KA **COMMON FIRST MID - TERM TEST - 2019**

STANDARD - XII

MATHEMATICS

Time : 1.15 hours Reg.No. [ ][ ][ ][ ][2][2]

Marks: 45

PART - I

Note : i) All questions are compulsory:

ii) Choose the most appropriate answer from the given four alternatives and write option code and answer. **10×1=10**

1. If A, B, and C are invertible matrices of some order, then which one of following is not true?
   a) adj A = $|A| A^{-1}$ b) adj (AB) = (adjA) (adjB)
   c) $\det A^{-1} = (\det A)^{-1}$ d) $(ABC)^{-1} = C^{-1} B^{-1} A^{-1}$
2. If $A = \begin{bmatrix} \cos\theta & -\sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$ and $A(\text{adj}A) = \begin{bmatrix} k & 0 \\ 0 & k \end{bmatrix}$ then k =
   a) 0 b) $\sin\theta$ c) $\cos\theta$ d) 1
3. If A is non-singular matrix of order 3 then |adj (adjA)| =
   a) $|A|^2$ b) $|A|^3$ c) $|A|^4$ d) $|A|$
4. If P(A) = P([A/B]) = 2. Then the system Ax = B of linear equation is
   a) consistent and has a unique solution b) consistent
   c) consistent and has infinitely many solution d) inconsistent
5. The value of $\sum_{i=1}^{13}(i^n + i^{n-1})$ is
   a) 1 + i b) i c) 1 d) 0
6. If $|z| = 1$, then the value of $\frac{1+z}{1+\bar{z}}$ is
   a) z b) $\bar{z}$ c) $\frac{1}{z}$ d) 1
7. The value of $i\, i^2 . i^3 . i^4 \ldots\ldots i^{2020}$
   a) 0 b) 1 c) -1 d) none
8. A polynomial equation in x of degree n always has
   a) n distinct roots b) n real roots
   c) n imaginary roots d) atmost one root
9. The polynomial $x^3 - kx^2 + 9x$ has three real zeros and if and only if, k satisfies
   a) $|k| \le 6$ b) k = 0 c) $|k| > 6$ d) $|k| \ge 6$
10. If α, β, γ are the roots of $9x^3 - 7x + 6 = 0$ then $\alpha\beta\gamma$ is
    a) $-\frac{7}{9}$ b) $\frac{7}{9}$ c) 0 d) $-\frac{2}{3}$

PART - II

Note : i) Answer any three questions. **2×3=6**

ii) Question number 15 is compulsory.

11. Prove that $\begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$ is orthogonal.

12. If $adj\ (adj\ A) = \begin{pmatrix} 1 & 2 \\ 0 & 1 \end{pmatrix}$ then find A.

13. Simplify : $\left(\frac{1+i}{1-i}\right)^3 - \left(\frac{1-i}{1+i}\right)^3$ into rectangular form.

14. Find the square root of -5 - 2i

15. Construct a cubic equation whose roots are 1, 1, -2.

PART - III

Note : i) Answer any three questions. **3×3=9**

ii) Question number 20 is compulsory.

16. Find the rank of matrix $\begin{bmatrix} 1 & 1 & 1 & 3 \\ 2 & -1 & 3 & 4 \\ 5 & -1 & 7 & 11 \end{bmatrix}$ by row reduction method.

17. If Z = 1 + i be a vertex of square in a argand plane, then find the other vertices.

18. In a competitive examination, one mark is awarded for every correct answer while ¼ mark is deducted for every wrong answer. A student answered 100 questions and got 80 marks. How many questions did he answer correctly? (Use Cramer's rule)

19. Obtain the condition that the roots of $x^3 + px^2 + qx + r = 0$ are in A.P.

20. Show that the equation $z^3 + 2\bar{z} = 0$ has five solution.

PART - IV

Note : Answer all the questions. **4×5=20**

21. Four men and 4 women can finish a piece of work jointly in 3 days while 2 men and 5 women can finish the same work jointly in 4 days. Find time taken by one man alone and that of one women alone to finish the same work by using matrix inverson method. **(OR)**

Find the value of k for which the equation kx - 2y + z = 1, x - 2ky + z = −2, x - 2y + kz = 1 have i) No solution ii) unique solution iii) Infinitely many solution.

22. By using Gaussian elimination method, balance the chemical reaction equation $C_5H_8 + O_2 \rightarrow CO_2 + H_2O$ **(OR)**

If z = x + iy is a complex number such that $Im\left(\frac{2z+1}{iz+1}\right) = 0$. Show that the locus of Z is $2x^2 + 2y^2 + x - 2y = 0$.

23. If $\frac{1+z}{1-z}$ cos2θ + isin2θ, show that z = i tanθ **(OR)**

Solve : $z^3 + 64 = 0$

24. If α, β, γ are the roots of the cubic equation $x^3 + 2x^2 + 3x + 4 = 0$, form a cubic equation whose roots are $\frac{1}{\alpha}, \frac{1}{\beta}, \frac{1}{\gamma}$. **(OR)**

Find all real numbers satisfying $4^x - 3(2^{x+2}) + 2^5 = 0$.
