SUB.CODE: 18UMM6M2A

REG.NO:

DHANALAKSHMI SRINIVASAN COLLEGE OF ARTS & SCIENCE FOR WOMEN (AUTONOMOUS)

(For Candidates admitted from 2018-2019 onwards)

UG DEGREE EXAMINATIONS APRIL - 2021

B.Sc., - MATHEMATICS

GRAPH THEORY

Time: 3 Hrs **Max.Marks: 75**

PART - A

CHOOSE THE CORRECT ANSWER **(10X1=10)**

1. A graph is a collection of
   a) Rows and Columns b) Vertices and Edges
   c) Equations d) None of these
2. A graph with all vertices having equal degree is known as a
   a) Regular graph b) Simple graph
   c) Complete graph d) Connected graph
3. The adjacency matrix A is
   a) Incidence matrix b) Skew Symmetric Matrix
   c) Symmetric Matrix d) Ad joint Matrix
4. A closed walk of odd length contains a
   a) Trail b) Path c) Cycle d) All of the above
5. Every Hamiltonian graph is
   a) Component b) 3- Connected c) 1- Connected d) 2- Connected
6. A graph G is called a ---------- if it is a connected acyclic graph.
   a) Spanning Tree b) Tree c) Centre d) Connected
7. A graph that is drawn on the plane without intersecting edges is called a
   a) Plane graph b) Planar graph c) Non-Planar d) None of these
8. A Connected planar graph having 6 vertices, 7 edges contains --------regions.
   a) 15 b) 3 c) 1 d) 11
9. Two digraphs $D_1 = (V_1, A_1)$ and $D_2 = (V_2, A_2)$ are said to be
   a) In-degree b) Out Degree c) Sub Digraph d) Isomorphic
10. Kruskal's Algorithm is used to
    a) Minimum spanning tree b) Shortest Path c) Weighted graph d) None of these

PART - B

ANSWER ALL THE QUESTIONS **(5X7=35)**

11. a) Prove that any self complementary graphs have $4n$ or $4n + 1$ points.

(OR)

b) A set $S \subseteq V$ is an independent set of G iff $V - S$ is a covering of G.

12. a) Write the incidence and adjacency matrices for the graphs with example.

(OR)

b) Write the Operations on Graphs.

13. $a)$ $C(G)$ Is well defined

(OR)

b) Every Connected graph has a spanning tree

14. a) Prove that the graphs K_5 and $K_{3,3}$ is not planar.

(OR)

b) If a (p_1, q_1) graph and a (p_2, q_2) graph are homemorphic then $p_1 + q_2 = p_2 + q_1$

15. a) If two graphs are isomorphic then corresponding points have the same degree pair.

(OR)

b) Write the Kruskal's Algorithm with example

PART - C

ANSWER ANY THREE QUESTIONS **(3X10=30)**

16. The maximum number of lines among all p point graphs with no triangles is $\left[\frac{p^2}{4}\right]$

17. The following statements are equivalent for 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.

18. Show that, The Peterson graph is non-Hamiltonian

19. Prove that, If G is a connected plane graph having V, E and F as the sets of vertices, edges and faces respectively, then $|V| - |E| + |F| = 2$.

20. Write the Shortest Path problem with example.