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Code: 20AC33T

II B.Tech. I Semester Regular & Supplementary Examinations December 2023

Discrete Mathematics

(Common CSE, AI&DS, AI&ML, CSE(AI) and CSE(DS))

Max. Marks: 70

Time: 3 Hours

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)

2. In Part-A, each question carries **Two marks**.

3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

- | | | |
|--|----|----|
| 1. Answer all the following short answer questions (5 X 2 = 10M) | CO | BL |
| a) Express in the symbolic form of the statement "Everyone who is healthy can do all kinds of work". | 1 | L1 |
| b) Find the generating function for the sequence 1,-1,1,-1,1,-1... | 2 | L1 |
| c) Define partial order relation. | 3 | L1 |
| d) Can a simple graph exist with 15 vertices each of degree 5? Justify your answer. | 4 | L1 |
| e) Explain briefly about trees. | 5 | L1 |

PART-B

Answer **five** questions by choosing one question from each unit (5 x 12 = 60 Marks)

Marks CO BL

UNIT-I

- | | | | |
|---|----|-----|----|
| 2. a) Verify whether the formula $(\neg p \wedge (p \vee q)) \rightarrow q$ is a tautology or not, without constructing truth table. | 6M | CO1 | L3 |
| b) Show that the hypotheses, "It is not sunny this afternoon and it is colder than yesterday", "We will go swimming only if it is sunny", "If we do not go swimming, then we will take a canoe trip", and "if we take a canoe trip, then we will be home by sunset", lead to the conclusion: "We will be home by sunset". | 6M | CO1 | L2 |

OR

- | | | | |
|--|----|-----|----|
| 3. a) Obtain the PCNF and PDNF of $(\neg P \rightarrow R) \wedge (Q \rightarrow P)$. | 6M | CO1 | L2 |
| b) Show that $r \rightarrow s$ can be derived from the premises $p \rightarrow (q \rightarrow s), \neg r \vee p$ and q by using rules of inference | 6M | CO1 | L2 |

UNIT-II

- | | | | |
|---|----|-----|----|
| 4. a) Solve the recurrence relation $S(k) - S(k-1) - 2S(k-2) = 0, S(0) = 0, S(1) = 1$. | 6M | CO2 | L3 |
| b) Find the generating function of the Fibonacci sequence. | 6M | CO2 | L2 |

OR

- | | | | |
|---|----|-----|----|
| 5. a) Find the general solution of the recurrence relation $a_n - 5a_{n-1} + 6a_{n-2} = 4^n$, for $n \geq 2$. | 6M | CO2 | L2 |
|---|----|-----|----|

- b) Solve the recurrence relation $a_n - 6a_{n-1} + 9a_{n-2} = 0$ for $n \geq 2$ given that $a_0 = 0$, and $a_1 = 12$, by generating functions method.

6M CO2 L2

UNIT-III

6. a) Let $A = \{1, 2, 3, 4\}$ and $B = \{a, b, c\}$ let $R = \{(1, a), (1, b), (2, b), (2, c), (3, b), (4, a)\}$ and $S = \{(1, b), (2, c), (3, b), (4, b)\}$.

Compute (i) complement of R (ii) $R \cup S$ (iii) $R \cap S$.

6M CO3 L2

- b) Draw the Hasse diagram for the positive divisors for 36 by considering the partial order divisibility.

6M CO3 L3

OR

7. a) If $*$ is the binary operation on the set of real numbers defined by $a * b = a + b + 2ab$, then (i) show that $(\mathbb{R}, *)$ is semigroup. (ii) find the identity element if it exists.

6M CO3 L2

- b) Explain compatibility relation with examples.

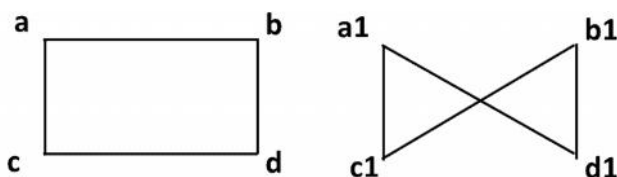
6M CO3 L3

UNIT-IV

8. a) Define (i) simple graph (ii) Pendant vertex (iii) Indegree and Outdegree of a vertex.

6M CO4 L2

- b) Show that the following graphs are isomorphism.



