MANIPAL UNIVERSITY
JAIPUR
(University under Section 2(f) of the UGC Act)

FIRST STATE PRIVATE UNIVERSITY IN RAJASTHAN
A+ NAAC
3.28 SCORE

B.TECH. SECOND YEAR

(III SEM. CSE/IT/CCE)

ACADEMIC YEAR: 2020-2021

COURSE NAME: ENGINEERING MATHEMATICS III

COURSE CODE : MA 2101

LECTURE SERIES NO : UNIT-III (LECTURE NO. 14- 22)

CREDITS : 3

MODE OF DELIVERY : ONLINE (POWER POINT PRESENTATION)

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MANIPAL UNIVERSITY
JAIPUR

VISION

Global Leadership in Higher Education and Human Development

MISSION

- Be the most preferred University for innovative and interdisciplinary learning
- Foster academic, research and professional excellence in all domains
- Transform young minds into competent professionals with good human values

VALUES

Integrity, Transparency, Quality,
Team Work, Execution with Passion, Humane Touch

SESSION OUTCOME

"TO UNDERSTAND THE CONCEPT OF TREES AND APPLY THE TREE ALGORITHMS TO ANALYZE THE SHORTEST PATH PROBLEMS"

ASSIGNMENT

QUIZ

MID TERM EXAMINATION –I & II

END TERM EXAMINATION

ASSESSMENT CRITERIA

PROGRAM OUTCOMES MAPPING WITH CO3

PO1

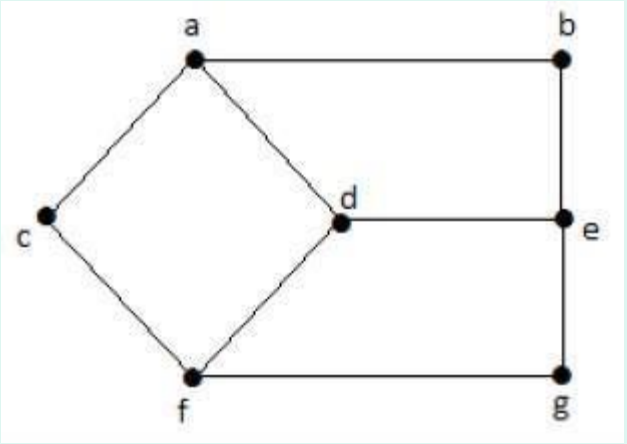
ENGINEERING KNOWLEDGE: APPLY THE KNOWLEDGE OF MATHEMATICS, SCIENCE, ENGINEERING FUNDAMENTALS, AND AN ENGINEERING SPECIALIZATION TO THE SOLUTION OF COMPLEX ENGINEERING PROBLEMS.

Distance & Centre

Example
Take a look at the following graph −

Here, the distance from vertex ‘d’ to vertex ‘e’ or simply ‘de’ is 1 as there is one edge between them. There are many paths from vertex ‘d’ to vertex ‘e’ −

•da, ab, be
•df, fg, ge
•de (It is considered for distance between the vertices)
•df, fc, ca, ab, be
•da, ac, cf, fg, ge



Eccentricity of a Vertex

The maximum distance between a vertex to all other vertices is considered as the eccentricity of vertex.

Notation : e(V)

The distance from a particular vertex to all other vertices in the graph is taken and among those distances, the eccentricity is the highest of distances.

Eccentricity of a Vertex

Example

In the above graph, the eccentricity of ‘a’ is 3.

The distance from ‘a’ to ‘b’ is 1 (‘ab’),

from ‘a’ to ‘c’ is 1 (‘ac’),

from ‘a’ to ‘d’ is 1 (‘ad’),

from ‘a’ to ‘e’ is 2 (‘ab’-‘be’) or (‘ad’-‘de’),

from ‘a’ to ‘f’ is 2 (‘ac’-‘cf’) or (‘ad’-‘df’),

from ‘a’ to ‘g’ is 3 (‘ac’-‘cf’-‘fg’) or (‘ad’-‘df’-‘fg’).

So the eccentricity is 3, which is a maximum from vertex ‘a’ from the distance between ‘ag’ which is maximum.

In other words,

e(b) = 3, e(e) = 3

e(c) = 3, e(d) = 2

e(f) = 3, e(g) = 3.

Radius of a Connected Graph

The minimum eccentricity from all the vertices is considered as the radius of the Graph G. The minimum among all the maximum distances between a vertex to all other vertices is considered as the radius of the Graph G.

Notation: r(G)

From all the eccentricities of the vertices in a graph, the radius of the connected graph is the minimum of all those eccentricities.

Example

In the above graph r(G) = 2, which is the minimum eccentricity for ‘d’.

Diameter of a Graph

The maximum eccentricity from all the vertices is considered as the diameter of the Graph G. The maximum among all the distances between a vertex to all other vertices is considered as the diameter of the Graph G.

Notation: d(G) − From all the eccentricities of the vertices in a graph, the diameter of the connected graph is the maximum of all those eccentricities.

Example

In the above graph, d(G) = 3; which is the maximum eccentricity.

Centre

Central Point

If the eccentricity of a graph is equal to its radius, then it is known as the central point of the graph. If

e(V) = r(V),

then ‘V’ is the central point of the Graph ’G’.

Example

In the example graph, ‘d’ is the central point of the graph.

e(d) = r(d) = 2

Centre

The set of all central points of ‘G’ is called the centre of the Graph.

Example

In the example graph, {‘d’} is the centre of the Graph.

Summary

- The eccentricity ecc(v) of v in G is the greatest distance from v to any other node.
- The radius rad(G) of G is the value of the smallest eccentricity.
- The diameter diam(G) of G is the value of the greatest eccentricity.
- The center of G is the set of nodes v such that ecc(v)=rad(G).