



Shree H.N. Shukla College of Science Rajkot

MATHEMATICS

T.Y.B.Sc. (Sem. VI) (CBCS)

UNIT TEST

PAPER- 601

Graph Theory

Time: 1 hour]

[Total Marks: 30

Instruction: (i) All questions are compulsory.

(ii) Figures to the right indicate full marks of the question.

1. (A) Answer the following: [05]

- (1) Define: Regular graph
- (2) Find the Nullity of connected graph with 4 vertices and 8 edges.
- (3) Write the number of internal vertices in a binary tree with 13 vertices.
- (4) How many edges are there in K_5 graph?
- (5) What is the degree of an isolated vertex in a graph?

(B) Attempt any one: [02]

- (1) Define: (i) Path (ii) Hamiltonian circuit
- (2) Prove that the number of vertices n in a binary tree is always odd.

(C) Attempt any one: [03]

- (1) Prove that a graph is a tree iff it is minimally connected.
- (2) State and prove first theorem of graph theory.

(D) Attempt any one: [05]

- (1) Explain Konigsberg Bridge Problem.
- (2) State and prove Euler theorem.

2. (A) Answer the following: [05]

- (1) Write the chromatic number of a complete graph with 5 vertices.
- (2) Define: Acyclic Digraph
- (3) Define: Chromatic number of graph
- (4) Every edge in Incidence Matrix of exactly _____ vertices.
- (5) Define: Circuit vector

(B) Attempt any one: [02]

- (1) Define: Path Matrix
- (2) Prove that Number of vertices in binary tree is odd.

(C) Attempt any one: [03]

- (1) A connected simple planar graph G with n -vertices, e -edges and f -region then prove that (i) $e \geq \frac{3}{2}f$
(ii) $e \leq 3n - 6$
- (2) Prove that every tree with two or more vertices is 2-chromatic.

(D) Attempt any one: [05]

- (1) Define: Adjacency Matrix and state its properties
- (2) Prove that a connected planar graph with n -vertices and e -edges has $e-n+2$ regions.

******BEST OF LUCK******