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

12th matrix 1 mark test 6

12th Standard 2019 EM

Maths

Date : 10-Jun-19

Reg.No. :

Time : 00:25:00 Hrs

Total Marks : 25

25 x 1 = 25

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

(a) 3   (b) 4   (c) 2   (d) 5

2) If A is a 3 × 3 non-singular matrix such that $AA^T = A^TA$ and $B = A^{-1}A^T$, then $BB^T =$

(a) A   (b) B   (c) I   (d) B^T

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

(a) $\frac{1}{3}$ (b) $\frac{1}{9}$ (c) $\frac{1}{4}$ (d) 1

4) If $A \begin{bmatrix} 1 & -2 \\ 1 & 4 \end{bmatrix} = \begin{bmatrix} 6 & 0 \\ 0 & 6 \end{bmatrix}$, then A =

(a) $\begin{bmatrix} 1 & -2 \\ 1 & 4 \end{bmatrix}$ (b) $\begin{bmatrix} 1 & 2 \\ -1 & 4 \end{bmatrix}$ (c) $\begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 4 & -1 \\ 2 & 1 \end{bmatrix}$

5) If $A = \begin{bmatrix} 7 & 3 \\ 4 & 2 \end{bmatrix}$, then 9I - A =

(a) A^{-1} (b) $\frac{A^{-1}}{2}$ (c) $3A^{-1}$ (d) $2A^{-1}$

6) 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

7) 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

(a) 15   (b) 12   (c) 14   (d) 11

8) 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

9) If A, B and C are invertible matrices of some order, then which one of the following is not true?

(a) adj A = $|A|A^{-1}$ (b) adj(AB) = (adj A)(adj B)   (c) det A^{-1} = (det A)$^{-1}$ (d) (ABC)$^{-1}$ = $C^{-1}B^{-1}A^{-1}$

10) If $(AB)^{-1} = \begin{bmatrix} 12 & -17 \\ -19 & 27 \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} 1 & -1 \\ -2 & 3 \end{bmatrix}$, then $B^{-1} =$

(a) $\begin{bmatrix} 2 & -5 \\ -3 & 8 \end{bmatrix}$ (b) $\begin{bmatrix} 8 & 5 \\ 3 & 2 \end{bmatrix}$ (c) $\begin{bmatrix} 3 & 1 \\ 2 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 8 & -5 \\ -3 & 2 \end{bmatrix}$

11) If $A^T A^{-1}$ is symmetric, then A^2 =

(a) A^{-1} (b) $(A^T)^2$ (c) A^T (d) $(A^{-1})^2$

12) If A is a non-singular matrix such that $A^{-1} = \begin{bmatrix} 5 & 3 \\ -2 & -1 \end{bmatrix}$, then $(A^T)^{-1}$ =

(a) $\begin{bmatrix} -5 & 3 \\ 2 & 1 \end{bmatrix}$ (b) $\begin{bmatrix} 5 & 3 \\ -2 & -1 \end{bmatrix}$ (c) $\begin{bmatrix} -1 & -3 \\ 2 & 5 \end{bmatrix}$ (d) $\begin{bmatrix} 5 & -2 \\ 3 & -1 \end{bmatrix}$

13) If $A = \begin{bmatrix} \frac{3}{5} & \frac{4}{5} \\ x & \frac{3}{5} \end{bmatrix}$ and $A^T = A^{-1}$, then the value of x is

(a) $\frac{-4}{5}$ (b) $\frac{-3}{5}$ (c) $\frac{3}{5}$ (d) $\frac{4}{5}$

14) If $A = \begin{bmatrix} 1 & \tan\frac{\theta}{2} \\ -\tan\frac{\theta}{2} & 1 \end{bmatrix}$ and AB = I, then B =

(a) $\left(\cos^2\frac{\theta}{2}\right)A$ (b) $\left(\cos^2\frac{\theta}{2}\right)A^T$ (c) $\left(\cos^2\theta\right)I$ (d) $(\sin^2\frac{\theta}{2})A$

15) If $A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$ and A(adj A) = $\begin{bmatrix} k & 0 \\ 0 & k \end{bmatrix}$ then adj (AB) is

