01860

MCS-033

MCA (Revised)

Term-End Examination

June, 2009

MCS-033 : ADVANCED DISCRETE MATHEMATICS

Time : 2 hours *Maximum Marks : 50*

Note : *Question no. 1 is* ***compulsory.*** *Attempt* ***any three*** *questions from the rest.*

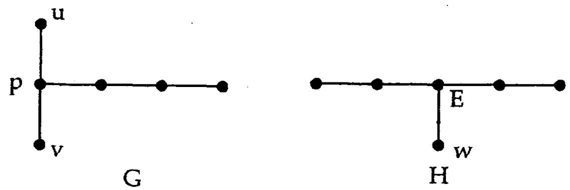
1. (a) Find the order and degree of the following recurrences. Also, state whether they are homogeneous or non homogeneous **4**

    (i) $a_n = a_n a_o + a_{n-1} a_1 e \ldots + a_o a_n \ (n \geq 2)$

    (ii) $a_r = \sin a_{r-1} + \cos a_{r-2} + \sin a_{r-3} + \ldots + e^r$

   (b) Show that the sum of the degrees of all vertices of a graph is twice the number of edges in the graph. **3**

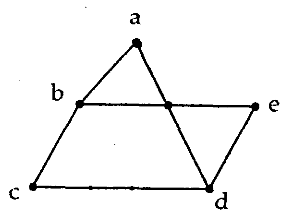
(c) Define isomorphism of graphs. Determine whether the graphs are isomorphic. 3



(d) Solve the recurrence relation $a^2_n - 2a^2_{n-1} = 1$ for $n \geq 1$, $a_o = 2$ 3

(e) Find a generating function to count the number of integer solutions to $e_1 + e_2 + e_3 = 10$ if for each i, $o \leq ei$ 4

(f) What is the complement of the given graph 3



2. (a) In a complete graph with n vertices there are $(n-1)/2$ edge disjoint Hamiltonian circuits, if n is an odd number ≥ 3. 5

(b) Solve $a_n - 6a_{n-1} + 8a_{n-2} = 3^n$ where $a_o = 3$ and $a_1 = 7$ 5

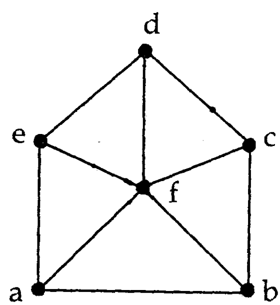
3. (a) Which connected graphs can be both regular and bipartite and why ? 3

(b) How many vertices will the following graphs have if they contain : 4

(i) 16 edges and all vertices of degree 2.

(ii) 21 edges, 3 vertices of degree 4 and the other vertices of degree 3

(c) Find the chromatic number of the following graph 3



4. (a) Solve the following recurrence relation by substitution method $a_n = a_{n-1} + n^2$ where $a_o = 7$ 4

(b) Define spanning tree with an example. 3

(c) Solve : $a_n + 6a_{n-1} + 12a_{n-2} + 8a_{n-3} = 0$ 3