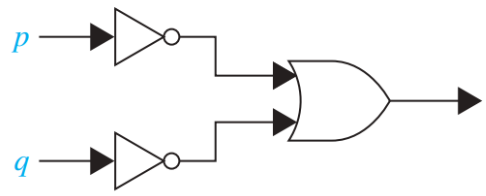
Choose the Correct Answer

1. **The statement " $x + 2 = 7$, for $x = 3$ " is __________.**
   A. Proposition False
   B. Proposition True
   C. Not a Proposition
   D. Proposition both True and False
2. **If p is false and q is true, then $(p \vee \neg q) \rightarrow (p \wedge q)$ is __________.**
   A. False
   B. True
   C. Neither true nor false
   D. Both true and false
3. **If p is true and q is false, then $p \rightarrow q$ is__________.**
   A. False
   B. True
   C. Neither true nor false
   D. Both true and false
4. **A compound proposition $(p \wedge q) \rightarrow p$ is_______.**
   A. Tautology
   B. Contradiction
   C. Contingency
   D. Equivalent
5. **Let p is a proposition, then $p \vee \neg p$ is logical equivalent to _______.**
   A. True
   B. False
   C. p
   D. q
6. **Express the statement "Every student in your class has taken a course in computer". Where $P(x)$ is "x has taken a course in computer". The domain of x is the set of the students in your class.**
   A. $\forall x P(x)$
   B. $\exists x P(x)$
   C. $\forall x \neg P(x)$
   D. $P(x)$

7. Find the output of the following combinatorial circuit.



A. $\neg(p \wedge q)$
B. $\neg p \wedge \neg q$
C. $\neg(p \vee q)$
D. $p \wedge q$

8. Let p is a proposition and T stands for True, then $p \vee$ T is logical equivalent to _______.

A. True
B. False
C. p
D. q

9. If A and B are sets, then A and B are equal if and only if __________.

A. $\forall x(x \in A \leftrightarrow x \in B)$.
B. $\forall x(x \in A \rightarrow x \in B)$
C. $\forall x(x \in A)$
D. $\exists x(x \in A)$

10. The power set of the set $S = \{a, \{b, c\}\}$ is __________.

A. $\{\emptyset, \{a\}, \{\{b, c\}\}, \{a, \{b, c\}\}\}$
B. $\{\emptyset, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{b, c\}, \{a, b, c\}\}$
C. $\{\emptyset, a, \{b, c\}, \{a, b, c\}\}$
D. $\emptyset$

11. The union of the sets A and B , $A \cup B$ is equal to__________.

A. $\{x | x \in A \vee x \in B\}$
B. $\{x | x \in A \wedge x \in B\}$
C. $\{x | x \in A \vee x \notin B\}$
D. $\{x\}$

12. Let f be the function from $\{a, b, c\}$ to $\{1, 2, 3\}$ such that $f(a) = 2$, $f(b) = 3$, and $f(c) = 1$. The function f is __________.

A. One-to-one correspondence
B. One-to-one ONLY
C. Onto ONLY
D. Not bijection

13. The following double sums $\sum_{i=0}^{2}\sum_{j=0}^{3} j$ is equal __________.

A. 18
B. $6i$
C. $6j$
D. 12

14. $\lceil -5.2 \rceil =$**__________.**

A. -5
B. 5
C. 6
D. -6

15. Binary search can be used when the list has terms occurring in __________.

A. Order of increasing size
B. Unordered
C. Even numbers
D. Odd numbers

16. The bubble sort comparing adjacent elements, interchanging them if they are in _______.

A. The wrong order
B. The right order
C. 1st location
D. 2nd location

17. If p is true and q is false, then $p \oplus q$ is __________.

A. False
B. True
C. Neither true nor false
D. Both true and false

18. Let p and q be the propositions: p: The automated reply can be sent. q: The file system is full. Express the following statement using p and q and logical connectives.
"The automated reply cannot be sent when the file system is full."

A. $p \to q$
B. $q \to \neg p$
C. $q \to p$
D. $p \to \neg q$

19. The set S of odd positive integers less than 7 can be expressed by using set builder notation as ____.

A. $S = \{x \in R^+ | x \text{ is odd and } x < 7\}$
B. $S = \{x \in Z^+ | x \text{ is odd and } x < 7\}$
C. $S = \{x | x \text{ is odd and } x < 7\}$
D. $S = \emptyset$

20. If A and B are sets, then A is said to be a subset of B if and only if __________.

A. $\forall x (x \in A \leftrightarrow x \in B)$.
B. $\forall x (x \in A \to x \in B)$
C. $\forall x (x \in A)$
D. $\exists x (x \in A)$

21. The difference of the sets A and B (i.e., $A - B$) is equal to__________.

A. $\{x | x \in A \vee x \in B\}$
B. $\{x | x \in A \wedge x \notin B\}$
C. $\{x | x \in A \vee x \notin B\}$
D. $\{x\}$

22. The matrix A $= \begin{bmatrix} \mathbf{1} & \mathbf{0} & \mathbf{2} \\ \mathbf{2} & \mathbf{0} & \mathbf{5} \\ \mathbf{2} & \mathbf{5} & \mathbf{-1} \end{bmatrix}$**, then the transpose of A = (A^t) = __________.**