(a) 0 (b) $\sin\theta$ (c) $\cos\theta$ (d) 1

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

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

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

(a) $\begin{bmatrix} -7 & -1 \\ 7 & -9 \end{bmatrix}$ (b) $\begin{bmatrix} -6 & 5 \\ -2 & -10 \end{bmatrix}$ (c) $\begin{bmatrix} -7 & 7 \\ -1 & -9 \end{bmatrix}$ (d) $\begin{bmatrix} -6 & -2 \\ 5 & -10 \end{bmatrix}$

18) The rank of the matrix $\begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 6 & 8 \\ -1 & -2 & -3 & -4 \end{bmatrix}$ is

(a) 1 (b) 2 (c) 4 (d) 3

19) 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) $e^{(\Delta_1/\Delta_3)}, e^{(\Delta_2/\Delta_3)}$

20) Which of the following is/are correct?

(i) Adjoint of a symmetric matrix is also a symmetric matrix.

(ii) Adjoint of a diagonal matrix is also a diagonal matrix.

(iii) If A is a square matrix of order n and λ is a scalar, then adj(λA) = λ^n adj(A).

(iv) A(adjA) = (adjA)A = |A|I

   (a) Only (i) (b) (ii) and (iii) (c) (iii) and (iv) (d) (i), (ii) and (iv)

21) If $\rho(A) = \rho([A | B])$, 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

22) If $0 \leq \theta \leq \pi$ and the system of equations x + (sinθ)y - (cosθ)z = 0, (cosθ)x - y +z = 0, (sinθ)x + y - z = 0 has a non-trivial solution then θ is

   (a) $\frac{2\pi}{3}$ (b) $\frac{3\pi}{4}$ (c) $\frac{5\pi}{6}$ (d) $\frac{\pi}{4}$

23)

The augmented matrix of a system of linear equations is $\begin{bmatrix} 1 & 2 & 7 & 3 \\ 0 & 1 & 4 & 6 \\ 0 & 0 & \lambda - 7 & \mu + 5 \end{bmatrix}$. The system has infinitely many solutions if

   (a) $\lambda = 7, \mu - -5$ (b) $\lambda = 7, \mu = 5$ (c) $\lambda - 7, \mu - -5$ (d) $\lambda = 7, \mu = -5$

24)

Let A = $\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ and 4B = $\begin{bmatrix} 3 & 1 & -1 \\ 1 & 3 & x \\ -1 & 1 & 3 \end{bmatrix}$. If B is the inverse of A, then the value of x is

   (a) 2 (b) 4 (c) 3 (d) 1

25)

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

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

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12th matrix full chapter test

12th Standard 2019 EM

Maths

Time : 01:15:00 Hrs

Date : 10-Jun-19

Reg.No. :

Total Marks : 50

5 x 1 = 5

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

(a) 3 (b) 4 (c) 2 (d) 5

2) 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

3) If $(AB)^{-1} = \begin{bmatrix} 12 & -17 \\ -19 & 27 \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} 1 & -1 \\ -2 & 3 \end{bmatrix}$, then $B^{-1} =$

(a) $\begin{bmatrix} 2 & -5 \\ -3 & 8 \end{bmatrix}$ (b) $\begin{bmatrix} 8 & 5 \\ 3 & 2 \end{bmatrix}$ (c) $\begin{bmatrix} 3 & 1 \\ 2 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 8 & -5 \\ -3 & 2 \end{bmatrix}$

4) If $A = \begin{bmatrix} 1 & \tan\frac{\theta}{2} \\ -\tan\frac{\theta}{2} & 1 \end{bmatrix}$ and $AB = I$, then $B =$

(a) $\left(\cos^2\frac{\theta}{2}\right)A$ (b) $\left(\cos^2\frac{\theta}{2}\right)A^T$ (c) $\left(\cos^2\theta\right)I$ (d) $(Sin^2\frac{\theta}{2})A$

5) 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) $e^{(\Delta_1/\Delta_3)}, e^{(\Delta_2/\Delta_3)}$

5 x 2 = 10

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

7) $A = \begin{bmatrix} 1 & \tan x \\ -\tan x & 1 \end{bmatrix}$, show that $A^T A^{-1} = \begin{bmatrix} \cos 2x & -\sin 2x \\ \sin 2x & \cos 2x \end{bmatrix}$

8) Given $A = \begin{bmatrix} 1 & -1 \\ 2 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 3 & -2 \\ 1 & 1 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & 1 \\ 2 & 2 \end{bmatrix}$, find a matrix X such that AXB = C.