6M CO4 L3

OR

9. a) Define the following with examples: (i) Degree of a vertex (ii) Complete Graph (iii) Regular graph.

6M CO4 L2

- b) Define (i) Euler's path (ii) Euler circuit (iii) Hamiltonian path (iv) Hamiltonian circuit.

6M CO4 L2

UNIT-V

10. a) What is meant by Pendant Vertices? Explain.

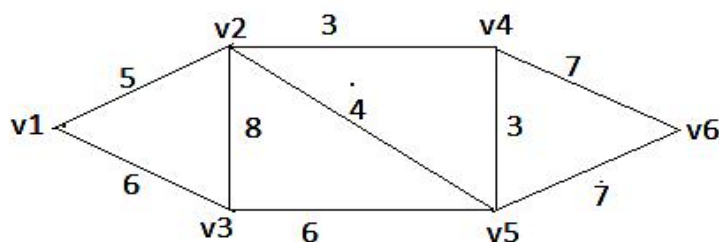
4M CO5 L2

- b) Distinguish DFS and BFS with examples.

8M CO5 L4

OR

11. Explain Kruskal's algorithm and find the shortest spanning tree for the following weighted graph.



12M CO5 L4

*** End ***

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Code: 20AC35T

II B.Tech. I Semester Regular & Supplementary Examinations December 2023

Management Science

(Common CSE, AI&DS, AI&ML, CSE(AI) and CSE(DS))

Max. Marks: 70

Time: 3 Hours

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)

2. In Part-A, each question carries **Two marks**.

3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

- | | | |
|---|-----|----|
| 1. Answer all the following short answer questions (5 X 2 = 10M) | CO | BL |
| a) Explain Management functions briefly. | CO1 | L1 |
| b) List any four functions of Human Resource Management. | CO2 | L1 |
| c) Describe Job Production with at least two examples. | CO3 | L1 |
| d) What do you learn from Pay Back Period method? | CO4 | L3 |
| e) Summarize market segmentation in your own words. | CO5 | L2 |

PART-B

Answer **five** questions by choosing one question from each unit (5 x 12 = 60 Marks)

Marks CO BL

UNIT-I

- | | | | |
|--|----|-----|----|
| 2. a) Illustrate Line and Staff organization. | 6M | CO1 | L2 |
| b) Tabulate the difference between Divisional and Matrix Organization. | 6M | CO1 | L1 |

OR

- | | | | |
|--|-----|-----|----|
| 3. Summarize Taylor's Functional Organization through a line diagram along with its merits and demerits. | 12M | CO1 | L1 |
|--|-----|-----|----|

UNIT-II

- | | | | |
|--|----|-----|----|
| 4. a) List at least 6 factors that affects Plant Location and their importance in brief. | 6M | CO2 | L2 |
| b) Differentiate between Mass Production and Batch Production. | 6M | CO2 | L1 |

OR

- | | | | |
|--|----|-----|----|
| 5. a) Why manpower planning is important for any organization? | 6M | CO2 | L2 |
| b) What are the factors that influence man power planning? | 6M | CO2 | L1 |

UNIT-III

- | | | | |
|---|----|-----|----|
| 6. a) Derive the Basic Economic Order Quantity for Basic Inventory Model. | 6M | CO3 | L3 |
| b) Demonstrate ABC analysis through a simple example. | 6M | CO3 | L3 |

OR

7. a) Briefly discuss factors affecting inventory control. 6M CO3 L1
b) What do you understand from Just-In-Time theory/
philosophy? 6M CO3 L1

UNIT-IV

8. a) Explain functions of financial management. 6M CO4 L4
b) What are the various sources of financing, discuss in
brief? 6M CO4 L1

OR

9. a) Describe concept of working capital. 6M CO4 L1
b) Differentiate between Payback Period and Accounting
Rate of Return methods of investment analysis. 6M CO4 L4

UNIT-V

10. a) Compare any two pricing methods. 6M CO5 L5
b) What are the challenges of using segmentation in
marketing? 6M CO5 L1

OR

11. Discuss various stages of Product Life Cycle and
explain what steps companies will initiate in the decline
stage? 12M CO5 L5

*** End ***

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Code: 20A532T

II B.Tech. I Semester Regular & Supplementary Examinations December 2023

Object Oriented Programming using Java

(Common CSE, AI&DS, AI&ML, CSE(AI) and CSE(DS))

