

MODEL CAT 1 QUESTION PAPER



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

**DEPARTMENT OF MATHEMATICS
SCHOOL OF ADVANCED SCIENCES**

Fall Semester – 2018 ~ 2019

Continuous Assessment Test – I, January - 2019

Course Code : MAT1014

Slot : A1+TA1

Course Name : Discrete Mathematics and Graph Theory

Date : 20/01/2019

Faculty Name: Dr. D. Ezhilmaran

Max. Marks : 50

Duration : 90 Minutes

ANSWER ALL QUESTIONS

(5 x 10 marks = 50 marks)

1	Test the consistency of the following Statements. i. If Jack studies well he will pass in exams. ii. If Jack studies well he will get a job. iii. Succeeding in exam and getting a job simultaneously are not possible for him. iv. Jack either enjoys or studies well. v. Finally, Jack enjoys.	[10]
2	Obtain the PCNF and PDNF of the following formula and hence conclude whether it is a tautology $(P \rightarrow (Q \wedge R)) \wedge (\neg P \rightarrow (\neg Q \wedge \neg R))$	[10]
3	(i) Symbolize the arguments and check the validity? Every person likes ice cream. Billy is a person. Therefore, Billy likes ice cream. (ii) What is the negation of the following statements? (a) Some subsets of N have 5 elements. (b) All people like ice cream.	[6+4]
4	Show that from (a) $(\exists x)(F(x) \wedge S(x)) \rightarrow (y)(M(y) \rightarrow W(y))$ (b) $(\exists y)(M(y) \wedge \neg W(y))$ the conclusion $(x)(F(x) \rightarrow \neg S(x))$.	[10]
5	(i) Prove that the set of idempotent elements of a commutative monoid $\langle M, * \rangle$ forms a submonoid. (ii) Show that the set Q^+ of all positive rational numbers forms an abelian group under the operation $*$ defined by $a * b = \frac{1}{2}(ab); \forall a, b \in Q^+$	[4+6]