# SHIKSHA CLASSES

**Subject : Maths - I** | **BOARD QUESTION PAPER** | **Total Marks : 20**

**Class : XII** | **Topic: 1. Mathematical Logic** | **Time : 1 Hr.**

## Section A

**Q.1 : Choose the correct option :** 4

i) If $p \wedge q$ is F, $p \rightarrow q$ is F then the truth values of p and q are ------

a) T,T b) T,F c) F,T d) F,F

ii) The negations of 'Mangoes are delicious and expensive.' is

a) Mangoes are delicious or they are not expensive.

b) Mangoes are not delicious or they are expensive.

c) Mangoes are not delicious or they are not expensive.

d) Mangoes are not delicious and they are not expensive.

**Q.2 : Solve the following questions:** **2**

i) Write the truth values of the following :5 is a prime number and 7 divides 94.

iii) Write the negations of the following. :If it is raining then we will go and play football.

## Section B

**: Solve the following : (ANY2)** 4

**Q.3 :** Write in verbal form.

p : Sachin is the captain of Indian cricket team.

q : He scored a century.

a) $p \wedge q$ b) $q \vee (\sim p)$

**Q.4 :** Using the rules of negation, write the negations of the following:

$(\sim p \vee q) \vee (p \wedge \sim q)$

**Q.5 :** Prove that $(\sim p \wedge q) \wedge (q \rightarrow p)$ is a contradiction.

## Section C

**: Solve the following : (ANY 2)** 6

**Q.6 :** State the converse, inverse and contr-apositive of the following conditional statements :

"If I do not secure good marks then I can not go for engineering."

**Q.7 :** Using the truth tables, prove the logical equivalences $p \leftrightarrow q \equiv (p \wedge q) \vee (\sim p \wedge \sim q)$

**Q.8 :** If the truth values of the statements p, q, and r are T , F, F then without constructing the truth tables find the truth values of the following.

a) $(p \rightarrow q) \wedge r$

b) $(\sim p \rightarrow q) \vee (\sim r)$

c) $(\sim q \rightarrow \sim p) \wedge (p \leftrightarrow q)$

## Section D

**: Solve the following : (ANY 1)** 4

**Q.9 :** Determine whether the following statement pattern is tautology, contradiction or contingency. $[p \rightarrow (q \rightarrow r)] \leftrightarrow [(p \wedge q) \rightarrow r]$

**Q.10 :** Without using truth table prove that.

$\sim [(p \vee \sim q) \rightarrow (p \wedge \sim q)] \equiv (p \vee \sim q) \wedge (\sim p \vee q)$

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