.**08**

- a) Define arithmetic mean. Write its advantages and disadvantages.
- b) Write a short note on measures of dispersion.
- c) Write a short note on skewness and kurtosis.
- d) Define Karl Pearson's coefficient of correlation and write its properties.

Q.3 Answer the followings.**16**

- a) Define arithmetic mean, harmonic mean and geometric mean. Derive the relation between these three measures.
- b) Explain the graphical procedure of correlation using scatter diagram.

Q.4 Answer the followings.**16**

- a) Let E be an experiment of tossing of three coins. Write sample space. Let A be an event of getting at least one head and B be the event of getting exactly two heads. Obtain the $P(A)$ and $P(B)$.
- b) Explain the procedure of hypothesis testing.

Q.5 Answer the followings.**16**

- a) Derive the test for testing single mean and two means.
- b) Explain the method of least square for fitting of regression line.

Q.6 Answer the followings.**16**

- a) Write down the formula for measure of central tendency for grouped and ungrouped data.
- b) Define probability mass function. Write down the PMF of binomial distribution and hence obtain its mean and variance.

Q.7 Answer the following.**16**

- a) Define the terms with suitable example: simple and composite hypothesis, test statistics, critical region.
- b) Derive the test for testing single and double proportion.