20UMACT5012

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.(Maths) - END SEMESTER EXAMINATIONS APRIL-2023
SEMESTER - V
20UMACT5012- Graph Theory

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

Section B

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

1. a) Prove that "If G is a (p,q) - graph then $\sum_{v \in v(G)} \deg(v) = 2q$
   b) Prove that the number of odd degree vertices in a graph G is even.
2. Define Weighted graph with it application in real life.
3. State and prove Hall's theorem.
4. State and prove the Euler formula for planar graphs.
5. If G is a (p.q) – graph then with usual notation prove that χ (G) $\geq \frac{p^2}{p^2-2q}$
6. Prove that a connected (p,q) – graph contains a cycle iff q $\geq$ p
7. Discuss the marriage problem
8. For any graph G with usual notation prove that χ (G) = Δ (G) +1

Section C

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

9. With usual notation, prove that for any graph G, q(G) $\geq$ p(G) - $\omega(G)$.
10. Show that a nontrivial connected graph is Eulerian iff it has no vertex of odd degree.
11. Prove that A(p,q) – graph G is a bipartite graph iff it contains no odd cycle.
12. Prove that a graph G is planar iff G contains no subdivision of K_5 or $K_{3,3}$. Also prove that a graph G is planar iff G contains no contraction of K_5 or $K_{3,3}$.
13. Let G be a graph and let u and v be non-adjacent vertices. Then show that χ (G) = {min(χ (G + (u,v)), χ (G.uv) }

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