RAVI MATHS TUITION CENTER, NEAR VILLIVAKKAM RLY STATION, CHENNAI – 82.
WHATSAPP - 8056206308

Application of Matrices and Determinants 5 MARKS TEST

12th Standard

Maths

Exam Time : 02:30:00 Hrs | Total Marks : 100

20 x 5 = 100

1) 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.

2) 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).)

3) 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.)

4) Solve the following systems of linear equations by Gaussian elimination method:
(i) 2x − 2y + 3z = 2, x + 2y − z = 3,3x − y + 2z = 1
(ii) 2x + 4y + 6z = 22, 3x + 8y + 5z = 27,−x + y + 2z = 2

5) Test for consistency of the following system of linear equations and if possible solve: 4x − 2y + 6z = 8, x + y − 3z = −1, 15x − 3y + 9z = 21.

6) 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.

7) Test for consistency and if possible, solve the following systems of equations by rank method.
i) x - y + 2z = 2, 2x + y + 4z = 7, 4x - y + z = 4
ii) 3x + y + z = 2, x - 3y + 2z = 1, 7x - y + 4z = 5
iii) 2x + 2y + z = 5, x - y + z = 1, 3x + y + 2z = 4
iv) 2x - y + z = 2, 6x - 3y + 3z = 6, 4x - 2y + 2z = 4

8) Investigate the values of λ and μ the system of linear equations 2x + 3y + 5z = 9, 7x + 3y - 5z = 8, 2x + 3y + λz = μ, have
(i) no solution
(ii) a unique solution
(iii) an infinite number of solutions.

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

10) 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.)

11) Solve the following system of homogenous equations.
3x + 2y + 7z = 0, 4x − 3y − 2z = 0,5x + 9y + 23z = 0

12) Determine the values of λ for which the following system of equations x + y + 3z = 0, 4x + 3y + λz = 0, 2x + y + 2z = 0 has
(i) a unique solution
(ii) a non-trivial solution

13) By using Gaussian elimination method, balance the chemical reaction equation:
$C_2 H_5 + O_2 \rightarrow H_2O + CO_2$

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

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

15) Solve the following system of linear equations by matrix inversion method:
x + y + z − 2 = 0, 6x − 4y + 5z − 31 = 0, 5x + 2y + 2z = 13.

16) Solve the following systems of linear equations by Cramer's rule:
3x + 3y − z = 11, 2x − y + 2z = 9, 4x + 3y + 2z = 25.

17) Solve: $\frac{2}{x} + \frac{3}{y} + \frac{10}{z} = 4$, $\frac{4}{x} - \frac{6}{y} + \frac{5}{z} = 1$, $\frac{6}{x} + \frac{9}{y} - \frac{20}{z}$ =2

18) The sum of three numbers is 20. If we multiply the third number by 2 and add the first number to the result we get 23. By adding second and third numbers to 3 times the first number we get 46. Find the numbers using Cramer's rule.

19) Show that the equations -2x + y + z = a, x - 2y + z = b, x + y -2z = c are consistent only if a + b + c =0.

20) Using Gaussian Jordan method, find the values of λ and μ so that the system of equations 2x - 3y + 5z = 12, 3x + y + λz =μ, x - 7y + 8z = 17 has (i) unique solution (ii) infinite solutions and (iii) no solution.

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