STANDARD 12th

BOOK BACK &
INTERIOR

QUESTION BANK

2019 – 2020

DEPARTMENT OF MATHS

MATHS UNIT 1
1. APPLICATIONS OF MATRICES AND DETERMINANTS

2- MARK QUESTIONS

1. If a square matrix has an inverse, then it is unique, prove.

2. Let A be square matrix of order n. Then, $A^{-1}$ exists if and only if A is non-singular prove.

3. If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ is non-singular, find $A^{-1}$.

4. Find the inverse of the matrix
   \[
   \begin{bmatrix}
   2 & -1 & 3 \\
   -5 & 3 & 1 \\
   -3 & 2 & 3
   \end{bmatrix}
   \]

5. If A is non-singular, then prove $|A^{-1}| = \frac{1}{|A|}$

6. If A is non-singular, then prove $(A^T)^{-1} = (A^{-1})^T$

7. If A is non-singular, then prove $(\lambda A)^{-1} = \frac{1}{\lambda} A^{-1}$, where $\lambda$ is a non-zero scalar

8. State and prove Left Cancellation Law (or) Let A, B and C be square matrices of order n. If A is non-singular and AB = AC, then prove B = C.

9. State and prove Right Cancellation Law (or) Let A, B and C be square matrices of order n. If A is non-singular and BA = CA, then prove B = C.

10. State and prove Law of Double Inverse (or) If A is non-singular, then $A^{-1}$ is also non-singular and $(A^{-1})^{-1} = A$

11. If A is a non-singular matrix of odd order, prove that $|\text{adj } A|$ is positive.

12. If $\text{adj } A = \begin{bmatrix} -1 & 2 & 2 \\ 1 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ find $A^{-1}$.

13. If $\text{adj } A$ is symmetric, prove that then $\text{adj } A$ is also symmetric.

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

15. Find the adjoint of
   \[
   \begin{bmatrix}
   -3 & 4 \\
   6 & 2
   \end{bmatrix}
   \]

16. Find the adjoint of
   \[
   \begin{bmatrix}
   2 & 3 & 1 \\
   3 & 4 & 1 \\
   3 & 7 & 2
   \end{bmatrix}
   \]

17. Find the adjoint of
   \[
   \begin{bmatrix}
   2 & 2 & 1 \\
   -2 & 1 & 2 \\
   1 & -2 & 2
   \end{bmatrix}
   \]

18. Find the inverse
   \[
   \begin{bmatrix}
   -2 & 4 \\
   1 & -3
   \end{bmatrix}
   \]

19. Find the inverse
   \[
   \begin{bmatrix}
   5 & 1 & 1 \\
   1 & 5 & 1 \\
   1 & 1 & 5
   \end{bmatrix}
   \]
21. Find the inverse \[
\begin{bmatrix}
2 & 3 & 1 \\
3 & 4 & 1 \\
3 & 7 & 2
\end{bmatrix}
\]

