K23U 1074

Reg. No. : .....

Name : .....

IV Semester B.C.A. Degree (CBCSS – OBE – Regular/Supplementary/ Improvement) Examination, April 2023

(2019 Admission Onwards)

GENERAL AWARENESS COURSE

4A14BCA : Discrete Mathematical Structures

Time : 3 Hours Max. Marks : 40

PART – A
(Short Answer)

Answer **all** questions. **(6×1=6)**

1. Define tautology.
2. Define equivalence relation.
3. How many relations are there on a set with 'n' elements ?
4. Define Boolean variable.
5. Find the value of x if x + x = 0.
6. Define Euler path.

PART – B
(Short Essay)

Answer **any 6** questions. **(6×2=12)**

7. Define 'directed multigraphs'.
8. What is a 'decision tree' ?

P.T.O.

9. What is 'OR gate' ?

10. Determine whether the following statements are true or false :

    a) $0 \in \phi$

    b) $\phi \subset \{0\}$.

11. Find A – B and B – A if A = {1, 2, 3, 4, 5} and B = {0, 3, 6}.

12. Write and converse and inverse of $p \rightarrow q$.

13. What do you mean by fallacy ?

14. Define Antisymmetric Relation.

PART – C

(Essay)

Answer **any 4** questions. **(4×3=12)**

15. Let R be a reflexive and transitive relation. Prove that $R^n = R$ for all positive integers n.

16. Explain 'complete graphs'. Draw complete graph with number of vertices 5 and 6.

17. Prove that an undirected graph has an even number of vertices of odd degree.

18. What is the value of the postfix expression ?

    7 2 3 * – 4 ↑ 9 3 / + ?

19. Define Cartesian product of two sets. Show that $A \times B \neq B \times A$ with the help of a suitable example.

20. Show that $\neg(p \vee (\neg p \wedge q)$ and $\neg p \wedge \neg q$ are logically equivalent by developing a series of logical equivalences.

PART – D
(Long Essay)

Answer **any 2** questions. **(2×5=10)**

21. Let p : "Swimming at the shore is allowed".

    q : "Sharks have been spotted near the shore"

    Express each of these propositions as sentences

    a) $p \wedge q$

    b) $p \rightarrow \neg q$

    c) $p \leftrightarrow \neg q$

    d) $\neg p \rightarrow \neg q$

    e) $\neg p \wedge (p \vee \neg q)$.

22. Explain Hamilton circuits with examples. Show that K_n has a Hamilton circuits whenever $n \geq 3$.

23. Explain Depth First Search method to build a spanning tree with suitable example.

24. State and prove De Morgan's laws and distributive laws using membership table.

K22U 1509

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IV Semester B.C.A. Degree CBCSS (OBE) Regular/Supplementary/ Improvement Examination, April 2022
(2019 Admission Onwards)
GENERAL AWARENESS COURSE
4A14BCA : Discrete Mathematical Structures

Time : 3 Hours Max. Marks : 40

PART – A

(Short Answer)

Answer **all** questions. **(6×1=6)**

1. Define set.
2. Define Tautology.
3. Distinct elements of A are mapped into distinct elements of B is called
4. Pictorial representation of a finite partial order on a set is called
5. A graph which allows more than one edge to join a pair of vertices is called a
6. A path of graph G, that includes each edge of G exactly once and intersects each vertex of G at least once is called

PART – B

(Short Essay)

Answer **any 6** questions. **(6×2=12)**

7. Determine the truth table of ~p (q p).
8. Let p be "He is tall" and q be "He is handsome". Write each of the following statements in symbolic form using p and q :
   a) He is tall and handsome.
   b) He is neither tall nor handsome.

P.T.O.

9. Find conjunctive normal form of p (p q).
10. Brief note on disjunctive normal form.
11. Prove that $\forall a \in B$, $a \cdot a = a$.
12. Simplify $z(y + z)(x + y + z)$.
13. Define Tree with example.
14. What is Hamiltonian graph ?

PART – C

(Essay)

Answer **any 4** questions. **(4×3=12)**

15. Illustrate the following identities by means of Venn diagrams.
    a) A (B C) = (A B) (A C)
    b) (A B).
16. Write down any three properties of complementation of sets.
17. Define inverse mapping with example.
18. Explain Pigeonhole principle.
19. Explain Travelling salesman's problem.
20. Define BFS for a graph and explain with example.

PART – D

(Long Essay)

Answer **any 2** questions. **(2×5=10)**

21. Prove that a graph is connected if and only if it has a spanning tree.
22. Show that (p r) (q r) and (p q) r are not logically equivalent.
23. Let A, B, C are the sets. Prove that $A - (B - C) = (A - B) - C$ if and only if $A \cap C = \phi$.
24. If f : AB and g : BC are bijections, then prove that gof : AC is also a bijection.

K21U 1073

Reg. No. : .....

Name : .....

KANNUR DT. 670511

IV Semester B.C.A. Degree CBCSS (OBE) Regular Examination, April 2021
(2019 Admission Only)
General Awareness Course
4A 14 BCA : DISCRETE MATHEMATICAL STRUCTURES

Time : 3 Hours Max. Marks : 40

PART – A
(Short Answer)

Answer **all** questions. **(6×1=6)**

1. A set with no elements is called _____
2. Define proposition.
3. a. a = ?
4. Define onto mapping.
5. Let G = (V, E) be a graph. If the elements of E are ordered pairs of vertices, then the graph G is called _____
6. What is planar graph ?

PART – B
(Short Essay)

Answer **any 6** questions. **(6×2=12)**

7. Determine the truth table of ~p (q p).
8. Let p be "it is cold" and q be " it is raining". Give a simple verbal sentence which describes each of the following :
   a. ~p
   b. ~p ∧ ~q
9. Define Hasse diagram.
10. Define relation from A to B with example.
11. Describe laws of Boolean Algebra.
12. Simplify F = + + A + AB.
13. Define complete graph with example.
14. What is graph coloring ?

P.T.O.

PART – C
(Essay)

Answer **any 4** questions. **(4×3=12)**

15. Prove that $(p \wedge q)\ p$ is tautology.
16. $A = \{1, 2\}$, $B = \{1, 2, 4, 5\}$, $C = \{5, 7, 9, 10\}$. Find the following :
    a) $(A \cup B) \cup C$
    b) $(A \cap B) \cap C$
    c) $(A \cup B) \cap C$.
17. Prove that the theorem : Let f : A B then g : B be both one-one and onto functions, then gof : A C is also one-one and onto.
18. Simplify $Y = (P + Q)\ (P + Q')\ (P' + Q)$.
19. Prove that K_5 is non planar graph.
20. The adjacency structure of a graph G is given as G = [A : B, E; B : A, E, F, G; C : D, G, H; D : C, H; E : A, B; F : G; G : B, C, F; H : C, D].

PART – D
(Long Essay)

Answer **any 2** questions. **(2×5=10)**

21. Compare DFS and BFS graph.
22. Describe shortest paths in weighted graphs.
23. Without using truth tables prove that $(\sim p \vee q) \wedge (p \wedge (p \wedge q)) = p \wedge q$.
24. Write down the properties of Union operations in sets.