RED ROSE SENIOR SECONDARY SCHOOL

CLASS – XII

Mathematics

ASSIGNMENT PROBLEM – A

1 MARK QUESTION

1. Find the maximum value of $\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1+\sin\theta & 1 \\ 1 & 1 & 1+\cos\theta \end{vmatrix}$ $Ans. \frac{1}{2}$

2. If $\begin{vmatrix} x & \sin\theta & \cos\theta \\ -\sin\theta & -x & 1 \\ \cos\theta & 1 & x \end{vmatrix} = 8$, write the value of x. $Ans. x = -2$

3. If $A = \begin{bmatrix} 1 & 2 \\ 3 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 3 \\ -1 & 1 \end{bmatrix}$, write the value of $|AB|$. $Ans. -28$

4. If $A = \begin{bmatrix} 5 & 6 & -3 \\ -4 & 3 & 2 \\ -4 & -7 & 3 \end{bmatrix}$, then write the cofactor of the element a_{21}. $Ans. 3$

5. In the interval $\pi/2 < x < \pi$, find the value of x for which the matrix $\begin{bmatrix} 2\sin x & 3 \\ 1 & 2\sin x \end{bmatrix}$ is singular. $Ans. x = \frac{2\pi}{3}$

6. If $\begin{vmatrix} 2x & 5 \\ 8 & x \end{vmatrix} = \begin{vmatrix} 6 & -2 \\ 7 & 3 \end{vmatrix}$, then write the value of x. $Ans. x = \pm 6$

7. If $\begin{vmatrix} 3x & 7 \\ -2 & 4 \end{vmatrix} = \begin{vmatrix} 8 & 7 \\ 6 & 4 \end{vmatrix}$, then write the value of x. $Ans. x = -2$

8. Write the value of the determinant $\begin{vmatrix} p & p+1 \\ p-1 & p \end{vmatrix}$. $Ans. 1$

9. If $\begin{vmatrix} 2x & x+3 \\ 2x+2 & x+1 \end{vmatrix} = \begin{vmatrix} 1 & 5 \\ 3 & 3 \end{vmatrix}$, then find the value of x. $Ans. x = 1$

10. If $\begin{vmatrix} x+1 & x-1 \\ x-3 & x+2 \end{vmatrix} = \begin{vmatrix} 4 & -1 \\ 1 & 3 \end{vmatrix}$, then write the value of x. $Ans. x = 2$

11. If A_{ij} is the cofactor of the element a_{ij} of the determinant $\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$, then write the value of $a_{32}.A_{32}$ $Ans. 110$

12. If $\Delta = \begin{vmatrix} 5 & 3 & 8 \\ 2 & 0 & 1 \\ 1 & 2 & 3 \end{vmatrix}$, write the cofactor of element a_{32}. $Ans. 11$

13. If $\Delta = \begin{vmatrix} 1 & 2 & 3 \\ 2 & 0 & 1 \\ 5 & 3 & 8 \end{vmatrix}$, write the minor of a_{22}. $Ans. -7$

14. If $\Delta = \begin{vmatrix} 5 & 3 & 8 \\ 2 & 0 & 1 \\ 1 & 2 & 3 \end{vmatrix}$, then write the minor of the element of a_{23}. $Ans. 7$

15. For what value of x, $A = \begin{bmatrix} 2x+2 & 2x \\ x & x-2 \end{bmatrix}$ is singular matrix. $Ans. x = -2$

16. For what value of x, the matrix $\begin{bmatrix} 2x+4 & 4 \\ x+5 & 3 \end{bmatrix}$ is singular matrix. $Ans. x = 4$

17. For what value of x, the matrix $\begin{bmatrix} 2x & 4 \\ x+2 & 3 \end{bmatrix}$ is singular matrix. $Ans. x = 4$

18. For what value of x, the matrix $\begin{bmatrix} 6-x & 4 \\ 3-x & 1 \end{bmatrix}$ is singular matrix. $Ans. x = 2$

19. For what value of x, the matrix $\begin{bmatrix} 5-x & x+1 \\ 2 & 4 \end{bmatrix}$ is singular matrix. $Ans. x = 3$

20. Evaluate $\begin{vmatrix} \cos 15^0 & \sin 15^0 \\ \sin 75^0 & \cos 75^0 \end{vmatrix}$ $Ans. 0$

21. If $\begin{vmatrix} x & x \\ 1 & x \end{vmatrix} = \begin{vmatrix} 3 & 4 \\ 1 & 2 \end{vmatrix}$, then write the positive value of x. $Ans. x = 2$

