266 **III**

Total No. of Questions – 24 **Regd. No.**

Total No. of Printed Pages – 4

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

I. Very short answer type questions : $10 \times 2 = 20$

(i) Answer **all** questions.

(ii) Each questions carries **two** marks.

1. If Arg z_1 and Arg z_2 are $\frac{\pi}{5}$ and $\frac{\pi}{3}$ respectively then find (Arg z_1 + Arg z_2).

2. Find the square root of $7 + 24i$.

3. Find the value of $(1 - i)^8$.

4. For what values of x, the expression $x^2 - 5x + 6$ is positive ?

5. If 1, 1, α are the roots of $x^3 - 6x^2 + 9x - 4 = 0$, then find α.

6. Find the number of ways of arranging 5 boys and 4 girls in a row, so that the row begins with a boy and ends with a girl.

7. Find the number of diagonals of a polygon with 12 sides.

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

9. Compute the mean deviation about the median for the data 6, 7, 10, 12, 13, 4, 12, 16.

10. Let X be a random variable such that

$P(X=-2)=P(X=-1)=P(X=2)=P(X=1)=1/6$ and

$P(X=0)=1/3$; then find the mean of X.

SECTION – B

$5 \times 4 = 20$

II. Short answer type questions :

(i) Answer any **five** questions.

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

11. Determine the locus of z, $z \neq 2i$

such that $\text{Re}\left(\frac{z-4}{z-2i}\right)=0$.

12. Find the maximum value of the function $\frac{x^2+14x+9}{x^2+2x+3}$ over R.

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

14. Find the number of ways of selecting 11 members cricket team from 7 batsmen, 6 bowlers and 2 wicket-keepers so that the team contains 2 wicket keepers and atleast 4 bowlers.

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

16. Two persons A and B are rolling a dice on the condition that the person who gets 3, will win the game. If A starts the game, then find the probabilities of A and B respectively to win the game.

17. If A and B are two events with $P(A \cup B) = 0.65$, $P(A \cap B) = 0.15$, then find the value of $P(A^C) + P(B^C)$.

SECTION – C $5 \times 7 = 35$

III. Long answer type questions :

(i) Attempt any **five** questions.

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

18. Show that one of the values of

$$\left(\frac{1+\sin\frac{\pi}{8}+i\cos\frac{\pi}{8}}{1+\sin\frac{\pi}{8}-i\cos\frac{\pi}{8}}\right)^{8/3} \text{ is } -1$$

19. Solve the equation : $x^4 - 10x^3 + 26x^2 - 10x + 1 = 0$.

20. Prove that

$$C_0 + \frac{3}{2}\cdot C_1 + \frac{9}{3}\cdot C_2 + \frac{27}{4}\cdot C_3 + \ldots\ldots + \frac{3^n}{n+1}\cdot C_n = \frac{4^{n+1}-1}{3(n+1)}.$$

21. If $x = \frac{1}{5} + \frac{1.3}{5.10} + \frac{1.3.5}{5.10.15} + \ldots\ldots \infty$, then find $3x^2 + 6x$.

22. Find the mean deviation from the mean of the following data. :

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70
No. of students	6	5	8	15	7	6	3

Using step deviation method.

23. Three boxes B_1, B_2, B_3 contain balls with different colours as shown below :

	White	Black	Red
B_1	2	1	2
B_2	3	2	4
B_3	4	3	2

A die is thrown. B_1 is chosen if either 1 or 2 turns up. B_2 is chosen if either 3 or 4 turns up. B_3 is chosen if either 5 or 6 turns up. Having chosen a box in this way, a ball is chosen at random from this box. If the ball drawn is found to be red, find the probability that it is drawn from box B_2.

24. Two dice are rolled at random. Find the probability distribution of the sum of the numbers on them. Find the mean of the random variable.
