No. of Printed Pages : 3

MCS-033

02892

MCA (Revised)

Term-End Examination

June, 2011

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. **6**
Determine whether they are homogeneous or non homogeneous :

(i) $a_n = a_{n-1} + a_{n-2} + ... + a_o$

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

(b) A graph G is said to be self complementary if it is isomorphic to its complement $\overline{G}$. Show that for a self complementary $(p-q)$ graph G, either P or $(P-1)$ is divisible by 4. **4**

(c) Define minimum vertex degree of G $(\delta(G))$ and maximum vertex degree of G $(\Delta(G))$. **3**

(d) Solve the following recurrence relation : 3

$4a_r - 5a_{r-1} = 0,\ r \geq 1,\ a_o = 1.$

(e) Find the generating function for the sequence $0^2, 1^2, 2^2, 3^2, \ldots$ 2

(f) Define bipartite graph. Also give an example of it. 2

2. (a) Show that if $G_1, G_2, \ldots, G_n$ are bipartite, then $\bigcup_{i=1}^{n} G$ is bipartite. 5

(b) Solve the recurrence 5

$$a_n = a_{n-1} + 2a_{n-1},\ n \geq 2$$

with $a_o = 0,\ a_1 = 1.$

3. (a) Solve $a_r = a_{r-1} + r\,2^r$, given $a_o = 1$. 5

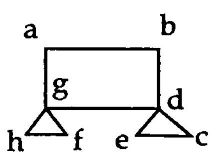
(b) Solve $a_r = 2a_{r-1} + 1$ with $a_1 = 7$, for $r > 1$, by substitution method. 5

4. (a) Use generating function to solve $a_n - 9a_{n-1} + 20a_{n-2} = 0,\ a_o = -3,\ a_1 = -10.$ 3

(b) Solve the recurrence 4

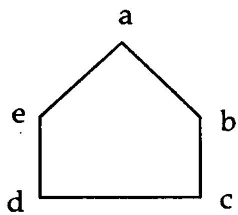
$a_{r+4} - 4a_{r+3} + 6a_{r+2} - 4a_{r+1} + 4a_r = 0.$

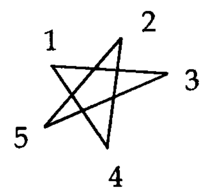
(c) Find Euler's path in the graph given below : 3



5. (a) Can a simple graph exist with 15 vertices, with each of degree five ? Justify your answer. **3**

(b) Are the following graphs are isomorphic ? If Yes or No Justify. **4**





(c) Show that K_5 is not planar. **3**