CHENGALPATTU DISTRICT
ASSESSMENT TEST - 2

STD : XII TIME : 3 HOURS

SUB : MATHEMATICS MARKS : 90

Part A

Choose the correct or the most suitable answer from the given four alternatives: $20 \times 1 = 20$

1. If $|adj\ (adjA)| = |A|^9$, then the order of the square matrix A is

(1) 3 (2) 4 (3) 2 (4) 5

2. If $A = \begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$, B = adjA and C = 3A , then $\frac{|adj\ B|}{|C|} =$

(1) $\frac{1}{3}$ (2) $\frac{1}{9}$ (3) $\frac{1}{4}$ (4) 1

3. If $P = \begin{bmatrix} 1 & x & 0 \\ 1 & 3 & 0 \\ 2 & 4 & -2 \end{bmatrix}$ is the adjoint of 3×3 matrix A and $|A| = 4$, then x is

(1) 15 (2) 12 (3) 14 (4) 11

4. If $adjA = \begin{bmatrix} 2 & 3 \\ 4 & -1 \end{bmatrix}$ and $adj\ B = \begin{bmatrix} 1 & -2 \\ -3 & 1 \end{bmatrix}$ then $adj\ (AB)$ is

(1) $\begin{bmatrix} -7 & -1 \\ 7 & -9 \end{bmatrix}$ (2) $\begin{bmatrix} -6 & 5 \\ -2 & -10 \end{bmatrix}$ (3) $\begin{bmatrix} -7 & 7 \\ -1 & -9 \end{bmatrix}$ (4) $\begin{bmatrix} -6 & -2 \\ 5 & -10 \end{bmatrix}$

5. If $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$, then $adj(adjA)$ is

(1) $\begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$ (2) $\begin{bmatrix} 6 & -6 & 8 \\ 4 & -6 & 8 \\ 0 & -2 & 2 \end{bmatrix}$ (3) $\begin{bmatrix} -3 & 3 & -4 \\ -2 & 3 & -4 \\ 0 & 1 & -1 \end{bmatrix}$ (4) $\begin{bmatrix} 3 & -3 & 4 \\ 0 & -1 & 1 \\ 2 & -3 & 4 \end{bmatrix}$

6. The value of $\sum_{i=1}^{13}(i^n + i^{n-1})$

(1) 0 (2) 1 (3) 2 (4) 3

7. If z is a non-zero complex number, such that $2iz^2 = \overline{z}$ then $|z|$ is

(1) $\frac{1}{2}$ (2) 1 (3) 2 (4) 3

8. The solution of the equation $|z| - z = 1 + 2i$ is

(1) $\frac{3}{2} - 2i$ (2) $-\frac{3}{2} + 2i$ (3) $2 - \frac{3}{2}i$ (4) $2 + \frac{3}{2}i$

9. z_1, z_2, z_3 are complex numbers such that $z_1 + z_2 + z_3 = 0$ and $|z_1| = |z_2| = |z_3| = 1$ then $z_1^{\ 2} + z_2^{\ 2} + z_3^{\ 2}$ is

(1) 3 (2) 2 (3) 1 (4) 0

10. If $(1+i)(1+2i)(1+3i)\ldots(1+ni) = x+iy$, then $2\cdot 5\cdot 10\cdots(1+n^2)$ is

(1) 1 (2) i (3) x^2+y^2 (4) $1+n^2$

11. A zero of x^3+64 is

(1) 0 (2) 4 (3) $4i$ (4) -4

12. If α, β and γ are the zeros of x^3+px^2+qx+r, then $\sum\frac{1}{\alpha}$ is

(1) $-\frac{q}{r}$ (2) $-\frac{p}{r}$ (3) $\frac{q}{r}$ (4) $-\frac{p}{q}$

13. The polynomial x^3-kx^2+9x has three real zeros if and only if, k satisfies

(1) $|k| \le 6$ (2) k = 0 (3) $|k| > 6$ (4) $|k| \ge 6$

14. If $x^3+12x^2+10ax+1999$ definitely has positive zero, if and only if

(1) $a \ge 0$ (2) a > 0 (3) a < 0 (4) $a \le 0$

15. The number of positive zeros of the polynomial $\sum_{j=0}^{n} nC_r(-1)^r x^r$ is

(1) 0 (2) n (3) $< n$ (4) r

16. The value of $\sin^{-1}(\cos x), 0 \le x \le \pi$ is\

(1) $\pi - x$ (2) $x-\frac{\pi}{2}$ (3) $\frac{\pi}{2}-x$ (4) $x-\pi$

17. If $\sin^{-1}x = 2\sin^{-1}\alpha$ has a solution then

(1) $|\alpha| \le \frac{1}{\sqrt{2}}$ (2) $|\alpha| \ge \frac{1}{\sqrt{2}}$ (3) $|\alpha| < \frac{1}{\sqrt{2}}$ (4) $|\alpha| > \frac{1}{\sqrt{2}}$