22. What is the value of determinant $\begin{vmatrix} 0 & 2 & 0 \\ 2 & 3 & 4 \\ 4 & 5 & 6 \end{vmatrix}$. $Ans. 8$

23. Find the minor of the element of second row and third column in the determinant
$\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$ $Ans. 13$

24. What positive value of x makes following pair of determinants equal?
$\begin{vmatrix} 2x & 3 \\ 5 & x \end{vmatrix}, \begin{vmatrix} 16 & 3 \\ 5 & 2 \end{vmatrix}$ $Ans. x = 4$

25. Evaluate $2\begin{vmatrix} 7 & -2 \\ -10 & 5 \end{vmatrix}$. $Ans. 30$

26. Find x from equation $\begin{vmatrix} x & 4 \\ 2 & 2x \end{vmatrix} = 0$ $Ans. x = \pm 2$

27. Evaluate : $\begin{vmatrix} \sqrt{6} & \sqrt{5} \\ \sqrt{20} & \sqrt{24} \end{vmatrix}$ $Ans. 2$

4 MARK QUESTION

28. Find the equation of the line joining $A(1,3)$ and $B(0,0)$using determinants and find the value of k if $D(k,0)$ is a point such that area of ΔABD is 3square units.
$Ans. y = 3x \text{ and } k = \pm 2$

ASSIGNMENT PROBLEM – B

1 MARK QUESTION

29. Write the value of $\Delta = \begin{vmatrix} x+y & y+z & z+x \\ z & x & y \\ -3 & -3 & -3 \end{vmatrix}$ $Ans. 0$

30. Write the value of $\begin{vmatrix} 2 & 7 & 65 \\ 3 & 8 & 75 \\ 5 & 9 & 86 \end{vmatrix}$ $Ans. 0$

31. Let A be square matrix of order 3×3. Write the value of $|2A|, where\ |A| = 4$
$Ans. 32$

32. If the determinant of matrix A of order 3×3 is of value 4, then write the value of $|3A|$.
$Ans. 108$

33. Write the value of determinant $\begin{vmatrix} 102 & 18 & 36 \\ 1 & 3 & 4 \\ 17 & 3 & 6 \end{vmatrix}$ $Ans. 0$

34. If A is a square matrix of order 3 and $|3A| = k|A|$, then write the value of k. $Ans.\ k = 27$

35. What is the value of $\begin{vmatrix} 4 & a & b+c \\ 4 & b & c+a \\ 4 & c & a+b \end{vmatrix}$. $Ans. 0$

36. Write the value of $\begin{vmatrix} 2 & 3 & 4 \\ 5 & 6 & 8 \\ 6x & 9x & 12x \end{vmatrix}$ $Ans. 0$

37. Write the value of $\begin{vmatrix} a-b & b-c & c-a \\ b-c & c-a & a-b \\ c-a & a-b & b-c \end{vmatrix}$ $Ans. 0$

38. If $A = \begin{bmatrix} 1 & 2 \\ 4 & 2 \end{bmatrix}$, then find the value of k, if $|2A| = k|A|$ $Ans. 4$

4 MARK QUESTION

39. Using properties determinants, prove that $\begin{vmatrix} a^2+2a & 2a+1 & 1 \\ 2a+1 & a+2 & 1 \\ 3 & 3 & 1 \end{vmatrix} = (a-1)^3$

40. Using properties of determinants, prove that

$$\begin{vmatrix} x & x+y & x+2y \\ x+2y & x & x+y \\ x+y & x+2y & x \end{vmatrix} = 9y^2(x+y)$$

41. If $f(x) = \begin{vmatrix} a & -1 & 0 \\ ax & a & -1 \\ ax^2 & ax & a \end{vmatrix}$, using properties of determinants, find the value of $f(2x) - f(x)$.
$Ans. x(3x+2a)a$

42. Using properties of determinants, prove that

$$\begin{vmatrix} 1 & a & a^2 \\ a^2 & 1 & a \\ a & a^2 & 1 \end{vmatrix} = (1-a^3)^2$$

