MLDC

QUESTION PAPER

BSCIT

SEM-I

NOV.22

Lib

F.Y.B.Sc.(I.T.) Semester I
Digital Logic and Applications

F. Y. I.T sem-I

(Time: 2½ hours)

Total Marks: 75

N. B.: (1) **All** questions are **compulsory**.
(2) Make **suitable assumptions** wherever necessary and **state the assumptions** made.
(3) Answers to the **same question** must be **written together**.
(4) Numbers to the **right** indicate **marks**.
(5) Draw **neat labeled diagrams** wherever **necessary**.
(6) Use of **Non-programmable** calculators is **allowed**.

1. Attempt *any three* of the following: **15**

a. Solve the following:
i) $(11011.011)_2 + (01110.001)_2$
ii) $(11011)_2 - (10101)_2$
iii) $(3\ 7.\ 1\ 2)_{10} = (x)_{BCD}$

b. Write a short note on BCD number system.

c. Solve the following:
i) $(1\ 2\ 5\ 0.6\ 7)_{10} = (X)_{16}$
ii) $(5\ 7\ 2.\ 1\ 3)_8 = (X)_{10}$
iii) $(4\ 2\ 7)_{10} = (X)_{xs-3}$

d. Why NAND and NOR gates are called as Universal gates? Construct NOT and OR expression using NOR gates.

e. What is Hexadecimal Number System? Explain decimal to Hexadecimal conversion with Suitable example.

f. Construct the logic circuit for the following equation and write truth table for the same.
Y = $Y = (\overline{A}.B) + (A.\ \overline{B})$

2. Attempt *any three* of the following: **15**

a. Explain the concept of **SOP** (SUM-OF_PRODUCTS) and **POS** (PRODUCT-OF-SUM) logical equations.

b. State and explain distributive Laws.

c. Reduce the following logical equations using Boolean laws and theorems.
i) $(X+Z).\ (\overline{X}+Y+Z)$
ii) $(AB+C)\ .\ (AB+D)$

d. Solve the following using Boolean algebra and draw circuit for the reduced expression.
$Y=f(A,B,C)= \sum m(0,2,4,6,7)$

e. Simplify the following logical equations using K-map.
i) $Y = f(A, B,C,D)= \sum m\ (1,5,7,9,11,13,15)$
ii) $Y= f(A, B,C) = \prod M\ (0,1,2,4,5)$

f. Prove the following:
i) $A\overline{B}\,\overline{C} + \overline{A}\,B\,\overline{C} + A\,\overline{B}\,\overline{C} + AB\,\overline{C} = \overline{C}\,(A+B)$
ii) $(A+B).(A+C)\,(B+C) = (A+B).(A+C)$

3. Attempt *any three* of the following: **15**

a. With neat and labelled diagram explain in detail full adder circuit.

b. What are combinational circuits? Explain the concept Multiplexer and Demultiplexer.

c. Write a short note on 1:4 De-Multiplexer.

d. What is half subtractor? Design a half subtractor using K-map and also draw the logic circuit for the same.

e. Design a logic circuit whose output is HIGH only when majority of inputs A,B,C are LOW.

f. Implement following logic function using multiplexer.
$Y=f(A, B,C,D) = \sum m\ (4,5,\ 8,10,12,14,15)$

4. Attempt *any three* of the following: **15**

a. Explain in detail SR flip flop.
b. What are different modes of Registers? Explain.
c. Design mod-3 ripple (asynchronous) counter.
d. What is a difference between Asynchronous and Synchronous counters? Discuss.
e. Explain in detail operation of SISO (Serial-In-Serial-Out) shift register.
f. Write a short note on D-flip-flop.

