Roll No. ..... **Total Pages : 4**

4422/MH

B-2051

DISCRETE MATHEMATICS-II

Paper–IV

Semester–VI

Time allowed : 3 Hours] [Maximum Marks : 40

Note : The candidates are required to attempt two questions each from section A and section B carrying 6 marks each and the entire Section C consisting of 8 questions carrying 2 marks each.

SECTION-A

1. Solve the recurrence relation $S_n - 4S_{n-1} + 4S_{n-2} = (n+1)2^n$. 6

2. Explain the Big-O notation and Big-Theta notation with examples. 6

3. Find general solution of recurrence relation

$S_n - 8S_{n-1} + 16S_{n-2} = 0.$ 6

4. Using the generating function, solve the recurrence relation $S_n + 3S_{n-1} - 4S_{n-2} = 0$, n 2 and $S_0 = 3, S_1 = -2$. 6

SECTION-B

5. Prove that every cyclic group is abelian. Is the converse true? Justify. 6

6. State and prove De-Morgan laws in Boolean Algebra. 6

7. For a non-empty finite set X, Prove that $(P(X), \ , \ , \ , X)$ is a complemented lattice, where $P(X)$ be a power set of X. 6

8. Simplify the Boolean function $\bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}C\bar{D} + A\bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}D + A\bar{B}C\bar{D} + A\bar{B}CD + ABC\bar{D} + ABCD$ and draw the logic diagram of the reduced function. 6

SECTION-C

9. Attempt all questions :

(i) Find the sequence whose generating function is $\frac{3 - 5z}{1 - 2z - 3z^2}$.

(ii) Draw the Hasse Diagram of D_{24} also find complement of each element.

(iii) Let G and H be two groups. If $: G \quad H$ be a homomorphism then prove that kernel of is subgroup of G.

(iv) Give an example of non abelian group G and a normal subgroup H of G such that G/H is abelian.

(v) What is Boolean Algebra and sub algebra? Give example.

(vi) Give Big-O estimate for the function

$(n) = 3n \log n! + (n^2 + 3)\log n.$

(vii) Prove that every field is an integral domain.

(viii) Draw the operation table for and for the lattice L= {1, 2, 3, 5, 30} under divisibility relation.

$2 \times 8 = 16$