

**AVINASHILINGAM INSTITUTE FOR HOME SCIENCE AND
HIGHER EDUCATION FOR WOMEN
COIMBATORE – 641 403
MASTER'S DEGREE EXAMINATION-NOVEMBER 2017
SEMESTER I**

CLASS: I PG

TIME: THREE HOURS

MAJOR: MATHEMATICS

MAXIMUM MARKS: 60

17MMAC03 GRAPH THEORY

PART A

$$10 \times \frac{1}{2} = 5$$

Choose the Correct Answer

1. A graph with a finite number of vertices and edges is called -----
(a) Infinite Graph (b) Finite Graph (c) Trivial (d) Nontrivial
2. A vertex of degree one is called -----
(a) Isolated Vertex (b) Regular (c) Pendent Vertex (d) None of these
3. A closed walk in which no vertex appears more than once is called a -----
(a) Circuit (b) Walk (c) Path (d) Terminal
4. If there is at least one path between every pair of vertices in a graph G is called -----
(a) Disconnected (b) Open Walk (c) Closed Walk (d) Connected
5. ----- graph is always connected
(a) Peterson graph (b) Hamiltonian Graph (c) Euler Graph (d) Null Graph
6. A simple graph in which there exists an edge between every pair of vertices is called a -----
(a) Complete Graph (b) Connected Graph (c) Disconnected Graph (d) None of these
7. A tree without any vertices is called a -----
(a) Rooted Tree (b) Binary Tree (c) Null Tree (d) Free Tree
8. A vertex with minimum eccentricity in a graph G is called ----- of G.
(a) Radius (b) Rooted Tree (c) Center (d) Binary Tree
9. A edge connectivity of tree is -----
(a) Two (b) Three (c) One (d) Zero
10. Every branch of a spanning tree defines a -----
(a) Unique Fundamental Circuit (b) Basic Cut Set
(c) Minimal Cut Set (d) Unique Fundamental Cut Set

Answer the following

Each answer should not exceed 200 words or two page

11.(a) Show that the number of odd degree vertices in a graph is always even. (OR)

(b) Define the Following (i) Self Loop (ii) Parallel Edges (iii) Adjacent (iv) Isolated Vertex.

12.(a) Define the following with Examples: (i) Path (ii) Circuit (iii) Component (Or)

(b) Define the following with Examples: (i) Connected Graph (ii) Walk

(iii) Isomorphism

13.(a) Define the Following: (i) Euler Graph (ii) Unicursal Graph (iii) Union of Two Graph (Or)

(b) Define the Following: (i) Ring Sum (ii) Fusion (iii) Clique

14. (a) Show that every tree have either one or two centers. (Or)

(b) Show that every connected graph has atleast one spanning tree.

15. (a) Explain Fundamental Cutsets.(Or)

(b) Explain Separable Graph.

PART-C

EACH ANSWER SHOULD NOT EXCEED 600 WORDS OR THREE PAGES

Answer the following

16.(a) (i) Show that the sum of the degrees of all vertices in G is twice the number of edges in G.

(ii) Define the Following: (i) Self Loop (ii) Simple Graph (Or)

(b) Define the Following: (i) Finite Graph (ii) Pendant Vertex (iii) Null Graph

(iv) Degree.

17.(a) A graph G is disconnected if and only if its vertex set V can be partitioned in to two non empty disjoint subsets V_1 and V_2 such that there exist no edge in G whose one end vertex is in subset V_1 and the other in subset V_2 . (Or)(b) Show that a simple graph with n vertices and k components can have atmost $\frac{(n-k)(n-k-1)}{2}$ edges.

18.(a) If G is a given connected Graph. State and prove the necessary and sufficient condition for G to be Euler. (Or)

(b) Prove that G is a complete graph with n vertices there are $\frac{(n-1)}{2}$ edge disjoint Hamiltonian circuits, if n is odd number edge disjoint Hamiltonian circuits, if n is odd number ≥ 3 19.(a) Show that a tree with n vertices has $n - 1$ edges.(Or)(b) Define binary tree. If n is the number of binary tree then show that n is odd. If p is the number of pendent vertices of a binary tree then show that $p = \frac{n-1}{2}$

20.(a) Show that every cutset in a connected graph G must atleast one branch of every spanning tree of G.(Or)

(b) Let T be that spanning tree of a given graph G. Show that a chord C: that determines a fundamental circuit Γ occurs in every fundamental cutset associated with the branches in Γ and in no other.