☼ **266** **II**

Total No. of Questions : **24**
Total No. of Printed Pages : **3**

Regd. 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

I. Very Short Answer Type Questions. **10x2=20**

(i) Answer *all* the questions.

(ii) Each question carries *two marks.*

1. Find a square root of the complex number $3+4i$.

2. If the Arg $\bar{z}_1$ and Arg z_2 are $\frac{\pi}{5}$ and $\frac{\pi}{3}$ respectively, then find (Arg z_1 + 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. Form quadratic equation whose roots are $7\pm2\sqrt{5}$.

5. Find the transformed equation whose roots are the negatives of the roots of $x^4+5x^3+11x+3=0$.

6. Find the number of ways in which 4 letters can be put in 4 addressed envelopes so that no letter goes into the envelope meant for it.

7. If ${}^nC_5={}^nC_6$ then find ${}^{13}C_n$.

8. Find the number of terms in the expansion of $(2x+3y+z)^7$.

9. Find the variance for the discrete data given below.
6, 7, 10, 12, 13, 4, 8, 12

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

SECTION - B

II. Short Answer Type Questions. **5x4=20**

(i) Answer *any five* questions.

(ii) Each question carries *four marks*.

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

12. If x is real, prove that $\frac{x}{x^2-5x+9}$ lies between $-\frac{1}{11}$ and 1.

13. If the letter of the word MASTER are permuted in all possible ways and the word thus formed are arranged in the dictionary order, then find the rank of the word REMAST.

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. https://www.apboardonline.com

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

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

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

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

17. The probability that Australia wins a match against India in a cricket game is given to be $\frac{1}{3}$. If India and Australia play 3 matches, what is the probability that

(i) Australia will loose all the three matches ?

(ii) Australia will win atleast one match ?

SECTION - C

III. Long Answer Type Questions. **5x7=35**

(i) Answer *any five* questions.
(ii) Each question carries *seven marks*.

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

19. Solve the equation $x^4+2x^3-5x^2+6x+2=0$ given that $1+i$ is one of its roots.

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

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

22. Find the mean deviation from the mean of the following data, using the step deviation method.

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

23. Three boxes B1, B2 and B3 contain balls with different colours as shown below :

	White	Black	Red
B1	2	1	2
B2	3	2	4
B3	4	3	2

A die is thrown. B1 is chosen if either 1 or 2 turns up. B2 is chosen if 3 or 4 turns up and B3 is chosen if 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 B2.

24. The range of a random variable X is $\{0, 1, 2\}$. Given that $P(X=0) = 3c^3$, $P(X=1) = 4c - 10c^2$, $P(X=2) = 5c-1$
(i) Find the value of c (ii) $P(X<1)$, $P(1<X\leq 2)$ and $P(0<X\leq 3)$.

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