**Course: Discrete Structure**

**Program: BS (SE)**

**Instructor: Muhammad Abrar Khan**

**Examination: Final paper**

**Total Marks: 50**

**Date: June. 25, 2020**

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

**Q.1**

1. Explain the concept of Biconditional statement.
2. Let p, q, and r represent the following statements:

p: Sam had pizza last night.

q: Chris finished her homework.

r: Pat watched the news this morning

Give a formula (using appropriate symbols) for each of these statements.

1. Sam had pizza last night if and only if Chris finished her homework.
2. Pat watched the news this morning iff Sam did not have pizza last night.
3. Pat watched the news this morning if and only if Chris finished her homework and Sam did not have pizza last night.
4. In order for Pat to watch the news this morning, it is necessary and sufficient that Sam had pizza last night and Chris finished her homework

**Q.2**

1. Lets p, q, r represent the following statements:

p: it is hot today.

q: it is sunny

r: it is raining

Express in words the statements using Bicondtional statement represented by the following formulas:

1. q ↔ p
2. p ↔ ( q ˄ r )
3. p ↔ ( q ˅ r)
4. r ↔ ( p ˅ q)

**Q.3**

1. Explain Argument with proper examples. Differentiate Valid and Invalid argument through proper examples, also construct a truth table showing valid and invalid arguments. (Note: Examples and truth table should not belongs to your book or slides)

**Q.4**

a) Explain the concept of Union, also explain membership table for union by giving proper example of truth table.

b) Explain the concept of Intersection, also explain membership table for Intersection by using proper example of truth table. (Note: Examples and truth table should not belongs to your book or slides)

**Q.5**

a) Explain the concept of Venn diagram with examples.

b) Given the set *P* is the set of even numbers between 15 and 25. Draw and label a Venn diagram to represent the set *P* and indicate all the elements of set *P* in the Venn diagram.

c) Draw and label a Venn diagram to represent the set

*R*= {Monday, Tuesday, Wednesday}.

d) Given the set Q = {x : 2x – 3 < 11, x is a positive integer }. Draw and label a Venn diagram to represent the set Q.