Max. Marks: 70

Time: 3 Hours

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)

2. In Part-A, each question carries **Two marks**.

3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

- | | | |
|---|----|----|
| 1. Answer all the following short answer questions (5 X 2 = 10M) | CO | BL |
| a) Describe the concept of garbage collection in JAVA | 1 | L1 |
| b) List at least two benefits of dynamic method dispatch | 2 | L1 |
| c) Identify at least two uses of static method | 3 | L2 |
| d) Show the application of generic class in the context of JAVA programming | 4 | L2 |
| e) Define "StringTokenizer" with a code snippet | 5 | L3 |

PART-B

Answer **five** questions by choosing one question from each unit (5 x 12 = 60 Marks)

- | | Marks | CO | BL |
|---|-------|----|----|
| UNIT-I | | | |
| 2. Describe the working mechanism of constructor with a supported program | 12M | 1 | L2 |
| OR | | | |
| 3. Discuss the importance of "this" keyword and "finalize()" method with a program. | 12M | 1 | L3 |
| UNIT-II | | | |
| 4. Examine the necessity and application of method overriding with an example. | 12M | 2 | L3 |
| OR | | | |
| 5. Show the advantage of using the string class with a minimum of five string methods. | 12M | 2 | L3 |
| UNIT-III | | | |
| 6. Discuss the concept of built-in and user defined packages. Write a program to create user-defined package and add a class to it. | 12M | 2 | L2 |
| OR | | | |
| 7. Explain the working mechanism of exception handling with a sample code by highlighting the nested try blocks. | 12M | 2 | L2 |
| UNIT-IV | | | |
| 8. Explain the life cycle of Java thread model with a neat diagram. | 12M | 3 | L2 |
| OR | | | |
| 9. Explain about the various types of available wildcards with a sample program. | 12M | 3 | L2 |
| UNIT-V | | | |
| 10. a) Illustrate the important features of ArrayList class with sample program. | 6M | 4 | L3 |
| b) Explain about Lambda Expressions with suitable example program. | 6M | 4 | L2 |
| OR | | | |
| 11. Explain how the LinkedList works. Write a sample code with a minimum of three methods of Java LinkedList. | 12M | 4 | L2 |

*** End ***

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Code: 20A533T

II B.Tech. I Semester Regular & Supplementary Examinations December 2023

Computer System Architecture

(Common to CSE, AI&DS, AI&ML, CSE(AI) and CSE(DS))

Max. Marks: 70

Time: 3 Hours

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. In Part-A, each question carries **Two marks**.
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

1. Answer **all** the following short answer questions (5 X 2 = 10M)
- | | | |
|--|-----|----|
| | CO | BL |
| a) Explain floating point representation with example? | CO1 | L3 |
| b) Write the two forms of boolean expression | CO2 | L2 |
| c) Write the instruction formats. | CO1 | L2 |
| d) List the components of a microprocessor? | CO2 | L4 |
| e) What is virtual memory? | CO2 | L3 |

PART-B

Answer **five** questions by choosing one question from each unit (5 x 12 = 60 Marks)

Marks CO BL

| |
|---------------|
| UNIT-I |
|---------------|

2. a) What is the basis behind Karnaugh map simplification? What are the limitations of Karnaugh map based digital logic circuit simplification? How do you mitigate the same? 6M CO1 L2
- b) Subtract the following unsigned numbers using two's complement:
- i) 11110011–11000011 ii) 10001101–11111000 6M CO2 L3

OR

3. a) Explain the functional architecture of the computer system. 6M CO1 L2
- b) Find 2's complement of the following
- (i) 10010 (ii) 111000 (iii) 0101010 (iv) 111111 6M CO2 L3

| |
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| UNIT-II |
|----------------|

4. a) Show that a JK flip-flop can be converted to a D flip flop with an inverter between J and K. 6M CO1 L2
- b) What is register? Explain the function of bidirectional shift register with parallel load with the help of diagram. 6M CO2 L3

OR

5. a) Compare combinational circuit and sequential circuit 6M CO1 L4
 b) Draw and explain the full adder using 8 to 1 multiplexer. 6M CO2 L2

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| UNIT-III |
|-----------------|

6. a) Write the hardware implementation for Booth's multiplication algorithm. 6M CO2 L2
 b) Compare direct and indirect addressing modes. 6M CO2 L4

