DISCRETE MATHEMATICS QUESTION BANK::

1. Verify that the following argument is valid by using the rules of inference:
   If Clifton does not live in France, then he does not speak French. Clifton does not drive a Dastun. If Clifton lives in France, then he rides a bicycle. Either Clifton speaks French, or he drives a Dastun. Hence, Clifton rides a bicycle.
2. Consider the argument and verify its validity:
   All men are fallible. All kings are men. Therefore , all kings are fallible.
3. No mothers are males. Some males are politicians. Hence some politicians are not males.
4. Show that $\exists x\, Q(x)$ is a valid conclusion from the premises: $\forall x(P(x) \rightarrow Q(x))$ and $\exists x\, P(x)$.
5. Test the validity: All integers are irrational numbers. Some integers are powers of 2. Therefore, some irrational numbers is a power of 2.
6. Test the validity: All squares have equal sides. A rhombus has equal sides. Therefore, a rhombus is a square.
7. Is the argument valid or invalid:: Socrates is mortal. Therefore every man is either mortal or immortal.
8. Verify the validity:: If the advertisement is successful, then sales of the product will go up. Either the advertisement is successful or the production of the product will be stopped. The sales of the product will not go up. Therefore the production of the product will be stopped.
9. Find the total number of positive integers that can be formed from the digits 1,2,3,4 and 5 if no digit is repeated in any one integer.
10. There are 10 telegrams and 2 messenger boys, in how many different ways can the telegrams be distributed to the messenger boys if the telegrams are distinguishable?
11. How many different license plates are there that involve 1,2 or 3 letters followed by 4 digits?
12. In how many ways can 10 people be seated in a row so that a certain pair of them are not next to each other?
13. Write all 3 combinations of $\{\infty.a, \infty.b, \infty.c, \infty.d\}$
14. In how many ways can the letters of the English alphabet be arranged so that there are exactly 5 letters between the letters a and b?
15. In how many ways can a team of 5 be choosen from 10 players so as to (a) include both the strongest and weakest player? (b) include the strongest but exclude the weakest player? (c) exclude both the strongest and the weakest player?
16. Find the coefficient of $x^4(1+x+x^2+x^3)(1+x+x^2+x^3+x^4)(1+x+x^2+....+x^{12})$
17. Solve the recurrence relation $a_n - 7a_{n-1} + 10\, a_{n-2} = 0$ for $n \geq 2$ using generating functions.
18. Solve the recurrence relation $a_n - 9a_{n-1} + 26a_{n-2} - 24a_{n-3} = 0$ for $n \geq 3$.
19. Find the particular solution of $a_n - 4a_{n-1} + 4a_{n-2} = 2^n$.
20. Solve the recurrence relation :: $a_n - 7a_{n-1} + 10a_{n-2} = 7.3^n + 4^n$.