



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 ?
 $7 \ 2 \ 3 \ * \ - \ 4 \ \uparrow \ 9 \ 3 \ / \ + \ ?$
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.