Enrolment No. 21MCA026

MCA 2nd Semester Mid-Term Examination, 2022
Subject: - GRAPH THEORY AND COMBINATORICS
Paper Code: - PCA02C10

Total Marks:-20 **Time: 1:00 hour**

Attempt all the questions

GROUP A

[1 X 4 = 4]

1. Can a graph exist with all edges and no vertices?
2. Define a "Complete Graph".
3. What do you mean by "Eccentricity"?
4. Show that every self-loop is a circuit but not all circuits are self-loops.

GROUP B

[2 X 4 = 8]

5. Differentiate between Euler Graph and Hamiltonian Graph.
6. Prove that "the number of vertices of odd degree in a graph is always even".
7. Is it possible to construct a graph with 12 vertices such that 2 vertices are of degree 3 and remaining having degree 4?
8. With suitable diagram show the "fusion operation" on a graph.

GROUP C

[4 X 2 = 8]

9. Given four cubes are variously coloured with Yellow, Blue, Green and Red. Is it possible to stack the cubes one on top of another to form a column such that no colour appears twice on any of the four sides of this column?

	B			B			B			B	
Y	R	G	Y	Y	G	G	Y	R	R	Y	G
	R			R			B			Y	
	R			B			G			R	

10. Show that the radius in a tree is not necessarily half its diameter. Explain with proper diagram when the diameter is equal to twice the radius?

Marks Division

Question	1	2	3	4	5	6	7	8	9	10
Marks	1	1	1	1	2	2	2	2	4	4

3412
1342

Enrolment No. | | | | | | | |

MCA 2nd Semester End-Term Examination, 2022
Subject: - GRAPH THEORY AND COMBINATORICS
Paper Code: - MCA02C10

Total Marks:-50 **Time: 2:00 hours**

Attempt all the questions

GROUP A – 10 Marks

1. "All complete graphs are regular but not all regular graphs are complete"- explain why? [2]
2. Define "Handshaking dilemma" with appropriate diagram. [2]
3. Draw a suitable graph and find the following from it:
   a) Directed walk b) Semi path [2]
4. Define Series edges with appropriate diagram. [2]
5. Why parallel edges are not allowed in adjacency matrix? [2]

GROUP B – 20 Marks

6. a) What is fundamental cut set and how is it formed? [3]
   b) Differentiate between block and component. [2]
7. a) A connected graph has 9 vertices having degrees 2, 2, 2, 3, 3, 3, 4, 4 and 5. Determine the number of edges and regions in that graph. [2]
   b) Define thickness and crossing. [3]
8. a) Discuss the properties of K_5 and $K_{3,3}$ graphs. [4]
   b) What is a cut vertex? [1]
9. a) Draw the Geometric Dual of the following graph. [2]

   b) Define Path Matrix with appropriate diagram. [3]

P.T.O.