

## M-603: GRAPH THEORY

TIME :2:30  
HOURSTOTAL  
MARKS:70INSTRUCTIONS: (1) All questions are compulsory.  
(2) Each question carries equal marks.

- Q.1 A Give Definitions of Following with example: [8]  
Pendant vertex , Simple Graph , Regular Graph , Loop
- B Obtain the no. of edges in a complete graph  $K_n$  . [6]  
OR
- Q.1 A Prove that in any graph G, the no. of odd vertices is even. [7]  
B State and prove Graph theory's first theorem [7]
- Q.2 A Prove that : Every tree with two or more than two vertex is a 2-cromatic graph [7]  
B State and prove necessary and sufficient condition for the graph G to become a disconnected graph. [7]  
OR
- Q.2 A Draw complete graph  $K_5$ , obtain spanning tree for graph  $K_5$  ,also obtain rank and nullity of it using spanning tree [4]  
B Give Definitions with example: Intersection Graph , Walk , Spanning tree , Unicrusal Graph , Hamiltonian path [10]
- Q.3 A Prove that in a tree there is exactly one path between any two different vertices [7]  
B Prove that in a tree with n vertices has the no. of edges n-1. [7]  
OR
- Q.3 A Write down properties of binary tree. [7]  
B State and prove necessary and sufficient condition for the covering g of graph G to become a smallest covering. [7]
- Q.4 A State and prove Euler's formula for planer graph. [7]  
B Prove that  $K_5$  is non planer graph. [7]  
OR
- Q.4 A Prove that Kuratowski's second graph is non planer graph. [7]  
B For simple connected graph prove that :  $\frac{3f}{2} \leq e \leq 3n-6$  [7]
- Q.5 A Prove that there is no cut vertex in circuit. [7]  
B Prove that  $W_T$  is sub space of vector space  $W_G$ . [7]  
OR
- Q.5 A Give the method to obtain minimal Decyclization of directed graph. [7]  
B Prove that  $W_s$  is sub space of vector space  $W_G$ . [7]