

14816 A

Name:

Reg.No.



SIXTH SEMESTER B.TECH (ENGINEERING) DEGREE
EXAMINATION, DECEMBER 2010

CS 2K 603 - GRAPH THEORY AND COMBINATORICS

Time: Three Hours

Maximum: 100 Marks

Answer all questions.

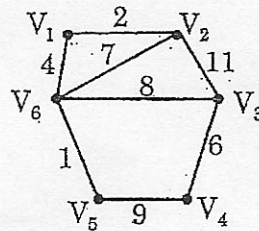
PART - I

1. Prove that there is one and only one path between every point if vertices in a tree.
2. State the principle of Inclusion and Exclusion.
3. Define adjacency matrix and incidence matrix of a graph.
4. Define (a) Binary tree and (b) Spanning tree.
5. Give an example of (a) A simple graph; (b) A pseudo graph; and (c) A multigraph.
6. Define a tree. Write any three properties of it.
7. Find the particular solution of $a_n + 2 - 4a_n + 1 + 4a_n = 3n + 2^n$.
8. There are twelve students in a class. Find the number of ways that the twelve students take three different tests if four students are to take each test.

(8×5=40)

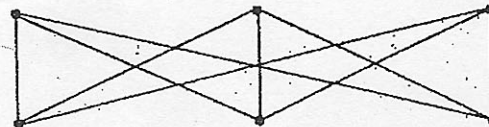
PART - II

1. (a) Find the minimal spanning tree for the following graph using Kruskal's algorithm.



(Or)

- (b) What do you mean by chromatic number and chromatic polynomial of a graph. Hence find the chromatic polynomial of the graph given below:



2. (a) Prove that if G is a connected planar graph then $|V| - |E| + |R| = 2$, where
 $|V|$ denotes the number of vertices in G,
 $|E|$ denotes the number of edges in G,
 $|R|$ denotes the number of regions in G

- (b) Show that $K_{3,3}$ satisfies the inequality $|E| \leq 3|V| - 6$, but it is non-planar.

(Or)

- (c) Prove that if a graph G has more than two vertices of odd degree, then there can be no Euler path in G .
- (d) In a complete graph with n vertices, prove that there are $(n-1)/2$ edge disjoint Hamiltonian cycles if n is an odd number ≥ 3 .

3. (a) Solve the recurrence relation:

$$a_{n+2} - 2a_{n+1} + a_n = 2^n; a_0 = 2$$

$$a_1 = 1$$

(b) Find the particular solution of $a_{n+3} + a_{n+2} - 8a_{n+1} - 12a_n = 2^n$

(Or)

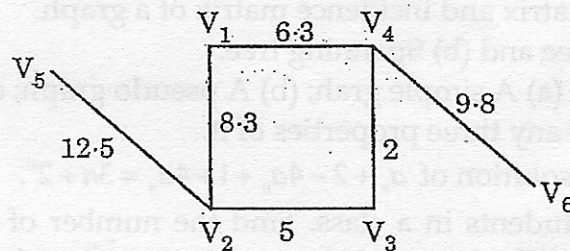
(c) Solve by method of generating function $a_{n+2} - 5a_{n+1} + 6a_n = 2; a_0 = 1, a_1 = 2$.

(d) Solve $a_{n+2} - 3a_{n+1} + 2a_n = 0; a_0 = 2, a_1 = 3$ by method of generating function.

4. (a) Prove that a non-directed graph G is connected if and only if G contains a spanning tree.

(Or)

(b) Consider the graph shown in the following figure :-



Find the minimal spanning tree and its weight.

(4×15=60)
