1. P ---> R is

A. Tautology

B. Contradiction

C. Contingency

D. none of the above

2. $A \subseteq B$ if and only if the quantification

A. $\forall x(x \in A \rightarrow x \in B)$

B. $\forall x(x \in B \rightarrow x \in A)$

3. If P(x) is “x spends more than five hours every weekday in class”. Then the statement “There are no students who spends more than five hours every weekday in class” is equivalent to which quantification?

A. $\exists x \neg P(x)$

B. $\forall x P(x)$

C. $\exists x P(x)$

D. $\forall x \neg P(x)$

4. The proposition $(p \oplus q) \wedge (p \leftrightarrow q)$ is:

A. Tautology

B. Contradiction

C. Contingency

D. None of the above

5. Let P: We should be honest., Q: We should be dedicated., R: We should be overconfident. Then ‘We should be honest or dedicated but not overconfident.’ is best represented by?

A. $\neg P \vee \neg Q \vee R$

B. $P \wedge \neg Q \wedge R$

C. $P \vee Q \wedge R$

D. $P \vee Q \wedge \neg R$

6. What is the power set of the empty set?

A. $P(\emptyset) = \{\emptyset\}$

B. $P(\emptyset) = \{\emptyset, \{\emptyset\}\}$

7. If P then Q is called __________ statement

A. Conjunction

B. disjunction

C. conditional

D. bi conditional

8 Let p, q, and r be the propositionsp: You have the flu.q: You miss the final examination.r: You pass the course.If you have the flu then you'll not pass the course OR If you miss the final examination then you'll fail the course

A. $(p \rightarrow -r) \vee (q \rightarrow -r)$

B. (p↔¬r)∨(q→¬r)
C. (p→¬r)∧(q→r)
D. (p→¬r)∨(q→r)

9. Which of the following propositions is tautology?
A. (p v q)→q
B. p v (q→p)
C. p v (p→q)
D. Both (b) & (c)

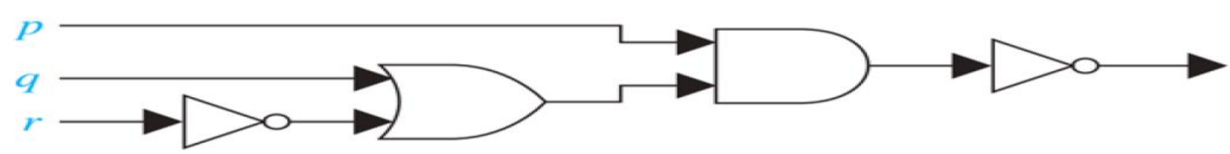
10. p ∨ q is logically equivalent to
A. ¬q → ¬p
B. q → p
C. ¬p → ¬q
D. ¬p → q

11. Let p and q be the propositions p: It is below freezing. q: It is snowing. Then the statement " It is either snowing or below freezing (or both) " is equivalent to which propositions
A. ¬p → ¬q
B. ¬p ∧ q
C. p ∨ q
D. p → q

12. (p → q) ∧ (p → r) is logically equivalent to
A. p → (q ∧ r)
B. p → (q ∨ r)
C. p ∧ (q ∨ r)
D. p ∨ (q ∧ r)

13. Let's consider a propositional language where •p means"Paola is happy", •q means"Paola paints a picture", •r means"Renzo is happy". Formalize the following sentence: ."if Paola is happy and paints a picture then Renzo isn't happy" Then which of these choices express that :
A. p∧q→¬r
B. p∧¬q→¬r
C. p∨q→¬r
D. ¬p∨q→¬r

14. What is the output of the following combinatorial circuit?



A. (¬p ∧ (q ∨ r)) ∧ ((¬p ∨ ¬r) ∧ ¬q)
B. (p ∧ ¬r) ∨ (¬q ∧ r)
C. ¬ (p ∧ (q ∨ ¬r))
D. (p ∨ ¬r) ∧ (¬p ∨ (q ∨ ¬r))

15. If A is any statement, then which of the following is a tautology?
A. $A \vee \neg A$
B. $A \wedge F$
C. $P \vee F$
D. $A \wedge T$

16. $A \subseteq B$ if and only if the quantification
A. $\forall x(x \in A \rightarrow x \in B)$
B. $\forall x(x \in B \rightarrow x \in A)$

17. Let P (x) be the statement "x spends more than five hours every weekday in class," where the
domain for x consists of all students. Express $\exists x P(x)$ quantifications in English
A. There is a student who spends more than five hours every weekday in class.
B. Every student spends more than five hours every weekday in class.
C. There is a student who does not spend more than five hours every weekday in class.
D. No student spends more than five hours every weekday in class.

1. $p \leftrightarrow q \equiv (p \rightarrow q) \wedge (q \rightarrow p)$
A. [True]
B. [False]

2 If A and B are sets with $A \subseteq B$, then $A \cup B = A$
A. [True]
B. [False]

3. The conditional statement $p \rightarrow (p \vee q)$ is a tautology
A. [True]
B. [False]

4. $\neg \exists x Q(x) \equiv \forall x\, Q(x)$
A. [True]
B. [False]

5. $\neg \forall x P(x) \equiv \exists x\, P(x)$.
A. [True]
B. [False]

6. A direct proof of a conditional statement $p \rightarrow q$ is constructed when the first step is the assumption that p is true
A. [True]
B. [False]

7. Proofs by contraposition make use of the fact that the conditional statement $p \rightarrow q$ is equivalent to its contrapositive, $\neg q \rightarrow \neg p$
A. [True]
B. [False]

8. Proofs by contraposition make use of the fact that the conditional statement $p \rightarrow q$ is equivalent to its contrapositive, $q \rightarrow \neg p$

A. [True]

B. [False]

9. Let p and q be propositions. The disjunction of p and q, denoted by $p \vee q$

A. [True]

B. [False]

10. The biconditional $p \leftrightarrow q$ is true when p and q have the same truth values, and is false otherwise

A. [True]

B. [False]

11. $p \rightarrow q$ and $\neg p \vee q$ are logically equivalent

A. [True]

B. [False]

12. $\neg(p \vee q)$ and $\neg p \wedge \neg q$ are logically equivalent

A. [True]

B. [False]

13. $p \rightarrow q$ and $\neg p \vee q$ are logically equivalent

A. [True]

B. [False]

14. The conditional statement $\neg p \rightarrow (p \rightarrow q)$ is a tautology

A. [True]

B. [False]

15. $\neg \exists x Q(x) \equiv \forall x \neg Q(x)$

A. [True]

B. [False]