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

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

24. Find the inverse of \( A = \begin{bmatrix}
0 & 5 \\
-1 & 6
\end{bmatrix} \) by Gauss-Jordan method.

25. Find the inverse of \( A = \begin{bmatrix}
2 & -4 \\
-1 & 2
\end{bmatrix} \) by Gauss-Jordan method.

26. Find the rank of \( \begin{bmatrix}
2 & -4 \\
-1 & 2
\end{bmatrix} \) by minor method.

27. Find the rank of \( \begin{bmatrix}
4 & -7 \\
3 & -4
\end{bmatrix} \) by minor method.

28. Find the rank of \( \begin{bmatrix}
1 & -2 & -1 & 0 \\
3 & -6 & -3 & 1
\end{bmatrix} \) by minor method.

29. Find the inverse of \( \begin{bmatrix}
2 & -1 \\
5 & -2
\end{bmatrix} \) by Gauss-Jordan method.

30. Solve: \( 5x-2y +16 = 0 \), \( x+3y -7= 0 \) by Cramer’s rule

31. Find the rank of \( \begin{bmatrix}
2 & 0 & -7 \\
0 & 3 & 1 \\
0 & 0 & 1
\end{bmatrix} \) in row - echelon form

32. Find the rank of \( \begin{bmatrix}
-2 & 2 & -1 \\
0 & 5 & 1 \\
0 & 0 & 0
\end{bmatrix} \) in row - echelon form

33. Find the rank of \( \begin{bmatrix}
6 & 0 & -9 \\
0 & 2 & 0 \\
0 & 0 & 0
\end{bmatrix} \) in row - echelon form

34. Find the rank of \( \begin{bmatrix}
1 & 2 & 3 \\
2 & 1 & 4 \\
3 & 0 & 5
\end{bmatrix} \) in row - echelon form

**3- MARK QUESTIONS**

1. For every square matrix \( A \) of order \( n \), \( \text{adj}(A) = (\text{adj} A) A = |A|I_n \).

2. If \( A \) and \( B \) are non-singular matrices of the same order, then the product \( AB \) is also non-singular and \( (AB)^{-1} = B^{-1}A^{-1} \) (or) State and prove Reversal Law for Inverses.

3. If \( A \) is a non-singular square matrix of order \( n \), then prove that
\[
(\text{adj} A)^{-1} = \text{adj}(A^{-1}) = \frac{1}{|A|} A
\]

4. If \( A \) is a non-singular square matrix of order \( n \), then prove that \( |\text{adj} A| = |A|^{n-1} \)

5. If \( A \) is a non-singular square matrix of order \( n \), then prove that \( \text{adj}(\text{adj} A) = |A|^{n-2}A \)

6. If \( A \) is a non-singular square matrix of order \( n \), then prove that \( \text{adj}(\lambda A) = \lambda^{n-1}\text{adj}(A) \)

7. If \( A \) is a non-singular square matrix of order \( n \), then prove that \( |\text{adj}(\text{adj} A)| = |A|^{(n-1)^2} \)
8. If A is a non-singular square matrix of order n, then prove that \((\text{adj} A)^T = \text{adj}( A^T)\)
9. If A and B are any two non-singular square matrices of order n, then prove
\[ \text{adj}(AB) = (\text{adj} B)(\text{adj} A) \]
10. Verify the property \((A^T)^{-1} = (A^{-1})^T\) with \(A = \begin{bmatrix} 2 & 9 \\ 1 & 7 \end{bmatrix}\)
11. Verify \((AB)^{-1} = B^{-1}A^{-1}\) with \(A = \begin{bmatrix} 0 & -3 \\ 1 & 4 \end{bmatrix}\), \(B = \begin{bmatrix} -2 & -3 \\ 0 & -1 \end{bmatrix}\).
12. If \(A = \begin{bmatrix} 6 & -3 & a \\ b & -2 & 6 \\ 2 & c & 3 \end{bmatrix}\) is orthogonal, find a, b and c, and hence \(A^{-1}\).
13. If \(F(\alpha) = \begin{bmatrix} \cos \alpha & 0 & \sin \alpha \\ 0 & 1 & 0 \\ -\sin \alpha & 0 & \cos \alpha \end{bmatrix}\), show that \([F(\alpha)]^{-1} = F(-\alpha)\).
14. If \(A = \begin{bmatrix} 8 & -4 \\ -5 & 3 \end{bmatrix}\), verify that \(A (\text{adj} \, A) = (\text{adj} \, A) \, A = |A|I_2\).
15. If \(A = \begin{bmatrix} 3 & 2 \\ 7 & 5 \end{bmatrix}\) and \(B = \begin{bmatrix} -1 & -3 \\ 5 & 2 \end{bmatrix}\), verify that \((AB)^{-1} = B^{-1}A^{-1}\).
16. Find the matrix \(A\) for which \(A = \begin{bmatrix} 5 & -3 \\ -1 & 2 \end{bmatrix}\) and \(B = \begin{bmatrix} 14 & 7 \\ 7 & 0 \end{bmatrix}\).
17. 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 \(AXB = C\).
18. Find the rank of \(A = \begin{bmatrix} 3 & 2 & 5 \\ 1 & 1 & 2 \\ 3 & 3 & 6 \end{bmatrix}\)
19. Find the rank of \(A = \begin{bmatrix} 4 & 3 & 1 & -2 \\ -3 & -1 & -2 & 4 \\ 6 & 7 & -1 & 2 \end{bmatrix}\)
20. Reduce the matrix \(A = \begin{bmatrix} -6 & 2 & 4 \\ -3 & 1 & 2 \end{bmatrix}\) to a row-echelon form.
21. Reduce the matrix \(A = \begin{bmatrix} 1 & -1 & 0 & 2 & 5 \\ 4 & 2 & 0 & 0 \end{bmatrix}\) to row-echelon form.
22. Find the rank of \(A = \begin{bmatrix} 2 & 4 & -6 \\ 5 & 1 & -1 \end{bmatrix}\) by minor method.
23. Find the rank of \(A = \begin{bmatrix} 0 & 1 & 2 \\ 0 & 2 & 4 \\ 8 & 1 & 0 \end{bmatrix}\) by minor method.
24. Find the rank of the matrix \(A = \begin{bmatrix} 2 & -2 & 4 & 3 \\ -3 & 4 & -2 & -1 \\ 6 & 2 & -1 & 7 \end{bmatrix}\) by reducing it to an echelon form.
25. Show that the matrix \(A = \begin{bmatrix} 3 & 1 & 4 \\ 2 & 0 & -1 \\ 5 & 2 & 1 \end{bmatrix}\) is non-singular and reduce it to the identity matrix by elementary row transformations.
26. Find the inverse of \(A = \begin{bmatrix} 2 & 1 & 1 \\ 3 & 2 & 1 \\ 2 & 1 & 2 \end{bmatrix}\) by Gauss-Jordan method.
27. Find the rank of \(A = \begin{bmatrix} 1 & 1 & 3 \\ 2 & -1 & 3 \\ 5 & -1 & 7 \end{bmatrix}\) by row reduction method.
28. Find the rank of \[
\begin{bmatrix}
3 & -8 & 5 & 2 \\
2 & -5 & 1 & 4 \\
-1 & 2 & 3 & -2 \\
1 & 2 & -1 \\
\end{bmatrix}
\] by row reduction method.

