# BRAINWARE UNIVERSITY

**Term End Examination 2021 - 22**
**Programme – Bachelor of Computer Applications**
**Course Name – Discrete Structures**
**Course Code - GEBS201**
**( Semester II )**

**Time allotted : 1 Hrs.15 Min.** **Full Marks : 60**

[The figure in the margin indicates full marks.]

**Group-A**

(Multiple Choice Type Question) 1 x 60=60

*Choose the correct alternative from the following :*

(1) Let p: It is cold and q: It is raining , then the symbolic form of the statement 'It is cold or it is not raining' is

a) $p \vee q$ b) $\neg p \vee q$

c) $\neg p \wedge q$ d) $p \vee \neg q$

(2) Let p be a proposition ' He is intelligent' and q be a proposition ' He is tall' . The the symbolic form of the statement ' He is intelligent and tall' is

a) $p \vee q$ b) $\neg p \wedge q$

c) $p \wedge q$ d) none of these .

(3) For the statement p and q $\neg(p \vee q)$ is

a) $\neg p \wedge \neg q$ b) $\neg p \vee \neg q$

c) $p \vee q$ d) none of these .

(4) $p \vee (p \wedge q) \equiv$

a) p b) q

c) $p \wedge q$ d) none of these

(5) $p \rightarrow q \equiv$

a) $\neg q \vee \neg p$ b) $\neg p \wedge q$

c) $\neg p \vee q$ d) $p \vee q$

(6) If the truth value of p and q are F and F respectively then the truth value of $\neg p \rightarrow \neg q$ is

a) T b) F

c) both T and F d) None of these

(7) If $p \leftrightarrow q \equiv (p \rightarrow q) \wedge r$ then r is

a) $p \rightarrow q$

b) $\neg p$

c) $q \rightarrow p$

d) $\neg q$

(8) $\neg(p \vee q) \vee (p \wedge \neg q) \equiv$

a) $\neg p$

b) $p$

c) $\neg q$

d) None of these .

(9) The proposition $p \wedge (q \wedge \neg q)$ is a

a) contradiction

b) Tautology

c) an argument

d) none of these .

(10) Contrapositive of '$\neg p \rightarrow q$' is

a) $p \rightarrow q$

b) $\neg q \rightarrow \neg p$

c) $\neg q \rightarrow p$

d) $q \rightarrow \neg p$

(11) Let p: ' It is sunny afternoon ' and q: ' It is hot today' . Then the following proposition $\neg p \wedge \neg q$ can be written as

a) It is not sunny afternoon and it is not hot today .

b) It is false that It is not sunny afternoon or it is not hot today .

c) It is false that It is sunny afternoon or it is hot today .

d) None of these .

(12) The negation of the statement ' No one wants to buy my house' is

a) All want to buy my house

b) Some one wants to buy my house

c) Every one wants to buy my house

d) None of these .

(13) 'Any proposition' $\vee$ 'a tautology'

a) The proposition

b) tautology

c) contradiction

d) none of these

(14) If ${}^{2n}C_3 : {}^{n}C_2 = 44:3$ then the value of $n$ is

a) 6

b) 5

c) 2

d) 7

(15) The number of three digit number that can be formed from the digits 1,3,5,7 is,

a) 24

b) 6

c) 4

d) none of these

(16) In how many ways 7 different beads can be arranged to form a necklace?

a) 250

b) 300

c) 360

d) 350

(17) The generating function for the sequence <1,-1,1,-1,…> is

a) $(1-x)^{-1}$

b) $(1+x)^{-1}$

c) $(1+2x)^{-\frac{1}{2}}$

d) $(1-2x)^{-\frac{1}{2}}$

(18) If $a_n = a_{n-1} + 9,\ n \geq 1$ and $a_0 = 5$ then $a_n =$

a) $9+5n$

b) $5+9n$

c) $9n$

d) $5n$

(19) The sequence represented by the function $\frac{1}{1-5x}$ is

a) $\{3^n\}$
b) $\{5^n\}$
c) $\{5^n+1\}$
d) $\{4^n\}$

(20) If ${}^nC_1$, ${}^nC_2$ and ${}^nC_3$ are in A.P., the value of $n$ is

a) 6
b) 7
c) 8
d) 4

(21) If A and B are sets and A∪ B= A ∩ B, then

a) $A = \Phi$
b) $B = \Phi$
c) A = B
d) none of these

(22) Let R be a non-empty relation on a collection of sets defined by ARB if and only if A ∩ B = Ø, then

a) R is reflexive and transitive.
b) R is symmetric and not transitive.
c) R is an equivalence relation.
d) R is not reflexive and not symmetric.

(23) Order of the power set of a set of order n is

a) n
b) 2n
c) $n^2$
d) $2^n$

(24) Which of the following two sets are equal?

a) A = {1, 2} and B = {1}
b) A = {1, 2} and B = {1}
c) A = {1, 2, 3} and B = {2, 1, 3}
d) A = {1, 2, 4} and B = {1, 2, 3}

(25) A function from A to B is called onto function if its range is

a) B
b) A
c) Neither A nor B
d) Both A and B

(26) The smallest set A such that A ∪ {1, 2} = {1, 2, 3, 5, 9} is

a) {2,3,5}
b) {1, 2, 5, 9}
c) {3, 5, 9}
d) None of the mentioned

(27) Let $N$ be the set of all natural number, $A=\{x \mid x \in N, x \geq 4\}$ and $B=\{x \mid x \in N, x < 5\}$ . Then $A \cap B = ?$

a) {4,5}
b) {4}
c) {0}
d) {9}

(28) If k is appositive integer , then $\gcd(ka, kb) =$

a) $k \gcd(ka, b)$
b) $k \gcd(a, b)$
c) $k \gcd(a, kb)$
d) none

(29) Set consisting of all first elements of each ordered pair in relation is called

a) subset
b) domain of relation
c) range of relation
d) complement of a set

(30) Set consisting of all second elements of each ordered pair in relation is called

a) domain of relation
b) range of relation

c) subset

d) complement of a set

(31) What is the base case for the inequality $7^n > n^3$, where n = 3?

