

SECTION A

VERY SHORT ANSWER TYPE QUESTIONS.

10X2 =20

Noe : Attempt all questions. Each question carries 2 marks.

1. If α and β are the roots of the equation $ax^2 + bx + c = 0$ then find the value of $\frac{1}{\alpha} + \frac{1}{\beta}$

2. If $-1, 2$ and α are the roots of $2x^3 + x^2 - 7x - 6 = 0$ then find ' α '.

3. If $A = \begin{bmatrix} -2 & 1 \\ 5 & 0 \\ -1 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} -2 & 3 & 1 \\ 4 & 0 & 2 \end{bmatrix}$ find $2A + B^T$

4. Find the determinant of $\begin{bmatrix} 1^2 & 2^2 & 3^2 \\ 2^2 & 3^2 & 4^2 \\ 3^2 & 4^2 & 5^2 \end{bmatrix}$

5. If ${}^{(n+1)}P_5 : {}^nP_6 = 2 : 7$ find n

6. Find ${}^{10}C_5 + 2 \cdot {}^{10}C_4 + {}^{10}C_3$

7. Find the coefficient of x^{-7} in the expansion of $\left(\frac{2x^2}{3} - \frac{5}{4x^5}\right)^{11}$

8. Find $1 + \frac{1}{2!} + \frac{1}{4!} + \frac{1}{6!} + \dots$

9. If A, B are two events with $P(A) = 0.5, P(B) = 0.4$ and $P(A \cap B) = 0.3$, then find probability of neither A nor B occurs.

10. A Poisson variable satisfies $P(X = 1) = P(X = 2)$. Find $P(X = 5)$

SECTION B

SHORT ANSWER TYPE QUESTIONS.

5X4 =20

Note : Answer any FIVE questions. Each question carries 4 marks.

11. Determine the range of the expression $\frac{x^2 + x + 1}{x^2 - x + 1}$, $x \in \mathbb{R}$
12. If $I \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ and $E = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$ then show that $(aI + bE)^3 = a^3I + 3a^2bE$.
13. Find the sum of all four digit numbers that can be formed using the digits 1,2,4,5,6 with out repetition.
14. Find the number of ways of forming a committee of 5 persons from a group of 5 Indians and 4 Russians such that there are atleast 3 Indians in the committee.
15. Resolve $\frac{x}{(x-1)(x-2)}$ in to partial fractions.
16. Show that $\frac{1}{2.3} + \frac{1}{4.5} + \frac{1}{6.7} + \dots = 1 - \log_e 2$
17. If A, B, C are three independent events of an experiment such that $P(A \cap B^c \cap C^c) = \frac{1}{4}$, $P(A^c \cap B \cap C^c) = \frac{1}{8}$, $P(A^c \cap B^c \cap C^c) = \frac{1}{4}$, then find P(A), P(B) and P(C).

SECTION C

LONG ANSWER TYPE QUESTIONS.

5X7 =35

Note: Answer any Five of the following. Each question carries 7 marks.

18. Solve that equation $x^4 - 10x^3 + 26x^2 - 10x + 1 = 0$.
19. Show that $\det \begin{bmatrix} a+b+2c & a & b \\ c & b+c+2a & b \\ c & a & c+a+2b \end{bmatrix} = 2(a+b+c)^3$
20. Solve the equations $x + y + z = 6$, $x - y + z = 2$, $2x - y + 3z = 9$ by Gauss Jordan method.

21. If P and Q are the sum of odd terms and the sum of even terms respectively in the expansion of

$$(x+a)^n \text{ then prove that i) } P^2 - Q^2 = (x^2 - a^2)^n \quad \text{ii) } 4PQ = (x+a)^{2n} - (x-a)^{2n}$$

22. Find the sum of the infinite series $\frac{1}{4} + \frac{5}{4 \cdot 8} + \frac{5 \cdot 7}{4 \cdot 8 \cdot 12} + \dots \infty$

23. A,B,C are 3 news papers from a city , 20% of the population read A, 16% read B, 14% read c, 8% read both A and B , 5% both A and C, 4% read both B and C and 2% read all the three. Find the percentage of the population who read atleast one news paper and find the percentage of population who read the newspaper A only.

24. A random variable X has the following probability distribution

$X = x_i$	0	1	2	3	4	5
$P(X = x_i)$	0	k	2k	3k	4k	5k

Find k, mean and variance of X.
