SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai - 600 044.
B.Sc.CGS - END SEMESTER EXAMINATIONS - NOV'2024
SEMESTER - I
21UCGAT1001 - Discrete Mathematics

Total Duration : 2 Hrs.30 Mins. Total Marks : 60

Section B

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. Explain about conjunction and disjunction.
2. Let (M, *, e) be a monoid and a $\in$ M. If a is invertible then show that its inverse is unique.
3. Define isomorphism between two graphs and give an example.
4. Examine the graph $K_{3,3}$ is planar or not. Justify that.
5. Discuss about characteristic functions.
6. Justify: A nonempty subset H of a group $(G, *)$ will be a subgroup of G iff a * $b^{-1} \in$ H, whenever a, b $\in$ H.
7. Show that a graph G with n vertices is a tree iff it has n-1 edges and no cycle.
8. Elaborate Dijkstra's Algorithm.

Section C

Answer any **THREE** questions $(3 \times 10 = 30$ Marks)

9. i) Show that Q $\vee$ (P $\vee$ $\neg$ Q) $\wedge$ ($\neg$ P $\vee$ $\neg$ Q) is a tautology.
   ii) Prove the following (P $\rightarrow$ (Q $\rightarrow$ R)) $\Rightarrow$ ((P $\rightarrow$ Q) $\rightarrow$ (P $\rightarrow$ R)).
10. Let f: R $\rightarrow$ R and g: R $\rightarrow$ R, where R is the set of real numbers be given by $f(x) = x^2 - 2$ and $g(x) = x + 4$. Find f $\circ$ g and g $\circ$ f. State whether these functions are injective, surjective and bijective.
11. If G is an abelian group, then for all a, b $\in$ G, show that $(a * b)^n = a^n * b^n$ for every integer n.
12. Prove that a given connected graph G is eulerian iff all the vertices of G are of even degree.
13. Elaborate Kruskal's Algorithm.

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