**Course: Discrete Structure**

**Program: BS (SE)**

**Instructor: Muhammad Abrar Khan**

**Examination: Midterm Assignment**

**Total Marks: 30**

**Date: Apr. 13, 2020**

**Note:** Attempt all questions. Use examples and diagrams where necessary.

**Q.1**

Which of the following are propositions?

1. Buy Premium Bonds!
2. The Apple Macintosh is a 16 bit computer.
3. There is a largest even number.
4. Why are we here?
5. 8 + 7 = 13
6. a + b = 13

**Q.2**

p is "x < 50"; q is "x > 40".

Write as simply as you can:

(a) ¬p

(b) ¬q

(c) p ˄ q

(d) p ∨ q

(e) ¬p ˄ q

(f) ¬p ˄¬q

**Q.3**

In each part of this question a proposition p is defined. Which of the statements that follow the definition correspond to the proposition ¬p? (There may be more than one correct answer.)

(a)

p is "Some people like Maths".

(a) "Some people dislike Maths"

(b) "Everybody dislikes Maths"

(c) "Everybody likes Maths"

b)

p is "The answer is either 2 or 3".

(a) "Neither 2 nor 3 is the answer"

(b) "The answer is not 2 or it is not 3"

(c) "The answer is not 2 and it is not 3"

c)

p is "All people in my class are tall and thin".

(a) "Someone in my class is short and fat"

(b) "No-one in my class is tall and thin"

(c) "Someone in my class is short or fat"

**Q.4**

Construct truth tables for:

1. ¬p ∨ ¬q
2. q˄ (¬p ∨ q)
3. p ˄ (q ∨ r)
4. (p˄ q) ∨ r

**Q.5**

Use truth tables to show that:

¬ ((p ∨ ¬q) ∨ (r ˄ (p ∨ ¬q))) ≡ ¬p ˄ q

**Q.6**

Use the laws of logical propositions to prove that:

(z ˄ w) ∨ (¬z w) ∨ (z ˄ ¬w) ≡ z ∨ w

State carefully which law you are using at each stage.