No. of Printed Pages : 3

MCS-033(S)

MCA (Revised)

00337

Term-End Examination

December, 2016

MCS-033(S) : 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 the following recurrence relation. Also determine whether they are homogeneous or non-homogeneous. *6*

(i) $a_n = ca_{n/m} + 5$

(ii) $a_n = 3a_{n-1} + n^2$

(iii) $a_n = c_1 a_{n-1} + c_2 a_{n-2} + \ldots c_{n-k} a_{n-k}$

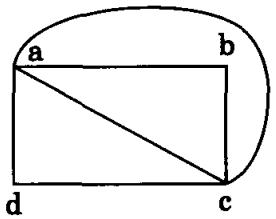
(b) Solve the following recurrence relation using the characteristic equation : *6*

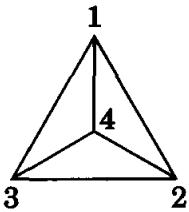
$t_n = 6t_{n-1} - 9t_{n-2}$ for $n > 1$

$t_0 = 0$

$t_1 = 1$

(c) Determine whether the following graphs are isomorphic. If yes, justify your answer. 4





(d) What is an undirected graph ? Prove that an undirected graph has even number vertices of odd degree. 4

2. (a) Define n-regular graph. Show for which value of n the following graphs are regular : 5

(i) K_n

(ii) Q_n

(b) What is a generating function ? Find the generating function for the following sequence : 3

1, 1, 1, 1, 1

(c) How many edges does a complete graph of 5 vertices have ? 2

3. (a) Derive and explain a recursive relation expression for binary search algorithm. 5

(b) Define a graph and a subgraph. Show that for a subgraph H of a graph G

$\Delta(H) \leq \Delta(G)$. 5

4. (a) Define a bipartite graph. For which value of n is Q_n bipartite ? 3

(b) State and prove Euler's formula for a planar graph. 4

(c) Show that a connected bipartite graph has a chromatic number of 2. 3

5. (a) State and prove Ore's theorem for a graph to be a Hamiltonian graph. 6

(b) What is a planar graph ? Determine whether the given graph is a planar. If so, redraw it such that no edges cross each other. 4