

## MCA (Revised)

## Term-End Examination

June, 2013

MCS-033 : ADVANCED DISCRETE  
MATHEMATICS

Time : 2 hours

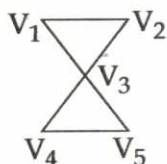
Maximum Marks : 50

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

1. (a) Find order and degree of the following recurrence relation. Also, state whether they are homogeneous or non-homogeneous. 6
- (i)  $a_n = na_{n-2} + 2^n$
- (ii)  $a_n = a_{n-1} + a_{n-2} + \dots + a_0$
- (b) Is every subgraph of a regular graph regular? Justify. 3
- (c) Draw three spanning tree of the following graph : 3
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- (d) What is a connected graph? Explain with an example and a non-examples each. 2
- (e) Solve the recurrence relation : 3
- $a_n = 3a_{n-1} + 1; a_0 = 1.$

- (f) Find the sequence generated by the following : 3
- $$\frac{1}{1-z} + 5z^3$$
2. (a) Solve  $a_r = a_{r-1} + r \cdot 2^r$ ;  $a_0 = 1$  by substitution method. 5
- (b) Show that maximum number of edges in a simple graph with  $n$  vertices is  $\frac{n(n-1)}{2}$ . 5
3. (a) Solve the recurrence relation given as follows : 5
- $$a_n = 8a_{n-1} - 16a_{n-2} \text{ for } n \geq 2, a_0 = 16, a_1 = 80$$
- (b) Solve the recurrence relation given as follows : 5
- $$a_{r+4} - 4a_{r+3} + 6a_{r+2} - 4a_{r+1} + 4a_r = 0$$
4. (a) Use substitution method to solve  $t_n = 1, n = 0$  and  $t_n = 2t_{n-1}, n \geq 1$ . 4
- (b) Use generating function to solve 4
- $$a_{n+2} - 2a_{n+1} + a_n = 2^n; a_0 = 2; a_1 = 1$$
- (c) Define bridge in a graph. Also give an example of it. 2

5. (a) Find that the graph has Eulerian Circuit or not ? 3



- (b) Find chromatic number of bipartite graph  $K_m, n$ . 4
- (c) Show that  $K_3, 3$  is non-planar. 3
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