0266

B

Total No. of Questions—24

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

2.   Write the conjugate of the complex number $(3 + 4i)$.

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

4.   Find the roots of the equation $x^2 - 7x + 12 = 0$.

5.   If 1, -2 and 3 are the roots of $x^3 - 2x^2 + ax + 6 = 0$, then find a.

6.   Find the number of ways of arranging the letters of the word INDEPENDENCE.

2023/3/21 12:27

7. If $^nC_4 = {}^nC_6$, find n.

8. Find the middle term of the $(3a - 5b)^6$.

9. Find the variance for the discrete data :

$$6, 7, 10, 12, 13, 4, 8, 12$$

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) Attempt ANY FIVE questions.

(ii) Each question carries FOUR marks.

11. If $z = 3 - 5i$, then show that $z^3 - 10z^2 + 58z - 136 = 0$.

12. Prove that $\dfrac{1}{3x+1} + \dfrac{1}{x+1} - \dfrac{1}{(3x+1)(x+1)}$ does not lie between 1 and 4, if x is real.

13. Find the number of ways of selecting a cricket team of 11 players from 7 batsmen and 6 bowlers such that there will be at least 5 bowlers in the team.

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

0266-B

15. Resolve $\dfrac{5x+1}{(x+2)(x-1)}$ 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. A and B are events with $P(A) = 0.5$, $P(B) = 0.4$ and $P(A \cap B) = 0.3$. Find the probability that (i) A does not occur (ii) neither A nor B occurs.

SECTION C

$5 \times 7 = 35$

III. Long Answer Type Questions :

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

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

18. If n is an integer, then show that :

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

19. Solve the equation $3x^3 - 26x^2 + 52x - 24 = 0$ given that the roots are in G.P.

20. Find the sum of the infinite series $1 + \dfrac{1}{3} + \dfrac{1 \cdot 3}{3 \cdot 6} + \dfrac{1 \cdot 3 \cdot 5}{3 \cdot 6 \cdot 9} + \ldots\ldots\ldots$

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0266-B

21. If the coefficients of x^9, x^{10}, x^{11} in the expansion of $(1 + x)^n$ are in A.P., then prove that $n^2 - 41n + 398 = 0$.

22. Find the mean deviation about the mean for the following data :

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

23. Suppose that an urn B_1 contains 2 white and 3 black balls and another urn B_2 contains 3 white and 4 black balls. One urn is selected at random and a ball is drawn from it. If the ball drawn is found black, find the probability that the urn chosen was B_1.

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) $P(x < 1), P(1 < x \le 2)$ and $P(0 < x \le 3)$.

0266-B