Total No. of Questions – 24 Regd.

Total No. of Printed Pages – 4 No.

Part – III
MATHEMATICS, Paper – II(A)
(English Version)

Time : 3 Hours] [Max. Marks : 75

Note : This question paper consists of **three** Sections – **A**, **B** and **C**.

SECTION – A $10 \times 2 = 20$

I. Very Short Answer Type questions :

(i) Answer **ALL** questions.

(ii) Each question carries **TWO** marks.

1. If $(a + ib)^2 = x + iy$, find $x^2 + y^2$.

2. If the Arg z_1 and Arg z_2 are $\dfrac{\pi}{5}$ and $\dfrac{\pi}{3}$ respectively, then find $(\text{Arg } z_1 + \text{Arg } z_2)$.

3. If A, B, C are angles of a triangle such that $x = \text{Cis } A$, $y = \text{Cis } B$, $z = \text{Cis } C$, then find the value of xyz.

4. For what values of x the expression $x^2 - 5x - 14$ is positive ?

5. If α, β, γ are the roots of $4x^3 - 6x^2 + 7x + 3 = 0$, then find the value of $\alpha\beta + \beta\gamma + \gamma\alpha$.

6. If $^{(n+1)}P_5 : {^n}P_5 = 3 : 2$, then find n.

7. Find the number of ways of arranging the letters of the word INTERMEDIATE.

8. Find the set E of the values of x for which the binomial expansion of $(3 - 4x)^{\frac{3}{4}}$ is valid.

9. Find the mean deviation from the median of the following discrete data :

   6, 7, 10, 12, 13, 4, 12, 16

10. 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 10 people, there is one who is left handed ?

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SECTION – B

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$5 \times 4 = 20$

II. Short Answer Type questions :

   (i) Attempt **ANY FIVE** questions.

   (ii) Each question carries **FOUR** marks.

11. Show that the four points in the Argand plane represented by the complex numbers $2 + i$, $4 + 3i$, $2 + 5i$, $3i$ are the vertices of a square.

12. Determine the range of the expression $\dfrac{x + 2}{2x^2 + 3x + 6}$.

13. If the letters of the word PRISON are permuted in all possible ways and the words thus formed are arranged in dictionary order, find the rank of the word PRISON.

14. Find the number of ways of forming a committee of 5 members out of 6 Indians and 5 Americans so that always the Indians will be in majority in the committee.

15. Resolve $\dfrac{x^3}{(x-a)(x-b)(x-c)}$ into partial fractions.

16. A, B, C are three horses in a race. The probability of A to win the race is twice that of B, and probability of B is twice that of C. What are the probabilities of A, B and C to win the race ?

$$\frac{4}{7}, \frac{2}{7}, \frac{1}{7}$$

17. A speaks truth in 75% of the cases and B in 80% cases. What is the probability that their statements about an incident do not match ? $\frac{7}{20}$

SECTION – C
$5 \times 7 = 35$

III. Long Answer Type questions :

(i)   Answer **ANY FIVE** questions.

(ii)   Each question carries **SEVEN** marks.

18. If n is an integer, then show that $(1 + i)^{2n} + (1 - i)^{2n} = 2^{n+1} \cos\left(\dfrac{n\pi}{2}\right)$.

19. Find the polynomial equation whose roots are the translates of those of the equation $x^5 - 4x^4 + 3x^2 - 4x + 6 = 0$ by -3.

20. If the coefficients of 4 consecutive terms in the expansion of $(1 + x)^n$ are a_1, a_2, a_3, a_4 respectively, then show that

$$\frac{a_1}{a_1 + a_2} + \frac{a_3}{a_3 + a_4} = \frac{2a_2}{a_2 + a_3}$$

21. If $x = \dfrac{1 \cdot 3}{3 \cdot 6} + \dfrac{1 \cdot 3 \cdot 5}{3 \cdot 6 \cdot 9} + \dfrac{1 \cdot 3 \cdot 5 \cdot 7}{3 \cdot 6 \cdot 9 \cdot 12} + \ldots$, then prove that $9x^2 + 24x = 11$.

22. Find the mean deviation about the mean for the fo...

x_i	2	5	7	8	10	35
f_i	6	8	10	6	8	2

23. The boxes numbered I, II, III contains the balls

	White	Black	Red
I	1	2	3
II	2	1	1
III	4	5	3

One box is randomly selected and a ball is drawn from it. If the ball is red, then find the probability that it is from box II.

24.

$X = x_i$	−3	−2	−1	0	1	2	3
$P(X = x_i)$	$\dfrac{1}{9}$	$\dfrac{1}{9}$	$\dfrac{1}{9}$	$\dfrac{1}{3}$	$\dfrac{1}{9}$	$\dfrac{1}{9}$	$\dfrac{1}{9}$

is the probability distribution of a random variable X. Find the variance of X.