9) Find the inverse of each of the following by Gauss-Jordan method:

$\begin{bmatrix} 1 & -1 & 0 \\ 1 & 0 & -1 \\ 6 & -2 & -3 \end{bmatrix}$

10) Solve the following system of homogenous equations.

$2x + 3y - z = 0$, $x - y - 2z = 0$, $3x + y + 3z = 0$

11) Solve the following system of equations, using matrix inversion method:

$2x_1 + 3x_2 + 3x_3 = 5$, $x_1 - 2x_2 + x_3 = -4$, $3x_1 - x_2 - 2x_3 = 3$.

12) If A = $\begin{bmatrix} -4 & 4 & 4 \\ -7 & 1 & 3 \\ 5 & -3 & -1 \end{bmatrix}$ and B = $\begin{bmatrix} 1 & -1 & 1 \\ 1 & -2 & -2 \\ 2 & 1 & 3 \end{bmatrix}$, find the productsAB and BAand hence solve the system of equations x - y + z = 4, x - 2y - 2z = 9, 2x + y + 3z = 1.

13) The upward speed v(t)of a rocket at time t is approximated by v(t) = at^2 + bt + c $\leq$ t $\leq$ 100 where a, b and c are constants. It has been found that the speed at times t = 3, t = 6, and t = 9 seconds are respectively, 64, 133, and 208 miles per second respectively. Find the speed at time t = 15 seconds. (Use Gaussian elimination method.)

14) Determine the values of λ for which the following system of equations $(3\lambda - 8)x + 3y + 3z = 0$, $3x + (3\lambda - 8)y + 3z = 0$, $3x + 3y + (3\lambda - 8)z = 0$. has a non-trivial solution.

15) By using Gaussian elimination method, balance the chemical reaction equation: $C_5H_8 + O_2 \longrightarrow CO_2 + H_2O$. (The above is the reaction that is taking place in the burning of organic compound called isoprene.)

16) Reduce the matrix $\begin{bmatrix} 0 & 3 & 1 & 6 \\ -1 & 0 & 2 & 5 \\ 4 & 2 & 0 & 0 \end{bmatrix}$ to row-echelon form.

17) Solve, by Cramer's rule, the system of equations

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

18) Find the condition on a, b and c so that the following system of linear equations has one parameter family of solutions: x + y + z = a, x + 2y + 3z = b, 3x + 5y + 7z = c.

19) 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

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MATRICES AND DETERMINANTS - TEST 1

Date : 10-Jun-19

12th Standard 2019 EM

Maths

Reg.No. :

Time : 01:30:00 Hrs

Total Marks : 50

5 x 1 = 5

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

(a) 3 (b) 4 (c) 2 (d) 5

2) If A is a 3 × 3 non-singular matrix such that $AA^T = A^TA$ and $B = A^{-1}A^T$, then $BB^T =$

(a) A (b) B (c) I (d) B^T

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

(a) $\frac{1}{3}$ (b) $\frac{1}{9}$ (c) $\frac{1}{4}$ (d) 1

4) If A $\begin{bmatrix} 1 & -2 \\ 1 & 4 \end{bmatrix} = \begin{bmatrix} 6 & 0 \\ 0 & 6 \end{bmatrix}$, then A =

(a) $\begin{bmatrix} 1 & -2 \\ 1 & 4 \end{bmatrix}$ (b) $\begin{bmatrix} 1 & 2 \\ -1 & 4 \end{bmatrix}$ (c) $\begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 4 & -1 \\ 2 & 1 \end{bmatrix}$

5) If A = $\begin{bmatrix} 7 & 3 \\ 4 & 2 \end{bmatrix}$, then 9I - A =

(a) A^{-1} (b) $\frac{A^{-1}}{2}$ (c) $3A^{-1}$ (d) $2A^{-1}$

5 x 2 = 10

6) Find the inverse (if it exists) of the following:

$\begin{bmatrix} -2 & 4 \\ 1 & -3 \end{bmatrix}$

7) If A = $\begin{bmatrix} 5 & 3 \\ -1 & -2 \end{bmatrix}$, show that $A^2 - 3A - 7I_2 = O_2$. Hence find A^{-1}.