29. Find the rank of \[
\begin{bmatrix}
3 & -1 & 2 \\
1 & -2 & 3 \\
1 & -1 & 1 \\
\end{bmatrix}
\] by row reduction method.

30. Find the inverse of \[
\begin{bmatrix}
1 & -1 & 0 \\
1 & 0 & -1 \\
6 & -2 & -3 \\
\end{bmatrix}
\] by Gauss-Jordan method.

31. Find the inverse of \[
\begin{bmatrix}
2 & 5 & 3 \\
1 & 0 & 8 \\
\end{bmatrix}
\] by Gauss-Jordan method.

32. Solve: \(5x+2y = 3\), \(3x+2y = 5\) by using matrix inversion method.

33. Solve: \(2x+5y = -2\), \(x+2y = -3\) by matrix inversion method.

34. Solve: \(2x-y = 8\), \(3x+2y = -2\) by matrix inversion method.

35. Solve: \(\frac{3}{x}+2y = 12\), \(\frac{2}{x}+3y = 13\) by Cramer’s rule.

36. Solve: \(x+2y+3z = 0\), \(3x+4y+4z = 0,7x+10y+12z = 0\).

37. Solve: \(x+3y-2z = 0\), \(2x+y+4z = 0,x-11y+14z = 0\).

38. Solve: \(x+y-2z = 0\), \(2x-3y+z = 0,3x-7y+10z = 0,6x-9y+10z = 0\).

39. Solve :\(2x+3y-z = 0\), \(x-y-2z = 0,3x+y+3z = 0\).

5 MARK QUESTIONS

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

2. Find a matrix \(A\) if \(\text{adj}(A) = \begin{bmatrix}
7 & 7 & -7 \\
-1 & 11 & 7 \\
11 & 5 & 7 \\
\end{bmatrix}\).

3. 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 \(A^{-1}\).

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

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

6. If \(\text{adj}(A) = \begin{bmatrix}
2 & -4 & 2 \\
-3 & 12 & -11 \\
-2 & 0 & 2 \\
\end{bmatrix}\) find \(A\).

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. If \(A = \begin{bmatrix}
0 & 1 \\
1 & 0 \\
1 & 1 \\
\end{bmatrix}\), show that \(A^{-1} = \frac{1}{2}(A^2 - 3I)\).

9. Decrypt the received encoded message \[2 \quad -3\][20 \quad 4] 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.

