**Assignment**

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| **Assignment No. 1** |
| **Title of Course: DISCRETE STRUCTURES** |
| **Course Code: AML4209** |
| **Topic Name: Permutation, Combination, Pigeonhole Principle, Recurrence Relations, Generating Function** |

1. How many 3 digit numbers can be formed from the digits 2, 3, 5, 6, 7 and 9 which are divisible by 5 and none of the digits is repeated?
2. A box contains 4 different black balls, 3 different red balls and 5 different blue balls. In how many ways can the balls be selected if every selection must have at least 1 black ball and one red ball?
3. In how many different ways can the letters of the word 'TRIANGLE' be arranged such that
4. Begin with H
5. Begin with H and end with E
6. T and E are at end positions
7. No two vowels come together
8. Vowels occupy odd places
9. In how many ways can a team of 5 persons can be formed out of a total of 10 persons such that two particular persons should be included in each team?
10. Find the number of triangles that can be formed using 14 points in a plane such that 4 points are collinear?
11. In a birthday party, every person shakes hand with every other person. If there was a total of 28 handshakes in the party, how many persons were present in the party?
12. In how many ways can 10 software engineers and 10 civil engineers be seated in a row so that they are positioned alternatively?
13. Prove that among any set of 51 positive integers less than 100, there is a pair whose sum is 100.
14. For the following expression, obtain partial fraction decompositions and identify the sequence having the expression as a generating function 
15. If S(k)-6S(k-1)+5S(k-2)=0, S(0) = 1, S(1) = 2, find the generating function of S, G(S,z) ?
16. Suppose that you have opened a savings account that pays an annual interest rate of 8%. In addition, suppose that you decide to deposit one rupee when you open the account and you intend to double your deposits each year. Let S(k) be your balance after k years. S can be described by the relation S(k) = 1.08, S(k-1) +2k with S(0) = 1. Solve the problem.
17. If S(k) – 4S(k-1)+3S(k-2) = k2, then find the generating function of S, G(S,z) ?
18. Find the coefficient of
19. x10 in (1+x5+x10+.....)3
20. x12 in (x3+x4+x5+....)3
21. x18 in (x+x2+x3+x4+x5)(x2+x3+x4+.....)5
22. Solve an+2 – 2an+1+an = 2r with a0 = 2 and a1 = 1 using generating function.
23. Solve S(k) – 8S(k-1)+21S(k-2)-18S(k-3)=0 for n>=3 using generating function upto partial fractions.
24. It is given that White tiger population in Orissa (India) is 30 at time and at time. Also the increase from time to n is twice the increase from time to time Write the recurrence relation for growth rate of tiger and then solve it.
25. Solve the recurrence relation
26. Suppose a school principal decides to give a prize away each day. Suppose further the principal has 3 different kinds of prizes worth 1 each and 5 different kinds of prizes worth $ 4 each. Find a recurrence relation for the number of different ways to distribute prizes with dollars.
27. Solve the difference equation.
28. The number of bacteria in a colony doubles every hour. If a colony begins with bacteria, how many bacteria will be there after n hours? Find a recurrence relation to represent the same and hence solve it.
29. Solve the recurrence relation:.
30. Obtain and solve a recurrence relation for Fibonacci sequence.
31. Solve the recurrence relation of Hand shake problem and.
32. Find the solution of recurrence relation: .
33. Find the minimum number of students in a class to be sure that four out of them are born in the same month.