

FIRST MID - TERM TEST - JULY - 2019

12 - STD

MATHS

TIME : 1.30 Hrs.

MARKS : 50

PART - A

Choose the correct answer.

10 X 1 = 10

1. If the matrix $\begin{pmatrix} -1 & 3 & 2 \\ 1 & k & -3 \\ 1 & 4 & 5 \end{pmatrix}$ has an inverse then the values of k.
 - a) k is any real number
 - b) $k = -4$
 - c) $k \neq -4$
 - d) $k \neq 4$
2. If $0 \leq \theta \leq \pi$, then system of equations $x + (\sin \theta) y - (\cos \theta) z = 0$, $(\cos \theta) x - y + z = 0$, $(\sin \theta) x + y - z = 0$ has a non - trivial solution then θ is
 - a) $\frac{3\pi}{4}$
 - b) $\frac{5\pi}{4}$
 - c) $\frac{\pi}{4}$
 - d) $\frac{2\pi}{3}$
3. If $|\text{adj}(\text{adj} A)| = |A|^9$ then the order of the square matrix A is
 - a) 3
 - b) 5
 - c) 4
 - d) 2
4. If $\frac{z-1}{z+1}$ is purely imaginary, then $|z|$ is
 - a) 1
 - b) $\frac{1}{2}$
 - c) 2
 - d) 3
5. If $z = 0$ then the arg (z) is
 - a) 0
 - b) indeterminate
 - c) π
 - d) $\frac{\pi}{2}$
6. If the amplitude of a complex number is $\frac{\pi}{2}$ then the number is
 - a) purely imaginary
 - b) purely real
 - c) 0
 - d) neither real nor imaginary
7. The value of $i i^2 i^3 \dots i^{40}$ is
 - a) 1
 - b) 0
 - c) -1
 - d) i
8. The polynomial $x^3 - kx^2 + 9x$ has three real zeros if and only if, k satisfies
 - a) $|k| \leq 6$
 - b) $k = 0$
 - c) $k^2 \geq 36$
 - d) $|k| \geq 6$
9. If f and g are polynomials of degrees m and n respectively, and if $h(x) = (f \circ g) x$, then the degree of h is
 - a) mn
 - b) n^m
 - c) m^n
 - d) $m + n$
10. A zero of $x^3 + 216$ is
 - a) 0
 - b) 4i
 - c) 4
 - d) -6

PART - B

Answer any 4 questions. Question No. 16 is compulsory.

4 X 2 = 8

11. If $\text{adj} A = \begin{pmatrix} -1 & 2 & 2 \\ 1 & 1 & 2 \\ 2 & 2 & 1 \end{pmatrix}$, find A^{-1} .
12. Solve the system of linear equations by matrix inversion method : $2x + 5y = -1$, $x + 2y = -3$.



13. Find the principal argument $\arg z$, when $z = \frac{-2}{1+i\sqrt{3}}$.
14. If the area of the triangle formed by the vertices z , iz and $z + iz$ is 50 square units, find the value of $|z|$.
15. Prove that the straight line and parabola cannot intersect at more than two points.
16. Solve : $\sin^2 x - 5 \sin x + 4 = 0$.

PART - C

Answer any 4 questions. Question No. 22 is compulsory.

4 X 3 = 12

17. A chemist has one solution which is 50% acid and another solution which is 25% acid. How much each should be mixed to take 10 litres of a 40% acid solution? (Use Cramer's rule)

18. Find the inverse of $A = \begin{pmatrix} 1 & -1 & 0 \\ 1 & 0 & -1 \\ 6 & -2 & -3 \end{pmatrix}$ by Gauss - Jordan method.

19. Solve the equation $Z^3 + 8i = 0$, where $z \in C$.

20. Show that the polynomial $9x^9 + 2x^5 - x^4 - 7x^2 + 2$ has at least six imaginary roots.

21. Form a polynomial equation with integer coefficients with $\sqrt{\frac{\sqrt{2}}{\sqrt{3}}}$ as a root.

22. Find the square root of $-7 + 24i$.

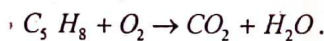
PART - D

Answer all the questions.

4 X 5 = 20

23. A boy is walking along the path $y = ax^2 + bx + c$ through the points $(-6, 8)$, $(-2, 12)$ and $(3, 8)$. He wants to meet his friend at $P(7, 60)$ will he meet his friend? (Use Gaussian elimination method) (OR)

By using Gaussian elimination method, balance the chemical reaction equation.



24. Suppose Z_1, Z_2 and Z_3 are the vertices of an equilateral triangle inscribed in the circle.

$|Z| = 2$. If $Z_1 = +i\sqrt{3}$, then find Z_1 and Z_3 (OR)

If $2\cos\alpha = x + \frac{1}{x}$ and $2\cos\beta = y + \frac{1}{y}$, show that a) $\frac{x^m}{y^n} - \frac{y^n}{x^m} = 2i \sin(m\alpha - n\beta)$

b) $x^m y^n + \frac{1}{x^m y^n} = 2 \cos(m\alpha + n\beta)$

25. Determine K and solve the equation $2x^3 - 6x^2 + 3x + k = 0$ if one of its roots is twice the sum of the other two roots. (OR)

Solve the equation $6x^4 - 5x^3 - 38x^2 - 5x + 6 = 0$ if it is known that $\frac{1}{3}$ is a solution.

26. Test for consistency of the following system of linear equations and if possible solve :
 $2x - y + z = 2$, $6x - 3y + 3z = 6$, $4x - 2y + 2z = 4$. (OR)

Solve : i) $8x^{\frac{3}{2n}} - 8x^{-\frac{3}{2n}} = 63$ ii) Find all real numbers satisfying $4x - 3(2x+2) + 25 = 0$.

