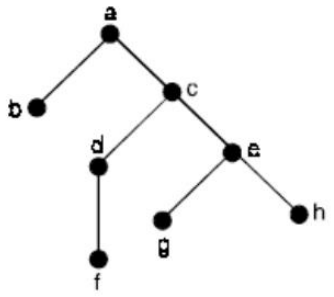
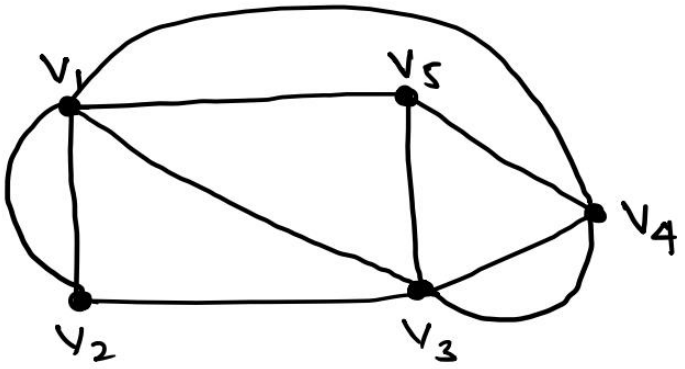
MA2101 Engineering Mathematics-III (common for CSE, CCE and IT)
Assignment III
(Graph Theory II)

1. A tree has five vertices of degree 2, three vertices of degree 3 and four vertices of degree 4. How many vertices of degree 1 does it have?
2. If a binary rooted tree has 17 number of vertices, then how many pendent vertices are there? Justify your answer.
3. Let V = $\{v_1, v_2, v_3, v_4, v_5, v_6, v_7, v_8, v_9, v_{10}\}$ be the set of vertices and let E = $\{(v_2, v_3), (v_2, v_1), (v_4, v_5), (v_4, v_6), (v_5, v_8), (v_6, v_7), (v_4, v_2), (v_7, v_9), (v_7, v_{10})\}$ be the set of edges. Show that the graph G (V, E) is a rooted tree and identify the root.
4. Consider the rooted tree in following Figure

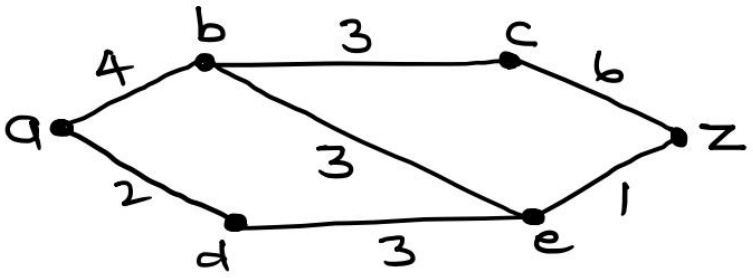


(a)What is the root of T ?
(b) Find the leaves and the internal vertices of T.
(c) What are the levels of c and e.
(d) Find the children of c and e.
(e) Find the descendants of the vertices a and c.

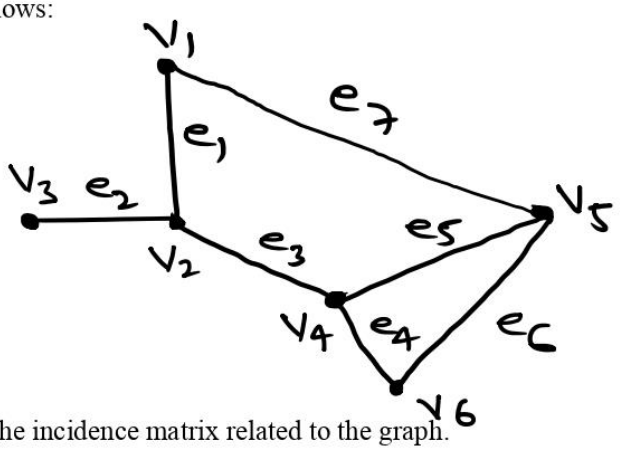
6. Find the adjacency matrix of the graph given below:



5. Find the length of the shortest path between **a** and **z** in the following weighted graph by Dijkstra's Algorithm.



6. Given a graph G (V, E) whose vertices and edges are labelled , it can be represented as follows:

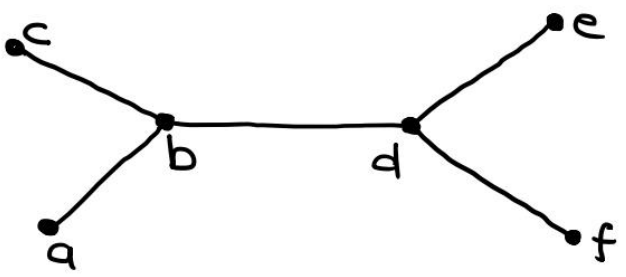


Find the incidence matrix related to the graph.

