



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, August 2018

Course Code: MAT1014

Slot: A2+TA2+TAA2+V3

Course Name: Discrete Mathematics and Graph Theory

Date: 12.08.2018

Answer All Questions ($5 \times 10 = 50$) Marks

1. (a). Show that the following premises are inconsistent. (5)
 - (i). If Jack misses many classes through illness, then he fails high school.
 - (ii). If Jack fails high school, then he is uneducated.
 - (iii). If Jack reads a lot of books, then he is not uneducated.
 - (iv). Jack misses many classes through illness and reads a lot of books.
- (b). Show that $(R \rightarrow \neg Q), R \vee S, S \rightarrow \neg Q, P \rightarrow Q \Rightarrow \neg P$, without using truth table. (5)
2. Using indirect method, show that $(\forall x)((P(x) \vee Q(x)) \Rightarrow (\forall x)P(x) \vee (\exists x)Q(x))$. (10)
3. (a). Show that $(G, \times)$ is a group, where $G = \{1, -1, i, -i\}$ and $\times$ is the usual multiplication. (5)
- (b). Write the symbolic form and negate the following statements (5)
 - (i). All lions are dangerous
 - (ii). Some integers are divisors of 32
 - (iii). Some rational numbers are power of 3.
4. Obtain the PCNF and PDNF of the formula S is given by $(\neg P \rightarrow R) \wedge (Q \leftrightarrow P)$. (10)
5. (a). Show that $(P \rightarrow C) \wedge (Q \rightarrow C) \iff (P \vee Q) \rightarrow C$, using truth table. (5)
- (b). Let $X = \{a, b\}$ be a set of two elements. Show that $(P(X), \cup)$ is semigroup, where $P(X)$ is the power set of X . (5)
