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. - END SEMESTER EXAMINATIONS APRIL-2023
SEMESTER - V
08UMACT5012 - Graph Theory

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

Section B

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

1. Prove that Every graph is an intersection graph.
2. Prove that if G is a graph in which the degree of every vertex is at least two then G contains a cycle.
3. Show that Every connected graph has a spanning tree.
4. Prove that K_5 graph is non-planar.
5. Prove that if G is uniquely n- colourable, then $\delta(G) \geq$ n-1.
6. Prove that any self complementary graphs has 4n (or) 4n+1 points.
7. Prove that Every tree has a centre consisting of either one point or two adjacent points.
8. Define the following terms,
   (i) Complete graph. (ii) Walk. (iii) Connected graph.
   (iv) Eulerian graph. (v) Tree.

Section C

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

9. Prove that the maximum number of lines among all P point graphs with no triangles is $\left(\frac{p^2}{4}\right)$
10. Prove that the following statements are equivalents for a connected graph G
    (i) G is eulerian (ii) Every point of G has even degree
    (iii) The set of edges of G can be partitioned into cycles.
11. Let G be a (p,q) graph. Prove the following statements are equivalent
    (i) G is a tree (ii) Every two points of G are joined by a unique path
    (iii)G is connected and p=q+1
    (iv) G is acyclic and p=q+1

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12. Show that every polyhedron has atleast two faces with the same number of edges on the boundary.
13. Show that every planar graph is 5-colourable.

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