5. Attempt *any three* of the following: **15**

a. Solve the following:
i) $(73)_8 + (65)_8$
ii $(BD.5)_{16} + (AF.8)_{16}$
b. Explain in detail Gray code and Excess-3 code.
c. Write a short note on 4-bit adder.
d. Design a circuit to convert 4-bit binary number into 4-bit gray code.
e. A 4-bit binary number is represented by ABCD where A equals to MSB and D equals to LSB. Design a logic circuit that will produce a HIGH output whenever binary number is greater than $(0\ 0\ 1\ 0)_2$ and less than $(1\ 0\ 0\ 0)_2$
f. Solve the following:
i) $(1\ 1\ 0\ 1)_2 \times (1\ 1\ 0)_2$
ii) $(1\ 0\ 1\ 0\ 0\ 1)_2 = (x)_{\text{Gray-code}}$

F.Y.B.Sc.(I.T.) Semester I
Programming Principles with C

(Time: 2½ hours)

Total Marks: 75

N. B.: (1) **All** questions are **compulsory**.
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(3) Answers to the **same question** must be **written together**.
(4) Numbers to the **right** indicate **marks**.
(5) Draw **neat labeled diagrams** wherever **necessary**.
(6) Use of **Non-programmable** calculators is **allowed**.

1 Attempt *any three* of the following: 15
a What are different data-types in C? Explain.
b List down features of C language.
c Write a short note on identifiers and keywords.
d Write an algorithm and draw a flow chart to find greatest among two numbers.
e What are variables and scope of variable?
f. What are different types of software? Explain.

2 Attempt *any three* of the following: 15
a What are different arithmetic operators in C? Explain with example.
b Explain switch case with help of example.
c Explain increment and decrement operator with example.
d Write a C program to print the following pattern using loops:
1
12
123
e Explain the difference between while loop and do while loop.
f. What will be the output of the following code:

A)
```
#include <stdio.h>
int main()
{
int num=212;
printf("Right shift: %d\n",
num >> 2);
printf("Left shift: %d\n",
num << 2); return 0;
}
```

B)
```
#include <stdio.h>
int main()
{
int a = 5, b = 5, c = 10;
printf("%d == %d is %d \n", a, b, a == b);
printf("%d > %d is %d \n", a, b, a > b);
printf("%d != %d is %d \n", a, b, a != b);
return 0;
}
```

3 Attempt *any three* of the following: 15
a What are functions and their types?
b List down four scope rules in C. Explain
c Write a C program to illustrate call by reference.
d Explain functions getchar(), putchar(), gets(), puts().
e Write a short note on recursive functions.
f. Write a short note on Error Handling in C.

4 Attempt *any three* of the following: 15
a What are C pointers? Explain with example.
b Write a program to add two matrix and display the result using multidimensional array.
c Explain dereference pointer and why is it needed?
d List down any three pointer arithmetic operators in C. Explain
e Explain malloc() and calloc() with help of an example.
f. Write a short note on Error Handling in C.

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5 Attempt *any three* of the following:

a Write a short note on structures. Explain with example.

b Explain the following terms: fopen(),fclose(),fprintf(),fscanf().

c Write a short note on Bit-fields in C with help of an example.

d List down a few modes in fopen() function. Explain

e What are array of structures? Explain with example.

f. Write a C program to copy contents of one file into another.

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F.Y.B.Sc.(I.T.) Semester I
Technical Communication Skills

(Time: 2½ hours) **Total Marks: 75**

N. B.: (1) **All** questions are **compulsory**.
(2) Make **suitable assumptions** wherever necessary and **state the assumptions** made.
(3) Answers to the **same question** must be **written together**.
(4) Numbers to the **right** indicate **marks**.
(5) Draw **neat labeled diagrams** wherever **necessary**.

1. Attempt *any three* of the following: **15**
a. Explain completeness and concreteness of 7 C's.
b. Differentiate between oral and written communication.
c. Write a letter applying for the job of a digital designer, attach a resume to it.
d. Write a report on Demonetization. Give suggestions.
e. What are the advantages of video conferencing?
f. What is intranet?

2. Attempt *any three* of the following: **15**
a. Explain other options of email.
b. Mention different types of brochures?
c. What are various types of resumes?
d. What are different types on interviews?
e. Differentiate between hearing and listening.
f. How will you overcome stage fright?

