Course: Mathematics-III **Semester- 3**

SHREYARTH UNIVERSITY

School of Computer Science and Applications

BCA, BCA (H), IM.Sc – CA & IT

Assignment-2

Module -1: Propositional Logic

For Division-A & B (09/09/2024)
For Division- C & I.M.Sc. (09/09/2024)

1 Which of the following statements are true and which are false?

$(a)\ 9<12$ (b) 2 is a prime number (c)41 is a composite number $(d)\ 2+5=3+9$

2 For what values of x following sentences will become true statements?

(1) $x+6=8$ (2) $x+1>5$

(3) $x+2<8$ (4) $3x+9=15$

3 Form the conjunction and disjunction of the following:

(1) p: Delhi is in India.
q: $5+2=7$

(2) p: It is raining.
q: The sun is shining.

(3) p: It is raining.
q: It is snowing.

(4) p: It is raining today.
q: There is a wind storm.

(5) $p: 5+2=7$
$q: 9+2=10$

(6) p: Roses are red.
q: Violets are blue

4 Form the negation of the following:

(1) p: Tajmahal is in New York.

(2) p: It is not cold today.

(3) p: Ram is poor.

(4) p: Delhi is in America.

(5) p: 3+2=7

(6) p: The flower is pink.

5 Let p: It is cold and q: It is raining. Give a simple verbal sentence which describes each of the following:

$(i)\ \sim p$ $(ii)\ \sim p \wedge \sim q$ $(iii)\ p \wedge q$ $(iv)\ p \vee q$ $(v)\ q \rightarrow p$ $(vi)\ p \wedge \sim q$
$(vii)\ p \leftrightarrow \sim q$

6 Let p : He is tall and q : He is handsome. Write each of the following statements in symbolic form using p and q.

(i) He is tall and handsome.

(ii) He is neither tall nor handsome.

(iii) He is not tall but handsome.

(iv) He is tall but not handsome.

7 Determine the truth value of each of the following statements (Propositions):

(1) $3+5=8$ or $2+1=9$

(2) $4+3=7$ and $5+2=7$

(3) Agra is in England or $1+9=8$

(4) $4+2=6$ and $2+2=4$

(5) Charminar is in Hyderabad or $7+1=6$

(6) $5+4=9$ and $3+3=5$

8 Let p : ram is rich and q : ram is happy. Write each of the following statements in symbolic form using p and q

(i) Ram is rich and happy.

(ii) Ram is neither rich nor happy.

(iii) Ram is either rich or happy.

(iv) Ram is poor but happy.

(v) Ram is rich but not happy.

9 Construct the truth table for the following. Also verify whether they are tautology, contradiction or contingency.

(1) $\sim p \wedge q$ (2) $p \wedge \sim p$ (3) $p \vee \sim p$ (4) $\sim(\sim p)$ (5) $\sim(p \vee q)$ (6) $\sim(p \vee \sim q)$

10 Translate the statement "Jack and Jill went up the hill" into symbolic form.

11 Write the statement "If either Jay takes Maths or Ram takes Science, then Shyam will take English." in symbolic form.

12 Write the statement "The crop will be destroyed if there is a flood." in symbolic form.

13 Write the converse, inverse and contrapositive of the statement given below:

(1) If it is raining heavily then I get wet.

(2) If I come early then I can get the bus.

(3) If a man is a fisherman then he is a swimmer.

14 Show that $(p \wedge q) \rightarrow (p \vee q)$ is a tautology.

15 Show that $\sim p \rightarrow (q \rightarrow p)$ is a contingency.

16 Which of the following open statements are true?

(1) $x+4=6$ when $x=2$

(2) $x+5 \neq 8$ when $x=3$

(3) $5 \in \{4, 2, x\}$ when $x=5$