INTERMEDIATE PUBLIC EXAMINATIONS – 2024

Revision Test Examinations – I, Nov/Dec 2023

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Part – III

MATHEMATICS – Paper – II(A)

Time : 3 Hours **Max. Marks : 75**

Note : This question paper consists of **THREE SECTIONS – A, B** and **C**.

SECTION – A

I. Answer all the following questions. **10×2=20**

1. Find the square root of 7+24i
2. If the $\left(\sqrt{3}+\ i\right)^{100} = 2^{99}(a+b)$ then show that $a^2+b^2=4$.
3. Find the least positive integer n, satisfying $\left(\frac{1+i}{1-i}\right)^n = 1$.
4. If $x = cis\theta$, then find the value of $\left(x^6+\frac{1}{x^6}\right)$.
5. Find the quadratic equation whose roots are $7+2\sqrt{5}$ and $7-2\sqrt{5}$.
6. If α, β, 1 are the roots of $x^3-2x^2-5x+6=0$ then find α, β.
7. Find the algebraic equation whose roots are two times of the roots of $x^5-2x^4+3x^3+2x^2-4x+3=0$.
8. If ${}^{12}P_r = 1320$, find 'r'.
9. Find the number of terms in the expansion of $\left[\frac{3a}{4}+\frac{b}{2}\right]^9$.
10. Find the middle term in the expansion of $\left[4a+\frac{3}{2}b\right]^{11}$.

SECTION – B

II. Answer any FIVE of the following questions. **5×4=20**

11. Show that the $Z_1 = \frac{2+11i}{25}$; $Z_2 = \frac{-2+1}{(1-2i)^2}$ are conjugate to each other.

12. If $x + iy = \frac{3}{2+cos\theta+i\sin\theta}$ then show that $x^2 + y^2 = 4x - 3$.
13. If 'x' is real, then prove that $\frac{x}{x^2+5x-9}$ lies between $\frac{-1}{11}$ and 1.
14. Determine the range of $\frac{x+2}{2x^2+3x+6}$ then $x \in R$.
15. Solve $2x^4 + x^3 - 11x^2 + x + 2 = 0$.
16. If the letters of the word EAMCET are permuted in all possible ways and if the words thus formed are arranged in dictionary order, find the rank of the word EAMCET.
17. Find the number of ways of forming a committee of 4 members out of 6 boys and 4 girls. Such that there is atleast one girl in the committee.

SECTION – C

III. Answer any FIVE of the following questions. 7×5=35

18. If $\cos\alpha+\cos\beta+\cos\delta = 0 = \sin\alpha+\sin\beta+\sin\delta$, then prove that $\cos^2\alpha+\cos^2\alpha\ \cos^2\beta+\cos^2\delta = \frac{3}{2} = \sin^2\alpha+\sin^2\beta+\sin^2\delta$.
19. Solve $6x^6 - 25x^5 + 31x^4 + 25x - 6 = 0$.
20. Given that the roots of $x^3 + 3px^2 + 3qx + r = 0$ are in
    i. A.P. show that $2p^3 + 3pq + r = 0$
    ii. G.P. show that $p^3r = q^3$
    iii. H.P. show that $2q^3 = r(3pq - r)$
21. Find the sum of the series $\frac{3.5}{5.10} + \frac{3.5.7}{5.10.15} + \frac{3.5.7.9}{5.10.15.20} + \cdots\cdots\cdots \infty$
22. Find the sum of the infinite series.
$$S = \frac{3}{4.8} + \frac{3.5}{4.8.12} + \frac{3.5.7.}{4.8.12.16} + \cdots\cdots\cdots$$
23. Find al the roots of the equation $x^{11} - x^7 + x^4 + 1 = 0$
24. If $x = \frac{5}{(2!)3} + \frac{5.7}{(3!)3^2} + \frac{5.7.9}{4!(3^3)} + \cdots\cdots$, then find the value of $x^2 + 4x$.