43. Using properties of determinants, prove that

$$\begin{vmatrix} a^2 & bc & ac+c^2 \\ a^2+ab & b^2 & ac \\ ab & b^2+bc & c^2 \end{vmatrix} = 4a^2b^2c^2$$

44. Using properties of determinants, solve the following for x $\begin{vmatrix} a+x & a-x & a-x \\ a-x & a+x & a-x \\ a-x & a-x & a+x \end{vmatrix} = 0$

$Ans. x = 0, 3a$

45. Using properties of determinants, prove that $\begin{vmatrix} (a+1)(a+2) & a+2 & 1 \\ (a+2)(a+3) & a+3 & 1 \\ (a+3)(a+4) & a+4 & 1 \end{vmatrix} = -2$

46. Prove the following, using properties of determinants.

$$\begin{vmatrix} a+b+2c & a & b \\ c & b+c+2a & b \\ c & a & c+a+2b \end{vmatrix} = 2(a+b+c)^3$$

47. Using properties of determinants, prove that

$$\begin{vmatrix} x^2+1 & xy & xz \\ xy & y^2+1 & yz \\ xz & yz & z^2+1 \end{vmatrix} = 1 + x^2 + y^2 + z^2$$

48. Using properties of determinants, prove that

$$\begin{vmatrix} 2y & y-z-x & 2y \\ 2z & 2z & z-x-y \\ x-y-z & 2x & 2x \end{vmatrix} = (x+y+z)^3$$

49. Using properties of determinants, prove that

$$\begin{vmatrix} b+c & c+a & a+b \\ q+r & r+p & p+q \\ y+z & z+x & x+y \end{vmatrix} = 2\begin{vmatrix} a & b & c \\ p & q & r \\ x & y & z \end{vmatrix}$$

50. Using properties of determinants, prove that

$$\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix} = abc + bc + ca + ab$$

51. Using properties of determinants, prove that $\begin{vmatrix} x+y & x & x \\ 5x+4y & 4x & 2x \\ 10x+8y & 8x & 3x \end{vmatrix} = x^3$

52. Using properties of determinants, prove that

$$\begin{vmatrix} x+a & 2x & 2x \\ 2x & x+a & 2x \\ 2x & 2x & x+a \end{vmatrix} = (5x+a)(a-x)^2$$

53. Using properties of determinants, prove that

$$\begin{vmatrix} a & a^2 & bc \\ b & b^2 & ca \\ c & c^2 & ab \end{vmatrix} = (a-b)(b-c)(c-a)(bc+ca+ab)$$

54. Show that $\Delta = \Delta_1$, where $\Delta = \begin{vmatrix} Ax & x^2 & 1 \\ By & y^2 & 1 \\ Cz & z^2 & 1 \end{vmatrix}, \Delta_1 = \begin{vmatrix} A & B & C \\ x & y & z \\ zy & zx & xy \end{vmatrix}$

55. Using properties of determinants, prove that $\begin{vmatrix} b+c & a & a \\ b & c+a & b \\ c & c & a+b \end{vmatrix} = 4abc$

56. Using properties of determinants, prove that

$$\begin{vmatrix} 1 & a & a^3 \\ 1 & b & b^3 \\ 1 & c & c^3 \end{vmatrix} = (a-b)(b-c)(c-a)(a+b+c)$$

57. Using properties of determinants, prove that

$$\begin{vmatrix} a & b & c \\ a^2 & b^2 & c^2 \\ bc & ca & ab \end{vmatrix} = (a-b)(b-c)(c-a)(ab+bc+ca)$$

58. Using properties of determinants, prove that

$$\begin{vmatrix} 3x & -x+y & -x+z \\ x-y & 3y & z-y \\ x-z & y-z & 3z \end{vmatrix} = 3(x+y+z)(xy+yz+zx)$$

59. Using properties of determinants, prove that

$$\begin{vmatrix} b+c & q+r & y+z \\ c+a & r+p & z+x \\ a+b & p+q & x+y \end{vmatrix} = 2\begin{vmatrix} a & p & x \\ b & q & y \\ c & r & z \end{vmatrix}$$

60. Using properties of determinants, prove that

$$\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^3 & b^3 & c^3 \end{vmatrix} = (a-b)(b-c)(c-a)(a+b+c)$$

