Roll No.

PRESIDENCY UNIVERSITY
BENGALURU

Department of Research & Development
Mid - Term Examinations - SEPTEMBER 2024

Odd Semester: Ph.D. Course Work	**Date**: 28 /09/2024
Course Code: MAT807	**Time**: 2:00pm – 3:30pm
Course Name: Algebraic Graph Theory	**Max Marks**: 50
Department: Mathematics	**Weightage**: 25%

Instructions:
(i) Read all questions carefully and answer accordingly.
(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 5 marks.		4Qx5M=20M
1	Define Euclidean spaces and vector spaces with suitable example	**5 Marks**
2	Show that two graphs are almost cospectral if and only if for each $k \in N$, they have the same number of closed walks of length k.	**5 Marks**
3	What is the relationship between Star sets, Star partition and Star complement	**5 Marks**
4	If H is a disconnected graph with at least three components, then show that the characteristic polynomial of H is determined uniquely by P(H).	**5 Marks**

Part B

Answer ALL Questions. Each question carries 15 marks.		2QX15M=30M
5	a) Prove that Any line graph L(G) satisfies $\lambda(L(G)) \geq -2$. b) State and prove Reconstruction theorem with a suitable Example.	**15 Marks**
6	If n is a positive integer and k is a divisor of n, then the prove that maximum number of 1-factors of k-regular nxn bipartite graph is $(k!)^{n/k}$.	**15 Marks**