07459

MCA (Revised)

Term-End Examination

June, 2014

MCS-033 : ADVANCED DISCRETE MATHEMATICS

Time : 2 hours *Maximum Marks : 50*

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

1. (a) Find the order and degree of the following recurrences relations. Determine whether they are homogeneous or non-homogeneous. **6**

(i) $a_n = a_0\, a_{n-1} + a_1\, a_{n-1} + \ldots\ldots + a_{n-1}\, a_0$

(ii) $a_n^2 + a_{n-1}^2 = -1$

(b) Define : **4**

(i) Simple graph

(ii) Finite and infinite graph

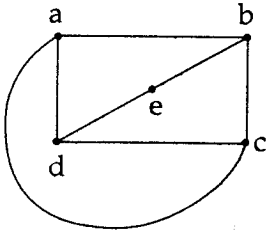
(iii) Isolated vertex

(iv) Subgraph

(c) Solve the recurrence relation $a_{n+1} - 1.5a_n = 0$ **3**

(d) Find the generating function of the following $a_n = 3^n + 5^n$ **2**

(e) Find the chromatic number of the given graph. 2



(f) How many edges are there in a graph with 10 vertices each of degree 6 ? 3

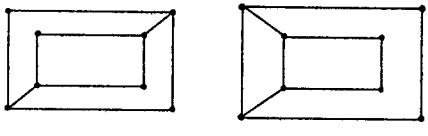
2. (a) Solve the recurrence relation 5

$a_n - 6a_{n-1} + 8a_{n-2} = 3^n$
where $a_0 = 3$ and $a_1 = 7$

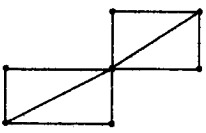
(b) Draw a graph (connected) which can be both regular and bipartite ? 5

3. (a) Find the solution to the recurrence relation $a_n = -3a_{n-1} - 3a_{n-2} - a_{n-3}$ with $a_0 = 1$, $a_1 = -2$, $a_2 = -1$ 5

(b) Define Isomorphism of two graphs. Find whether the given graphs are isomorphic or not. 5



4. (a) Find Euler's path in the graph given below : 3



(b) Show that k_4 is planar graph. 3

(c) Solve the recurrence relation $a_n + 2a_{n-1} + 2a_{n-2} = 0$ given that $a_0 = 0$, $a_1 = -1$. 4

5. (a) Solve the recurrence relation $a_{n+2} - 5a_{n+1} + 6a_n = 2$, $a_0 = 1$, $a_1 = 2$ using the method of generating function. 5

(b) State and prove Hand Shaking Theorem. 5