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

9) Find adj(adj A) if adj A = $\begin{bmatrix} 1 & 0 & 1 \\ 0 & 2 & 0 \\ -1 & 0 & 1 \end{bmatrix}$.

10) A = $\begin{bmatrix} 1 & \tan x \\ -\tan x & 1 \end{bmatrix}$, show that $A^TA^{-1} = \begin{bmatrix} \cos 2x & -\sin 2x \\ \sin 2x & \cos 2x \end{bmatrix}$

5 x 3 = 15

11) If A = $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & 4 \\ 2 & -4 & 3 \end{bmatrix}$, verify that $A(adj\ A) = (adj\ A)A = |A|\ I_3$.

12) 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}.

13) Solve the following system of equations, using matrix inversion method:

$2x_1 + 3x_2 + 3x_3 = 5$, $x_1 - 2x_2 + x_3 = -4$, $3x_1 - x_2 - 2x_3 = 3$.

14) Solve the following system of linear equations, by Gaussian elimination method :

$4x + 3y + 6z = 25$, $x + 5y + 7z = 13$, $2x + 9y + z = 1$.

15) Determine the values of λ for which the following system of equations $(3\lambda - 8)x + 3y + 3z = 0$, $3x + (3\lambda - 8)y + 3z = 0$, $3x + 3y + (3\lambda - 8)z = 0$. has a non-trivial solution.

4 x 5 = 20

16)
Find the rank of the matrix $\begin{bmatrix} 2 & -2 & 4 & 3 \\ -3 & 4 & -2 & -1 \\ 6 & 2 & -1 & 7 \end{bmatrix}$ by reducing it to an echelon form.

17)
Find the inverse of A = $\begin{bmatrix} 2 & 1 & 1 \\ 3 & 2 & 1 \\ 2 & 1 & 2 \end{bmatrix}$ by Gauss-Jordan method.

18) Solve, by Cramer's rule, the system of equations

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

19) 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).)

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MATRICES AND DETERMINANTS - TEST 2

12th Standard 2019 EM

Maths

Date : 10-Jun-19

Reg.No. :

Time : 01:30:00 Hrs

Total Marks : 50

5 x 1 = 5

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 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

(a) 15   (b) 12   (c) 14   (d) 11

3) 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

4) If A, B and C are invertible matrices of some order, then which one of the following is not true?

(a) adj A = |A|A^{-1} (b) adj(AB) = (adj A)(adj B)   (c) det A^{-1} = (det A)$^{-1}$ (d) (ABC)$^{-1}$ = C^{-1}B^{-1}A^{-1}

5) If (AB)$^{-1}$ = $\begin{bmatrix} 12 & -17 \\ -19 & 27 \end{bmatrix}$ and A^{-1} = $\begin{bmatrix} 1 & -1 \\ -2 & 3 \end{bmatrix}$, then B^{-1} =

(a) $\begin{bmatrix} 2 & -5 \\ -3 & 8 \end{bmatrix}$ (b) $\begin{bmatrix} 8 & 5 \\ 3 & 2 \end{bmatrix}$ (c) $\begin{bmatrix} 3 & 1 \\ 2 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 8 & -5 \\ -3 & 2 \end{bmatrix}$

10 x 2 = 20

6) Find the matrix A for which A$\begin{bmatrix} 5 & 3 \\ -1 & -2 \end{bmatrix}$ = $\begin{bmatrix} 14 & 7 \\ 7 & 7 \end{bmatrix}$.

7) Given A = $\begin{bmatrix} 1 & -1 \\ 2 & 0 \end{bmatrix}$, B = $\begin{bmatrix} 3 & -2 \\ 1 & 1 \end{bmatrix}$ and C = $\begin{bmatrix} 1 & 1 \\ 2 & 2 \end{bmatrix}$, find a matrix X such that AXB = C.

8) 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.

