Code No: R1921051 **R19** SET - 1

II B. Tech I Semester Supplementary Examinations, September - 2021
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Computer Science &Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions each Question from each unit
All Questions carry **Equal** Marks
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1	a)	Prove that $[(P \wedge \neg Q) \rightarrow R] \rightarrow [P \rightarrow (Q \vee R)]$ is a tautology using a truth table.	[8M]
	b)	Explain the law of duality with a case study.	[7M]
		Or	
2	a)	Define free and bound variables and explain the theory of predicate calculus.	[8M]
	b)	Show that $(\exists x)[F(x) \wedge S(x)] \rightarrow (y)[M(y) \rightarrow W(y)]$ and $(\exists y)[M(y) \wedge \neg W(y)]$ derives the Conclusion, $(x)[F(x) \rightarrow \neg S(x)]$.	[7M]
3	a)	Find the transitive closure for the R={(1,2),(2,3),(3,4)}on X={1,2,3,4}	[8M]
	b)	Demonstrate equivalence relation with a case study.	[7M]
		Or	
4	a)	Discuss the similarities and dissimilarities between monoid and group.	[8M]
	b)	Draw the Hasse diagram for the relation $\leq$ defined as $x \leq y$, if x divided y where X={2,3,6,12,24,36}	[7M]
5	a)	State and Prove Fermat's theorem.	[8M]
	b)	How many ten digit binary numbers can be formed with (i) exactly five 1's (ii) greater than five 1's.	[7M]
		Or	
6	a)	Discuss the properties of modular arithmetic with examples.	[8M]
	b)	Explain the binomial theorem with an example.	[7M]
7	a)	Calculate the coefficient of X^{15} in $A(X)=(X^2+X^3+X^4+X^5)(X+X^2+X^3+X^4+X^5+X^6+X^7)(1+X+\ldots.+X^{15})$	[8M]
	b)	Solve the recurrence relation $a_n-9a_{n-1}+26_{n-2}-24a_{n-3}=0$ for $n \geq 3$ using characteristic polynomial representation.	[7M]
		Or	
8	a)	Find the Coefficient of $X^{23}$and X^{32} in $(1+X^5+X^9)^{10}$	[8M]
	b)	Discuss the importance of methods to solve a recurrence relation.	[7M]
9	a)	Trace the BFS algorithm with a case study.	[8M]
	b)	Define a minimum spanning tree and write a procedure to identify a minimum spanning tree for an example graph.	[7M]
		Or	
10	a)	Discuss the similarities and dissimilarities between Eulerian and Hamiltonian graphs.	[8M]
	b)	Define the following terms in graph theory(i) path (ii) cycle (iii) loop	[7M]

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