Printed Pages:2

Paper Id: 236735

Sub Code:RCAI-601

Roll No.

MCA (INTEGRATED)
(SEM VI) THEORY EXAMINATION 2022-23
DATABASE MANAGEMENT SYSTEMS

Time: 3 Hours ***Total Marks: 70***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**

a. Discuss about the statement "Redundancy leads to data inconsistency" with a suitable example.

b. Differentiate between the char & varchar data types.

c. How database triggers are useful? How are they executed?

d. Summarize the advantages of normalization.

e. Differentiate between partial and full functional dependencies.

f. Summarize the functionality of buffer manager.

g. Differentiate between Deferred and Immediate database modification.

SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**

a. Express the advantages, disadvantages and applications of DBMS.

b. Show the importance of Relational Integrity Constraints with proper example of each.

c. Discuss about BCNF? Summarize how BCNF is different from Third Normal form?

d. Explain the concepts of one pass and two pass algorithms.

e. Define and explain the various types of transaction failures.

SECTION C

3. Attempt any *one* part of the following: **7 x 1 = 7**

a. With a neat diagram discuss the three level architecture of DBMS. Discus also the mapping between various levels.

b. Analyze the different needs for designing an ERD for Library Management System and design the ERD for that.

4. Attempt any *one* part of the following: **7 x 1 = 7**

a. SAILORS (Sid, Sname, Rating, Age)
BOATS (Bid, Boat Name, Color)
RESERVES (Sid, Bid, Day)
Based on above relations, expose the Relational Algebra expressions for following-
   1. Find the colors of boats reserved by 'Ramesh'.
   2. Find sailors details who have reserved all boats.

b. For following relation, determine the Super Key, Candidate Key, Primary Key and Alternate Key -
First_Sem_Students(Name, Father_name, Mother_name, DOB, Address, Branch, Batch, Sem, Section, Class_roll_number, Aadhar_no)

5. Attempt any *one* part of the following: **7 x 1 = 7**

a. For a relation Client Master[Client_No, Name, Address, City, Pincode], express the SQL queries for following-
1. Find a list of such clients whose name starts with 'R' and ends with 'Kumar'.
2. Find a list of clients who belongs from Ghaziabad/ Loni/ Noida.

b. Design a trigger for maintaining the backup of deleted employees detail in Deleted Employees (EmpId,EmpName,deleted_date) if any employee is being deleted from EmpMaster (EmpId,Name, Father, DOB, Department).

6. Attempt any *one* part of the following: **7 x 1 = 7**

a. Show the concept of Query Processing. Determine the use of a parser.

b. By using the concept of Bitmap Indexing, find the employees with an age in the range 45-55 and a salary in the range 100-200 for following data-

No	Age	Salary
1	25	60
2	45	60
3	50	75
4	50	100
5	50	120
6	70	110
7	85	140
8	30	260
9	25	400
10	45	350
11	50	275
12	60	260

7. Attempt any *one* part of the following: **7 x 1 = 7**

a. Draw and explain the state diagram of transaction.

b. What do you mean by Locking techniques of concurrency control? Discuss any one locking technique in detail.

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Printed Pages:02
Paper Id: 236252

Sub Code:RCAI-602
Roll No. 2 0 0 6 5 0 0 6 0 0 5 4

MCA-INT
(SEM VI) THEORY EXAMINATION 2022-23
GRAPH THEORY

Time: 3 Hours

Total Marks: 70

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**

(a) Define Regular Graph.
(b) Define Isolated and Pendent vertex.
(c) What are the applications of a Planer graph?
(d) It is possible to construct a graph with 12 vertices such that 2 of the vertices have degree 3 and the remaining vertices have degree 4.
(e) Show that the sequence 6, 6, 6, 6, 4, 3, 3, 0 is not graphical.
(f) What is an Edge Covering?
(g) Define minimum vertex degree of G (δ (G)) and maximum vertex degree of G (Δ (G)).

SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**

(a) What does it mean by Degree of a Vertex? Can a simple graph exist with 15 vertices each of degree five? Explain your answer.
(b) Define the terms Distance, Centre and Eccentricity in a tree. Show that the distance between two spanning trees is a metric.
(c) Define the Vector and Vector Space with example.
(d) What are Chromatic Polynomials? Explain the concept of Chromatic Partition.
(e) Explain the Digraph and Binary Relations.

