04852

MCS-033

MCA (REVISED)

Term-End Examination, 2019

MCS-033 : ADVANCED DISCRETE MATHEMATICS

Time : 2 Hours]   **[Maximum Marks : 50**

Note : Question number **1** is **compulsory**. Attempt **any three** questions from the rest.

1. (a) Find the generating function of :   [3]

         0, 1, –2, 4, –8 ......

    (b) The sum of degrees of all vertices in a graph G is equal to twice the number of edges in G. Prove this statement.   [3]

    (c) Find the order and degree of the following recurrence relation. Also state are they homogeneous or non-homogeneous :   [6]

         (i) $a_n = a_n a_0 + a_{n-1} a_1 + \cdots + a_0 a_n (n \geq 2)$

         (ii) $a_n = \sqrt{a_{n-1}} + a_{n-2}^2$
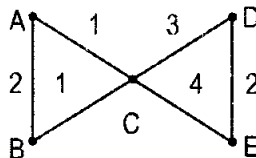
(d) Define : [3]

    (i)   Complete Graph

    (ii)   Regular Graph

    (iii)   Bipartite Graph

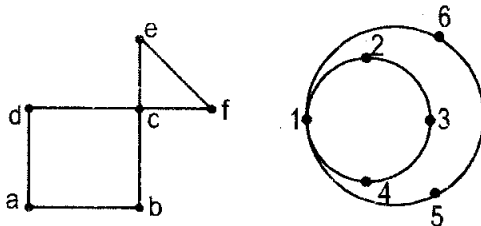(e) Solve the recurrence relation $a_n = a_{n-1} + a_{n-2}$ with $a_0 = 0, a_1 = 1$. [3]

(f) Draw the minimum spanning trees of the following graph : [2]

2. (a) Solve the recurrence relation [5]

$$a_n - 5a_{n-1} + 6a_{n-2} = 7^n$$

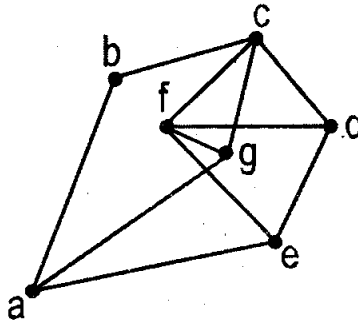(b) Determine whether the graphs are isomorphic : [5]

3. (a) Solve the recurrence relation : [5]

$$a_n - 3a_{n-1} - 4a_{n-2} = 4^n$$

(b) Show that C_6 is bipartite and k_3 is not bipartite.[5]

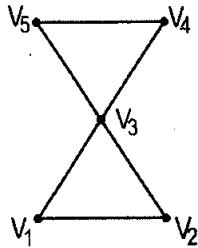4. (a) Find the chromatic number of the given graph :

[2]

(b) Solve the recurrence relation : [4]

$$a_n - 5a_{n-1} + 6a_{n-2} = 0 \text{ with } a_0 = 2, a_1 = 5$$

(c) What is spanning tree ? Give example. [4]

5. (a) Find Euler's path in the graph given below : [3]

(b)   Solve :   [4]

$$a_n = 6a_{n-1} - 11a_{n-2} + 6a_{n-3}$$

with $a_0 = 2, a_1 = 5, a_2 = 15$

(c)   What is the difference between an Hamiltonian circuit and Eulerian circuit ?   [3]

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