



BRAINWARE UNIVERSITY

Term End Examination 2023
Programme – BCA-2022
Course Name – Discrete Structure
Course Code - BCAC203
(Semester II)

Full Marks : 60

Time : 2:30 Hours

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question)

1 x 15=15

1. Choose the correct alternative from the following :

(i) Choose the correct option A simple graph has

- | | |
|---|-----------------------|
| a) no loops | b) no parallel edges |
| c) no parallel edges and no isolated vertex | d) no isolated vertex |

(ii) Choose the correct one, If A proposition formula is calledif it assumes only the truth value F(every entry of last column is F).

- | | |
|------------------------|------------------|
| a) Tautology | b) Contradiction |
| c) Logical Equivalence | d) None of these |

(iii) Let p: It is cold and q: It is raining, then the symbolic form of the statement 'It is not raining and it is not cold', Select the correct option

- | | |
|-----------------------|---------------------------|
| a) $\neg q \wedge p$ | b) $\neg q \wedge \neg p$ |
| c) $\neg(q \wedge p)$ | d) None of these |

(iv) For the statement p and q $\neg(p \vee q)$, identify the correct one.

- | | |
|---------------------------|-------------------------|
| a) $\neg p \wedge \neg q$ | b) $\neg p \vee \neg q$ |
| c) $p \vee q$ | d) None of these. |

(v) 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, Identify the correct one

- | | |
|---|---|
| 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. |

(vi) Let p and q be the propositions 'She is pretty' and 'She is tall' respectively. Then the sentence 'It is false that She is pretty and she is not tall' is, Select the correct option

- | | |
|----------------------------|---------------------|
| a) $\neg p \wedge \neg q$ | b) $\neg(p \vee q)$ |
| c) $\neg(p \wedge \neg q)$ | d) $q \wedge p$ |

(vii) Let p and q be two propositions denoted as p: S Thomas is sincere and q: Thomas is intelligent be two propositions. Then $p \wedge q$ describe as

- | | |
|--|---|
| a) Thomas is sincere and he is intelligent | b) Thomas is sincere or he is intelligent |
| c) Thomas neither sincere nor intelligent | d) None of these |

(viii) Let R be a non-empty relation on a collection of sets defined by ARB if and only if $A \cap B = \emptyset$, then, Select the correct option

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.

(ix) What is the Cartesian product of $A = \{1, 2\}$ and $B = \{a, b\}$? Select the correct option

a) $\{(1, a), (1, b), (2, a), (b, b)\}$

b) $\{(1, 1), (2, 2), (a, a), (b, b)\}$

c) $\{(1, a), (2, a), (1, b), (2, b)\}$

d) $\{(1, 1), (a, a), (2, a), (1, b)\}$

(x) Which of the following is not an abelian group? Choose the correct one

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

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

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

d) S_5

(xi) Which of the following two sets are equal? Select the correct option

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 $B = \{1, 2, 3\}$

(xii) If the origin and terminus of a walk coincide then it is a, Choose the correct statement

a) path

b) open walk

c) circuit

d) closed walk

(xiii) Identify the correct option, the proposition $p \wedge (q \wedge \neg q)$ is a

a) Contradiction

b) Tautology

c) an argument

d) none of these

(xiv) Which of the following two sets are equal? Select the correct option

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 $B = \{1, 2, 3\}$

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

correct one

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

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

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

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

Group-B

(Short Answer Type Questions)

3 x 5=15

2. Describe Contradiction, With an example

(3)

3. If $y = f(x) = \frac{ax - b}{cx - a}$, show that $f(y) = x$

(3)

4. Describe Logical equivalence

(3)

5. If $(G, *)$ be a group then construct that $(a^{-1})^{-1} = a$

(3)

6. Conclude the truth table for the proposition: $(\sim p \wedge q)$ (3)

OR

Conclude the truth table for the proposition: $(\sim p) \wedge (\sim q)$ (3)

Group-C
(Long Answer Type Questions)

5 x 6=30

7. Illustrate that the sum of the degrees of all vertices in a graph is twice the number of edges in the graph. (5)
8. If p: Madhu goes to cinema and q: Ram goes to cinema be two propositions then state the symbolic form of the statements: (5)
- (i) Both of Madhu and Ram goes to cinema.
 - (ii) At least one of Madhu and Ram goes to cinema.
 - (iii) Madhu does not go to cinema but Ram goes to cinema.
 - (iv) Either Madhu or Ram goes to cinema.
 - (v) If Ram goes to cinema then Madhu also goes to cinema.
9. Show that if $A \rightarrow B$ is one-one onto, then $f^{-1}: B \rightarrow A$ is also one-one onto. (5)
10. Show that the following equivalence $p \equiv (p \wedge q) \vee (p \wedge \sim q)$ (5)
11. There are 12 bulbs in a room each of which is operated independently by 12 different switches. Examine how many ways the room can be illuminated? (5)
12. Conclude that $[(p \wedge q) \vee (\sim r)]$ the proposition is not a Tautology (5)

OR
Conclude that the proposition $(p \vee q) \wedge (\sim p \wedge \sim q)$ Contradiction using truth table (5)

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