10. Decrypt the received encoded message \([45 \quad 28 \quad 23][46 \quad 18 \quad 3][5 \quad -5 \quad 5]\) with the encryption matrix 
\[
\begin{pmatrix}
1 & -1 & 1 \\
2 & -1 & 0 \\
1 & 0 & 0
\end{pmatrix}
\] 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.

11. Solve: \(2x_1+3x_2+3x_3 = 5, x_1-2x_2+x_3 = -4, 3x_1-x_2-2x_3 = 3\) using matrix inversion method.

12. If \(A = \begin{pmatrix} -4 & 4 & 4 \\ -7 & 1 & 3 \\ 5 & -3 & -1 \end{pmatrix}\) and \(B = \begin{pmatrix} 1 & -1 & 1 \\ 1 & -2 & -2 \\ 2 & 1 & 3 \end{pmatrix}\), find the products \(AB\) and \(BA\) and hence solve the system of equations \(x+y+z = 4, x-2y-2z = 9, 2x+y+3z = 1\).

13. Solve: \(2x+3y-z = 9, x+y+z = 9, 3x-y-z = -1\) by matrix inversion method.

14. Solve: \(x+y+z = 0, 6x-4y+5z-31 = 0, 5x+2y+2z = 13\) by matrix inversion method.

15. If \(A = \begin{pmatrix} -5 & 1 & 3 \\ 7 & 1 & -5 \\ 1 & -1 & 1 \end{pmatrix}\) and \(B = \begin{pmatrix} 1 & 1 & 2 \\ 3 & 2 & 1 \\ 2 & 1 & 3 \end{pmatrix}\), find the products \(AB\) and \(BA\) and hence solve the system of equations \(x+y+2z = 1, 3x+2y+z = 7, 2x+y+3z = 2\).

16. 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 ₹ 19,800 per month at the end of the first month after 3 years of service and ₹ 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.)

17. 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.

18. The prices of three commodities A, B and C are ₹ \(x, y\) 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 units of B and one unit of C. In the process, PQ and R earn ₹ 15,000, ₹ 1,000 and ₹ 4,000 respectively. Find the prices per unit of A, B and C. (Use matrix inversion method to solve the problem.)

19. Solve, by Cramer’s rule, the system of equations \(x_1-x_2 = 3, 2x_1+3x_2+4x_3 = 17, x_2+2x_3 = 7\).

20. 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),(40,22), 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).)

21. Solve: \[3x + 3y - z = 11, 2x - y + 2z = 9, 4x + 3y + 2z = 25\] by Cramer’s rule.

22. Solve: \[\frac{3}{x} - \frac{4}{y} - \frac{2}{z} - 1 = 0, \frac{1}{x} + \frac{2}{y} + \frac{1}{z} - 2 = 0, \frac{2}{x} - \frac{5}{y} - \frac{4}{z} + 1 = 0\] by Cramer’s rule.

23. 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).

24. 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).

25. A fish tank can be filled in 10 minutes using both pumps A and B simultaneously. However, pump B can pump water in or out at the same rate. If pump B is inadvertently run in reverse, then the tank will be filled in 30 minutes. How long would it take each pump to fill the tank by itself? (Use Cramer’s rule to solve the problem).

26. A family of 3 people went out for dinner in a restaurant. The cost of two dosai, three idlies and two vadais is ₹ 150. The cost of the two dosai, two idlies and four vadais is ₹ 200. The cost of five dosai, four idlies and two vadais is ₹ 250. The family has ₹ 350 in hand and they ate 3 dosai and six idlies and six vadais. Will they be able to manage to pay the bill within the amount they had?

27. Solve: \[4x + 3y + 6z = 25, x + 5y + 7z = 13, 2x + 9y + z = 1\] by Gaussian elimination method.

28. Solve: \[2x - 2y + 3z = 2, x + 2y - z = 3, 3x - y + 2z = 1\] by Gaussian elimination method.

29. Solve: \[2x + 4y + 6z = 22, 3x + 8y + 5z = 27, -x + y + 2z = 2\] by Gaussian elimination method.

30. The upward speed \(v(t)\) of a rocket at time \(t\) is approximated by \(v(t) = at^2 + bt + c\), \(0 \leq t \leq 100\) 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.)

