BACHELOR OF TECHNOLOGY (CBCS - 2023)
B. Tech. Sem-I Computer Science & Business Systems : WINTER : 2024
SUBJECT: DISCRETE MATHEMATICS

Day : Monday
Date : 02/12/2024

W-27621-2024

Time : 10:00 AM-01:00 PM
Max. Marks : 60

N.B.

1) All questions are **COMPULSORY.**
2) Figures to the **RIGHT** indicate **FULL** marks.
3) Assume suitable data **WHEREVER** necessary.
4) Draw neat diagrams **WHEREVER** necessary.

Q.1 Explain following Rules of Inferences for propositional logic with the help of suitable examples: **(10)**

i) Modus Ponen
ii) Modus Tollens
iii) Hypothetical syllogism
iv) Disjunctive syllogism
v) Resolution

OR

Q.1 Define the following properties of propositions along with suitable examples: **(10)**

i) Tautology
ii) Contradiction
iii) Contingency
iv) Satisfactory
v) Valid
vi) Invalid

Q.2 What is multiset? Explain operations on multiset (Union, Intersection, Difference, Sum of multiset) with suitable examples. **(10)**

OR

Q.2 Using k-map (Karnough map) –solve the following function **(10)**

$f(A,B,C) = \sum M(0,1,5,6,7)$

Q.3 What are the different types of functions? Explain composition of functions with suitable diagram and examples. **(10)**

OR

Q.3 Explain Pigeonhole principles with suitable diagrams along with different cases and state different applications of Pigeonhole principle. **(10)**

Q.4 Explain 'semigroup' Algebraic structure, check whether the Algebraic system (A, *) whose table is given below is a Semigroup. **(10)**

*	a	b	c
a	a	b	c
b	a	c	b
c	a	b	c

OR

P. T. O.

Q.4 Explain Rings and group codes with suitable examples. Also explain Homomorphism, Automorphism and Isomorphism of group. (10)

Q.5 Solve the following Recurrence relation with Interation method. $T(p)=T(P-1)+3 \quad P \geq 1$ and $T(0)=2$. Also calculate the closed form for given equation. (10)

OR

Q.5 Explain combinatorics and basic counting principle. Also explain sum rule and product rule with suitable examples. (10)

Q.6 Explain following concept with respect to graph theory with help of suitable examples: (10)

i) Incident
ii) Adjacent
iii) Degree of vertices
iv) In- degree and out-degree
v) loop
vi) Parallel Edge
vii) Isolated vertex
viii) Pendent vertex

OR

Q.6 Explain various types of graph along with suitable diagrams. (10)

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