

266 (N)

(NEW SYLLABUS)



Total No. of Questions : 24
Total No. of Printed Pages : 4

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Part-III

MATHEMATICS, Paper - II(A)

(English version)

Time : 3 Hours]

[Max. Marks : 75

Note : This question paper contains three Sections A, B and C.

SECTION - A

10×2=20

I. Very short answer type questions.

- (i) Answer **all** the questions.
(ii) Each question carries **two** marks.

1. Find the square roots of $7 + 24i$.
2. Express the complex number $1 + i\sqrt{3}$ in modulus - amplitude form.
3. If $x = \text{cis } \theta$, then find the value of $\left(x^6 + \frac{1}{x^6}\right)$.
4. Find the maximum value of the quadratic expression $2x - 7 - 5x^2$.
5. If $-1, 2$ and α are the roots of $2x^3 + x^2 - 7x - 6 = 0$, then find ' α '.

6. If ${}^n P_4 = 1680$, then find 'n'.
7. If ${}^{15} C_{2r-1} = {}^{15} C_{2r+4}$, then find 'r'.
8. Find the number of terms in the expansion of $(2x + 3y + z)^7$.
9. Find the mean deviation from the mean of following discrete data
6, 7, 10, 12, 13, 4, 12, 16.
10. A Poisson variable satisfies $P(X=1) = P(X=2)$. Find $P(X=5)$.

SECTION-B

5×4=20

II. Short answer type questions.

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

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

11. If $z = x + iy$ and if the point P in the Argand plane represents z. Find the locus of z satisfying the equation $|z - 3 + i| = 4$.
12. If x is real, prove that $\frac{x}{x^2 - 5x + 9}$ lies between $-\frac{1}{11}$ and 1.
13. If the letters of the word PRISON are permuted in all possible ways and the words formed are arranged in dictionary order, find the rank of the word PRISON.
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 $\frac{x+4}{(x^2-4)(x+1)}$ 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?
17. If A and B are independent events with $P(A) = 0.6$, $P(B) = 0.7$, then compute (i) $P(A \cap B)$, (ii) $P(A \cup B)$, (iii) $P\left(\frac{B}{A}\right)$, (iv) $P(A^c \cap B^c)$

SECTION-C

5×7=35

III. Long answer type questions.

- (i) Attempt **ANY FIVE** questions.
- (ii) Each question carries **seven** marks.
18. If α, β are roots of the equation $x^2 - 2x + 4 = 0$; then for any $n \in \mathbb{N}$, show that $\alpha^n + \beta^n = 2^{n+1} \cos\left(\frac{n\pi}{3}\right)$.
19. Solve $4x^3 - 24x^2 + 23x + 18 = 0$ given that the roots of the equation are in Arithmetic Progression.
20. In 'n' is a positive integer and 'x' is any non-zero real number, then prove that $C_0 + C_1 \cdot \frac{x}{2} + C_2 \cdot \frac{x^2}{3} + C_3 \cdot \frac{x^3}{4} + \dots + C_n \cdot \frac{x^n}{n+1} = \frac{(1+x)^{n+1} - 1}{(n+1)x}$.
21. If $x = \frac{1}{5} + \frac{1 \cdot 3}{5 \cdot 10} + \frac{1 \cdot 3 \cdot 5}{5 \cdot 10 \cdot 15} + \dots \infty$, then prove that $3x^2 + 6x = 2$.

22. Calculate the variance and standard deviation of the following continuous Frequency distribution.

Class interval	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequency	3	7	12	15	8	3	2

23. State and prove Addition theorem on Probability.

24. The probability distribution of a random variable X is given below.

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

Find the value of 'k' and the mean and variance of 'X'.
