BRAC UNIVERSITY
Inspiring Excellence

CSE 230 : DISCRETE MATHEMATICS
MID TERM EXAMINATION : SPRING 2017
TIME:1 HOUR MARKS:50

ANSWER ANY 05 (FIVE) OF THE FOLLOWING 06 (SIX) QUESTIONS
[N.B.: TO UNDERSTAND THE QUESTIONS IS A PART OF EXAMINATION]

NAME:	ID:	SEC:

1. **i.** On the Venn's diagrams (fig.a, fig.b, fig.c) below, shade the following regions. [Draw the Venn's diagrams on your answer scripts] **[2+2+2]**

a) $(A \cup C) \cap B$
b) $A' \cap C'$
c) $A \cap B \cap C$

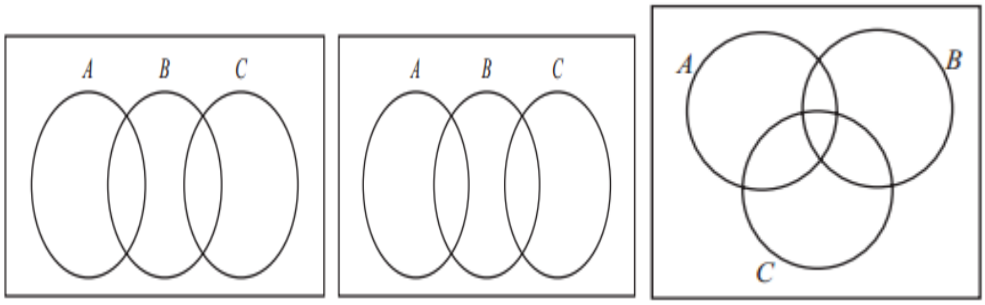

Fig. a Fig. b Fig. c

ii. Determine whether the following sets are equal or not? Justify your answer. **[4]**

A = {x | x is positive integers and prime numbers less than 10}
B = {y+2 | y is all odd positive integers less than 7}

2. 100 students were interviewed. 28 took PE, 31 took BIO, 42 took ENG, 9 took PE and BIO, 10 took PE and ENG, 6 took BIO and ENG, 4 took all three subjects. **[10]**

a) How many students took none of the three subjects?
b) How many students took PE but not BIO or ENG?
c) How many students took BIO and PE but not ENG?
d) How many students took BIO or ENG but not both?
e) How many students took only BIO

3. **i.** Prove that, if **n** is an integer then **6n+11** is odd. **[5]**

ii. List all terms in each set: **[2.5+2.5]**

a) The set of all prime numbers divisible by 3.
b) The set of all whole numbers greater than 5 and smaller than 35, and divisible by 5.

4. Express the followings in terms of propositions and logical connectives (state the necessary propositions first) **[10]**

a) If Dev comes to the party, then Bob and Chris come too.
b) John reads in class-IX or class-X.
c) An integer is even if and only if it is divisible by 2.

5. $\neg(p \rightarrow r) \rightarrow \neg q$ **[10]**

The compound proposition stated above is logically equivalent to which of the followings [check each one of the followings as there might be more than one]

a) $\neg q \rightarrow (\neg p \vee r)$

b) $\neg q \rightarrow (\neg p \rightarrow \neg r)$

c) $\neg q \rightarrow \neg(p \rightarrow r)$

6. Express the followings in terms of quantified propositional functions and logical connectives (state the necessary propositional functions first) **[10]**

a) Every student enrolled in CSE or EEE program must take a discrete mathematics course.
b) Some of the integers that are divisible by 2 are not divisible by 3.
c) All of the students who took CSE111 have already completed CSE 110.