18. The domain of the function defined by $f(x) = \sin^{-1}\sqrt{x-1}$ is

(1) $[1,2]$ (2) $[-1,1]$ (3) $[0,\ 1]$ (4) $[-1,0]$

19. If the function $f(x) = \sin^{-1}(x^2-3)$ then x belongs to

(1) $[-1,1]$ (2) $[\sqrt{2},2]$

(3) $[-2,-\sqrt{2},]\cup[\sqrt{2},2]$ (4) $[-2,-\sqrt{2},]$

20. $\sin^{-1}\left(\tan\frac{\pi}{4}\right)-\sin^{-1}\left(\sqrt{\frac{3}{x}}\right)=\frac{\pi}{6}$, then x is a root of the equation

(1) $x^2-x-6=0$ (2) $x^2-x-12=0$

(3) $x^2+x-12=0$ (4) $x^2+x-6=0$

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PART B

Answer all the Questions $7 \times 2 = 14$

21. If $adjA = \begin{bmatrix} -1 & 2 & 2 \\ 1 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$, find A^{-1}

22. Find the rank of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & 4 \\ 3 & 0 & 5 \end{bmatrix}$ by reducing in to row-echelon form.

23. Write the following in the rectangular form

$\overline{(5+9i)+(2-4i)}$

24. Obtain the Cartesian equation for the locus of z = x + iy in the form $|z-4| = 16$

25. Find a polynomial equation of minimum degree with rational coefficients having $2-\sqrt{3}$ as a root.

26. If α and β are the roots of the equation $2x^2 - 7x + 13 = 0$, then find the value of $\alpha^2 + \beta^2$

27. Find the principal value of $cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$

PART C

Answer all the Questions $7 \times 3 = 21$

28. Find the inverse of the matrix $\begin{bmatrix} 2 & -1 & 3 \\ -5 & 3 & 1 \\ -3 & 2 & 3 \end{bmatrix}$

29. If $F(\alpha) = \begin{bmatrix} \cos\alpha & 0 & \sin\alpha \\ 0 & 1 & 0 \\ -\sin\alpha & 0 & \cos\alpha \end{bmatrix}$, show that $[F(\alpha)]^{-1} = F(-\alpha)$.

30. If $|z| = 2$ then show that $3 \leq |z+3+4i| \leq 7$

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

32. If α, β and γ are the roots of the equation $x^3 + px^2 + qx + r = 0$, then find the value of $\sum \frac{1}{\beta\gamma}$ in terms of the coefficients

33. Construct a cubic equation with roots 1, 2 and 3

34. Find the value of $tan^{-1}(-1) + cos^{-1}\left(\frac{1}{2}\right) + sin^{-1}\left(-\frac{1}{2}\right)$

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PART D

Answer all the Questions $7 \times 5 = 35$

35. Solve the following system of equations by using matrix inversion method

$x_1 - x_2 = 3; 2x_1 + 3x_2 + 4x_3 = 17\ ;\ x_2 + 2x_3 = 7.$

36. The prices of three commodities A, B and C are Rs.x, y and z per units respectively. A person P purchases 4 units of B and sells two units of A and 5 units of C. Person Q purchases 2 units of C and sells 3 units of A and one unit of B. Person R purchases one unit of A and sells 3 unit of B and one unit of C. In the process, P, Q and R earn Rs.15,000, Rs.1,000 and Rs.4,000 respectively. Find the prices per unitof A, B and C. (Use Matrix inversion method to solve the problem)

37. Solve the following system of linear equations by cramer's rule

$2x + 3y - z = 9\ ; x + y + z = 9; 3x - y - z = -1$

38. If $z = x + iy$ is a complex number such that $\left|\frac{z-4i}{z+4i}\right| = 1$. Show that the locus of z is real axis.

39. Show that $\left(\frac{19+9i}{5-3i}\right)^{15} - \left(\frac{8+i}{1+2i}\right)^{15}$ is purely imaginary

40. Solve the equations $6x^4 - 35x^3 + 62x^2 - 35x + 6 = 0$

41. Find the domain of $cos^{-1}\left(\frac{2+\sin x}{3}\right)$

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