B.Sc. DEGREE EXAMINATION,ODD SEMESTER 2020
III Year V Semester
GRAPH THEORY

Max.marks :25

Answer any **FIVE** questions $(5 \times 5 = 25)$ Marks

1. Define induced sub graph, edge induced sub graph and spanning sub graph.

2. If G is a Hamiltonian graph, prove that $\omega(G-S) \le |S|$, for every non-empty subset S of V(G).

3. Prove that a graph G is a tree if and only if every two vertices of G are connected by a unique path.

4. Prove that A graph is planar if and only if it contains no contraction of K_5 or $K_{3,3}$.

5. Prove that there exists a k-colouring of a graph G if and only if V(G) can be partitioned into k subsets $V_1, V_2, \ldots, V_k$ such that no two vertices in V_i, $i=1, 2, \ldots, k$ are adjacent.

6. Prove that a vertex v in a connected graph G is a cut-vertex if and only if there exist vertices u and w $(\ne v)$ such that every path connecting u and w contains v.

7. Let $A= [a_{ij}]$ be the adjacency matrix of a graph G. Prove that (i, j)th entry $[A^n]_{ij}$ in A^n is the number of walks of length n from v_i to v_j .