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**D.K.M.COLLEGE FOR WOMEN (AUTONOMOUS), VELLORE-1**

**SEMESTER EXAMINATIONS**

**NOVEMBER - 2018 15CMA5E ELECTIVE III : GRAPH THEORY**

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SECTION-A (10 x 2 =20)

**Answer ALL the questions.**

1. *What is multigraph?*
2. *Define complete graph.*
3. *Define adjacency matrix.*
4. *Give a short note on incidence matrix.*
5. *When do you say that graph is connected?*
6. *Define block.*
7. *Prove that every hamiltonian graph is 2- connected.*
8. *State Chavatal theorem.*
9. *If G is a plane (p, q) graph with r faces and K components then prove that p – q + r = K+1.*
10. *Define colouring of the graph.*

SECTION-B (5 x 5 =25)

**Answer any FIVE of the following questions.**

1. *Prove that δ < < Δ.*
2. *Prove that any self complementary graph has 4n or 4n +1 points.*
3. *Write the adjacency and incidence matrices for the following graph.*

v1

x1 x4

x5

x63

v2 v4

v­3

x2 x3

1. *Prove that a graph G with p points and δ > is connected.*
2. *For any graph G, then show that K < λ < δ.*
3. *If G is a graph in which the degree of every vertex is at least two then prove that G*

*contains a cycle.*

1. *Prove that C(G) is well defined.*
2. *Prove that K5 is non – planar*.

SECTION-C (3 x 10 =30)

**Answer ALL the questions.**

1. *(a) Show that the maximum number of lines among all p point graphs with no triangle is .*

*(Or)*

*(b) If A is the adjacency matrix of a graph with V = {v1, v2, ….vp}, prove that for any n >1 the (i, j)th*

*entry of An is the number of vi-vj walks of length n in G.*

*20. (a) Explain in detail about operation on graphs.*

*(Or)*

*(b)* *Prove that a graph G with at least two points is bipartite if all its cycles are*

*of even length.*

1. *(a)* *Let G be a (p, q) graph. Then prove that the following statements are equivalent.*
2. *G is a tree.*
3. *Every two points of G are joined by a unique path.*
4. *G is connected and p = q + 1*
5. *G is acyclic and p = q + 1.*

*(Or)*

*(b) Prove that (Kn) = n if n is odd (n ≠ 1) and (Kn) = n – 1 if n is even.*

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