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(Printed Pages 4)

22/133-C

B.C.A (Second Semester) Examination, 2022

Paper: Fourth

(BCA-204)

Discrete Mathematics

Time : Three Hours] *[Maximum Marks : 70*

Note : Attempt **all** sections as per instructions.

Section-A

(Very Short Answer Type Questions)

Note : Attempt **all** parts of this question. 1.5x10=15

1. (i) If A={1,2,3}, B={3,4,5} and C={0,2,3}, find(A∩ B)x C.

   (ii) In a group of 850 persons, 600 can speak hindi and 340 can speak Tamil. Find how many can speak Hindi only?

   (iii) Define an abelian group.

(iv) Let A={1,2,3,4,6}. Let R be the relation defined by R={(a,b)| a∈ A, b ∈ A a divides b}. Write the elements of R.

(v) Define Path and circuits.

(vi) Define Bipartite graph.

(vii) Explain De-Morgans Law

(viii) Define equivalence relation.

(ix) Define conjunction and Disjunction.

(x) Define Radius and Diameter of a tree.

Section-B

(Short Answer Type Questions)

Note : Attempt all questions. 7x5=35

2. Prove that $\{[(P \rightarrow q) \vee P] \wedge q\} \rightarrow q$ is a Tautology.

OR

Given the relation R-{(1,1),(1,2), (2,1), (2,2), (3,3), (4,4)} decide whether it is re-flesive or symmetric or anti-symmetric or transitive.

3. Discuss Ford- Fulkerson algorithm for maximum flow problem.

OR

Explain Groups, Subgroups and Normal Subgroups.

4. Explain Predicate calculus with suitable example.

OR

Explain the following:

(a) Hamiltonian graph

(b) Eulerian graph.

5. When it can be said that two graphs G1 and G2 are isomorphic?

OR

Explain Handshaking Lemma.

6. What is spanning tree? Prove that a simple graph has a spanning tree, iff it is connected.

OR

Let $f(x)=x^2-1$ and $g(x)=(3x+1)$, describe

(a) gof

(b) fog

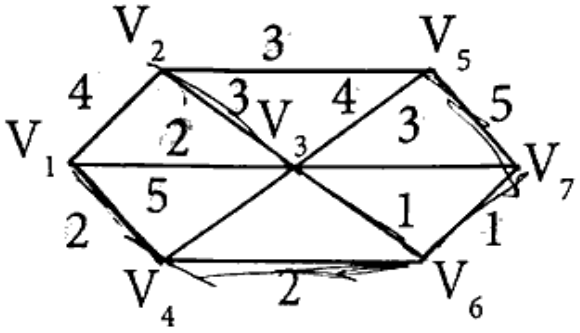
(c) fof

Section-C

(Long Answer Type Questions)

Note : Attempt any **two** questions. 10x2=20

7. Find the minimum spanning tree by Krushkal's algorithm.



8. State and prove Edmonds- Karp algorithm.

9. Show that the following argument is a valid argument.

$$\begin{array}{l} P \\ q \\ 2P \rightarrow r \\ q \rightarrow \sim r \\ \hline \sim r \end{array}$$

10. Explain the concept of chinese Postman problem.

11. Write short notes on any two of the following:

(a) Logarithmic function

(b) Short Path problem

(c) Menger's theorem