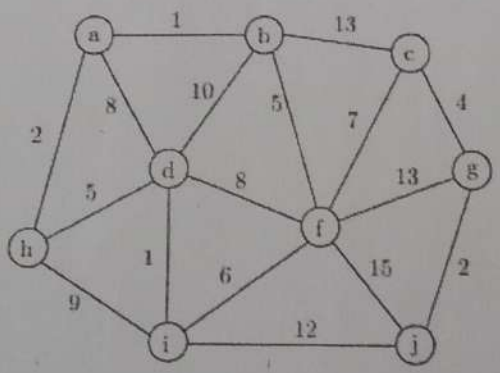
SECTION C

3. Attempt any *one* part of the following: **7 x 1 = 7**

(a) Explain the Combinatorial and Geometric with the help of example.
(b) Prove the given statement, "A tree with n vertices has n-1 edges".

4. Attempt any *one* part of the following: **7 x 1 = 7**

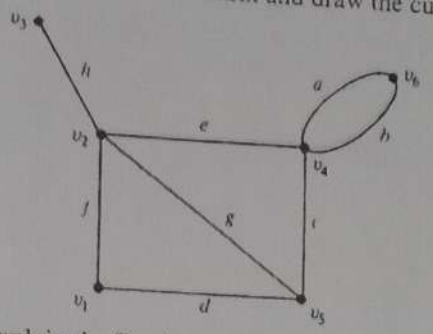
(a) Find a minimal spanning tree for the given graph by Kruskal's algorithm and Prim's algorithm.



(b) Prove that There is one and only one path between every pair of vertices in a tree T.

5. **Attempt any *one* part of the following:** **7 x 1 = 7**

(a) Define the cut set matrix and draw the cut set matrix give graph.



(b) Explain the Fundamental Circuit Matrix.

6. **Attempt any *one* part of the following:** **7 x 1 = 7**

(a) Define the Matching. What is the Complete Matching? Are all bipartite graphs having complete matching?

(b) Prove that A graph with at least one edge is 2-chromatic if and only if it has no circuits of odd length.

7. **Attempt any *one* part of the following:** **7 x 1 = 7**

(a) Prove that in any digraph the sum of the in-degrees of all vertices is equal to the sum of their out-degrees.

(b) Explain Euler digraphs in detail.

Printed Pages: 02

Sub Code:RCAI-603

Paper Id: 236382

Roll No. 2000650060054

MCA-INT
(SEM VI) THEORY EXAMINATION 2022-23
ARTIFICIAL INTELLIGENCE

Time: 3 Hours

Total Marks: 70

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**

- (a) Name the elements of an agent.
- (b) What do you mean by term weak AI and strong AI
- (c) What do you infer from hill-climbing search algorithm?
- (d) Justify the usage of universal and existential quantifier with an example
- (e) Derive the process of conditional probability in Bayes' Theorem
- (f) Explain the brief in concept of reinforcement learning
- (g) Write short notes on support vector machine

SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**

- (a) Discuss agents and its structure. Also discuss the types of agents.
- (b) Illustrate Classical "Water jug Problem". Prepare the production rules for this problem and also give the solution with appropriate rules applied on to it.
- (c) Illustrate the different design issues to be solved to use hidden markov model for real world application.
- (d) Write the steps for converting FOPL into CNF.
- (e) Illustrate machine learning concept. Differentiate between supervised, unsupervised and reinforcement learning.

SECTION C

3. Attempt any *one* part of the following: **7 x 1 = 7**

- (a) For each of the following agent develop the PEAS description of task environment
  - (i) Online food delivery
  - (ii) Online shopping agent
  - (iii) Weather forecasting system
  - (iv) For Tic-Tac-Toe Game
- (b) Trace the constraint satisfaction procedure to solve the following cryptarithmetic problem: BASE+ BALL = GAMES

4. Attempt any *one* part of the following: **7 x 1 = 7**

- (a) Describe A* and AO* search technique. Prove that A* is complete and optimal.
- (b) Explain the concept of alpha-Beta pruning. Write Alpha-Beta search algorithm

5. **Attempt any *one* part of the following:** **7 x 1 = 7**

(a) Use forward and backward chaining algorithm for the Given the knowledge base as: P, P→Q, Q→R. Derive R by using forward and backward chaining?

(b) Modify the following sentences to FOPL-

a) If it is not raining and I have time, then I will go to movie.
b) If it is raining and I will not go to movie.
c) It is not raining.
d) I will not go to movie.
e) I will not go to movie only if it is not raining.

6. **Attempt any *one* part of the following:** **7 x 1 = 7**

(a) Discuss Expectation-Maximization algorithm by choosing a suitable example also discuss its advantages and disadvantages.

(b) Apply the principles of pattern recognition system for dimension reduction using Principal Component Analysis (PCA) and Linear Discriminant Analysis (LDA).

7. **Attempt any *one* part of the following:** **7 x 1 = 7**

(a) Illustrate classification is done by k-nearest neighbors. Perform KNN classification algorithms on the following dataset and predict the class for X (p1=3, p2=7). Given k=3.

