

Practice Questions

Lecture No. 1

Q1: Separate the statements (Propositions) and sentences from the following:

- a) $7 + 5 = 15$
- b) $7 + 5 = 12$
- c) The sky is blue.
- d) He is a poor man.
- e) Zaid is a poor man.
- f) $x \geq 5$
- g) Given $x = 9$, then x is greater than 5.
- h) Open the book.
- i) Logic is not difficult.
- j) Is it hot today?

Q2: Let $p =$ I am healthy, $q =$ I am ill.

Then translate the following into word statements:

- a) $\sim p$
- b) $\sim q$
- c) $p \vee q$

d) $\sim p \wedge q$

e) $\sim p \vee q$

f) $p \wedge \sim q$

Q3: When is $p \wedge q$ True?

Q4: When is $p \wedge q$ False?

Q5: When is $p \vee q$ True?

Q6: When is $p \vee q$ False?

Q7: Write the conjunction of p and q in symbolic form.

Q8: Write the disjunction of p and q in symbolic form.

Q9: Let p = Saleem is a student, q = Saleem is hardworking.

Then translate the following into symbolic statements:

- a) Saleem is NOT a student.
- b) Saleem is NOT hardworking.
- c) Saleem is a student AND Saleem is hardworking
- d) Saleem is a student AND Saleem is NOT hardworking
- e) Saleem is NOT a student OR Saleem is hardworking
- f) Saleem is NOT a student AND Saleem is NOT hardworking

Practice Questions

Lecture No. 2

Q1: Construct a truth table for $\sim(\sim p) \wedge q$

Q2: Show that $\sim(\sim p) \wedge p \equiv p$

Q3: Write the negation of the statement:

The sea is near OR the sky is far.

Q4: Write the negation of the statement:

I live in Pakistan AND I am a teacher.

Q5: Write the statement in the symbolic form:

It is NOT that I read the useless books AND I waste my time.

Q6: Write a statement in symbols, which is a tautology.

Q7: Write the statement in the symbolic form:

It is NOT that Zaid is NOT an obedient boy.

Q8: Write the statement in the symbolic form:

It is NOT that Arslan plays football AND Aslam plays tennis.

Practice Questions (MTH001)

Lecture No. 3

Implication or conditional statement is denoted by $p \rightarrow q$. It can also be written as:

- “if p then q”
- “p implies q”
- “if p, q”
- “p only if q”
- “p is sufficient for q”
- “not p unless q”
- “q follows from p”
- “q if p”
- “q whenever p”
- “q is necessary for p”

Q1: Let p = It is a heavy rain.

q = There is water in the streets.

$p \rightarrow q$ = IF it is a heavy rain, THEN There is water in the streets.

Write this implication statement $p \rightarrow q$ in the above 10 ways.

Q2: Let p = You are honest.

q = You are truthful.

s = People like you.

r = People trust you.

Translate $p \vee q \rightarrow s \wedge r$ into English statement.

Q3: Let p = Aslam obeyed his parents.

q = Aslam was successful in his life.

Write the implication, converse, inverse and contra-positive statements.

Q4: Write the negation of the following implication statements:

- a) IF Saleem is happy, THEN Saleem gives a party.
- b) IF x is greater than 5, THEN x is greater than 3.
- c) IF Asif has a library, THEN Asif has many books.
- d) IF it is winter season, THEN we wear warm clothes.

e) IF you read a newspaper, THEN you have the up-to-date knowledge.

Practice Questions (MTH001)

Lecture No. 4

Q1: Write “p is equivalent to q” in symbolic form.

Q2: Construct a Truth Table for $(p \leftrightarrow q) \rightarrow (p \leftrightarrow r)$

Q3: Show that $\sim(p \oplus q) \rightarrow t$ is a tautology, where t is a tautology.

Q4: Answer the following:

1. $\text{True} \rightarrow \text{False}$
2. $\text{True} \oplus \text{False}$
3. $\text{True} \leftrightarrow \text{False}$
4. $\text{True} \rightarrow \text{False}$
5. $\text{True} \oplus \sim \text{False}$
6. $\sim(\text{True} \rightarrow \text{False}) \rightarrow \text{True}$
7. $\text{False} \leftrightarrow \text{False}$
8. $\sim \text{True} \wedge \text{True}$
9. $\text{False} \leftrightarrow \sim \text{True}$
10. $\sim \text{True} \leftrightarrow \sim \text{False}$

Practice Questions

Lecture No. 6

Q1: Write the following sets in tabular form and set builder notation.

