D 51644 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2008

IT 04 505 – GRAPH THEORY AND COMBINATORICS

(2004 admissions)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

I. (a) Distinguish between Planar graph and Euler graph.

(b) What do you mean by Chinese Postman problem.

(c) Define a tree. Write any two properties of it.

(d) Distinguish between sorted trees and weighted trees.

(e) State the principle of Inclusion and Exclusion with an example.

(f) Generate the recursive formula for derangement using the principle of inclusion – exclusion.

(g) Define generating function and exponential generating function.

(h) Solve $a_n + a_{n-1} = 0; a_0 = 1$.

(8 × 5 = 40 marks)

II. (a) Prove that a graph with n vertices has a Hamiltonian path if the sues of degrees of every pair of vertices v_i, v_j in G satisfies the condition $d(v_i) + d(v_j) \geq n - 1$

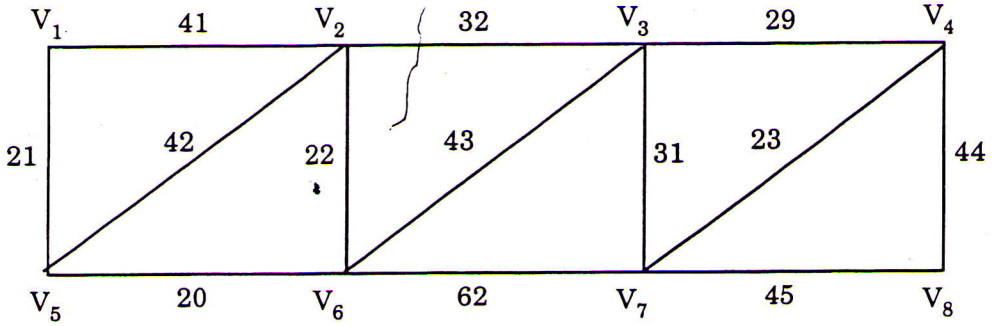
Or

(b) State and prove Euler's formula.

III. (a) State and prove max–flow–min–cut theorem.

Or

(b) Find the minimal spanning tree using Kruskal's algorithm.



IV. (a) State binomial theorem. Prove that :–

$$nC_0 + {}_{n+1}C_1 + {}_{n+2}C_2 + \ldots\ldots + {}_{n+r}Cr = {}_{n+r+1}Cr$$

Or

Turn over

(b) How many 4-digit numbers can be formed from the numbers 1 to 9 such that both 1 and 2 appear but not adjacent to each other.

V. (a) Find the generating function of Fibonacci sequence.

Or

(b) Solve the recurrence relation $a_n = a_{n-1} + 2(n-1)$ with $a_0 = 1$.

(4 × 15 = 60 marks)