61. Using properties of determinants, prove that

$$\begin{vmatrix} a & b & c \\ a-b & b-c & c-a \\ b+c & c+a & a+b \end{vmatrix} = a^3+b^3+c^3-3abc$$

62. Using properties of determinants, prove that

$$\begin{vmatrix} a & b-c & c+b \\ a+c & b & c-a \\ a-b & b+a & c \end{vmatrix} = (a+b+c)(a^2+b^2+c^2)$$

63. Using properties of determinants, prove that

$$\begin{vmatrix} \alpha & \beta & \gamma \\ \alpha^2 & \beta^2 & \gamma^2 \\ \beta+\gamma & \gamma+\alpha & \alpha+\beta \end{vmatrix} = (\alpha-\beta)(\beta-\gamma)(\gamma-\alpha)(\alpha+\beta+\gamma)$$

64. Using properties of determinants, prove that

$$\begin{vmatrix} a^2 & a^2-(b-c)^2 & bc \\ b^2 & b^2-(c-a)^2 & ca \\ c^2 & c^2-(a-b)^2 & ab \end{vmatrix} = (a-b)(b-c)(c-a)(a+b+c)(a^2+b^2+c^2)$$

65. Using properties of determinants, prove that $\begin{vmatrix} -a^2 & ab & ac \\ ba & -b^2 & bc \\ ca & cb & -c^2 \end{vmatrix} = 4a^2b^2c^2$

66. Using properties of determinants, prove that

$$\begin{vmatrix} x & y & z \\ x^2 & y^2 & z^2 \\ x^3 & y^3 & z^3 \end{vmatrix} = xyz(x-y)(y-z)(z-x)$$

67. Using the properties of determinants, solve the following for x

$$\begin{vmatrix} x-2 & 2x-3 & 3x-4 \\ x-4 & 2x-9 & 3x-16 \\ x-8 & 2x-27 & 3x-64 \end{vmatrix} = 0$$

68. Using properties of determinants, solve the following for x

$$\begin{vmatrix} x+a & x & x \\ x & x+a & x \\ x & x & x+a \end{vmatrix} = 0$$

69. Prove, using properties of determinants

$$\begin{vmatrix} a-b-c & 2a & 2a \\ 2b & b-c-a & 2b \\ 2c & 2c & c-a-b \end{vmatrix} = (a+b+c)^3$$

70. Prove, using properties of determinants $\begin{vmatrix} y+k & y & y \\ y & y+k & y \\ y & y & y+k \end{vmatrix} = k^2(3y+k)$

71. Prove that : $\begin{vmatrix} (b+c)^2 & a^2 & a^2 \\ b^2 & (c+a)^2 & b^2 \\ c^2 & c^2 & (a+b)^2 \end{vmatrix} = 2abc(a+b+c)^3$

72. Prove that : $\begin{vmatrix} 1 & 1+p & 1+p+q \\ 2 & 3+2p & 1+3p+2q \\ 3 & 6+3p & 1+6p+3q \end{vmatrix} = 1$

73. Using properties of determinants, prove that $\begin{vmatrix} 1+a^2-b^2 & 2ab & -2b \\ 2ab & 1-a^2+b^2 & 2a \\ 2b & -2a & 1-a^2-b^2 \end{vmatrix} =$ $(1+a^2+b^2)^3$

74. Prove that $\begin{vmatrix} yz-x^2 & zx-y^2 & xy-z^2 \\ zx-y^2 & xy-z^2 & yz-x^2 \\ xy-z^2 & yz-x^2 & zx-y^2 \end{vmatrix}$ is divisible by $(x+y+z)$ and hence find quotient.

$Ans.\ (x+y+z)(xy+xz+yz-x^2-y^2-z^2)^2$

75. Using properties of determinants, prove that

$$\begin{vmatrix} (x+y)^2 & zx & zy \\ zx & (z+y)^2 & xy \\ zy & xy & (z+x)^2 \end{vmatrix} = 2xyz(x+y+z)^3$$

76. Using properties of determinants, prove that

$$\begin{vmatrix} x & x^2 & 1+px^3 \\ y & y^2 & 1+py^3 \\ z & z^2 & 1+pz^3 \end{vmatrix} = (1+pxyz)(x-y)(y-z)(z-x)$$

