Practice Problems (Set 1)

2 marks

1. In how many ways can the letters of the word 'LEADER' be arranged?
2. In a group of 6 boys and 4 girls, four children are to be selected. In how many different ways can they be selected such that at least one boy should be there?
3. In how many ways a committee, consisting of 5 men and 6 women can be formed from 8 men and 10 women?
4. Find the generating functions for the sequence: $\{1, 1, 1, 1, \cdots\cdots\cdots\}$.
5. Find the generating functions for the sequence: $\{1, -2, 3, 4, \cdots\cdots\cdots\}$.
6. Find the generating functions for the sequence: $\{0, 1, 2, 3, \cdots\cdots\cdots\}$.
7. Let p: 'It is cold' and q: 'It is raining', then write down the symbolic form of the statement 'It is cold or it is not raining'.
8. Let p: 'It is cold' and q: 'It is raining', then what will be the symbolic form of the statement ' It is not cold and it is not raining'.
9. Let p be a proposition 'He is intelligent' and q be a proposition 'He is tall', then what will be the symbolic form of the statement 'He is intelligent and tall'.

5 marks

10. Find the characteristic roots of the recurrence relation :$a_n - 3a_{n-1} - 4a_{n-2} = 0$
11. Find the characteristic equation and characteristic roots of the relation $a_{n+2} - 5a_{n-1} + 6a_n = 2$.
12. Using generating functions solve the recurrence relation: $a_n = 3a_{n-1}, a_0 = 1$.
13. Show that $p \leftrightarrow q$ and $(p \wedge q) \vee (\neg p \wedge \neg q)$ are logically equivalent.
14. Show that $\neg p \rightarrow (q \rightarrow r)$ and $q \rightarrow (p \vee r)$ are logically equivalent.

10 marks

15. Using generating functions solve the recurrence relation: $a_n = 2a_{n-1} + 1, a_0 = 2$.
16. Using generating functions solve the recurrence relation
    $a_n - 7a_{n-1} + 10a_{n-2} = 2 \quad , \forall\, n \in \mathbb{N}\, , \& \quad a_0 = a_1 = 3$.
17. Using generating function solve the recurrence relation
    $a_n = 3a_{n-1} - 4n + 3.2^n$.
19. Show that the argument $\sim p \wedge q, r \rightarrow p, \sim r \rightarrow s, s \longrightarrow t \vdash t$ is valid.
20. Show that the argument $p \rightarrow q, \sim p \rightarrow r, r \longrightarrow s \vdash \sim q \rightarrow s$ is valid.
21. Show that $p \vee s$ is the valid conclusion from the premises $(p \wedge q) \vee r$ and $r \rightarrow s$.