A. $\begin{bmatrix} 1 & 0 & 2 \\ 2 & 0 & 5 \\ 2 & 5 & -1 \end{bmatrix}$

B. $\begin{bmatrix} 1 & 2 & 2 \\ 0 & 0 & 5 \\ 2 & 5 & -1 \end{bmatrix}$

C. $\begin{bmatrix} 1 & 0 & 2 \\ 0 & 0 & 5 \\ 2 & 5 & -1 \end{bmatrix}$

D. $\begin{bmatrix} 1 & 0 & 2 \\ 0 & 1 & 5 \\ 2 & 0 & -1 \end{bmatrix}$

23. The meet of the two metrices $\mathbf{A} = \begin{bmatrix} \mathbf{1} & \mathbf{0} \\ \mathbf{1} & \mathbf{1} \end{bmatrix}$ **and** $\mathbf{B} = \begin{bmatrix} \mathbf{0} & \mathbf{1} \\ \mathbf{0} & \mathbf{1} \end{bmatrix}$ **is__________.**

A. $\begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$

B. $\begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix}$

C. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

D. $\begin{bmatrix} 0 & 0 \\ 1 & 1 \end{bmatrix}$

24. An algorithm should produce the correct output values for each set of input values. This means __________.

A. Finiteness
B. Definiteness
C. Correctness
D. Generality

25. $(\mathbf{10011} \vee \mathbf{01010}) \oplus \mathbf{11111}$ **is __________.**

A. 11111
B. 00000
C. 00100
D. 11011

26. Let p is a proposition and F stands for False, then $p \vee$ F is logical equivalent to _______.

A. True
B. False
C. p
D. q

27. Let p is a proposition and T stands for True, then $p \wedge$ T is logical equivalent to _______.

A. True
B. False
C. p
D. q

28. Let p and q are two propositions, then $p \to q$ is logical equivalent to _______.

A. $p \vee q$
B. $p \wedge q$
C. $\neg p \vee q$
D. $q \to p$

29. The set $\mathbf{Z} = \{\dots, -2, -1, 0, 1, 2, \dots\}$ is the set of __________.

A. Real Numbers
B. Natural Numbers
C. Integers Numbers
D. Complex Numbers

30. If $2^S = \{\emptyset\}$, then $S =$ __________.

A. $\{\{\emptyset\}\}$
B. $\{\emptyset\}$
C. $\emptyset$
D. $\{\{\ \}\}$

31. Let U be the universal set. The complement of the set A is equal to__________.

A. $\{x \notin U | x \notin A\}$
B. $\{x | x \in A\}$
C. $\{x \in U | x \notin A\}$
D. $\{x\}$

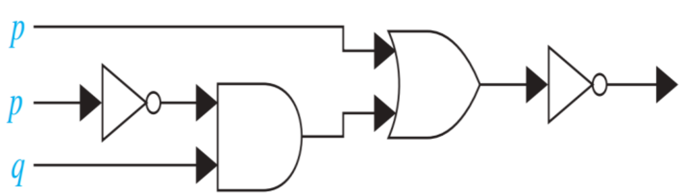
32. The composition $f \circ g$ cannot be defined unless the range of g is a subset of the________.

A. Domain of g
B. Co-Domain of f
C. Domain of f
D. Co-Domain of g

33. $(01111 \wedge 10101) \vee 01000$ is __________.

A. 10101
B. 01001
C. 01111
D. 01101

34. Find the output of the following combinatorial circuit.



A. $\neg p \vee \neg q$
B. $\neg(p \vee p \wedge q)$
C. $(\neg p \wedge q) \vee p$
D. $\neg p \wedge (p \vee \neg q)$

35. Express the statement "Every student in FCAI has an email". Where $P(x)$ is "x in FCAI", $F(x)$ is "x has an email". The domain of x is the set of all students in Egypt.

A. $\forall x F(x)$

B. $\forall x P(x)$

C. $\forall x \big(P(x) \wedge F(x)\big)$

D. $\forall x \big(P(x) \rightarrow F(x)\big)$

36. Let $A = \{1, 2, 3, 4\}$, and $B = \{a, b, c\}$, the $|A \times B|$ is __________ elements.

A. 3

B. 4

C. 16

D. 12

37. The general term a_n of the sequence $15,\ 8,\ 1,\ -6,\ -13,\ -20, \dots$ is__________.

A. $\{15 - n\}$

B. $\{15 + 7n\}$

C. $\{7 - 15n\}$

D. $\{15 - 7n\}$

38. $\begin{bmatrix} 1 & 2 & 2 \\ 0 & 0 & 0 \\ 1 & 3 & -1 \end{bmatrix} \times \begin{bmatrix} 1 & 2 \\ 3 & -1 \\ 1 & 1 \end{bmatrix} =$ _________.

A. $\begin{bmatrix} 9 & 2 \\ 3 & 1 \\ 9 & -2 \end{bmatrix}$

B. $\begin{bmatrix} 9 & 0 \\ 0 & 0 \\ 9 & -2 \end{bmatrix}$

C. $\begin{bmatrix} 9 & 1 \\ 0 & 1 \\ 9 & -2 \end{bmatrix}$

D. $\begin{bmatrix} 9 & 2 \\ 0 & 0 \\ 9 & -2 \end{bmatrix}$

39. $\lfloor 3.5 \rfloor =$ _______.

A. -4

B. 4

C. -3

D. 3

40. A(an) _______ is a sequence of the form $a + ar + ar^2, \dots., ar^n, \dots.$

A. Arithmetic progression

B. Floor function

C. Fibonacci

D. Geometric progression