3. Attempt *any three* of the following: **15**
a. What points a chairman has to keep in mind while running a meeting?
b. What are the benefits of group discussions?
c. Give 7 points of relation between communication and IT.
d. What is the significance of public speaking skills?
e. What are the techniques for a group discussion?
f. What are the techniques of team briefing?

4. Attempt *any three* of the following: **15**
a. Describe the media relation characteristic in corporate communication.
b. Explain the post crisis management.
c. What are the aspects of persuasion at work?
d. What is AIDA?
e. What are the characteristics of conflict?
f. What are the ethical guidelines for managers?

5. Attempt *any three* of the following: **15**
a. What preparation is required to use graphics in presentations?
b. What are the different types of font effects?
c. Mention the merit and demerits of using templates.
d. How to make concept maps?

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e. Fill in the blanks with appropriate Prepositions:---

1. She is the cutest __all the siblings.
2. Meena jumped _____the swimming pool.
3. The car was ____the road.
4. The birds flew _____ the building.
5. Air passed _____the trees in the jungle.
6. The cat was sitting _____the table.
7. I took the blind man ____the road.
8. Boys are playing ___the playing ground.
9. The flower vase is kept _____the two chairs.
10. The shirt is made up ___silk.

f. Convert the following into Indirect/Reported Speech:--

1. "Please give me a glass of water", said mother to Jack.
2. "Pinky has been working since morning", said mom.
3. "Raman had played in the Olympics", said Ketan.
4. " We will be going for a movie", said Fenny.
5. Mom said, " Will you eat dinner at home tonight?"

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F.Y.B.Sc.(I.T.) Semester I
Computation Logic and Discrete Structures
(Time: 2½ hours)

Total Marks: 75

N. B.: (1) **All** questions are **compulsory**.
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(3) Answers to the **same question** must be **written together**.
(4) Numbers to the **right** indicate **marks**.
(5) Draw **neat labeled diagrams** wherever **necessary**.
(6) Use of **Non-programmable** calculators is **allowed**.

1. Attempt *any three* of the following: **15**

a. Define : Inverse Relation & Symmetric Closure of R
If $R = \{(2,4),(2,5),(4,2),(4,4),(5,4),(5,5)\}$ is a relation defined on set $A = \{2,4,5\}$ then find its symmetric closure .

b. In a survey of 120 students it is observed that 65 play football, 45 play cricket, 42 play volleyball, 20 play football & cricket, 25 play football & volleyball , 15 play cricket & volleyball , 8 play all three games. Determine the number students who play only one game.

c. Let $U = \{x \epsilon I / -1 \leq x \leq 3\}$ $P = \{x \epsilon I / -1 < x < 2\}$,
$Q = \{x \epsilon I / 0 \leq x < 3\}, R = \{x \epsilon I / 1 < x \leq 2\}$, then prove or disprove
i) $P - Q = P \cap Q^c$
ii) $P \cup (Q - R) = (P \cup Q) - (P \cup R)$

d. Let R be the relation defined on set $A = \{2,3,5,6\}$ & aRb if $a + b > 8$. Find the elements of R , $Im(R), Dom(R), M_R$. Draw diagraph of R. Determine whether R is reflexive , symmetric & transitive relation. Justify your answers.

e. Apply Principle of Mathematical Induction to prove that $n^3 - n$ is divisible by 6 for all $n \geq 1$

f. Define : Power Set . Find power set of $A = \{1,5,7\}$
Define : Partition Of Set .
Determine which of the following set of subsets forms partition of $A = \{1,2,3,4,5,6\}$
i) $A1 = \{1,6\}, A2 = \{2,3,5\}, A3 = \{4\}$
ii) $A1 = \{2,6\}, A2 = \{1,3,5\}, A3 = \{4,6\}$

2. Attempt *any three* of the following: **15**

a. If $f: R - \{2\} \to R - \{3\}$ is the function defined by $f(x) = \frac{3x-5.}{x-2}$ then determine whether f is injective , surjective & hence bijective. If it is bijective, find its inverse.