9) Find the rank of the following matrices by row reduction method:

$\begin{bmatrix} 1 & 1 & 1 & 3 \\ 2 & -1 & 3 & 4 \\ 5 & -1 & 7 & 11 \end{bmatrix}$

10)

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.

11) In a competitive examination, one mark is awarded for every correct answer while $\frac{1}{4}$ 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 to solve the problem).

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) Find the value of k for which the equations kx - 2y + z = 1, x - 2ky + z = -2, x - 2y + kz = 1 have
   (i) no solution
   (ii) unique solution
   (iii) infinitely many solution

14) Find the adjoint of the following:

$$\begin{bmatrix} 2 & 3 & 1 \\ 3 & 4 & 1 \\ 3 & 7 & 2 \end{bmatrix}$$

15) Solve the following system of linear equations by matrix inversion method:
   $2x - y = 8$, $3x + 2y = -2$

                                                                                    5 x 3 = 15

16) The upward speed v(t)of a rocket at time t is approximated by $v(t) = at^2 + bt + c \le t \le 100$ where a, b and c are constants. It has been found that the speed at times t = 3, t = 6, and t = 9 seconds are respectively, 64, 133, and 208 miles per second respectively. Find the speed at time t = 15 seconds. (Use Gaussian elimination method.)

17) Solve the system: $x + y - 2z = 0$, $2x - 3y + z = 0$, $3x - 7y + 10z = 0$, $6x - 9y + 10z = 0$.

18) Determine the values of λ for which the following system of equations $(3\lambda - 8)x + 3y + 3z = 0$, $3x + (3\lambda - 8)y + 3z = 0$, $3x + 3y + (3\lambda - 8)z = 0$. has a non-trivial solution.

19) By using Gaussian elimination method, balance the chemical reaction equation: $C_5H_8 + O_2 \longrightarrow CO_2 + H_2O$. (The above is the reaction that is taking place in the burning of organic compound called isoprene.)

20) If the system of equations px + by + cz = 0, ax + qy + cz = 0, ax + by + rz = 0 has a non-trivial solution and p - a,q - b,r - c, prove that $\frac{p}{p-a} + \frac{q}{q-b} + \frac{r}{r-c} = 2$.

                                                                                    2 x 5 = 10

21) Test for consistency of the following system of linear equations and if possible solve:
   $x + 2y - z = 3$, $3x - y + 2z = 1$, $x - 2y + 3z = 3$, $x - y + z + 1 = 0$

22) 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

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Ravi home tutions

12th matrix 2 marks

12th Standard 2019 EM

Maths

Date : 10-Jun-19

Reg.No. :

Time : 00:30:00 Hrs

Total Marks : 20

10 x 2 = 20

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

2) If A = $\begin{bmatrix} 5 & 3 \\ -1 & -2 \end{bmatrix}$, show that $A^2 - 3A - 7I_2 = O_2$. Hence find A^{-1}.

3) If A = $\frac{1}{9}\begin{bmatrix} -8 & 1 & 4 \\ 4 & 4 & 7 \\ 1 & -8 & 4 \end{bmatrix}$, prove that $A^{-1} = A^T$.

4) If A = $\begin{bmatrix} 3 & 2 \\ 7 & 5 \end{bmatrix}$ and B = $\begin{bmatrix} -1 & -3 \\ 5 & 2 \end{bmatrix}$, verify that $(AB)^{-1} = B^{-1}A^{-1}$

5) If adj(A) = $\begin{bmatrix} 2 & -4 & 2 \\ -3 & 12 & -7 \\ -2 & 0 & 2 \end{bmatrix}$, find A.

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

7) Find adj(adj A) if adj A = $\begin{bmatrix} 1 & 0 & 1 \\ 0 & 2 & 0 \\ -1 & 0 & 1 \end{bmatrix}$.

8) A = $\begin{bmatrix} 1 & \tan x \\ -\tan x & 1 \end{bmatrix}$, show that $A^T A^{-1} = \begin{bmatrix} \cos 2x & -\sin 2x \\ \sin 2x & \cos 2x \end{bmatrix}$

9) Find the matrix A for which A$\begin{bmatrix} 5 & 3 \\ -1 & -2 \end{bmatrix} = \begin{bmatrix} 14 & 7 \\ 7 & 7 \end{bmatrix}$.

