RAVI MATHS TUITION CENTER ,GKM COLONY, CH- 82. PH: 8056206308

12th MATHS MID TERM I

Date : 19-Jul-19

12th Standard 2019 EM

Maths

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

Time : 01:15:00 Hrs

Total Marks : 50

ANSWER ALL

10 x 1 = 10

1) If $A = \begin{bmatrix} 2 & 0 \\ 1 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 4 \\ 2 & 0 \end{bmatrix}$ then |adj (AB)| =

(a) -40 (b) -80 (c) -60 (d) -20

2) If $A = \begin{bmatrix} 3 & 1 & -1 \\ 2 & -2 & 0 \\ 1 & 2 & -1 \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$ then the value of a_{23} is

(a) 0 (b) -2 (c) -3 (d) -1

3) If $x^a y^b = e^m$, $x^c y^d = e^n$, $\Delta_1 = \begin{vmatrix} m & b \\ n & d \end{vmatrix}$, $\Delta_2 = \begin{vmatrix} a & m \\ c & n \end{vmatrix}$, $\Delta_3 = \begin{vmatrix} a & b \\ c & d \end{vmatrix}$, then the values of x and y are respectively,

(a) $e^{(\Delta_2/\Delta_1)}, e^{(\Delta_3/\Delta_1)}$ (b) $\log(\Delta_1/\Delta_3), \log(\Delta_2/\Delta_3)$ (c) $\log(\Delta_2/\Delta_1), \log(\Delta_3/\Delta_1)$ (d) $e^{(\Delta_1/\Delta_3)}, e^{(\Delta_2/\Delta_3)}$

4) The area of the triangle formed by the complex numbers z,iz, and z+iz in the Argand's diagram is

(a) $\frac{1}{2}|z|^2$ (b) $|z|^2$ (c) $\frac{3}{2}|z|^2$ (d) $2|z|^2$

5) z_1, z_3 and z_3 are complex number such that z1+z2+z3=0 and $|z_1|=|z_2|=|z_3|=1$ then $z_1^2+z_2^2+z_2^3$ is

(a) 3 (b) 2 (c) 1 (d) 0

6) The principal argument of (sin 40°+i cos40°)5 is

(a) −110° (b) −70° (c) 70° (d) 110°

7) A polynomial equation in x of degree n always has

(a) n distinct roots (b) n real roots (c) n imaginary roots (d) at most one root

8) According to the rational root theorem, which number is not possible rational root of $4x^7+2x^4-10x^3-5$?

(a) -1 (b) $\frac{5}{4}$ (c) $\frac{4}{5}$ (d) 5

9) If $\sin^{-1}x+\sin^{-1}y=\frac{2\pi}{3}$; then $\cos^{-1}x+\cos^{-1}y$ is equal to

(a) $\frac{2\pi}{3}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{6}$ (d) π

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

(a) [1,2] (b) [-1,1] (c) [0,1] (d) [-1,0]

ANSWER 4

4 x 2 = 8

11) If $A = \begin{bmatrix} 8 & -4 \\ -5 & 3 \end{bmatrix}$, verify that A(adj A) = $|A|I_2$.

12) 4 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 the time taken by one man alone and that of one woman alone to finish the same work by using matrix inversion method.

13) The complex numbers u,v, and w are related by $\frac{1}{u}=\frac{1}{v}+\frac{1}{w}$ If v=3−4i and w=4+3i, find u in rectangular form.

14) Simplify the following
$\sum_{n=1}^{12} i^n$

15) Construct a cubic equation with roots 1,2, and 3

16) Determine the number of positive and negative roots of the equation $x^9-5x^4-14x^2=0$.

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

ANSWER 4 4 x 3 = 12

18) If adj A = $\begin{bmatrix} -1 & 2 & 2 \\ 1 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$, find A^{-1}.

19) Solve the system: x + y − 2z = 0, 2x − 3y + z = 0, 3x − 7y + 10z = 0, 6x − 9y + 10z = 0.

20) Simplify $\left(\frac{1+cos2\theta+isin2\theta}{1+cos2\theta-isin2\theta}\right)^{30}$

21) Solve the equation $x^4-9x^2+20=0$.

