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COMMON FIRST MID-TERM TEST - 2019

Standard XI

Reg.No.: | | | | | | |

Time: 1.30 hours. **MATHEMATICS** Marks: 45

Part - A

I. Choose the correct answer: $10 \times 1 = 10$

1. The number of real numbers in $[0, 2\pi]$ satisfying $\sin^4 x - 2\sin^2 x + 1$ is
   a) 2 b) 4 c) 1 d) ∞
2. If $|z - 2 + i| \le 2$, then the greatest value of $|z|$ is
   a) $\sqrt{3}-2$ b) $\sqrt{3}+2$ c) $\sqrt{5}-2$ d) $\sqrt{5}+2$
3. If $x^3 + 12x^2 + 10ax + 1999$ definitely has positive zero if and only if
   a) $a \ge 0$ b) $a > 0$ c) $a < 0$ d) $a \le 0$
4. The value of $\left(\frac{1+\sqrt{3}i}{1-\sqrt{3}i}\right)^{10}$ is a) $\text{cis}\frac{2\pi}{3}$ b) $\text{cis}\frac{4\pi}{3}$ c) $-\text{cis}\frac{2\pi}{3}$ d) $-\text{cis}\frac{4\pi}{3}$
5. If $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$ be such that $\lambda A^{-1} = A$, then λ is a) 17 b) 14 d) 19 d) 21
6. If $P = \begin{bmatrix} 1 & x & 0 \\ 1 & 3 & 0 \\ 2 & 4 & -2 \end{bmatrix}$ is the adjoint of 3 x 3 matrix A and $|A| = 4$, then x is
   a) 15 b) 12 c) 14 d) 11
7. If $A^T A^{-1}$ is symmetric, then A^2 is a) A^{-1} b) $(A^T)^2$ c) A^T d) $(A^{-1})^2$
8. $\sum_{i=1}^{25} i^n$ is a) $-i$ b) 1 c) -1 d) i
9. adj(AB)
   a) adj(A) + adj(B) b) adj(A) − adj(B) c) adj(A) . adj(B) d) adj(B) . adj(A)
10. Quadratic equation with roots are $2, \frac{1}{2}$ is
    a) $2x^2 - 5x + 2$ b) $x^2 + \frac{5}{2}x + 1 = 0$ c) $2x^2 + 5x - 2$ d) $x^2 + \frac{5}{2}x - 1 = 0$

Part - B

II. Answer any 4 questions: (Ques.No.16 is compulsory) $4 \times 2 = 8$

11. If $\text{adj}(A) = \begin{vmatrix} 0 & -2 & 0 \\ 6 & 2 & -6 \\ -3 & 0 & 6 \end{vmatrix}$, find A^{-1}.

$2(4)+10-2$
$8-2+10$
$6+10$
$=16$
$2(\frac{1}{2})^2 - 5(\frac{1}{2}) + 2$

12. Solve by Cramer's rule: $\frac{3}{x} + 2y = 12$; $\frac{2}{x} + 3y = 13$
13. If the area of the triangle formed by the vertices, z . iz and z + iz is 32 sq.units, then find the value of |z|.

14. Simplify: $\left(\sin\frac{\pi}{6}+i\cos\frac{\pi}{6}\right)^{18}$
15. Find the polynomial equation of minimum degree with rational coefficients having $2+\sqrt{3}$ as a root.
16. $1950x^{26}+15x^{8}+26x^{6}+2020=0$, discuss the nature of the roots of the above equation.

Part - C

III. Answer any 4 questions: (Ques.No.22 is compulsory) $4\times3=12$

17. Show that the matrix $A=\begin{bmatrix}2 & 3\\ 1 & 2\end{bmatrix}$, satisfy the equation $A^2-4A+I_2=0$. Using this equation, find A^{-1}
18. Find the rank of $\begin{bmatrix}1 & 2 & -1\\ 3 & -1 & 2\\ 1 & -2 & 3\\ 1 & -1 & 1\end{bmatrix}$

19. Show that $\left(\frac{19+9i}{5-3i}\right)^{15}-\left(\frac{8+i}{1+2i}\right)^{15}$ is purely imaginary.
20. If z_1, z_2 and z_3 are three complex numbers such that $|z_1|=2$, $|z_2|=3$, $|z_3|=4$ and $|z_1+z_2+z_3|=1$ then find $|16z_1z_2+9z_1z_3+4z_2z_3|$
21. Find the sum of squares of the roots of the equation $2x^4-8x^3+6x^2-3=0$
22. Solve: $x^4-10x^3+26x^2-10x+1=0$

Part - D

IV. Answer all the questions: $3\times5=15$

23. a) Find the inverse of $A=\begin{bmatrix}2 & 1 & 1\\ 3 & 2 & 1\\ 2 & 1 & 2\end{bmatrix}$ by Gauss-Jordan method.

(or)

b) By using Gaussian Elimination method balance the chemical reaction equation. $CH_4+O_2\rightarrow CO_2+H_2O$

24. a) If $\left|z-\frac{2}{z}\right|=2$, show that the greatest and least value of $|z|$ are $\sqrt{3}+1$ and $\sqrt{3}-1$ respectively.

(or)

b) If $z=x+iy$ and $\arg\left(\frac{z-i}{z+2}\right)=\frac{\pi}{4}$, show that $x^2+y^2+3x-3y+2=0$

25. a) Solve : $(2x-1)(x+3)(x-2)(2x+3)+20=0$

(or)

b) Find the condition that the roots of ax^3+bx^2+cx+d are in geometric progression. Assume $a,b,c,d\neq0$.

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