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21MAT3G1CL

Sl. No.

M.Sc. III Semester Degree Examination, April/May - 2024

MATHEMATICS

GEC-Graph Theory

(NEP)

Time : 1 Hour Maximum Marks : 30

Note : *Answer* ***all*** *the questions.*

SECTION - A

Answer **all** the following questions, each question carries **one** mark. **5x1=5**

1. (a) Define a path and give an example.

(b) Find all spanning subgraph of K_3.

(c) Give an example of Eulerian cycle.

(d) Define Hamiltonian graph with an example.

(e) How many vertices are in a tree with 26 edges ?

SECTION - B

Answer **any five** of the following questions, each question carries **two** marks. **2x5=10**

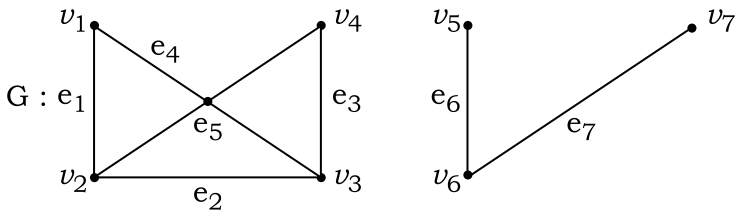
2. Show that in any graph G, the number of vertices of odd degree is even.

3. Prove that every connected graph contains a spanning tree.

4. Prove that a graph G with P vertices and $\delta \geq \frac{P-1}{2}$ is connected.

5. Give an example of a graph which is Hamiltonian but not Eulerian.

6. Find the incidence matrix of the following disconnected graph.



7. Draw all complete bipartite trees with $4 \leq P \leq 6$ vertices.

8. If G is a tree and if any two nonadjacent vertices of G are joined by an edge e, then show that G+e has exactly one cycle.

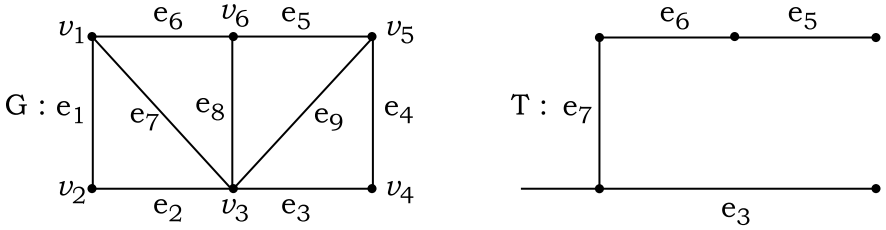
P.T.O.

SECTION - C

Answer **any three** of the following questions, each question carries **five** marks. **3x5=15**

9. Define centroids. Prove that every tree has a centre consisting of either one vertex or two adjacent vertices.

10. Write all fundamental cycles of connected graph G with respect to a spanning tree T as shown in fig.



11. A connected graph G is Eulerian if and only if the set of edges of G can be partitioned into cycles.

12. State and prove Kruskal's Algorithm.

13. Write a short note on shortest-path problems.

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