H Roll No. ....

TMA–301

B. TECH. (CSE) (THIRD SEMESTER)

MID SEMESTER EXAMINATION, 2019

FUNDAMENTALS OF GRAPH THEORY AND DISCRETE MATHEMATICS

Time : 1 : 30 Hours

Maximum Marks : 50

Note : (i) This question paper contains two Sections.

(ii) Both Sections are compulsory.

Section—A

1. State True-False : (1×5=5 Marks)

   (a) A given connected graph is Euler if and only if all vertices are of odd degree.

   (b) The sum of degrees of all vertices is twice the number of vertices.

   (c) There is one and only one path between a pair of vertices in a tree.

   (d) Every Euler graph is a Hamiltonian graph.

(e) A connected graph can have more than one minimal spanning tree.

2. Attempt any *five* parts : (3×5=15 Marks)

(a) Define path, circuit and trail with example.

(b) What is a cutset ? Explain vertex connectivity and edge connectivity with example.

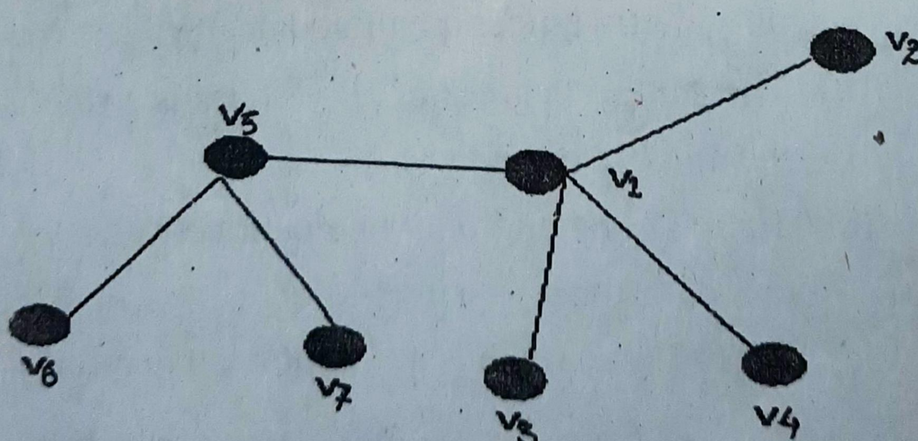
(c) What is planar graph ? Show that $K_{2.5}$ is planar.

(d) Draw the following Graph :

K_6, W_9 and C_6.

(e) What is a Complete Binary Tree ? Explain with example.

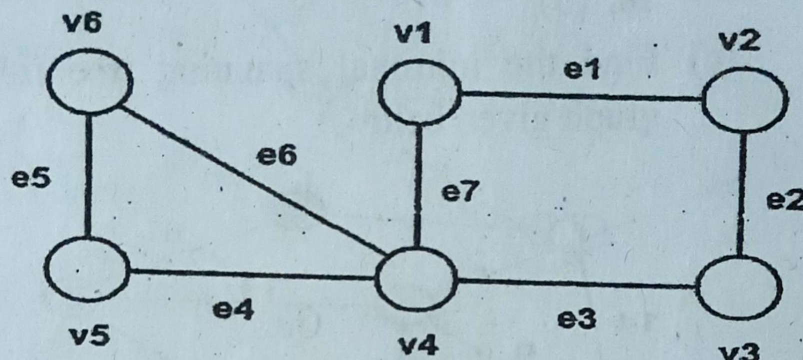
(f) Find the centre, radius and diameter of the Tree given below :



Section—B

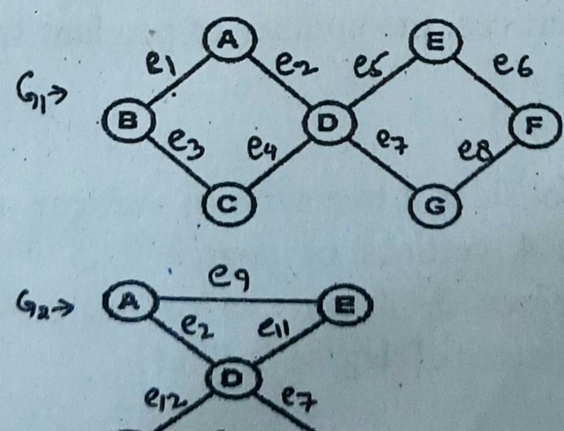
3. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) Find the Adjacency and Incidence matrix for the graphs given below :



(b) Prove that the number of vertices of odd degree in a graph is always even.

(c) Find the Union, Intersection, Ring sum and complement of the graphs given below :



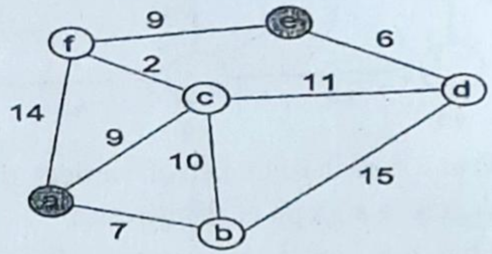
4. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) Prove that every tree has one or two centres.

(b) Draw a Binary search tree with the following keys :

(20, 15, 14, 12, 25, 10, 9, 12, 30, 23, 28, 13)

(c) Find the minimal spanning tree for the graph given below :



5. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) Prove that in a full binary tree with n vertices, the number of pendant vertices is $\frac{n+1}{2}$.

(b) Consider a tree with n_1 vertices of degree 1, 4 vertices of degree 2, 5 vertices of degree 3, 3 vertices of degree 4 and 6 vertices of degree 5. Find n_1.

(c) Find the shortest path from vertex V_1 to V_6 using Dijkstra's algorithm.