77. Using properties of determinants, show that ΔABC is isosceles, if

$$\begin{vmatrix} 1 & 1 & 1 \\ 1+\cos A & 1+\cos B & 1+\cos C \\ \cos^2 A+\cos A & \cos^2 B+\cos B & \cos^2 C+\cos C \end{vmatrix} = 0$$

78. If a, b and c are all non-zero and $\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix} = 0$, then prove that $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}+1=0$

79. If a, b, c are positive and unequal, show that the following determinant is negative.

$$\Delta = \begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$$

ASSIGNMENT PROBLEM – C

1 MARK QUESTION

80. If for any 2×2 square matrix A, $A(adjA) = \begin{bmatrix} 8 & 0 \\ 0 & 8 \end{bmatrix}$, then write the value of $|A|$.
$Ans. \pm 8$

81. For what value of k, the system of linear equations
$$x + y + z = 2$$
$$2x + y - z = 3$$
$$3x + 2y + kz = 4$$
has a unique solutions? $Ans. k \neq 0$

82. Find $|adjA|$, if $A = \begin{bmatrix} 5 & 2 \\ 7 & 3 \end{bmatrix}$. $Ans. 1$

83. If A is square matrix of order 3 such that $|adjA| = 64$, then find $|A|$. $Ans. \pm 8$

84. Write A^{-1} for $A = \begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$ $Ans. \begin{bmatrix} 3 & -5 \\ -1 & 2 \end{bmatrix}$

85. If $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$, then write A^{-1} in terms of A. $Ans. \frac{1}{19} A$

86. Write the adjoint of the matrix : $\begin{pmatrix} 2 & -1 \\ 4 & 3 \end{pmatrix}$ $Ans. \begin{bmatrix} 3 & -1 \\ -4 & 2 \end{bmatrix}$

87. If $A = \begin{bmatrix} 3 & 1 \\ 2 & -3 \end{bmatrix}$, then find $|adjA|$. $Ans. -11$

88. If $|A| = 2$, where A is a 2×2 matrix, then find $|adjA|$. $Ans. 2$

89. If A is a non-singular matrix of order 3 and $|adjA| = |A|^k$, then what is the value of k?
$Ans. k = 2$

90. If A is an invertible matrix of order 3 and $|A| = 5$, then find $|adjA|$. $Ans. 25$

4 MARK QUESTION

91. If $A = \begin{bmatrix} 1 & -2 & 3 \\ 0 & -1 & 4 \\ -2 & 2 & 1 \end{bmatrix}$, then find $(A')^{-1}$. $Ans. \begin{bmatrix} -9 & -8 & -2 \\ 8 & 7 & 2 \\ -5 & -4 & -1 \end{bmatrix}$

92. Find the adjoint of the matrix $A = \begin{bmatrix} -1 & -2 & -2 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$ and hence show that $A(adjA) = |A| I_3$.

93. If $A = \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$ and I is the identity matrix of order 2, then show that

94. $A^2 = 4A - 3I$. hence find A^{-1}. $Ans. \begin{bmatrix} 2/3 & 1/3 \\ 1/3 & 2/3 \end{bmatrix}$

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

6 MARK QUESTION

96. If $A = \begin{bmatrix} 2 & 3 & 10 \\ 4 & -6 & 5 \\ 6 & 9 & -20 \end{bmatrix}$, find A^{-1}. Using A^{-1} solve the system of equations.

$\frac{2}{x}+\frac{3}{y}+\frac{10}{z}=2;\ \frac{4}{x}-\frac{6}{y}+\frac{5}{z}=5\ and\ \frac{6}{x}+\frac{9}{y}-\frac{20}{z}=-4$ $\quad Ans.\, x=2, y=-3, z=5$

