GRAPH THEORY

time : Three Hours   Maximum : 75 Marks

SECTION-A (20 Marks)
- ■   Answer ALL' questions
ALL questions carry EQUAL marks .   (1 0 x 2 = 20)

1   Define simple graph.
2   Give an example for disconnected graph.
3   Define binary tree.
4   Define spanning tree.
-5 What do you mean by planar graph?   -
6   Draw the Luratowski's second graph.
7   Define Adjacency matrix.
8   State any two properties of incidence matrix.   -
9   Define directed graph.
10   Define Euler diagraph.

SECTION - B (25 Marks)
Answer ALL Questions
ALL Questions Carry EQUAL Marks (5 x 5 = 25)

11 a Prove that the number of vertices of odd degree in a graph is always even.
OR
   b Prove that if a graph (connected (or). disconnected) has exactly two
      . vertices of odd degree then there must be a path joining these two vertices.

12 .a Prove that there is one and only one path between every pair of vertices in a tree.
OR
   b Prove that a graph is a tree iff it is minimally connected.

13 a Write the properties common to the two graphs of Kuratowski.
OR
   b Write the steps involved in elementary reduction.

14 a If B is a circuit matrix of connected graph G with e edges and n vertices
      then prove that rank of B = e^{n+1} ,
OR
   b • Write the properties of path matrix.

15 a Explain different types of connected digraphs.
.OR
   b Define symmetric digraph and completed digraph..

.^{T} ### SECTION - C (30 Marks)
Answer any THREE Questions
ALL Questions Carry EQUAL Marks (3 x 10 = 30)

16   Prove that a given connected graph G is an Euler graph iff all vertices of G
      are of even degree.   '   *

17   Prove that a tree with n vertices has n-1 edges. .

18   State and prove Euler's formula.

19   Prove that if A(G) is an incidence matrix of a connected graph G with n
      vertices then the rank of A(G) is n-1.

20   Write the properties of the adjacency matrix of a Digraph.