VIT

Vellore Institute of Technology

Winter Semester 2019-2020

Continuous Assessment Test – I

Programme Name & Branch: B. Tech.

Course Name & Code: MAT 1014 Discrete Mathematics and Graph Theory Slot: A2+TA2+TAA2

Exam Duration: 90 minutes Maximum Marks: 50

Answer All the Questions (5 × 10 = 50)

1. Find the PDNF and PCNF of $(p \wedge q) \vee (p \wedge r) \vee (q \wedge r)$.
   (i) With truth table method (ii) without truth table method.

2. (i) Prove that $\neg(p \wedge q) \rightarrow (\neg p \vee (\neg p \vee q)) \Leftrightarrow (\neg p \vee q)$.

   (ii) Test the validity of the following arguments:
   If milk is black then every crow is white.
   If every crow is white then it has 4 legs.
   If every crow has 4 legs then every Buffalo is white and brisk.
   The milk is black.
   So, every Buffalo is white.

3. (i) Show that the following statement is valid.
   All men are mortal
   Socrates is a man
   Therefore Socrates is a mortal.

   (ii) Prove that $(\exists x)(p(x) \wedge q(x)) \Rightarrow (\exists x)p(x) \wedge (\exists x)q(x)$.

4. Prove that $(\forall x)(P(x) \vee Q(x)) \Rightarrow (\forall x)(P(x)) \vee (\exists x)(Q(x))$ using indirect method.

5. Show that the set of all real (2×2) matrix $\begin{bmatrix} a & b \\ c & d \end{bmatrix}, ad - bc \neq 0$ is a group under matrix multiplication as binary operation.