97. Use product $\begin{bmatrix}1 & -1 & 2\\ 0 & 2 & -3\\ 3 & -2 & 4\end{bmatrix}\begin{bmatrix}-2 & 0 & 1\\ 9 & 2 & -3\\ 6 & 1 & -2\end{bmatrix}$ to solve the system of equations

$$x-y+2z=1$$
$$2y-3z=1$$
$$and\ 3x-2y+4z=2$$

$Ans.\, x=0, y=5, z=3$

98. Using elementary transformations, find the inverse of the matrix $A=\begin{bmatrix}8 & 4 & 3\\ 2 & 1 & 1\\ 1 & 2 & 2\end{bmatrix}$ and use if to solve the following system of linear equations:

$$8x+4y+3z=19$$
$$2x+y+z=5$$
$$x+2y+2z=7$$

$Ans.\, x=1, y=2\ and\ z=1$

99. If $A=\begin{bmatrix}\cos\alpha & -\sin\alpha & 0\\ \sin\alpha & \cos\alpha & 0\\ 0 & 0 & 1\end{bmatrix}$, find $adjA$ and verify that $A(adjA)=(adjA)A=|A|I_3$

$Ans.\begin{bmatrix}\cos\alpha & -\sin\alpha & 0\\ \sin\alpha & \cos\alpha & 0\\ 0 & 0 & 1\end{bmatrix}$

100. A total amount of Rs. 7000 is deposited in three different savings bank accounts with annual interest rates of 5%, 8% and $8\frac{1}{2}$% respectively. The total annual interest from these three accounts is Rs.550. Equal amounts have been deposited in the 5% and 8% savings accounts. Find the amount deposited in each of the three accounts, with the help of matrices.

$Ans.\, Rs1125, Rs1125\ and\ Rs4750$

101. Using matrices, solve the following system of equations

$$x-y+2z=7$$
$$3x+4y-5z=-5$$
$$2x-y+3z=12$$

$Ans.\, x=2, y=1\ and\ z=3$

102. Using matrices, solve the following system of linear equations

$$x+y-z=3$$
$$2x+3y+z=10$$
$$3x-y-7z=1$$

$Ans.\, x=3, y=1, z=1$

103. Using matrices, solve the following system of linear equations

$$3x+4y+7z=4$$
$$2x-y+3z=-3$$
$$x+2y-3z=8$$

$Ans.\, x=1, y=2, z=-1$

104. Using matrices, solve the following system of linear equations

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

$Ans.\, x=1, y=2, z=-1$

105. If $A=\begin{bmatrix}1 & 2 & 1\\ -1 & 1 & 1\\ 1 & -3 & 1\end{bmatrix}$, then find A^{-1} and hence solve the system of equations

$$x+2y+z=4$$
$$-x+y+z=0$$
$$x-3y+z=4$$

$Ans.\, x=2, y=0, z=2$

106. Determine the product of $\begin{bmatrix} -4 & 4 & 4 \\ -7 & 1 & 3 \\ 5 & -3 & -1 \end{bmatrix}\begin{bmatrix} 1 & -1 & 1 \\ 1 & -2 & -2 \\ 2 & 1 & 3 \end{bmatrix}$ and then use to solve the system of equations $\begin{matrix} x - y + z = 4 \\ x - 2y - 2z = 9 \\ 2x + y + 3z = 1 \end{matrix}$ $\quad Ans. x = 3, y = -2, z = -1$

107. Find $A^{-1}, where\ A = \begin{bmatrix} 1 & 2 & -3 \\ 2 & 3 & 2 \\ 3 & -3 & -4 \end{bmatrix}$. Hence, solve the system of equations,

$$\begin{matrix} x + 2y - 3z = -4 \\ 2x + 3y + 2z = 2 \\ 3x - 3y - 4z = 11 \end{matrix}$$

$Ans. x = 3, y = -2, z = -1$

108. Using matrix method, solve the following system of equations

$$\begin{matrix} \frac{2}{x} + \frac{3}{y} + \frac{10}{z} = 4 \\ \frac{4}{x} - \frac{6}{y} + \frac{5}{z} = 1 \\ \frac{6}{x} + \frac{9}{y} - \frac{20}{z} = 2, x, y, z \neq 0 \end{matrix}$$

$Ans. x = 2, y = 3\ z = 5$

109. Using matrices, solve the following system of linear equations

$$\begin{matrix} 4x + 3y + 2z = 60 \\ x + 2y + 3z = 45 \\ 6x + 2y + 3z = 70 \end{matrix}$$

$Ans. x = 5, y = 8, z = 8$

110. Using matrices, solve the following system of linear equations

$$\begin{matrix} x + 2y + z = 7 \\ x + 3z = 11 \\ 2x - 3y = 1 \end{matrix}$$

$Ans. x = 2, y = 1, z = 3$

111. Using matrices, solve the following system of linear equations

$$\begin{matrix} x + 2y - 3z = -4 \\ 2x + 3y + 2z = 2 \\ 3x - 3y - 4z = 11 \end{matrix}$$