10) Given A = $\begin{bmatrix} 1 & -1 \\ 2 & 0 \end{bmatrix}$, B = $\begin{bmatrix} 3 & -2 \\ 1 & 1 \end{bmatrix}$ and C = $\begin{bmatrix} 1 & 1 \\ 2 & 2 \end{bmatrix}$, find a matrix X such that AXB = C.

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

12th maths matrix 2 & 3 marks test 2

12th Standard 2019 EM

Maths

Date : 10-Jun-19

Reg.No. :

Time : 00:30:00 Hrs

Total Marks : 25

5 x 2 = 10

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

2) If $A = \begin{bmatrix} 5 & 3 \\ -1 & -2 \end{bmatrix}$, show that $A^2 - 3A - 7I_2 = O_2$. Hence find A^{-1}.

3) If $A = \frac{1}{9}\begin{bmatrix} -8 & 1 & 4 \\ 4 & 4 & 7 \\ 1 & -8 & 4 \end{bmatrix}$, prove that $A^{-1} = A^T$.

4) If $A = \begin{bmatrix} 3 & 2 \\ 7 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & -3 \\ 5 & 2 \end{bmatrix}$, verify that $(AB)^{-1} = B^{-1}A^{-1}$

5) If $adj(A) = \begin{bmatrix} 2 & -4 & 2 \\ -3 & 12 & -7 \\ -2 & 0 & 2 \end{bmatrix}$, find A.

5 x 3 = 15

6) If $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & 4 \\ 2 & -4 & 3 \end{bmatrix}$, verify that $A(adj\ A) = (adj\ A)A = |A|\ I_3$.

7) If A is a non-singular matrix of odd order, prove that $|adj\ A|$ is positive

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

9) Verify the property $(A^T)^{-1} = (A^{-1})$ with $A = \begin{bmatrix} 2 & 9 \\ 1 & 7 \end{bmatrix}$.

10) Verify $(AB)^{-1} = B^{-1}A^{-1}$ with $A = \begin{bmatrix} 0 & -3 \\ 1 & 4 \end{bmatrix}$, $B = \begin{bmatrix} -2 & -3 \\ 0 & -1 \end{bmatrix}$.

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Maths

Reg.No. :

Time : 00:30:00 Hrs

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5 x 2 = 10

1) $A = \begin{bmatrix} 1 & \tan x \\ -\tan x & 1 \end{bmatrix}$, show that $A^T A^{-1} = \begin{bmatrix} \cos 2x & -\sin 2x \\ \sin 2x & \cos 2x \end{bmatrix}$

2) Find the matrix A for which $A \begin{bmatrix} 5 & 3 \\ -1 & -2 \end{bmatrix} = \begin{bmatrix} 14 & 7 \\ 7 & 7 \end{bmatrix}$.

3) Given $A = \begin{bmatrix} 1 & -1 \\ 2 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 3 & -2 \\ 1 & 1 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & 1 \\ 2 & 2 \end{bmatrix}$, find a matrix X such that AXB = C.

4) 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.

5) Find the rank of the following matrices by row reduction method:

   $\begin{bmatrix} 1 & 1 & 1 & 3 \\ 2 & -1 & 3 & 4 \\ 5 & -1 & 7 & 11 \end{bmatrix}$

5 x 3 = 15

6) If $A = \begin{bmatrix} 4 & 3 \\ 2 & 5 \end{bmatrix}$, find x and y such that $A^2 + xA + yI_2 = O_2$. Hence, find A^{-1}.

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

8) 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}.

9) Solve the following system of linear equations, using matrix inversion method:

   5x + 2y = 3, 3x + 2y = 5.

10) Solve the following system of linear equations, by Gaussian elimination method :

   4x + 3y + 6z = 25, x + 5y + 7z = 13, 2x + 9y + z = 1.

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12th matrix 2 & 3 marks test 4

12th Standard 2019 EM

Maths

Time : 00:25:00 Hrs

Date : 10-Jun-19

Reg.No. :

Total Marks : 30

5 x 2 = 10

1) A man is appointed in a job with a monthly salary of certain amount and a fixed amount of annual increment. If his salary was Rs.19,800 per month at the end of the first month after 3 years of service and Rs.23,400 per month at the end of the first month after 9 years of service, find his starting salary and his annual increment. (Use matrix inversion method to solve the problem.)