a) 652 > 189

b) 42 < 132

c) 343 > 27

d) $42 \leq 431$

(32) If $f(x-2) = 2x^2 + 3x - 5$ then $f(-1) =$

a) 0

b) 1

c) -1

d) 2

(33) The function $f: R \to R$ defined by $f(x) = x^2$, where $R$ is the set of all real numbers Then $f$ is

a) surjective

b) injective

c) bijective

d) None of these

(34) If $\phi(x-2) = 2x^2 + 3x - 5$ then $\phi(x) =$

a) $2x^2 + 11x + 9$

b) $2x^2 - 11x + 9$

c) $x^2 + 11x + 9$

d) none

(35) Let a and b any two positive integers. Then

a) $\gcd(a,b) = lcm(a,b)$

b) $\gcd(a,b) lcm(a,b) = ab$

c) $\gcd(a,b) lcm(a,b) = 1$

d) $\gcd(a,b) lcm(a,b) = a + b$

(36) If $32 \equiv a \pmod 7$. Then the value of $a$ is-

a) 10

b) 11

c) 12

d) 13

(37) If $gcd(a,b) = c$, then $\frac{a}{c}$ and $\frac{b}{c}$ are

a) both prime

b) both composite

c) relatively prime to each other

d) None of these

(38) The $\gcd(81,135)$ is

a) 3

b) 9

c) 27

d) 81

(39) The $lcm(81,135)$ is

a) 10935

b) 2187

c) 3645

d) 405

(40) The set of all real numbers under usual addition formed a group. Then the inverse of 2.36 is:

a) 2.36

b) -2.36

c) 2.4

d) -2.4

(41) The inverse of the element $-i$ in the multiplicative group $\{-1, 1, -i, i\}$, where $i^2 = -1$

a) $i$

b) $-i$

c) 1

d) -1

(42)

The identity element in the multiplicative group $\{-1, 1, -i, i\}$, where $i^2 = -1$

a) $i$

b) $-i$

c) 1

d) $-1$

(43) A monoid $(M, +)$ is called a group if

a) $a + b = b + a = e$

b) $a + (b + c) = (a + b) + c$

c) $a + b = b + a \forall a, b \in M$

d) $a + b \in M, \forall a, b \in M$

(44) A group of three element is:

a) Always non-abelian

b) Always abelian

c) Sometimes abelian

d) Always non-cyclic

(45) Let $(G, .)$ be a group and $a$ has the inverse $b$ then $ab^{-1} = ?$

a) $e$

b) $a^2$

c) $a$

d) $b^2$

(46) The number of elements in the group $(Z_3, +)$ is

a) 1

b) 3

c) 4

d) 6

(47) The inverse of the element [1] in the additive group $Z_3$

a) [1]

b) [2]

c) [0]

d) None of these

(48) If $\circ$ denotes permutation multiplication , then the value of $(1\ 2) \circ (1\ 4)$

a) $(4\ 1\ 2)$

b) $(1\ 4\ 2)$

c) $(4\ 2)$

d) $(4\ 1)$

(49) Let $a$ be an element in a group with order 5. Then the value of $a^{2020}$

a) $a$

b) $a^2$

c) $a^4$

d) $e$

(50) Let $a$ be an element in a group with order 10. Then the order of the element $a^7$

a) 10

b) 70

c) 1

d) Cannot be determined from the given data

(51) Which of the following is not an abelian group:

a) $(\mathbb{Q}, +)$

b) $(\mathbb{Z}, +)$

c) $(\mathbb{Z}_3, +)$

d) $S_5$

(52) A subgroup H of a group G is normal if for all $x \in G$ and $h \in H$

a) $xhx^{-1} \in H$

b) $xhx^{-1} \in G$

c) $xh^{-1} \in H$

d) $x^{-1}h \in H$

(53) In a Boolean algebra B, if $a + b = b$ then $a.b = ?$

a) $a$

b) $b$

c) $a'$

d) Cannot determined from the given data

(54) In a Boolean algebra B, $(a+b)' = ?$

a) $a' + b'$

b) $(a.b)'$

c) $a'.b'$

d) $I$

(55) In a Boolean algebra B, $0' = ?$

a) $I$

b) 0

c) $I'$

d) $0''$

(56) Arithmetical minus (-) is a binary operation on

a) set of all integers

b) set of positive integers

c) set of negative integers

d) none

(57) A groupoid $(G, \circ)$ is a semi-group if for all a,b,c in $G$

a) $a \circ b = b \circ a$

b) $a \circ a = a$

c) $(a \circ b) \circ c = (b \circ c) \circ a$

d) $a \circ (b \circ c) = (a \circ b) \circ c$

(58) Which one of the following groupoid is semi-group

a) $(Z, +)$

b) $(Z, -)$

c) $(R, \div)$

d) None

(59) In the group $Z_4 = \{[0],[1],[2],[3]\}$ under addition $[3] + [2] =$

a) $[5]$

b) $[0]$

c) $[1]$

d) $[2]$

(60) An edge whose two end vertices coincide is called

a) ring

b) adjacent edge

c) loop

d) none