SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution, Affiliated to Anna University)

Coimbatore – 641 035.

Internal Assessment- I

Academic Year 2023-2024(Odd)

Fifth Semester

19MAT301-DISCRETE MATHEMATICS

(REGULATION 2019)

(Common to CSE, IT & AIML)

B

Time:1.30 Hours   **Maximum Marks:50**

	PART – A(5 x 2 = 10 MARKS) ANSWER ALL QUESTIONS	CO	BLOOMS
1.	Construct the truth table for the expression $(P \to Q) \wedge (Q \to P)$.	CO1	(Rem)
2.	Give the Contra positive for the statement "If it is raining, then I get wet".	CO1	(Und)
3.	Define Quantifiers.	CO1	(Rem)
4.	State the Principle of Mathematical induction.	CO2	(Rem)
5.	How many different bit strings are there of length 7?	CO2	(Und)
	PART – B (13+13+14= 40 MARKS) **ANSWER ALL QUESTIONS**		
6. a)i)	Show that the expression $(\neg Q \wedge (P \to Q)) \to \neg P$ is a Tautology.	CO1	(App) (6)
ii)	Obtain the PDNF of $\neg P \vee Q$.	CO1	(App) (7)
	(or)		
b)i)	Without using truth table show that $(P \to (Q \to R)) \Leftrightarrow P \to (\neg Q \vee R) \Leftrightarrow (P \wedge Q) \to R$.	CO1	(App) (6)
ii)	Show that $R \wedge (P \vee Q)$ is a valid conclusion from the premises $P \vee Q$, $Q \to R$, $P \to M$ and $\neg M$.	CO1	(App) (7)

7.	a)	Obtain the PDNF of P → ((P → Q) ∧ ¬ (¬ Q ∨ ¬ P)) and also find its PCNF.	CO1	(App)(13)
		(or)		
	b)i)	Prove by mathematical induction $\sum_{k=1}^{n} k^2 = \dfrac{n(n+1)(2n+1)}{6}$	CO2	(App)(7)
	ii)	Suppose there are 6 boys and 4 girls. (i)　　In how many ways can they sit in a row? (ii)　　In how many ways can they sit in a row if they boys and the girls each sit together? (iii)　　In how many ways can they sit in a row if the girls can sit together?	CO2	(Ana)(6)
8	a)i)	Show that (x) [P(x) ∨ $Q(x)$] ⇒ (x) P(x) ∨ (∃x)Q(x) by Indirect proof.	CO1	(App)(7)
	ii)	Show that the following premises are inconsistent. (a) If Jack misses many classes through illness then he fails high school. (b) If Jack fails high school, then he is uneducated. (c) If Jack reads a lot of books then he is not uneducated. (d) Jack misses many classes through illness and reads a lot of books.	CO1	(Ana) (7)
		(or)		
	b) i)	Using Mathematical Induction, prove that $2 + 2^2 + 2^3 +... + 2^n = 2^{n+1} - 2$	CO2	(App) (7)
	ii)	A box contains 6 white balls and 5 red balls. Find the number of ways four balls can be drawn from the box if (i) They can be any color (ii) Two must be white and two red (iii) They must all be the same color.	CO2	(Ana) (7)

Rem/Und: Remember/ Understand　　**App:** Apply　　**Ana** : Analyze　　　　**Eva :** Evaluate　　**Cre** : Create

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Prepared by　　　　　　　**Verified by**　　　　　　　**Dean(S&H)**