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**VIT**

Vellore Institute of Technology  
(Deemed to be University under section 3 of UGC Act, 1956)

Continuous Assessment Test – I

Programme Name & Branch: B.Tech

Course Name & Code: Discrete Mathematics and Graph Theory - MAT1014

Slot: A2+TAA2+TA2+V3

Exam Duration: 90 minutes

Maximum Marks: 50

Answer ALL the Questions (5 x 10=50 marks)

S.No	Questions	Marks
1.a)	Using P: I will study Mathematics, Q: I will watch TV, R: I am happy, write the statement corresponding to the formula $(\neg P \wedge Q) \rightarrow R$ .	(2)
b)	Obtain the principal disjunctive and principal conjunctive normal forms of $S \Leftrightarrow (p \rightarrow (q \wedge r)) \wedge (\neg p \rightarrow (\neg q \wedge \neg r))$	(8)
2.a)	Verify the equivalence of $(\neg P \wedge (\neg Q \wedge R)) \vee (Q \wedge R) \vee (P \wedge R) \Leftrightarrow R$ .	(5)
b)	Test whether the premises $P \rightarrow Q$ , $Q \rightarrow R$ , $S \rightarrow R$ and $P \wedge S$ are consistent	(5)
3.a)	If $S(x)$ : x is a spy novel, $L(x)$ : x is long and $M(x)$ : x is a mystery then write the well-formed formula for the statements (i) Not every mystery is a spy novel (ii) Every long spy novel is a mystery.	(2)
b)	Use indirect method of proof to verify the following $(x) (P(x) \vee Q(x)) \Rightarrow [((x) P(x)) \vee ((\exists x) Q(x))]$ .	(8)
4.	Is the following argument valid? All lecturers are determined, Anyone who is determined and intelligent will give satisfactory service, Clara is an intelligent lecturer. Therefore Clara will give satisfactory service.	(10)
5.a)	Let Z be the set of integers and * be a binary operation defined as $a * b = a + b - ab$ . Determine whether $(Z, *)$ is a Monoid.	(5)
b)	Find whether $(Z_4, +_4)$ is a group.	(5)

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