

# Alexandria Higher Institute of Engineering & Technology (AIET)

	Computer Engineering (CE) Department		2 rd Year
ı	CE 171 Introduction to Discrete Mat	111 5	Semester, 2018-2019
I	Instructor Dr. Fatma Ahmed		Sheet (2)

#### Sheet (2) The logic of compound statements

## Question 1:

Construct truth tables for the following statement forms:

2. 
$$p \vee (\sim p \wedge q) \longrightarrow q$$

1. 
$$\sim p \vee q \rightarrow \sim q$$
  
3.  $p \wedge \sim r \leftrightarrow q \vee r$ 

2. 
$$p \lor (\sim p \land q) \longrightarrow q$$
  
4.  $(p \longrightarrow r) \longleftrightarrow (q \longrightarrow r)$ 

## Question2:

Use truth tables to verify that:

$$1.p \rightarrow q \equiv \sim p \vee q$$

$$2.\sim (p \rightarrow q) \equiv p \land \sim q$$

#### Question3:

Write negations for each of the following statements:

- 1. If p is a square, then p is a rectangle.
- 2. If n is prime, then n is odd or n is 2.
- 3. If x is nonnegative, then x is positive or x is 0.
- 4. If Tom is Ann's father, then Jim is her uncle and sue is her aunt.

#### Question4:

Write contrapositives for the statements of Question 3.

#### Question 5:

Write the converse and inverse for each statements of Question 3.

### Question6:

Use truth tables to determine whether the following argument forms are valid:

2. 
$$p \rightarrow q$$
 $\sim q \lor r$ 

$$P \vee q$$
3.  $p \rightarrow \sim q$ 

$$p \rightarrow q$$

$$P \rightarrow r$$

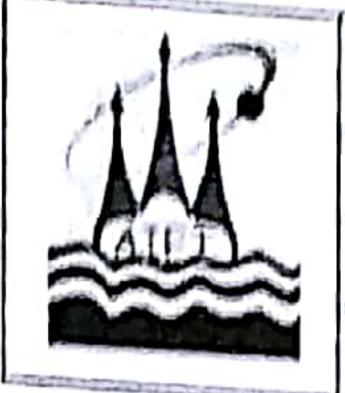
$$4. \quad \mathbf{p} \longrightarrow \mathbf{r}$$

 $\therefore p \longrightarrow q \wedge r$ 

## Question7:

Prove modus tollens. In other word, prove that the following argument form is valid.

$$p \rightarrow q$$



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Question 8:

Use truth tables to show that the following forms of argument are invalid.

$$P \longrightarrow q$$

$$P \rightarrow q$$

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