2) 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.

3) Solve the following systems of linear equations by Cramer's rule:

$\frac{3}{x} + 2y = 12, \frac{2}{x} + 3y = 13$

4) In a competitive examination, one mark is awarded for every correct answer while $\frac{1}{4}$ 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 to solve the problem).

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

5 x 3 = 15

6) Solve the system: x + 3y - 2z = 0, 2x - y + 4z = 0, x - 11y + 14z = 0

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

8) Determine the values of λ for which the following system of equations $(3λ − 8)x + 3y + 3z = 0, 3x + (3λ − 8)y + 3z = 0, 3x + 3y + (3λ − 8)z = 0.$ has a non-trivial solution.

9) By using Gaussian elimination method, balance the chemical reaction equation: $C_5H_8 + O_2 \longrightarrow CO_2 + H_2O$. (The above is the reaction that is taking place in the burning of organic compound called isoprene.)

10) If the system of equations px + by + cz = 0, ax + qy + cz = 0, ax + by + rz = 0 has a non-trivial solution and p - a,q - b,r - c, prove that $\frac{p}{p-a} + \frac{q}{q-b} + \frac{r}{r-c} = 2$.

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12th matrix 2 marks & 5 marks test 5

12th Standard 2019 EM

Maths

Date : 10-Jun-19

Reg.No. :

Time : 00:40:00 Hrs

Total Marks : 40

10 x 2 = 20

1) Investigate the values of λ and m the system of linear equations $2x + 3y + 5z = 9$, $7x + 3y - 5z = 8$, $2x + 3y + \lambda z = \mu$, have

   (i) no solution

   (ii) a unique solution

   (iii) an infinite number of solutions.

2) Determine the values of λ for which the following system of equations $x + y + 3z = 0$, $4x + 3y + \lambda z = 0$, $2x + y + 2z = 0$ has

   (i) a unique solution

   (ii) a non-trivial solution

3) By using Gaussian elimination method, balance the chemical reaction equation:

   $C_2 H_5 + O_2 \rightarrow H_2O + CO_2$
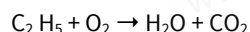
4) Find the rank of the following matrices by minor method:

$$\begin{bmatrix} 0 & 1 & 2 & 1 \\ 0 & 2 & 4 & 3 \\ 8 & 1 & 0 & 2 \end{bmatrix}$$

5) Find the rank of the following matrices by row reduction method:

$$\begin{bmatrix} 3 & -8 & 5 & 2 \\ 2 & -5 & 1 & 4 \\ -1 & 2 & 3 & -2 \end{bmatrix}$$

6) Find the inverse of each of the following by Gauss-Jordan method:

$$\begin{bmatrix} 1 & 2 & 3 \\ 2 & 5 & 3 \\ 1 & 0 & 8 \end{bmatrix}$$

7) Solve the following system of linear equations by matrix inversion method:

   $2x + 3y - z = 9$, $x + y + z = 9$, $3x - y - z = -1$

8) Solve the following systems of linear equations by Cramer's rule:

   $\frac{3}{x} - \frac{4}{y} - \frac{2}{z} - 0$, $\frac{1}{x} + \frac{2}{y} + \frac{1}{z} - 2 = 0$, $\frac{2}{x} - \frac{5}{y} - \frac{4}{z} + 1 = 0$

9) Test for consistency and if possible, solve the following systems of equations by rank method.

   $2x + 2y + z = 5$, $x - y + z = 1$, $3x + y + 2z = 4$

10) Test for consistency and if possible, solve the following systems of equations by rank method.

   $2x - y + z = 2$, $6x - 3y + 3z = 6$, $4x - 2y + 2z = 4$

4 x 5 = 20

11) 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?

Processing math: 75%

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).)

12) Test the consistency of the following system of linear equations

x - y + z = -9, 2x - y + z = 4, 3x - y + z = 6, 4x - y + 2z = 7.

13) Find the condition on a, b and c so that the following system of linear equations has one parameter family of solutions: x + y + z = a, x + 2y + 3z = b, 3x + 5y + 7z = c.

14) 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

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