b. If f & g are well defined functions on set of real numbers R by $f(x) = 3x - 5$ & $g(x) = 2x + 3$,then find the value of constant k so that $gof(3) = fog(k)$

c. $f = \{(1,3),(2,4),(3,1),(4,2)\}$ & $g = \{(1,2),(2,3),(3,4),(4,1)\}$ are given functions defined on $A = \{1,2,3,4\}$ Find
i) $fogof$
ii) $gogof$

d. Probability of solving a problem by Amit is 0.6. Probability of solving a problem by Seema is 0.4. If they both solve the problem independently , find the probability that
i) Both of them solve the problem
ii) At least one of them solve the problem
iii) None of them solve the problem
iv) Only Amit solve the problem

e. A box contains tickets numbers from 1 to 14. One ticket is drawn randomly from a box. Determine the probability that number on ticket is
i) Divisible by 2
ii) Divisible by 7
iii) Divisible either by 2 or by 7

f. Consider the following probability distribution of discrete random variable X .Find mean & variance of the distribution.

xi	1	2	3	4	5
pi	0.3	0.2	0.1	0.25	0.15

3. Attempt *any three* of the following: **15**

a. Committee of 5 persons is to be formed among 4 boys & 6 girls. In how many ways committee can be formed if committee consists of
i) 2 boys & 3 girls
ii) 3 boys & 2 girls
iii) Only girls

b. In how many ways total number of words can be formed by using letters of the word 'ATTITUDE' if
i) There is no restriction
ii) Each word begins with T
iii) Each word end with vowel
iv) Each word begins with U & end with D

c. Solve the recurrence relation: $a_n - 5a_{n-1} + 6a_{n-2} = 0, n \geq 2$ given $a_0 = 1,\ a_2 = 3$

d. Solve the recurrence relation: $b_n + 4b_{n-1} + 4b_{n-2} = 0, n \geq 2$ given $b_2 = 3,\ b_3 = -4$

e. Prove that : $nCr + nC_{r-1} = (n+1)C_r$ where r & n are positive integers & $r \leq n$

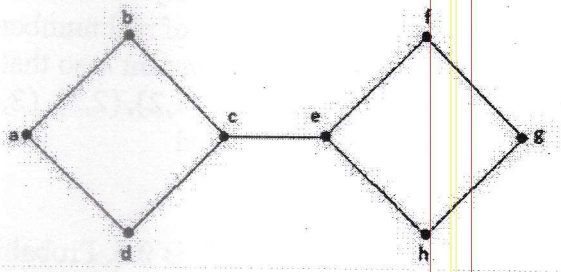
f. There are 8 different ice-cream flavours in the ice-cream shop. In how many ways a person can choose 5 flavours out of these 8 flavours?

4. Attempt *any three* of the following: **15**

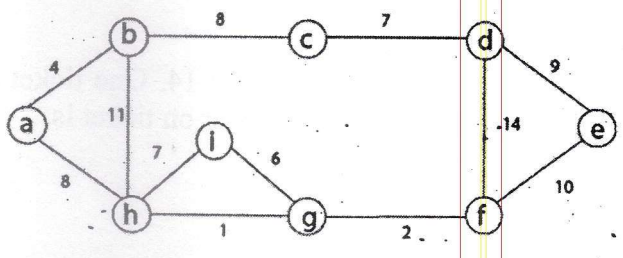
a. Explain the terms with suitable example: Degree Of a vertex, Odd Vertex, Even Vertex, Pendant Vertex, Isolated Vertex.

b. Define : Euler graph & Hamiltonian graph
Draw one graph which is Euler but non- Hamiltonian.
Draw one graph which is neither Hamiltonian nor Euler.

c. Define: Cut vertex & Bridge
Find cut vertex & bridge of the following graph. Justify your answer.



d. Define :Spanning Tree
Apply Kruskal's Algorithm to find minimum spanning tree of the following weighted graph.



e. Draw the graph corresponding to following adjacency matrices.

i) $A = \begin{bmatrix} 0 & 0 & 1 \\ 1 & 1 & 0 \\ 1 & 1 & 0 \end{bmatrix}$

ii) $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 0 & 2 \\ 1 & 2 & 0 \end{bmatrix}$

f. State Handshaking Lemma
Apply it to determine whether it is possible to draw a graph with 5 vertices of degrees 1,2,3,3 & 5
If it is possible draw such one graph.