22) Solve the equation $7x^3-43x^2=43x-7$

23) Evaluate $sin\left[sin^{-1}\left(\frac{3}{5}\right)+sec^{-1}\left(\frac{5}{4}\right)\right]$

24) Solve $tan^{-1}\left(\frac{x-1}{x-2}\right)+tan^{-1}\left(\frac{x+1}{x+2}\right)=\frac{\pi}{4}$

4 x 5 = 20

25) 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) Investigate for what values of λ and μ the system of linear equations
x + 2y + z = 7, x + y + λz = μ, x + 3y − 5z = 5 has
(i) no solution
(ii) a unique solution
(iii) an infinite number of solutions

26) a) Find (i) $\cos^{-1}\left(-\frac{1}{\sqrt{2}}\right)$
ii) $\cos^{-1}\left(cos\left(-\frac{\pi}{3}\right)\right)$
iii) $\cos^{-1}\left(cos\left(-\frac{7\pi}{6}\right)\right)$

(OR)

b) Show that $\cot^{-1}\left(\frac{1}{\sqrt{x^2-1}}\right)=sec^{-1}x, |x|>1$

27) a) Solve the equation (x-2)(x-7)(x-3)(x+2)+19=0

(OR)

b) Discuss the nature of the roots of the following polynomials:
$x^5-19x^4+2x^3+5x^2+11$

28) a) Let z_1,z_2, and z_3 be complex numbers such that $|z_1|=|z_2|=|z_3|=r>0$ and $z_1+z_2+z_3\neq 0$ prove that $\left|\frac{z_1z_2+z_2z_3+z_3z_2}{z_1+z_2+z_3}\right|=r$

(OR)

b) If z=x+iy and $\arg\left(\frac{z-1}{z+1}\right)=\frac{\pi}{2}$,then show that $x^2+y^2=1$.

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12th MATHS MID TERM II

Date : 19-Jul-19

12th Standard 2019 EM

Maths

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

Time : 01:15:00 Hrs

Total Marks : 50

ANSWER ALL

10 x 1 = 10

1) If $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$ be such that $\lambda A^{-1} = A$, then λ is

(a) 17 (b) 14 (c) 19 (d) 21

2) If $\rho(A) = \rho([A \mid B])$, then the system AX = B of linear equations is

(a) consistent and has a unique solution (b) consistent (c) consistent and has infinitely many solution (d) inconsistent

3) The system of linear equations x + y + z = 2, 2x + y - z = 3, 3x + 2y + kz = has a unique solution if

(a) k - 0 (b) -1 < k < 1 (c) -2 < k < 2 (d) k=0

4) If $\sqrt{a+ib}$ =x+iy, then possible value of $\sqrt{a-ib}$ is

(a) x^2+y^2 (b) $\sqrt{x^2+y^2}$ (c) x+iy (d) x-iy

5) If, $i^2 = -1$, then $i^1 + i^2 + i^3 + ...+$ up to 1000 terms is equal to

(a) 1 (b) -1 (c) i (d) 0

6) If the root of the equation $x^3 + bx^2 + cx - 1 = 0$ form an Increasing G.P, then

(a) one of the roots is 2 (b) one of the rots is 1 (c) one of the rots is -1 (d) one of the rots is -2

7) If $\propto, \beta, \gamma$ are the roots of 9x3-7x+6=0, then $\propto \beta \gamma$ is _____

(a) $\frac{-7}{9}$ (b) $\frac{7}{9}$ (c) 0 (d) $\frac{-2}{3}$

8) The value of $\sin(2(\tan^{-1} 0.75)$ is_____

(a) 0.75 (b) 1.5 (c) 0.96 (d) $\sin^{-1}(1.5)$

9) If $\theta = sin^{-1}\left(sin(-60^0)\right)$ then one of the possible values of θ is _____

(a) $\frac{\pi}{3}$ (b) $\frac{\pi}{2}$ (c) $\frac{2\pi}{3}$ (d) $\frac{-2\pi}{3}$

10) $tan^{-1}\left(tan\frac{9\pi}{8}\right)$

(a) $\frac{9\pi}{8}$ (b) $\frac{9\pi}{8}$ (c) $\frac{\pi}{8}$ (d) $\frac{-\pi}{8}$

ANSWER 4

4 X 2 = 8

11) Decrypt the received encoded message $\begin{bmatrix}2 & -3\end{bmatrix}\begin{bmatrix}20 & 4\end{bmatrix}$ with the encryption matrix $\begin{bmatrix}-1 & -1\\ 2 & 1\end{bmatrix}$ and the decryption matrix as its inverse, where the system of codes are described by the numbers 1 - 26 to the letters A - Z respectively, and the number 0 to a blank space.

