

C**0266**

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****10×2=20****I. Very Short Answer Type Questions.****(i) Answer ALL questions.****(ii) Each question carries TWO marks.**

1. Write the complex number $\frac{a - ib}{a + ib}$ in the form $A + iB$.

2. If $z_1 = (6, 3)$; $z_2 = (2, -1)$, find z_1 / z_2 .

3. If $x = \text{cis } \theta$, then find the value of $\left(x^6 + \frac{1}{x^6}\right)$.

4. Form a quadratic equation whose roots are $\frac{m}{n}$, $-\frac{n}{m}$ ($m \neq 0$, $n \neq 0$).

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

6. If ${}^{12}P_r = 1320$, find r .

7. Find the number of ways of selecting 4 English, 3 Telugu and 2 Hindi books out of 7 English, 6 Telugu and 5 Hindi books.

8. Find the 7th term in the expansion of $\left(\frac{4}{x^3} + \frac{x}{2}\right)^{14}$.

9. Find the mean deviation about the mean for the following data -

3, 6, 10, 4, 9, 10.

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 $|z - 3 + i| = 4$, determine the locus of z .

12. If x is real, prove that $\frac{x}{x^2 - 5x + 9}$ lies between $-\frac{1}{8}$ and 1 .

13. Find the sum of all 4 digit numbers that can be formed using the digits 1, 2, 4, 5, 6 without repetition.

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

15. Resolve $\frac{x^2 + 5x + 7}{(x - 3)^3}$ into partial fractions.

16. If A and B be independent events with $P(A) = 0.2$, $P(B) = 0.5$, then

find (i) $P(A|B)$ (ii) $P(B|A)$ (iii) $P(A \cap B)$ and (iv) $P(A \cup B)$

17. If two numbers are selected randomly from 20 consecutive natural numbers, find the probability that the sum of the two numbers is

(i) an even number (ii) an odd number.

SECTION - C

5×7=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

$$(1 + \cos \theta + i \sin \theta)^n + (1 + \cos \theta - i \sin \theta)^n = 2^{n+1} \cos^n \left(\frac{\theta}{2} \right) \cos \left(\frac{n\theta}{2} \right).$$

19. Solve the equation $8x^3 - 36x^2 - 40x + 81 = 0$, given that the roots are in Arithmetic Progression.

20. If P and Q are the sum of odd terms and the sum of even terms respectively in the expansion of $(x + a)^n$ then prove that

(i) $P^2 - Q^2 = (x^2 - a^2)^n$

(ii) $4PQ = (x + a)^{2n} - (x - a)^{2n}$

21. Find the sum of the infinite series $\frac{35}{4} + \frac{35}{4.8} + \frac{35.7}{4.8.12} + \dots$

22. Find the mean deviation about the mean for the following distribution.

x_i	10	30	50	70	90
f_i	4	24	28	16	8

23. State and prove Addition Theorem of Probability.

24.

$X = x$	-2	-1	0	1	2	3
$P(X = x)$	0.1	k	0.2	$2k$	0.3	k

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

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