SECTION - A

$10 \times 2 = 20$

VERY SHORT ANSWER TYPE QUESTIONS

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

1. Find the quadratic equation for which the sum of the roots is 1 and the sum of the squares of the roots is 13.

2. Solve the equation $4x^3 + 20x^2 - 23x + 6 = 0$, two of the roots being equal.

3. If $A = \begin{bmatrix} i & 0 \\ 0 & -i \end{bmatrix}$, find A^2.

4. Find the rank of the matrix $\begin{bmatrix} 1 & 4 & -1 \\ 2 & 3 & 0 \\ 0 & 1 & 2 \end{bmatrix}$.

5. If ${}^nP_7 = 42\,{}^nP_5$, find n.

6. If ${}^9C_3 + {}^9C_5 = {}^{10}C_r$, find r.

7. Find the middle term in the expansion of $\left(\frac{3x}{7} - 2y\right)^{10}$.

8. Show that $\frac{1}{1!} + \frac{1+3}{2!} + \frac{1+3+3^2}{3!} + \ldots = \frac{e}{2}(e^2 - 1)$.

9. A page is opened arbitrarily from a book of 200 pages. What is the probability that the number of the page is a perfect square.

10. If the difference between the mean and variance of a binomial variate is 5/9 then find the probability for the event of 2 successes when the experiment is conducted 5 times.

SECTION - B

$5 \times 4 = 20$

SHORT ANSWER TYPE QUESTIONS

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

11. If x is real, show that $\frac{1}{3x+1} + \frac{1}{x+1} - \frac{1}{(3x+1)(x+1)}$ does not lie between 1 and 4.

12. Find the number of ways of arranging 5 different Mathematics books, 4 different Physics books and 3 different Chemistry books such that the books of the same subject are together.