08011

MCA (Revised)

Term-End Examination

December, 2011

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 each of the following recurrence relation. Also find whether they are homogeneous or non-homogeneous ? **4**

(i) $a_n = \sqrt{a_{n-1}} + a^2_{n-2}$

(ii) $a_n = a_{n-1} + a_{n-2} + \ldots\ldots + a_0$

(b) Find the recurrence relation whose solution is given by $a_n = A \cdot 3^n + B(-4)^n$. **3**

(c) Solve the recurrence relation given by **3**

$a_n - 5a_{n-1} + 6a_{n-2} = 0$

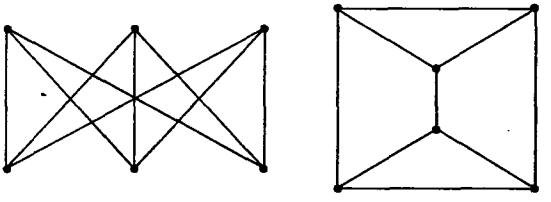
where $a_0 = 2$ and $a_1 = 5$.

(d) Draw the graph $k_{2,5}$ 3

(e) Show that for a subgraph H of a graph G, $\Delta(H) \leq \Delta(G)$ 4

(f) If a graph of n vertices is isomorphic to its complement, how many vertices it must have ? 3

2. (a) Determine whether the graphs are isomorphic. 4

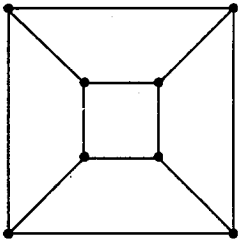


(b) Show that a graph G without parallel edges or self loop with n vertices and k components can have at most $(n-k)(n+k=1)/2$ edges. 6

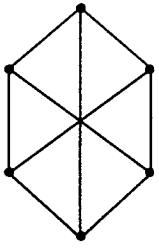
3. (a) Check that $a_n = \frac{3}{2} n - 2$ is a solution to the recurrence $a_n = 2a_{n/2} + 2$, where n is a power of 2 and $a_2 = 1$. 5

(b) Solve the recurrence relation $T_n = 2T_{n-1} + 1$ if $n \geq 2$ and $T_1 = 1$, using generating function. 5

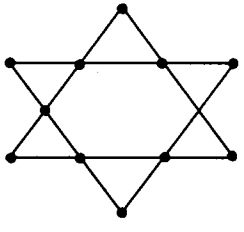
4. (a) Show that the graph in the fig. given below has a Hamiltonian circuit. 4



(b) What is the chromatic number of the following graph ? 2



(c) Whether the following graph contains Euler circuit or not ? 4



5. (a) Solve the recurrence relation 4

$a_{n+1}^2 = 5a_n^2$, where $a_n > 0$ and $a_0 = 2$.

Find a_8

(b) Show that K_5 is not planar. 3

(c) How many integer solutions are there to $a_1 + a_2 + a_3 + a_4 + a_5 = 28$ with $a_k > k$ for each k, $1 \leq k \leq 5$? 3