10/4/'23

K23U 0517

Reg. No. : ....

Name : ....

VI Semester B.Sc. Degree (CBCSS – OBE – Regular/Supplementary/ Improvement) Examination, April 2023
(2019 and 2020 Admissions)
DISCIPLINE SPECIFIC ELECTIVE IN MATHEMATICS
6B14A MAT : Graph Theory

Time : 3 Hours

Max. Marks : 48

PART – A

Answer **any 4** questions. **Each** question carries **one** mark.

1. Define Graph.

2. Define connectivity of a graph.

3. Draw a 3-regular graph.

4. Define Euler tour.

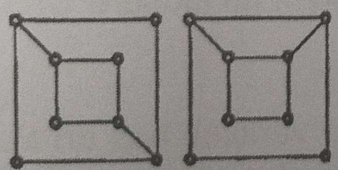
5. What is meant by adjacency matrix of a graph ?

PART – B

Answer **any 8** questions. **Each** question carries **two** marks.

6. Define union and intersection of sub graphs of a graph.

7. Are the following graphs isomorphic ? Justify your answer.



P.T.O.

8. Find the number of vertices in a complete graph with 55 edges.

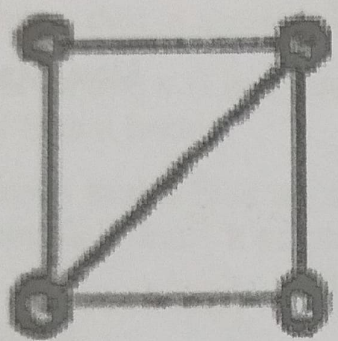
9. Draw all trees with 5 vertices.

10. Define platonic bodies.

11. Define walk. Give one example.

12. Explain Chinese Postman Problem.

13. State Euler's formula. Verify the formula in the following graph.



14. What is meant by closure of a graph ?

15. Draw a complete bipartite non planar graph.

16. Find the number of distinct spanning trees in the complete graph K_5.

PART – C

Answer **any four** questions. **Each** question carries **four** marks.

17. State **True** or **False**. Graphs are natural mathematical models. Justify your answer.

18. Prove that a connected graph is a tree if and only if every edge of G is a bridge.

19. Prove that a simple graph G is Hamiltonian if and only if its closure C(G) is Hamiltonian.

20. Prove that a connected graph G with at most two odd vertices has an Euler trail.

21. Let G be a graph with n vertices. Prove that if G is a connected graph with $n - 1$ edges then G is a tree.

22. a) Define Jordan curve. Give one example.
    b) State Jordan curve theorem.

23. Explain contraction with example.

PART – D

Answer **any two** questions. **Each** question carries **six** marks.

24. Prove that a tree with n vertices has precisely $n - 1$ edges.

25. a) State and prove the first theorem of graph theory.
    b) Prove that every graph has an even number of odd vertices.
    c) Let G be a k-regular graph, where k is an odd number. Prove that the number of edges in G is a multiple of k.

26. Prove that a connected graph is Euler iff the degree of every vertex is even.

27. Prove that k_5, the complete graph on five vertices, is non planar.