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MCA (Revised)

Term-End Examination

December, 2008

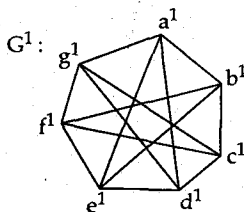
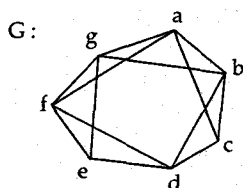
MCS - 033 : ADVANCED DISCRETE
MATHEMATICS

Time : 2 hours

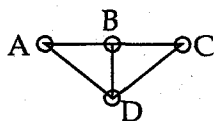
Maximum Marks : 50

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

1. (a) Show that the graphs G and G^1 are isomorphic. 4



- (b) Draw three spanning tree of the graph. 3



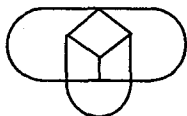
- (c) Solve the recurrence relation 4

$$t_n = 4(t_{n-1} - t_{n-2})$$

subject to initial condition

$$t_n = 1 \text{ for } n=0 \text{ and } n=1$$

- (d) Find the chromatic number of following graph. 2



- (e) Find the general solution of 4

$$a_r - 7a_{r-1} + 10a_{r-2} = 7 \cdot 3^r, \quad r \geq 2$$

- (f) Which of the following represent the sequence 1, 2, 5, 11, 26, 3

(i) $t_n = t_{n-1} + t_{n-2}$ $t_0 = 1, t_1 = 2$

(ii) $t_n = t_{n-1} + 3t_{n-2}$ $t_0 = 1, t_1 = 2$

(iii) $t_n = 2t_{n-1} + 1$ $t_0 = 1, t_1 = 2$

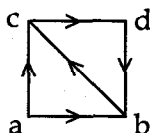
(iv) $t_n = 2t_{n-1} + 2$ $t_0 = 1, t_1 = 2$

2. (a) Show that for a subgraph H of a graph G, 4

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

- (b) Show that K_5 is nonplanar. 3

- (c) Show that the following graph is Euler. Also find Euler Path. 3



3. (a) Solve the recurrences $a_n = a_{n-1} + 5^n$, $a_0 = 1$. 5

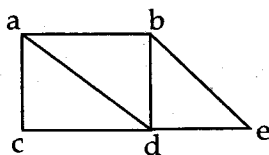
(b) Find the order, degree homogeneous or not for following recurrence. 5

(i) $a_n = a_n = a_{n-1}^2 + a_{n-2} a_{n-3} a_{n-4}$

(ii) $a_n = a_n a_0 + a_{n-1} + \dots + a_0 a_n (n \geq 2)$

4. (a) A connected plane graph has 10 vertices each of degree 3. Into how many regions, does a representation of this planar graph split the plane ? 3

(b) Find an Euler path in the graph : 2



(c) Solve the recurrence 5

$$a_n - 6a_{n-1} + 12a_{n-2} - 8a_{n-3} = 0.$$

5. (a) Suppose a coin is flipped until 2 heads appear and then the experiment stops. Find a recurrence relation for the number of experiment that end on the n^{th} flip or sooner ? 3

- (b) Find the solution of following recurrence relation by substitution method. 5

$$t_n = 1 \quad \text{for } n = 0$$

$$\text{and} \quad t_n = t_{n-1} + n \quad \text{for } n \geq 1.$$

- (c) Define K- critical graph. 2

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