SECTION - A

10 × 2 = 20

VERY SHORT ANSWER TYPE QUESTIONS

Attempt **ALL** questions. Each question carries **2** marks.

1. Find the number which exceeds its positive square root by 12.
2. If $1, -2, 3$ are the roots of $x^3 - 2x^2 + ax + 6 = 0$ then find a.
3. If $A = \begin{bmatrix} -2 & 1 & 0 \\ 3 & 4 & -5 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 2 \\ 4 & 3 \\ -1 & 5 \end{bmatrix}$, find $A + B^T$.
4. Find the cofactors of 2 and -5 in the matrix $\begin{bmatrix} -1 & 0 & 5 \\ 1 & 2 & -2 \\ -4 & -5 & 3 \end{bmatrix}$.
5. Find the number of 4 letter words that can be formed using the letters of the word PISTON in which atleast one letter is repeated.
6. 14 persons are seated at a round table. Find the number of ways of selecting two persons out of them who are not seated adjacent to each other.
7. Find the 6th term of $(1 + x/2)^{-5}$.
8. Show that $1 + \frac{1}{3 \cdot 2^2} + \frac{1}{5 \cdot 2^4} + \frac{1}{7 \cdot 2^6} + \ldots = \log_e 3$.
9. If $P(A) = 0{\cdot}2$, $P(B) = 0{\cdot}5$ and A, B are independent, find $P(A \cup B)$.
10. A poisson variable satisfies $P(X-1) = P(X=2)$. Find $P(X=5)$.

SECTION - B

5 × 4 = 20

SHORT ANSWER TYPE QUESTIONS

Attempt **any 5** questions. Each question carries **4** marks.

11. If the roots of $ax^2 + bx + c = 0$ are imaginary, show that for all $x \in R$, $ax^2 + bx + c$ and a have the same sign.
12. Find n if ${}^{(n+1)}P_5 : {}^{n}P_6 = 2 : 7$.
13. Find the number of ways of arranging 6 boys and 6 girls around a circular table so that i) all the girls come together ii) no two girls come together.

14. Resolve $\frac{x^2-3}{(x+2)(x^2+1)}$ into partial fractions.

15. Show that $1+\frac{1^2+2^2}{2!}+\frac{1^2+2^2+3^2}{3!}+\ldots=\frac{17}{6}e$.

16. If A is an $m\times n$ matrix, B is an $n\times p$ matrix, C is an $p\times q$ matrix then show that $(AB)C=A(BC)$.

17. Three Urns have the following composition of balls
Urn I : 1 white , 2 black; Urn II : 2 white , 1 black; Urn III : 2 white , 2 black
One of the urns is selected at random and a ball is drawn. It turns out to be white. Find the probability that it came from urn III.

SECTION - C

5 × 7 = 35

LONG ANSWER TYPE QUESTIONS

Attempt **any 5** questions. Each question carries 7 marks.

18. Solve the equation $x^4+4x^3+5x^2+2x-2=0$, one root being $-1+i$.

19. Show that $C_0+\frac{C_1}{2}+\frac{C_2}{3}+\ldots+\frac{C_n}{n+1}=\frac{2^{n+1}-1}{n+1}$.

20. Show that $C_0^2-C_1^2+C_2^2-C_3^2+\ldots+(-1)^n C_n^2=0$ if n is odd
$=(-1)^{n/2}\ {}^nC_{n/2}$ if n is even.

21. Solve the equations by Gauss Jordan method.
$x+y+z=9,\ 2x+5y+7z=52,\ 2x+y-z=0$.

22. If $A=\begin{bmatrix}0&1&1\\1&0&1\\1&1&0\end{bmatrix}$ and $B=\frac{1}{2}\begin{bmatrix}b+c&c-a&b-a\\c-b&c+a&a-b\\b-c&a-c&a+b\end{bmatrix}$ then show that ABA^{-1} is a diagonal matrix.

23. A, B, C are aiming to shoot a balloon. A will succeed 4 times out of 5 attempts. The chance of B to shoot the balloon is 3 out of 4 and that of C is 2 out of 3. If the three aim the balloon simultaneously find the probability that atleast 2 of them hit the balloon.

24. The probability that a person chosen at random is left handed (in hand writing) is 0·1. What is the probability that in a group of ten people there is one, and only one, who is left handed ?