EASTERN UNIVERSITY, SRI LANKA

DEPARTMENT OF MATHEMATICS

FIRST EXAMINATION IN SCIENCE - 2010/2011

FIRST SEMESTER (April/May, 2017)

EXTERNAL DEGREE

EXTMT 101 - FOUNDATION OF MATHEMATICS

(REPEAT)

Answer all questions **Time : Three h**

---

1. (a) Let p and q be two statements such that $p \rightarrow \sim q$ is false. Find the truth val each of the following statements:

   i. $p \wedge (q \rightarrow \sim p)$;

   ii. $q \wedge (p \vee \sim q)$.

   (b) Prove the following equivalences using the laws of algebra of logic:

   i. $(p \wedge q) \vee \sim p \equiv \sim p \vee q$;

   ii. $[p \vee (q \wedge r)] \vee \sim [(\sim q \wedge \sim r) \vee r] \equiv p \vee q$,

   where p, q and r are statemtnts.

   (c) Test the validity of the argument "If you are a mathematician then you are c You are clever and rich. Therefore if you are rich then you are a mathematici

2. (a) For any sets A and B, prove that $A \triangle B = (A \cup B) \setminus (A \cap B)$.
   Hence show that:

   i. $A \triangle B$ and $A \cap B$ are disjoint,

   ii. $A \cup B = (A \triangle B) \cup (A \cap B)$.

   (b) For any sets A, B and C, prove that:

   i. $A \times (B \cup C) = (A \times B) \cup (A \times C)$,

   ii. $A \times (B \setminus C) = (A \times B) \setminus (A \times C)$.