

## MCA (Revised)

## Term-End Examination

December, 2013

MCS-033 : ADVANCED DISCRETE  
MATHEMATICS

Time : 2 hours

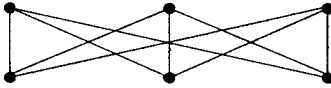
Maximum Marks : 50

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

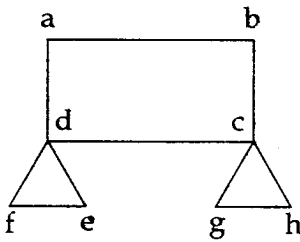
1. (a) Define : 4
- (i) Graph (ii) Simple Graph  
(iii) null graph (iv) connected Graph
- (b) Find the order and degree of the following 6  
recurrence relations. Determine whether they  
are homogeneous or non homogeneous .
- (i)  $a_n = 2a_{n-1} + 3 \cdot 2^n$   
(ii)  $a_n = 8a_{n,2} - 16a_{n,4}$
- (c) Solve the following recurrence relation : 3  
 $a_n - 5a_{n-1} + 6a_{n-2} = 0$  where  $a_0 = 2$ ,  
 $a_1 = 5$ .
- (d) Define  $\delta(G)$  and  $\Delta(G)$  for a graph G 2
- (e) Define walk, path and circuits in a graph. 3
- (f) What is the generating function for the 2  
sequence 1, 1, 1, 1, 1, 1, 1 ?

2. (a) Solve the recurrence relation,  $a_n = 6a_{n-1} - 11a_{n-2} + 6a_{n-3}$  with the initial conditions  $a_0=2, a_1=5$  and  $a_2=15$ . 5
- (b) Define Bipartite graph. Show that every two chromatic graph is Bipartite. 5

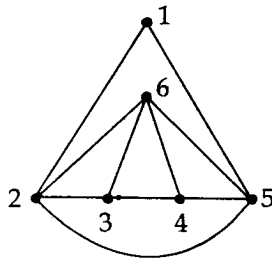
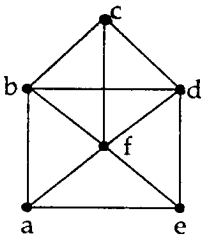
3. (a) Show that the graph given below is not Eulerian. 3



- (b) Solve  $a_{n+1} - a_n = n$  with  $a_0=1$  using method of generating functions. 5
- (c) Find the chromatic number of the given graph. 2



4. (a) Show that  $K_{3,3}$  is non planar. 3
- (b) Are the following graphs isomorphic? If Yes or No justify. 4



- (c) Solve  $a_n - 2a_{n-1} = 7n$ , 3

5. (a) Solve the recurrence relation  $a_n - 3a_{n-1} + 2a_{n-2} = 2^n$  5
- (b) A connected planar graph has six vertices each of degree 4. Determine the number of regions into which this planar graph can be split. 5
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