SECTION - A

10 × 2 = 20

VERY SHORT ANSWER TYPE QUESTIONS

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

1. Solve $4^{x-1} - 3 \cdot 2^{x-1} + 2 = 0$.
2. If α, β, γ are the roots of $4x^3 - 6x^2 + 7x + 3 = 0$ then find $\alpha\beta + \beta\gamma + \gamma\alpha$.
3. If $A = \begin{bmatrix} -1 & 2 \\ 0 & 1 \end{bmatrix}$, find AA^T.
4. Find the value of the determinant $\begin{vmatrix} a & h & g \\ h & b & f \\ g & f & c \end{vmatrix}$.
5. If ${}^{12}P_5 + 5 \cdot {}^{12}P_4 = {}^{13}P_r$ find r.
6. In a class there are 30 students. If each student plays a chess game with each of the other students, then find the total number of chess games played by them.
7. If the coefficents of $(2r+4)$th term and $(3r+4)$th term in the expansion of $(1+x)^{21}$ are equal, find r.
8. If $y = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \ldots$ then show that $x = y + \frac{y^2}{2!} + \frac{y^3}{3!} + \ldots$
9. If A, B are two events, then show that $P(A \mid B)\,P(B) + P(A \mid B^c)\,P(B^c) = P(A)$.
10. Find the constant c so that $P(x) = c\left(\frac{2}{3}\right)^x, x = 1, 2, 3, \cdots$ is the *p.d.* of a discrete random variable X.

SECTION - B

5 × 4 = 20

SHORT ANSWER TYPE QUESTIONS

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

11. Solve $\sqrt{(x-3)(2-x)} < \sqrt{4x^2 + 12x + 11}$.
12. Find the number of ways of arranging 6 boys and 5 girls in a row so that no two girls sit together.
13. Find the number of ways of arranging 6 red roses and 3 yellow roses of different sizes into a garland. In how many of them i) all the yellow roses come together ii) no two yellow roses come together.

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

15. Show that $1+\dfrac{1+2}{2!}+\dfrac{1+2+3}{3!}+\dfrac{1+2+3+4}{4!}+\ldots=\dfrac{3e}{2}$.

16. Find the inverse of the matrix $A=\begin{bmatrix}1 & 3 & 3\\ 1 & 4 & 3\\ 1 & 3 & 4\end{bmatrix}$.

17. A problem in a Calculus is given to two students A and B whose chances of solving it are 1/3 and 1/4. Find the probability that the problem being solved if both of them try independently.

SECTION - C $\quad 5 \times 7 = 35$

LONG ANSWER TYPE QUESTIONS

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

18. Remove second term from the equation $x^4+8x^3+x-5=0$.

19. Prove that $C_0+\dfrac{3}{2}\cdot C_1+\dfrac{9}{3}\cdot C_2+\dfrac{27}{4}\cdot C_3+\cdots+\dfrac{3^n}{n+1}C_n=\dfrac{4^{n+1}-1}{3(n+1)}$.

20. Show that $1+\dfrac{1}{3}+\dfrac{1\cdot3}{3\cdot6}+\dfrac{1\cdot3\cdot5}{3\cdot6\cdot9}+\ldots=\sqrt{3}$.

21. Solve the equations $2x-y+3z=9, x+y+z=6, x-y+z=2$ by Cramer's rule.

22. Solve $\begin{vmatrix}x-2 & 2x-3 & 3x-4\\ x-4 & 2x-9 & 3x-16\\ x-8 & 2x-27 & 3x-64\end{vmatrix}=0$.

23. The probability that Australia wins a match against India in a cricket game is given to be 1/3. If India and Australia play three matches, what is the probability that (i) Aus- tralia will loose all the three matches ? (ii) Australia will win atleast one match ?

24. One in 9 ships is likely to be wrecked, when they are set on sail. When 6 ships set on sail find the probability for i) atleast 1 will arrive safely ii) exactly 3 will arrive safely.