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GIET UNIVERSITY, GUNUPUR – 765022
M. Sc (Fourth Semester) Examinations, May – 2021
MTPC 401 – GRAPH THEORY
(MATHEMATICS)

Time: 2 hrs   Maximum: 50 Marks

(The figures in the right hand margin indicate marks.)

PART – A   **(2 x 10 = 20)**

Q.1. Answer **ALL** the questions
  a. Define isomorphism on graphs and give an example
  b. Define join of two graphs and give an example
  c. Define a unicyclic graph and draw this graph on 9 vertices
  d. Define a weighted graph and draw such a graph on 6 vertices
  e. Define closure of a graph
  f. Define line graph of G and draw the line graph of $K_{2,3}$.
  g. Define a Jordan curve and draw a curve which is not a Jordan curve.
  h. Define a maximal non-Hamiltonian graph and give an example of such graph on 4 vertices
  i. If G is an acyclic graph with n vertices and k- components, show that it has n-k edges
  j. Define a complete n-partite graph.

PART – B   **(6× 5 = 30 Marks)**

Answer *ANY FIVE* questions   Marks

2. **S**how that a nonempty graph with at least two vertices is bipartite if and only if it has no odd cycles (6)

3. Show that for any two vertices u and v of a graph G, every u-v walk contains a u-v path (6)

4. With usual notations prove that $\omega(G) \le \omega(G\text{-}e) \le \omega(G+1)$ where e is an edge of G (6)

5. If T is a tree with n vertices show that it has exactly n-1 edges (6)

6. Prove that a connected graph is Euler graph if and only if the degree of every vertex is even (6)

7. If G is a graph with at least three vertices prove that G is 2-connected if and only if for every pair of distinct vertices u and v of G, there are two internally disjoint u-v paths in G (6)

8. If G is a simple graph with n vertices where n ≥ 3 and degree $d(v) \ge n/2$ for each vertex v of G Show that G is Hamiltonian (6)

9. Show that the complete graph K_5, on five vertices is nonplanar (6)

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