B.C.A.

Part III: Basic Subjects

Paper-1 Discrete Mathematics

Time: 3 hours Max. Marks: 80

SECTION-A

Answer All Questions. Each Question carry equal marks. 4 x 15=60

1) a) Find the power sets of (i) A={1,2,3} (ii) A={1,2,3,4} (iii) A={1,2,3,4,5}.

b) If A={1,2}, B={2,3}, C={a,b}, find AXBXC using diagram

(Or)

c) Write the truth table of $p \leftrightarrow q$.

d) Prove that $p \rightarrow q$=-pvq.

2) a) Solve 2x+y-z=3, x+y+z=1, x-2y-3z=4 by Cramer's rule.

b) If u=(5,3,4), v=(3,2,1),w=(1,6,-7) verify (u+v).w = u.w+v.w

(Or)

c) Find the independent term of x in $(x^2+3a/x)^{15}$

d) The probability of solving a problem by A is 2/3, that of B is 4/5 and that of C is 3/7. Find the probability of solving a problem.

3) a) Show that the sum of the degree of the two vertices of a graph is equal to twice the number of edges in G.

b) Show that a graph G is connected if and only if it is minimally connected.

(Or)

c) State and prove Lagranges theorem on sets.

d) Explain different types of grammars.

4) a) Show that in a distributive lattice if an element has a complement, then this complement is unique.

b) In any Boolean algebra, if a*x=a*y and a+x=a+y, then x=y.

(Or)

c) Find the lexicographic ordering of the following n-tuples. (i) (1, 1, 2) (ii) (1,2,1), (1,0,1,0,1), (0, 1, 1, 1, 0).

d) Show that there exists a consistent enumeration for any finite poset S.

SECTION –B

Answer any FOUR questions. 4X5=20

5) Prove that by means of truth table that (i) $\neg(p \rightarrow q) = p \wedge \neg q$.
(ii) $\neg(p \leftrightarrow q) = \neg p \leftrightarrow q = p \leftrightarrow q$

6) Explain Binary addition with example. Draw the machine.

7) Show that a graph is a tree if and only if it is minimally connected.

8) Show that $p(n) = 1^2+2^2+3^2+\ldots\ldots\ldots\ldots\ldots\ldots+n^2 = n(n+1)(2n+1)/6$ by Induction.

9) Define ring homomorphism, isomorphism, kernel and image of homomorphism.

10) Define reflexive, symmetric, transitive, anti-symmetric and equivalence relation.

11) Find g.c.d (8316, 10920) and write d= (8316, 10920) in the form of d= ma+nb. Also find l.c.m

12) Prove that C(12,7) = C(11,6) + C(11,7).