$Ans. x = 3, y = -2, z = 1$

112. If $A = \begin{bmatrix} 2 & -1 & 1 \\ 3 & 0 & -1 \\ 2 & 6 & -1 \end{bmatrix}$, then find A^{-1}. Using A^{-1}, solve the following system of equations

$$\begin{matrix} 2x - y + z = -3 \\ 3x - z = 0 \\ 2x + 6y - z = 2 \end{matrix}$$

$Ans. x = -\frac{1}{2}, y = \frac{1}{2}, z = \frac{-3}{2}$

113. If $A = \begin{bmatrix} 1 & -2 & 1 \\ 0 & -1 & 1 \\ 2 & 0 & -3 \end{bmatrix}$, then find A^{-1}. Using A^{-1}, solve the following system of equations

$$\begin{matrix} x - 2y + z = 0 \\ -y + z = -2 \\ 2x - 3z = 10 \end{matrix}$$

$Ans. x = 2, y = 0, z = -2$

114. If $A = \begin{bmatrix} 1 & -2 & 0 \\ 2 & 1 & 3 \\ 0 & -2 & 1 \end{bmatrix}\ and\ B = \begin{bmatrix} 7 & 2 & -6 \\ -2 & 1 & -3 \\ -4 & 2 & 5 \end{bmatrix}$ then find AB and hence solve system of equations $\begin{matrix} x - 2y = 10 \\ 2x + y + 3z = 8 \\ -2y + z = 7 \end{matrix}$ $\quad Ans. AB = 11I, x = 4, y = -3, z = 1$

115. If $A = \begin{bmatrix} 3 & -4 & 2 \\ 2 & 3 & 5 \\ 1 & 0 & 1 \end{bmatrix}$, then find A^{-1}. Using A^{-1}, solve the following system of equations

$$\begin{matrix} 3x - 4y + 2z = -1 \\ 2x + 3y + 5z = 7 \\ x + z = 2 \end{matrix}$$

$Ans. x = 3, y = 2, z = -1$

116. If $A = \begin{bmatrix} 8 & -4 & 1 \\ 10 & 0 & 6 \\ 8 & 1 & 6 \end{bmatrix}$, then find A^{-1}. Using A^{-1}, solve the following system of equations

$$8x - 4y + z = 5$$
$$10x + 6z = 4$$
$$8x + y + 6z = \frac{5}{2}$$

$Ans. x = 1, y = \frac{1}{2}, z = -1$

117. If $A = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 2 & -4 \\ -4 & 2 & -4 \\ 2 & -1 & 5 \end{bmatrix}$ then find AB and hence solve system of equations

$$x - y = 3$$
$$2x + 3y + 4z = 17$$
$$y + 2z = 7$$

$Ans. AB = 6I, x = 2, y = -1, z = 4$

118. If $A = \begin{bmatrix} 3 & 2 & 1 \\ 4 & -1 & 2 \\ 7 & 3 & -3 \end{bmatrix}$, then find A^{-1}. Using A^{-1}, solve the following system of equations