5. Attempt *any three* of the following: **15**

a. Prove that D_{35} is complemented lattice. Also draw its Hasse diagram.

b. Draw the Hasse diagram of poset (A, R) where $A = \{1, 2, 5, 10, 20\}$ & aRb if a divides b .Hence find its least element & greatest element .Justify your answers.

c. Explain the following terms of a poset with suitable example
i) Upper bound
ii) Lower bound
iii) Minimal element
iv) Maximal element

d. A binary tree has 9 nodes .Draw the tree if the preorder & inorder traversals of tree are as follows

Postorder	C	K	A	H	B	E	G	D	F
Inorder	A	K	C	F	H	D	G	B	E

e. Define: Partial Ordered relation
Prove that in set of non-zero integers divisibility between 2 integers is partial ordered relation.

f. Solve the following expression
i) $\times - \times + \div 635421$ given in prefix form ii) $723 \times -2\text{^}62 \div +$ given in postfix form

F.Y.B.Sc.(I.T.) Semester I

Fundamentals of Database Management Systems 21/11/2022

(Time: 2½ hours) **Total Marks: 75**

N. B.: (1) **All** questions are **compulsory**.
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(3) Answers to the **same question** must be **written together**.
(4) Numbers to the **right** indicate **marks**.
(5) Draw **neat labeled diagrams** wherever **necessary**.
(6) Use of **Non-programmable** calculators is **allowed**.

1. Attempt *any three* of the following: **15**

a. Explain different types of users available in DBMS.
b. What is meant by physical data independence and logical data independence in DBMS?
c. Write short note on database schema.
d. What is meant by ACID property in DBMS? Explain with an example.
e. What are disadvantages of File System?
f. Explain 3-tier architecture in DBMS.

2. Attempt *any three* of the following: **15**

a. Explain with an example Union and Set Difference operation in Relational Algebra.
b. Explain following attributes in E-R diagram with suitable example.
   a) Key attribute b) Multivalued attribute
c. Explain the term Entity and Entity Types
d. What are the different types of relationship set available in E-R diagram.
e. Write short note on Relational Data Model.
f. Consider the following relational database schema
   Flight (F_id, Fdate, Time, Source, Destination)
   Answer the following questions using relational algebra queries
   a) Get the complete details of all flights to New Delhi.
   b) Get the details about all flights from Chennai to New Delhi.

3. Attempt *any three* of the following: **15**

a. Find closure set of AB, BC, CF, DE, BD from the given relation and functional dependency.
   R(ABCDEF)
   AB →C
   BC → AD
   D →E
   CF→B
b. Explain First Normal Form (1NF) with an example.
c. Write short note on: Armstrong axioms rules
d. Identify given relation is in which normal form? Justify your answer.
   R(ABCDEF)
   BC →ADEF
   DEF →ABC
   A→BCDEF
e. Differentiate between 2NF and 3NF.
f. Find superkeys and candidate keys from the given relation and functional dependency.
   R(ABCD)

4. **Attempt *any three* of the following:** 15

a. What are different types of constraints available in SQL? Explain any two of them with an example.
b. How file records are organized in DBMS?
c. Explain Hashing in DBMS? Also Explain Static Hashing with an example.
d. What is Query Processing and Optimization in DBMS?
e. Differentiate between Where clause and Having Clause in SQL.
f. Write short note on :
   a) DISTINCT operator b) DELETE command

5. **Attempt *any three* of the following:** 15

a. Write short note on view serializability.
b. Explain Dirty Read problem occurs in concurrency.
c. What is transaction in DBMS? Explain different states of transaction in DBMS.
d. Explain Timestamp ordering protocol with an example.
e. What are different database recovery techniques used in DBMS?
f. Explain cascadless schedule with an example.