OR

7. a) Derive and explain an algorithm for adding and subtracting 2 floating point binary numbers 6M CO2 L2
 b) Explain hardware implementation of binary multiplier with example. 6M CO2 L1

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| UNIT-IV |
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8. a) Explain RAM and ROM memories in suitable diagrams 6M CO1 L2
 b) Explain the address translation in virtual memory 6M CO2 L2

OR

9. a) Explain different types of mapping functions in cache memory. 6M CO1 L3
 b) Write short notes on Hardwired Control and Micro-programmed Control 6M CO2 L4

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| UNIT-V |
|---------------|

10. What is Direct Memory Access (DMA)? What is the need for DMA? Explain the working of DMA. Also mention its advantages. 12M CO2 L4

OR

11. a) What are interrupts? Why do we need them? How interrupts are commonly handled? Assuming that currently an instruction is in its decode cycle and an interrupt has arrived. Are we going to stop the current instruction there itself? If not, why? 6M CO2 L4
 b) Explain the functions of typical input-output interface. 6M CO1 L2

*** End ***

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Code: 20A531T

II B.Tech. I Semester Regular & Supplementary Examinations December 2023

Database Management Systems

(Common CSE, AI&DS, AI&ML, CSE(AI) and CSE(DS))

Max. Marks: 70

Time: 3 Hours

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)

2. In Part-A, each question carries **Two marks**.

3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

- | | | | |
|---|-----------------|-----|----|
| 1. Answer all the following short answer questions | (5 X 2 = 10M) | CO | BL |
| a) What are the applications of database system? | | CO1 | L1 |
| b) Define a Key | | CO2 | L1 |
| c) Explain Having Clause | | CO3 | L2 |
| d) Write advantages of Normalizing Database schema | | CO4 | L2 |
| e) What is meant by Concurrency | | CO5 | L2 |

PART-B

Answer **five** questions by choosing one question from each unit (5 x 12 = 60 Marks)

Marks CO BL

UNIT-I

- | | | | |
|---|----|-----|----|
| 2. a) Compare and Contrast DROP and Truncate? | 6M | CO1 | L2 |
| b) What are the Responsibilities of Database Administrator? | 6M | CO1 | L1 |

OR

- | | | | |
|---|----|-----|----|
| 3. a) Explain DDL, DML and TCL | 6M | CO1 | L2 |
| b) Compare and Contrast File System and DBMS? | 6M | CO1 | L2 |

UNIT-II

- | | | | |
|---|----|-----|----|
| 4. a) Explain one-one, one-many many-many relationships with examples | 6M | CO2 | L3 |
| b) Explain any 3 key constrains | 6M | CO2 | L3 |

OR

- | | | | |
|---|----|-----|----|
| 5. a) Analyze Various types of Relations in E-R model | 6M | CO2 | L4 |
| b) Explain Various types of attributes in E-R model with examples | 6M | CO2 | L3 |

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| UNIT-III |
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6. Consider the following relations

Sailors(sid, sname, rating, age)

Boats(bid, bname, color)

Reserves(sid, bid, day)

Write the SQL statements for the following:

- (i) Find the names of sailors who have reserved a Red boat.
- (ii) List all the Red Color or Green Color Boats.
- (iii) Find the names of sailors who have reserved Red and Green boat.
- (iv) Find the names of sailors who have reserved Red or a White boat.
- (v) List number boats reserved by each sailor.
- (vi) List all sailors names

12M CO3 L4

OR

7. a) Discuss various types of JOINS in Relational Database with examples

6M CO3 L3

b) Discuss about sub queries and Correlated Queries

6M CO3 L3

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| UNIT-IV |
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8. a) Explain Armstrong's Axioms in Functional Dependency in DBMS

6M CO4 L2

b) Explain Lossless Decomposition

6M CO4 L3

OR

9. a) Explain 1NF and 2NF with examples

6M CO4 L3

b) Explain 3NF and BCNF with examples

6M CO4 L3

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| UNIT-V |
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10. a) What are Properties of Transaction

6M CO5 L2

b) Why concurrency control is needed demonstrate with an example

6M CO5 L3

OR

11. a) Explain Lock Based Concurrency Control

6M CO5 L3

b) Write a Transaction and explain each statement Include all TCL statements

6M CO5 L4

*** End ***