12) If $ax^2 + bx + c$ is divided by $x + 3$, $x - 5$, and $x - 1$, the remainders are 21,61 and 9 respectively. Find a,b and c. (Use Gaussian elimination method.)

13) 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 $2x^2+2y^2+x-2y=0$

14) If $\omega \neq 1$ is a cube root of unity, show that the roots of the equation $(z-1)^3 +8=0$ are $-1, 1-2\omega, 1-2\omega^2$.

15) Solve the following equations,
$\sin^2 x-5\sin x+4=0$

16) Construct a cubic equation with roots 2,−2, and 4.

17) If $\tan^{-1} x+\tan^{-1}y+\tan^{-1}z=\pi$, show that x+y+z+=xyz

ANSWER 4ANSWE 4 4x 3 = 12

18) If $A = \frac{1}{7}\begin{bmatrix}6 & -3 & a\\ b & -2 & 6\\ 2 & c & 3\end{bmatrix}$ is orthogonal, find a, b and c , and hence A^{-1}.

19) Verify $(AB)^{-1} = B^{-1}A^{-1}$ for $A=\begin{bmatrix}2 & 1\\ 5 & 3\end{bmatrix}$ and $B=\begin{bmatrix}4 & 5\\ 3 & 4\end{bmatrix}$.

20) If $z = (\cos\theta + i\sin\theta)$, show that $z^n + \frac{1}{z^n} = 2\cos n\theta$ and $z^n - \frac{1}{z^n} = 2i\sin n\theta$

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

22) Solve the following equation: $x^4-10x^3+26x^2-10x+1=0$

23) Prove that $\frac{\pi}{2} \leq \sin^{-1}x + 2\cos^{-1}x \leq \frac{3\pi}{2}$.

24) Prove that
$\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{3} = \frac{\pi}{4}$

4 x 5 = 20

25) a) In a T20 match, Chennai Super Kings needed just 6 runs to win with 1 ball left to go in the last over. The last ball was bowled and the batsman at the crease hit it high up. The ball traversed along a path in a vertical plane and the equation of the path is $y = ax^2 + bx + c$ with respect to a xy-coordinate system in the vertical plane and the ball traversed through the points (10, 8), (20, 16) (30, 18) can you conclude that Chennai Super Kings won the match?
Justify your answer. (All distances are measured in metres and the meeting point of the plane of the path with the farthest boundary line is (70, 0).)

(OR)

b) Show that the points $1, \frac{-1}{2} + i\frac{\sqrt{3}}{2}$, and $\frac{-1}{2} - i\frac{\sqrt{3}}{2}$ are the vertices of an equilateral triangle.

26) a) Investigate for what values of λ and μ the system of linear equations
$x + 2y + z = 7, x + y + \lambda z = \mu, x + 3y - 5z = 5$ has
(i) no solution

(ii) a unique solution

(iii) an infinite number of solutions

(OR)

b) Simplify $sin^{-1}\left(\frac{sinx+cosx}{\sqrt{2}}\right), \frac{\pi}{4} < x < \frac{\pi}{4}$

27) a) Solve: $(2x^2 - 3x + 1)(2x^2 + 5x + 1) = 9x^2$.

(OR)

b) Find the domain of $\cos^{-1}(\frac{2+sinx}{3})$

28) a) Find all the roots $(2-2i)^{\frac{1}{3}}$ and also find the product of its roots.

(OR)

b) Discuss the nature of the roots of the following polynomials:

$x^{2018}+1947x^{1950}+15x^8+26x^6+2019$

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