31. A boy is walking along the path \(y = ax^2 + bx + c\) through the points \((-6, 8), (-2, -12)\) and \((3, 8)\). He wants to meet his friend at \(P(7, 60)\). Will he meet his friend? (Use Gaussian elimination method.)

32. 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.)

33. An amount of ₹ 65,000 is invested in three bonds at the rates of 6%, 8% and 9% per
annum respectively. The total annual income is ₹ 4,800. The income from the third
bond is ₹ 600 more than that from the second bond. Determine the price of each bond.
(Use Gaussian elimination method.)
34. Test for consistency of the following system of linear equations and if possible solve:
   \[ x+2y-z = 3, \quad 3x-y+2z = 1, \quad x-2y+3z = 3, \quad x-y+z +1= 0. \]
35. Test for consistency of the following system of linear equations and if possible solve:
   \[ 4x-2y+6z = 8, \quad x+y-3z = -1, \quad 15x-3y+9z = 21. \]
36. Test for consistency of the following system of linear equations and if possible solve:
   \[ x-y+z = -9, \quad 2x-2y+2z = -18, \quad 3x-3y+3z +27= 0. \]
37. Test the consistency of the following system of linear equations
   \[ x-y+z = -9, \quad 2x-y+z = 4, \quad 3x-y+z = 6, \quad 4x-y+2z = 7. \]
38. Find the condition on \( a, b \) and \( c \) so that the following system of linear equations has
   one parameter family of solutions: \( x+y+z = a, \quad x+2y+3z = b, \quad 3x-y+z = 6, \quad 3x+5y+7z = c. \)
39. Investigate for what values of \( \lambda \) and \( \mu \) the system of linear equations
   \( x+2y+z = 7, \quad 2x-y+\lambda \ z = \mu, \quad x+3y-5z = 5 \)
   has (i) no solution (ii) a unique solution (iii) an infinite number of solutions.
40. Test for consistency and if possible, solve \( x-y+2z = 2, \) \( 2x+y+4z = 7, \)
   \( 4x-y+z = 4 \) by rank method.
41. Test for consistency and if possible, solve \( 2x+2y+z = 5, \) \( x-y+z = 1, \)
   \( 3x+y+2z = 4 \) by rank method.
42. Test for consistency and if possible, solve \( 2x-y+z = 2, \) \( 6x-3y+3z = 6, \)
   \( 4x-2y+2z = 4 \) by rank method.
43. Test for consistency and if possible, solve \( 3x+y+z = 2, \) \( x-3y+2z = 1, \)
   \( 7x-y+4z = 5 \) by rank method.
44. 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 solutions.
45. Investigate the values of \( \lambda \) and \( \mu \) the system of linear equations
   \( 2x+3y+5z = 9, \quad 7x+3y-5z = 8, \quad 2x+3y+\lambda \ z = \mu \)
   have (i) no solution (ii) a unique solution (iii) an infinite number of solutions.
46. Determine the values of \( \lambda \) for which the following system of equations
   \( (3\lambda-8)x+3y+3z = 0, \quad 3x+(3\lambda-8)y+3z = 0, \quad 3x+3y+(3\lambda-8)z = 0 \)
   has a non-trivial solution.
47. If the system of equations
   \[ px+by+cz = 0, \quad ax+qy+cz = 0, \quad ax+by+rz = 0 \]
   has a non-trivial solution and \( p \neq a, \) \( q \neq b, \) \( r \neq c, \) prove that
   \[ \frac{p}{p-a} + \frac{q}{q-b} + \frac{r}{r-c} = 2. \]
48. Determine the values of \( \lambda \) for which the following system of equations
   \( x+y+3z = 0, \quad 4x+3y+\lambda z = 0, \quad 2x+y+2z = 0 \)
   has (i) a unique solution (ii) a non-trivial solution.
49. By using Gaussian elimination method, balance the chemical reaction equation:
   \( C_3H_8+O_2 \rightarrow CO_2+H_2O. \)
50. By using Gaussian elimination method, balance the chemical reaction equation:

\[ \text{C}_2\text{H}_6 + \text{O}_2 \rightarrow \text{H}_2\text{O} + \text{CO}_2. \]