MCS-033

MCA (Revised)
Term-End Examination
07186 ## June, 2016

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) Is a tree a bipartite graph ? Justify.   *3*

    (b) Are the following recurrence relations homogeneous or non-homogeneous ? Give the order of each.   *4*
         (i) $x_{n+1} + 10x_n + 22x_{n-1} = 4$
         (ii) $a_n = a_{n-1} + a_{n-2} + \dots + a_0$

    (c) Solve the recurrence relation
         $4a_n - 5a_{n-1} = 0$ for $n \geq 1$, $a_0 = 1$.   *4*

    (d) Find the generating function for the sequence 1, 1, 1, 0, 1, 1, ...   *3*

(e) Let $a_n = 2^n + 5(3^n)$ for $n = 0, 1, 2, ...$

Show that $a_n = 5a_{n-1} - 6a_{n-2}$ for all integers n with $n \geq 2$. *3*

(f) Find the sum $\displaystyle\sum_{k=1}^{n} k\, 3^k\, C(n, k)$ by using

generating function. *3*

2. (a) Solve $a_n = a_{n-1} + n$, $a_0 = 2$ by Substitution method. *5*

(b) Solve the recurrence relation
$a_n - 9a_{n-1} + 26a_{n-2} - 24a_{n-3} = 0$, $n \geq 3$
by characteristic root method. *5*

3. (a) Solve the recurrence relation
$a_n = 3a_{n-1} + 1$, $a_0 = 1$ by using iterative method. *4*

(b) Draw K_4 graph. Show that it is planar and 4-colorable. *4*

(c) What do you mean by isomorphic graphs ? *2*

4. (a) State Handshaking Theorem. *3*

(b) A non-directed graph G has 8 edges. Find the number of vertices, if the degree of each vertex in G is 2. *3*

(c) Construct a non-Hamiltonian graph on 5 – vertices. *4*

5. (a) Find the number of vertices and number of edges in complete bipartite graph $K_{m, n}$.   *3*

(b) Solve the recurrence

$a_n - 4a_{n-1} = 0$ by Generating function.   *4*

(c) State whether the following graphs are planar or not :   *3*

(i)

(ii)

———————