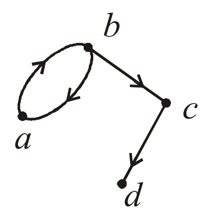
Unit IV

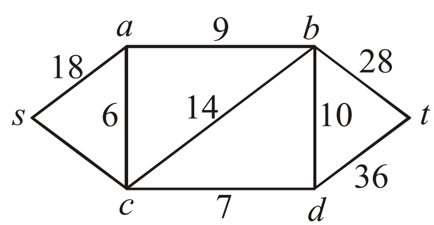
7. (a) Prove that a finite connected graph is Eulerian if and only if each vertex has even degree.

(b) State and prove Euler's formula for connected planar graphs.

8. (a) Find the adjacency matrix and path matrix for the diagraph shown below :



(b) Find shortest path from s to t in the given graph :



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CC-313

M. Sc. EXAMINATION, May 2018

(Third Semester)

(Re-appear Only)

MATHEMATICS

MAT605B

Discrete Mathematics

Time : 3 *Hours*] [*Maximum Marks :* 100

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Develop a recurrence relation for the number of edges of complete graph k_n and find explicit formula for it.

   (b) Find explicit formula for Fibonacci sequence.

2. (a) Find the total solution of the difference equation :

$$a_n - a_{n-1} - 2a_{n-2} = 2n^2.$$

   (b) Solve the recurrence relation (by method of generating function) $a_n - 4a_{n-1} = 6.4^n$, $a_0 = 1$.

Unit II

3. (a) Explain Hasse diagram and Hasse diagram dual poset. Draw the Hasse diagram of the patitions of 5.

   (b) Draw the truth tables for $p \oplus q$ and $(p \wedge q) v \sim r$ where p, q and r are statements.

4. (a) Explain quantifiers.

   (b) Let L be a finite complemented lattice. Then prove that every element 'a' and 'L' is the joint of unique set of atoms.

Unit III

5. (a) Let 'a' be any element of a Boolean algebra B. Then :

   (i) Complement of 'a' is unique

   (ii) $(a')' = a$ and

   (iii) $0' = 1$ and $1' = 0$.

   (b) Prove that every finite Boolean algebra is structurally the same as a Boolean algebra of sets.

6. (a) Explain consensus method for finding prime implicants of a Boolean expression and find the prime implicant of $E(x, y, z) = xyz + x'z' + xyz' + x'y'z + x'yz'$.

   (b) Explain Half-Adder and Full-Adder.