A = The set of first 10 Natural numbers.

B = The set of Integers between 7 and 14

C = The set of odd number between 3 and 11

D = The set of prime numbers less than 19

Q2: Write the following sets in tabular form.

$$A = \{x : x \in Z : x^2 \leq 16\}$$

$$B = \{x : x \in E : x \leq 25\} \text{ , where E is the set of even numbers.}$$

$$C = \{x : x \in Z : 3 \leq x \leq 10\}$$

$$D = \{x : x \in Z : x^2 = 1\}$$

Q3 : Give example of Three Prime Numbers.

Q4 : Give example of Three Rational Numbers

Q5 : Give example of Three Irrational Numbers

Q6 : Give example of Three Whole Numbers

Q7: Are these two sets $\{1, 2, 5, 9\}$ and $\{5, 2, 1, 9\}$ equal or not?

Q8: Write the subsets of $\{a, b, c, d\}$

Q9: What is a Venn diagram. Give example.

Q10: Which states are True or False?

- i) $\{a, b\} \subseteq \{a, b, d, e\}$
- ii) $\{a, b, f\} \subseteq \{a, b, d, e\}$
- iii) $\{ \} \subset \{a, b, d, e\}$
- iv) $\{1\} \subset \{2, 3, 4, 5\}$
- v) $\{6\} \subset \{2, 3, 4, 5\}$
- vi) $\{2, 3, 4, 5\} \subseteq \{2, 3, 4, 5\}$
- vii) $Z \subseteq R$
- viii) $N \subseteq Z$
- ix) $P \subseteq N$
- x) $Q \subseteq R$

Practice Questions

Lecture No. 7

Q1: Let $A = \{0, 2, 4, 6\}$, $B = \{1, 3, 5, 7\}$

Find (i) $A \cup B$

(ii) $A \cap B$

(iii) Check $A \cap B \subseteq B$

(iv) Check $A \cap B \subseteq A$

(v) Check $A \subseteq A \cup B$

(vi) Check $B \subseteq A \cup B$

Q2: Let $A = \{1, 2, 3, 4\}$, $B = \{1, 3, 5, 7, 9\}$

Find (i) $A - B$

(ii) $A - B$

(iii) Check $A - B \subseteq A$

(iv) Check whether $A - B \subseteq B$

(v) Check whether $B - A \subseteq A$

(vi) Check $B - A \subseteq B$

(vii) Check $A - B \neq B - A$

Q3: Let $U = \{t, u, v, w, x, y, z\}$, $A = \{u, v, w, x\}$

Find (i) A^c

(ii) Check $A^c \cap A = \emptyset$

(iii) Check $A^c \cup A = U$

Q4: Let $A = \{a, b, c, d\}$, $B = \{d, e\}$, $C = \{d, f, g, h\}$

Find (i) $A - B$

(ii) $B - A$

(iii) $C - A$

(iv) $C - B$

(v) $(A - B) \cap C$

Practice Questions

Lecture No. 8

Q1: Let $A = \{x, y\}$, $B = \{2, 4\}$

Find (i) $A \times B$

(ii) $A \times A$

(iii) $B \times B$

(iv) $B \times A$

(v) Pick any number of ordered pairs from $A \times B$ and make three relations

R1, R2 and R3 of your own choice.

Q2: Let $A = \{1, 2, 3\}$

Find (i) $A \times A$

(ii) Pick any number of ordered pairs from $A \times A$ and make three relations

R_1, R_2 and R_3 of your own choice.

Q3: Let $A = \{1, 2, 3, 4, 5\}$

And $R = \{(1, 2), (2, 3), (2, 4), (3, 4), (3, 5)\}$ be a relation on A

- (i) Find the domain and range of the relation R .
- (ii) Draw its Directed Graph.
- (iii) Make its Matrix.