



**DEPARTMENT OF MATHEMATICS
SCHOOL OF ADVANCED SCIENCES**

Winter Semester – 2016 ~ 2017

Continuous Assessment Test – I, February - 2017

Course Code : MAT 1014

Slot : A1+TA1+TAA1

Course Name : Discrete Mathematics & Graph theory

Date : 25-2-2017

Max. Marks : 50

Duration: 90 Minutes

ANSWER ALL THE QUESTIONS (5x10=50 Marks)

1. (a) Construct the logic network for $(a.\bar{b}) + (\bar{a}.b)$. (4M)
(b) Find the PCNF for $(P \wedge Q) \vee (\neg P \wedge R)$. (6M)
2. Show that the premises $A \rightarrow B, B \rightarrow D, C \rightarrow \neg D$, and $A \wedge C$ are inconsistent. (10M)
3. Show that the conclusion $(x)(F(x) \rightarrow \neg S(x))$ follows from (a) $(\exists y)(M(y) \wedge \neg W(y))$ and
(b) $(\exists x)(F(x) \wedge S(x)) \rightarrow (y)(M(y) \rightarrow W(y))$. (10M)
4. Define the rules ES and EG. Prove that $(\exists x)(P(x) \wedge Q(x)) \Rightarrow (\exists x)P(x) \wedge (\exists x)Q(x)$. (10M)
5. (a) Prove that the set of idempotent elements of a commutative monoid $\langle M, * \rangle$ forms a submonoid. (5M)
(b) Show that if every element in a group is its own inverse, then the group is abelian. And give an example. (5M)