Unit-II Question Bank.

PART-A

1) Define permutation
2) Define combination.
3) What is $p(n,n)$
4) If $p(n,r) = 0$, then $r = ?$
5) What is the number of ways of arranging n distinct object in a cycle
6) How many words of three different letters can be formed from the letters of the word COMPUTER
7) How many distint words can be formed from the letters of the words MATHEMATICS.
8) How many permutations are there of $A = \{a, e, i, o, u\}$ taken 2 at a time
9) A coin is tossed six times and the result of each toss is recorded. How many different sequence of heads and tails are possible.
10) Find $\sum_{K=0}^{n} C(n, K)$
11) compute the number of distinct 13 card hands that can dealt from a deck of of 52 cards
12) How many different classes of 25 student with a class leader can be selected from

55 new students in a school?

13) What is the value of $\sum_{r=0}^{n}(-1)^{r} n(C,r)$

14) Show that $p(n,n) = p(n,n-2)$

17) State the principle of induction

18) Show that $1+2+\cdots+n = \frac{n(n+1)}{2}$ by using mathematical induction

19) Using mathematical induction prove that $n < 2^n \ (n>1)$

20) State Pigeon hole principle.

21) Show that if any six numbers from 1 to 10 are chosen, then two of them will add up to 11.

22) Among 200 people how many of them were born in the same ~~method~~ month.

23) State principle of inclusion and exclusion.

24) How many positive integers not exceeding 100 that are divisible by 5?

25) Show that in any group of 27 English words there must be atleast two that begin with the same letter.

26) Find the recurrence relation of $S(K) = 6(-5)^K$, $n \geq 0$

27) Find the recurrence relation of $f(k) = 5 + 2^{k+1} + (-3)^k$ $k \geq 0$

28) Find the recurrence relation of $y_n = A(-3)^n + B(4)^n$ for $n \geq ?$

29) Find the recurrence relation of $D(n) = (A + nB)4^n$ $n \geq 0$.

30) What is meant by solution of the recurrence relation.

31) What is the characteristic equation of the recurrence relation.

$$S(k) + 2S(k-1) - 3S(k-2) - 6S(k-4) = 0$$

32) Find the homogeneous solution of

$$S_n - 7S_{n-1} + 10S_{n-2} = 6 + 8n$$

PART-B

1) Each user in a computer system has a password, each character is an upper case or a digit. Each password must contains atleast two digit. How many different passwords are there?

2) In how many ways can the letters of the word WEDNESDAY be rearranged

3) How many rearrangements can be made of the following words

(i) REARRANGEMENT (ii) PROGRAMMING

4) How many license plates can be made using either three digits followed by three letters

Or three letters followed by the three digits

(5) Using mathematical induction show the following $2^{n+2} + 3^{2n+1}$ is divisible by 7, $n \geq 0$.

6) Show that $\sum_{i=1}^{n} i(i+1) = \frac{n(n+1)(n+2)}{3}$

7) Show that $1.2.3 + 2.3.4 + 3.4.5 + \cdots + n(n+1)(n+2)$
$= \frac{n(n+1)(n+2)(n+3)}{4}$, $n \geq 1$

8) Show that $1^3 + 2^3 + \cdots + n^3 = \frac{n^2(n+1)^2}{4}$

9) There are 51 houses on a street. Each house has an address between 1000 and 1099 inclusive. Show that atleast two houses have ~~different~~ address that are two consecutive integers

10) Find the number of positive integers not exceeding 100 that are divisible by 5 or by 7

11). Prove the principle of inclusion - exclusion using mathematical induction

12) $S(n) - 2S(n-1) - 8S(n-2) = 0$ for $n \geq 2$

13) $S(K) - 20S(K-1) + 100S(K-2) = 0$
$S(0) = 2$, $S(1) = 30$.

14) $y_{n+2} - 3y_{n+1} - 4y_n = 0$ with $y_0 = 1$, $y_1 = 3$

15) $S(K) - 10S(K-1) + 9S(K-2) = 0$ with
$S(0) = 3$, $S(1) = 11$