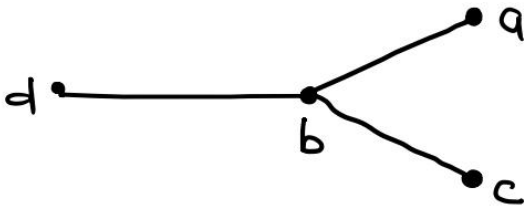
7. Is there exist a graph G that corresponding to the following incidence matrix? Justify your answer.

$$\begin{bmatrix} 1 & 0 & 1 & 1 & 1 & 0 \\ 0 & 1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 1 & 1 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 & 1 \end{bmatrix}$$

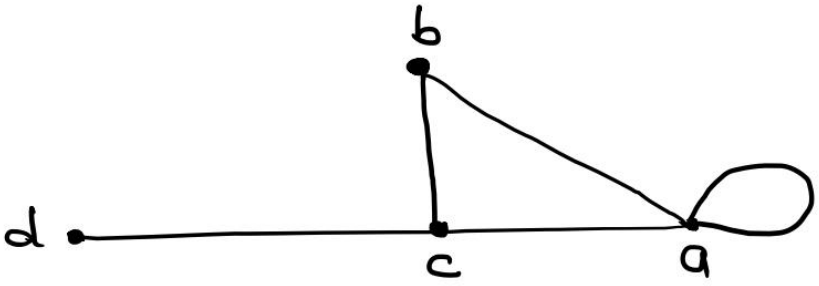
8. Find the centre of the graph G.



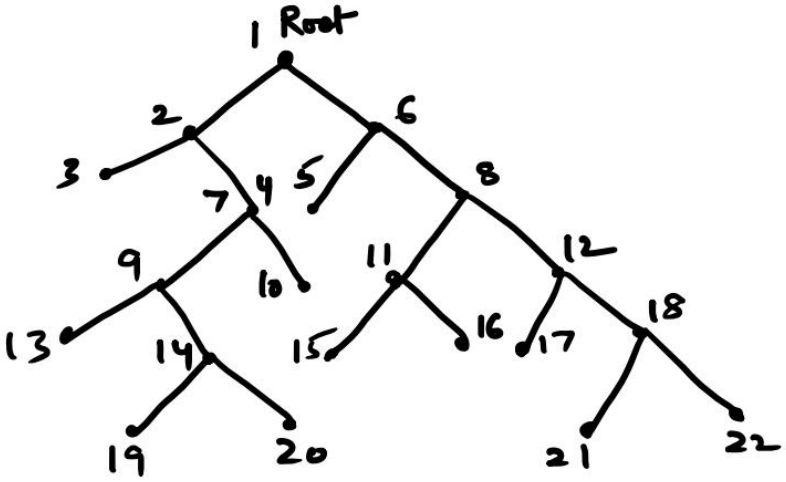
9. In the graph G, find the eccentricity of each vertex and the centre of the graph.



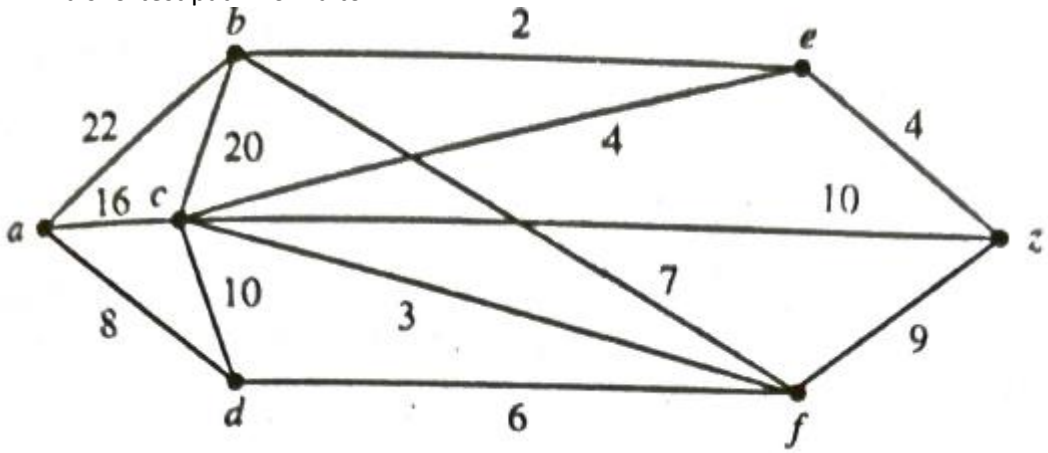
10. For the following graph find the centre, radius, and diameter of the graph.



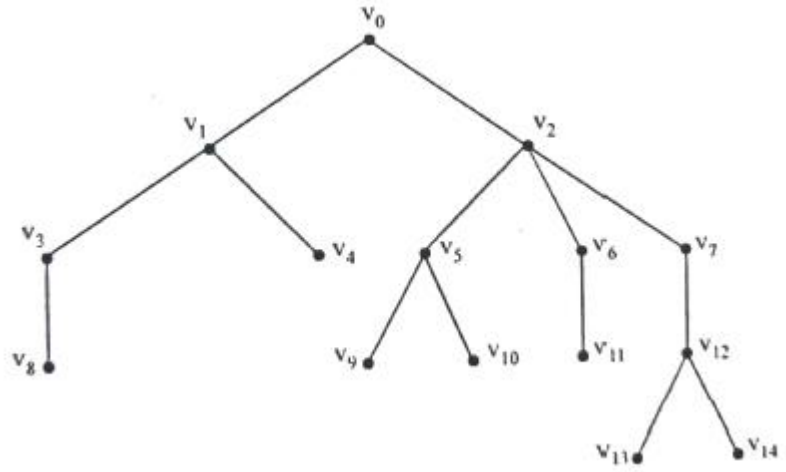
11. Find the path length of the following binary tree.



12. Find shortest path from a to z.



13. Find the path length from its roots to each of the vertices v_1, v_6, v_8, v_{13}.



14. For the binary tree

(i) find the level of each vertex

(ii) find the height or depth of each vertex

(iii) list the children of each vertex.