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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. Write the conjugate of the complex number $\frac{5i}{7+i}$.

2. Simplify $-2i(3+i)\ (2+4i)\ (1+i)$ and obtain the modulus of that complex number.

3. If 1, ω, ω^2 are the cube roots of unity, then prove that :
$(2-\omega)\ (2-\omega^2)\ (2-\omega^{10})\ (2-\omega^{11}) = 49$.

4. For what values of x the expression $x^2-5x-14$ is positive ?

5. Form polynominal equations of the lowest degree, with roots 1, -1, 3.

6. There are 4 copies (alike) each of 3 different books. Find the number of ways of arranging these 12 books in a shelf in a single row.

7. If ${}^nP_r = 5040$ and ${}^nC_r = 210$, find n and r.

8. Write down and simplify 6^{th} term in $\left(\frac{2x}{3}+\frac{3y}{2}\right)^9$.

9. Find the mean deviation about the median for the following data
4, 6, 9, 3, 10, 13, 2.

10. The mean and variance of a binomial distribution are 4 and 3 respectively. Fix the distribution and find $P(x \geq 1)$.

SECTION - B

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

(i) Answer *any five* questions.

(ii) Each question carries *four marks.*

11. Show that points in the Argand plane represented by the complex numbers $-2+7i, \frac{-3}{2}+\frac{1}{2}i, 4-3i, \frac{7}{2}(1+i)$ are the vertices of a rhombus.

12. If the expression $\frac{x-p}{x^2-3x+2}$ takes all real values for $x \in R$, then find the bounds for p.

13. Find the number of 5 letter words that can be formed using the letters of the word CONSIDER.
How many of them begin with "C", how many of them end with "R" and how many of them being with "C" and end "R" ?

14. A question paper is divided into 3 sections A, B, C containing 3, 4, 5 questions respectively. Find the number of ways of attempting 6 questions choosing atleast one from each section.

15. Resolve $\frac{2x^2+3x+4}{(x-1)(x^2+2)}$ into partial fractions.

16. A speaks truth in 75% of the cases and B in 80% cases. What is the probability that their statements about an incident do not match ?

17. A fair die is rolled. Consider the events A={1, 3, 5}, B={2, 3} and C={2, 3, 4, 5}. Find :

(i) $P(A \cap B)$, $P(A \cup B)$ (ii) $P(A/B), P(B/A)$

(iii) $P(A/C), P(C/A)$ (iv) $P(B/C), P(C/B)$

SECTION - C

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

(i) Answer *any five* questions.

(ii) Each question carries *seven marks.*

18. If $\cos\alpha+\cos\beta+\cos\gamma=0=\sin\alpha+\sin\beta+\sin\gamma$ then show that :

(i) $\cos3\alpha+\cos3\beta+\cos3\gamma=3\cos(\alpha+\beta+\gamma)$

(ii) $\sin3\alpha+\sin3\beta+\sin3\gamma=3\sin(\alpha+\beta+\gamma)$

19. Solve the equation $6x^6 = 25x^5 + 31x^4 - 31x^2 + 25x - 6 = 0$.

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

21. Find the sum of the infinite series $\frac{3}{4.8} - \frac{3.5}{4.8.12} + \frac{3.5.7}{4.8.12.16} - \ldots\ldots$

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. State and prove Addition theorem on probability.

24. A random variable X has the following probability distribution.

X = x	0	1	2	3	4	5	6	7
P(X = x)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2 + k$

Find (i) k (ii) the mean and (iii) $P(0 < X < 5)$.

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