$$3x + 2y + z = 6$$
$$4x - y + 2z = 5$$
$$7x + 3y - 3z = 7$$

$Ans. x = 1, y = 1, z = 1$

119. Using matrices, solve the following system of linear equations

$$2x - 3y + 5z = 11$$
$$3x + 2y - 4z = -5$$
$$x + y - 2z = -3$$

$Ans. x = 1, y = 2, z = 3$

120. Using matrices, solve the following system of linear equations

$$x + y + z = 6$$
$$x + 2z = 7$$
$$3x + y + z = 12$$

$Ans. x = 3, y = 1, z = 2$

121. Using matrices, solve the following system of linear equations

$$3x - 2y + 3z = 8$$
$$2x + y - z = 1$$
$$4x - 3y + 2z = 4$$

$Ans. x = 1, y = 2, z = 3$

122. Using matrices, solve the following system of linear equations

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

$Ans. x = \frac{1}{2}, y = 0, z = \frac{1}{2}$

123. Using matrices, solve the following system of linear equations

$$8x + 4y + 3z = 18$$
$$2x + y + z = 5$$
$$x + 2y + z = 5$$

$Ans. x = 1, y = 1, z = 2$

124. Using matrices, solve the following system of linear equations

$$x + y - z = 3$$
$$2x + 3y + z = 10$$
$$3x - y - 7z = 1$$

$Ans. x = 3, y = 1, z = 1$

125. Using matrices, solve the following system of linear equations

$$2x + 8y + 5z = 5$$
$$x + y + z = -2$$
$$x + 2y - z = 2$$

$Ans. x = -3, y = 2, z = -1$

ASSIGNMENT PROBLEM – D

4 MARK QUESTION

VALUE BASED QUESTIONS

126. A typist charges Rs.145 for typing 10 English and 3 Hindi pages, while charges for typing 3 English and 10 Hindi pages are Rs.180. Using matrices, find the charges of typing 1 English and 1 Hindi page separately. However, typist charged only Rs.2 per page for a poor student Shyam for 5 Hindi pages. How much less was charged from this poor boy? Which values are reflected in this problem?
$Ans. English = Rs. 10\ and\ Hindi = Rs. 15$

127. The monthly incomes of Aryan and Babban are in the ratio 3:4 and their monthly expenditure are in the ratio 5:7. If each saves Rs. 15000 per month, find their monthly incomes using matrix method. This problem reflects which value? $Ans. Rs. 90{,}0000\ and\ Rs. 1{,}20{,}000$

128. A trust invested some money in two type of bonds. The first bond pays 10% interest and second bond pays 12% interest. The trust received Rs.2800 as interest. However, if trust interchanged money in bonds they would have got Rs.100 less as interest. Using matrix method, find the amount invested by the trust. Interest received on this amount will be given to Helpage India as donation. Which value is reflected in this question? $Ans. Rs. 25{,}000$

129. A coaching institute of English (subject) conducts classes in two batches I and II and fees for rich and poor children are different. In batch I, it has 20 poor and 5 rich children and total monthly collection is Rs.9000, whereas in batch II, it has 5 poor and 25 rich children and total monthly collection is Rs. 26000. Using matrix method, find monthly fees paid by each child of two types. What values the coaching institute is inculcating in the society? $Ans. Rs. 200, Rs. 1000$

130. Two schools P and Q want to award their selected student on the values of discipline, politeness and punctuality. The school P wants to award Rs.x each, Rs.y each and Rs.z each for the three respective values to 3, 2 and 1 students respectively with a total award money of Rs.1000. School Q wants to spend Rs.1500 to award its 4, 1 and 3 students on the respective values (by giving the same award money to the three values as before). If the total amount of award for 1 prize on each value is Rs.600, using matrices, find the award money for each value. Apart from the above three vales suggest one more value for awards. $Ans. 100, 200, 300$

131. Two schools P and Q want to award their selected student on the values of tolerance, kindness and leadership. The school P wants to award Rs.x each, Rs.y each and Rs.z each for the three respective values to 3, 2 and 1 students respectively with a total award money of Rs.2200. School Q wants to spend Rs.3100 to award its 4, 1 and 3 students on the respective values (by giving the same award money to the three values as P). If the total amount of award for 1 prize on each value is Rs.1200, using matrices, find the award money for each value. Apart from the above three values, suggest one more value which should be considered for award. $Ans. 300, 400, 600$

132. Two institutions decided to award to their employees for the three values of resourcefulness, competence and determination in the form of prizes at the rate of Rs.x, Rs.y and Rs.z, respectively per person. The institution decided to award respectively 4, 3 and 2 employees with total prize money of Rs.37,000 and the second institution decided to award respectively 5, 3 and 4 employees with a total prize money of Rs.47,000. If all the three prizes per person together amount to Rs.12000, then using matrix method, find the values of x, y and z. what values are described in this question?
$Ans. x = Rs. 4000, y = Rs. 5000\ and\ z = Rs. 3000$

133. A school wants to award its students for the values of honesty, regularity and hard-work with a total cash award of Rs.6000. Three times the award money for hard work added to that given for honesty, amounts to Rs.11000. The award money given for honesty and hard work together is double the one given for regularity. Represent the above situation algebraically and find the award money for each

values, namely, honesty, regularity and hard work, suggest one more value which the school must include for award. $Ans. 500, 2000, 3500$