

DISCRETE MATHEMATICS - II

Paper - IV
Semester-VI

[Maximum Marks : 40

Time Allowed : 3 Hours]

Note : Attempt *five* questions in all, selecting *two* questions from each Section A and B and the entire Section C. All questions carry equal marks.

Section - A

1. (a) Solve $S(k) - 7S(k-1) + (k-2) = 0$, $S(0) = 4$, $S(1) = 17$. 4
(b) Find a closed form expression for the term of Fibonacci sequence. 4
2. Solve $S(k) - 4S(k-1) + 4S(k-2) = 3k + 2^k$, $S(0) = 1$, $S(1) = 1$. 8
3. If $S(k) - 6S(k-1) + 5S(k-2) = 0$, $S(0) = 1$, $S(1) = 2$, what is the generating function of S . $G(S, z)$? Find the sequence which satisfies it. 8
4. (a) Derive a second order linear relation for $C(k) = 3^{k-1} + 2^{k+1} + k$, $k \geq 0$.
(b) Explain algorithm of solving n th order linear homogeneous recurrence relations. 4

Section - B

5. (a) Show that lattice L is a distributive iff $a \vee (b \wedge c) = (a \vee b) \wedge (a \vee c)$, $\forall a, b, c \in L$. 4
(b) Let $[B; -, \vee, \wedge]$ be any Boolean algebra of order 2.

B. Sc. Part -III (Paper-2017) Sem. V & VI

- Let $f: B^k \rightarrow B$. Find the 16 possible functions. 4
6. (a) Prove that every chain is a distributive lattice. 4
(b) Define Switching Circuit? Give suitable example. 4
7. Find out the operations tables and Hasse diagram for $\{B_2^2; -, \vee, \wedge\}$.
Also find the atoms for this Boolean algebra. 8
8. (a) Prove that the complement of every element in a Boolean algebra B is unique. 4
(b) Explain Design and implementation of digital Networks with example. 4

Section - C

(Compulsory Questions)

9. Write short notes on the following :
- (a) Find telescoping form of $p(n) = 3n^4 + 2n^3 + 4n^2 - n + 7$?
- (b) Write a short note on Recurrence relations.
- (c) By the recursive definition of binomial coefficient, find $C(5, 3)$.
- (d) Solve the recurrence relation $\sqrt{a_n} = \sqrt{a_{n+1}} + \sqrt{a_{n+2}}$.
- (e) Write a short note on analysis of algorithm-time complexity.
- (f) Find the atoms of the following Boolean lattice $\{1, 2, 5, 10, 11, 55, 110\}$.
- (g) Define Boolean expressions ?
- (h) Find list of all atoms of B_2^4 ?
- (i) Show that if n is a positive integer and p^2/n , where p is a prime number, then D_n is not a Boolean algebra.
- (j) Find the complement of each element in D_{42} . (10×0.8=8)