Unit-I

b (a) 1 Inverse, converse and contrapositive of $A \to B$

(b) Define an inverse function with a suitable example

-> Define set

-> Types of quantifiers

-> Show that $(x)(H(x) \to M(x)) \wedge H(s) \Rightarrow M(s)$

-> If the universe of the discourse is the set $\{a, b, c\}$ elimate the quantifier from $(x) R(x)$

-> Draw Venn diagram of $A \cap B^c$

-> Implication; modus Pones; modus Tollens

-> Define contrapositive statement

-> Define venn diagram with the help of an example

-> Define cardinality of set

-> Different types of sets definitions

-> Laws; Domain & range; 6 types of relations

-> Equivalence relation.

-> Function; one-one; onto; Bijective; inverse

-> Prepositional logic

-> 4 types of fundamental logic

-> Tautology, contradiction, condigency

-> Subject; predicate; Quantifiers & their types

-> What are the 9 methods of proof of an implication

Unit-2

-) Sum rule, Product rule

-) Permutation, combination differences

-) Principle of inclusion, exclusion & Pigeonhole principle

-) Problems on Permutation & combination

1. Compute the no. of subcommittees of 3 members each that can be formed from a comittee with 25 members :- $25C_3$

2. There are 15 married couples in a party. In how many ways we can select a man & woman such that they are

(i) married together :- $15C_1 = 15$

(ii) Not married together :- 15×14

3. In how many ways can 10 people arrange themselves in a ring :- $(10-1) = 9!$

4. Find the no. of arrangements of TALLAHASSEE $= \frac{11!}{3!\,2!\,2!\,2!}$

5. How many elements are there in $A_1 \cup A_2$ if $|A_1| = 12$, $|A_2| = 18$ & $A_1 \subseteq A_2$?

$$n(A_1 \cup A_2) = n(A_1) + n(A_2) - n(A_1 \cap A_2) = 12 + 18 - 12 = 18$$

Formulae:

$$n(A_1 \cup A_2) = n(A_1) + n(A_2) - n(A_1 \cap A_2)$$

$$n(A_1 \cup A_2 \cup A_3) = n(A_1) + n(A_2) + n(A_3) - n(A_1 \cap A_2) - n(A_1 \cap A_3) - n(A_2 \cap A_3) + n(A_1 \cap A_2 \cap A_3)$$

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Unit-3

-> Define recurrence relation & explain its types

-> Define generating function.

-> ~~Examples for~~ General form of second order linear homogeneous recurrence relation.

$$C_0(n)\, a_{n-0} + C_1(n)\, a_{n-1} + C_2(n)\, a_{n-2} = 0 \; ; \; n \geq 2$$

-> Coefficient of x^{12} in $x^3(1-2x)^{10}$

Sol: Binomial $(x+y)^n = \sum_{r=0}^{n} {}^nC_r \cdot x^{n-r} y^r$

$$x^3(1-2x)^{10} = x^3(1+(-2x))^{10}$$

$$x=1,\ y=-2x,\ n=10$$

$$\Rightarrow x^3 \sum_{r=0}^{10} {}^{10}C_r \cdot (-2x)^r$$

At $r=9$

$$\Rightarrow x^3\ {}^{10}C_9\,(-2x)^9 \Rightarrow -2^9\,{}^{10}C_9\, x^{12}$$

$\therefore$ coefficient of $x^{12} = -2^9\,{}^{10}C_9$

-> Generating function for $e_1+e_2+\cdots+e_n = r$; $0 \leq e_i \leq 1$

$$A(x) = (1+x)^n$$

-> Explain divide & conquer recurrence relation

& All formulas in Unit-3