Sl. No.	P1	P2	Class
1	6	5	False
2	7	7	False
3	3	5	True
4	2	4	True

(b) Describe the decision tree-learning model by choosing a suitable example. Also discuss the issues related to the applications of decision tree

Printed Pages:02
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Sub Code: RCAI-604
Roll No. 2000650060054

MCA-INT
(SEM VI) THEORY EXAMINATION 2022-23
INTRODUCTION TO AUTOMATA THEORY & LANGUAGES

Time: 3 Hours *Total Marks: 70*

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**

(a) List out applications of automata.
(b) Differentiate between dead state and not reachable states.
(c) Design a regular expression that accepts all strings containing at least two 1's over the input {0,1}.
(d) What is unit production?
(e) What do you mean by ambiguous grammar?
(f) Explain recursive theory function.
(g) What do you understand by the Halting Problem?

SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**

(a) Explain each step in designing of NFA with ε-moves for the regular expression (a+b)*abb.
(b) Construct a Moore machine that will count occurrence of substring aab in the given string over the input {a,b}.
(c) Discuss the various closure properties of CFLs.
(d) Write short notes on:
    1. Turing Machine as Computer of Integer functions
    2. Universal Turing Machine
(e) Define Post's Correspondence Problem (PCP) and Modified PCP with its applications. Find any three PCP solutions of the lists x=(b,bab^3,ba) and y=(b^3,ba,a).

SECTION C

3. Attempt any *one* part of the following: **7 x 1 = 7**

(a) Design a DFA that will accept set of strings over {a, b} in which every 'a' is followed by a 'b'.
(b) Construct a DFA for $L(G) = \{w | w \in (a+b)^*, n_a(w) \geq 2, n_b(w) \leq 1\}$

4. Attempt any *one* part of the following: **7 x 1 = 7**

(a) Discuss Chomsky Hierarchy in detail.
(b) Discuss the grammar? Write a grammar for language L(G) = {w ∈ {a. b} | w is a palindrome of odd length}.

5. Attempt any *one* part of the following: **7 x 1 = 7**

(a) Convert the grammar S → aAA, A → a laSl bS to a PDA that accepts the same language by empty stack.
(b) Discuss the Push Down Automata (PDA). Discuss with suitable example.

6. **Attempt any *one* part of the following:** **7 x 1 = 7**

(a) Design a Turing Machine for the language L, where $L = \{a^n b^n b^n : n \geq 1\}$.

(b) Design a Turing Machine for equal number of a's and b's.

7. **Attempt any *one* part of the following:** **7 x 1 = 7**

(a) Discuss the complexity classes? Write the short note on
   (i) P Class
   (ii) NP Class, and
   (iii)NP-Complete.

(b) Write the short note on:
   (i) Multi-Tape and Multi-Head Turing Machine
   (ii) Church-Turing Thesis

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Printed Pages: 02
Paper Id: 236610

Sub Code: RCAI-605
Roll No. 20ACS060054

MCA - INT
(SEM VI) THEORY EXAMINATION 2022-23
UNIVERSAL HUMAN VALUES &PROFESSIONAL ETHICS

Time: 3 Hours *Total Marks: 70*

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**

(a) Differentiate between prosperity and wealth.
(b) Define existence?
(c) Difference between respect and gratitude.
(d) What is utility value?
(e) What do you understand by trust?
(f) Differentiate between units and space.
(g) What do you mean by professional ethics?

SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**

(a) What do you mean by values (human values)?
(b) What is pre-conditioning? What is their source?
(c) How can you say that love is the complete value?
(d) Explain the differences and similarities between animal order and human order. What is the relation between these two orders?
(e) What is utility value and artistic value? How are both important in human life? Explain with example

SECTION C

3. Attempt any *one* part of the following: **7 x 1 = 7**

(a) What are the basic guidelines for value education?
(b) Explain with examples the various activities in the self 'I'.

4. Attempt any *one* part of the following: **7 x 1 = 7**

(a) What is 'justice'? What are its four elements? Is it a continuous or a temporary need?
(b) Distinguish between the activities of different orders of nature giving an example of each.

5. Attempt any *one* part of the following: **7 x 1 = 7**

(a) What do you understand by competence in professional ethics? Give two examples of its implications in industry.
(b) Write a short note on the need for value education in today's scenario.

6. **Attempt any *one* part of the following:** 7 x 1 = 7

(a) Define Sanyam and Swasthya. How are they helpful in keeping harmony between self and body.

(b) How do we differentiate in relationships on the basis of body, physical facilities, or beliefs? What problems do we face because of such differentiation?

7. **Attempt any *one* part of the following:** 7 x 1 = 7

(a) Explain how there is recyclability and self-regulation in nature.

(b) What would be the pragmatic implications of value-based living at the four levels? Briefly explain.