C 47553

(Pages 2)

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, JUNE 2008

CS 2K 603—GRAPH THEORY OF COMBINATORICS

17

(New Scheme)

Time : Three Hours

Maximum : 100 Marks

Answer **all** *questions.*

Part A

1. Define (a) Subgraph and (b) Euler graph.

2. Write a note on colouring of graph.

3. Define rooted trees and weighted trees.

4. State max-flow-min-cut theorem.

5. State the principle of Inclusion and Exclusion.

6. In how many ways can the letters of the word ALLAHABAD be arranged ?

7. Show that $c(n, 0) + c(n, 1) + ... + c(n, n) = 2^n$.

8. Solve the recurrence relation $a_n - 9a_{n-1} + 18a_{n-2} = 0$; $a_0 = 1$ and $a_1 = 4$.

$(8 \times 5 = 40 \text{ marks})$

Part B

9. (a) State and prove Euler's formula.

Or

   (b) Prove that a map G is 2-face colourable if and only if it is an Euler graph.

10. (a) Apply Dijkstra's algorithm to find the shortest path of the following graph in Fig. 1. from S to t.
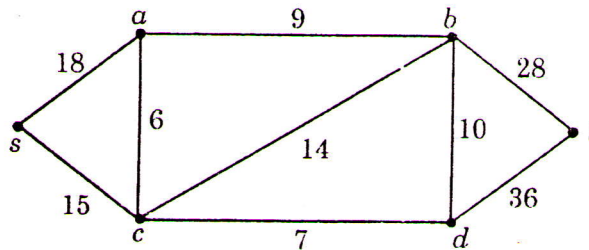

Fig. 1.

(15 marks)

Or

Turn over

(b) Apply Prim's algorithm to find the minimal spanning tree of the following graph in Fig. 2 :—
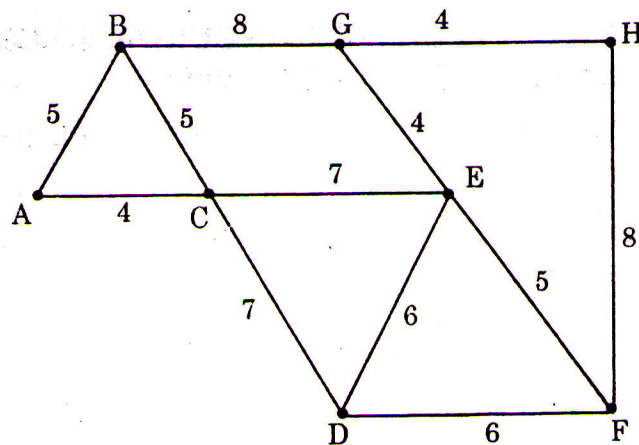

Fig. 2.

(15 marks)

11. (a) If the objects are arranged in a circular order, prove that the circular permutations of n different objects is $(n-1)!$

(8 marks)

(b) Find the value of n if $3C(2n, 3) = 44\ C(n, 2)$.

(7 marks)

Or

(c) Out of 10 electric blubs, 3 are defective but it is not known which are those. In how many ways these :

   (i) 3 bulb can be selected.

   (ii) Selections will include at least *one* defective bulb.

(8 marks)

(d) Find the value of n and r if $p(n, r) = 240$ and $C(n, r) = 120$.

(7 marks)

12. (a) Solve $a_n - a_{n-1} - a_{n-2} = 0$; $a_0 = 1$

$$a_1 = 1.$$

(7 marks)

(b) Find the particular solution of $a_n - 2a_{n-1} = 5.2^n$.

(8 marks)

Or

(c) Solve by method of generating function $a_{n+2} - 2a_{n+1} + a_n = 2^n$; $a_0 = 2$

$$a_1 = 1.$$

(8 marks)

(d) Solve $a_{n+2} - 4a_{n+1} + 4a_n = 0$; $a_0 = 1$

$$a_1 = 3.$$

(7 marks)

[4 × 15 = 60 marks]