Test / Exam Name: Matrices Pyq | Standard: 12th Science | Subject: Mathematics

Instructions

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Q1. Given a skew-symmetric matrix $A = \begin{bmatrix} 0 & a & 1 \\ -1 & b & 1 \\ -1 & c & 0 \end{bmatrix}$ the value of $(a + b + c)^2$ is _____. **1 Mark**

Q2. If $\begin{bmatrix} x+y & 7 \\ 9 & x-y \end{bmatrix} = \begin{bmatrix} 2 & 7 \\ 9 & 4 \end{bmatrix}$, then x.y = _____.

Q3. Find adj A, if $A = \begin{bmatrix} 2 & -1 \\ 4 & 3 \end{bmatrix}$

Q4. If A is a square matrix of order 3 and |A| = 5, then the value of |2A'| is:

A -10 **B** 10 **C** -40 **D** 40

Q5. If the matrix $A = \begin{bmatrix} 0 & a & -3 \\ 2 & 0 & -1 \\ b & 1 & 0 \end{bmatrix}$ is skew symmetric, find the values of 'a' and 'b'.

Q6. Write the number of all possible matrices of order 2×2 with each entry 1, 2 or 3.

Q7. Write the element a_{23} of a 3×3 matrix $A = (a_{ij})$ whose elements a_{ij} are given by $a_{ij} = \frac{|i - j|}{2}$.

Q8. Let A be a 3 × 3 matrix such that |adj A| = 64. Then |A] is equal to:

A 8 only **B** - 8 only **C** 64 **D** 8 or -8

Q9. If a matrix has 36 elements, the number of possible orders it can have, is:

A 13 **B** 3 **C** 5 **D** 9

Q10. If $x \in N$ and $\begin{bmatrix} x+3 & -2 \\ -3x & 2x \end{bmatrix} = 8$, then find the value of x. **1 Mark**

Q11. Find the value of x + y from the following equation: **1 Mark**

$$2\begin{bmatrix} x & 5 \\ 7 & y-3 \end{bmatrix} + \begin{bmatrix} 3 & -4 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 7 & 6 \\ 15 & 14 \end{bmatrix}.$$

Q12. For what value of x, the matrix $\begin{bmatrix} 5-x & x+1 \\ 2 & 4 \end{bmatrix}$ is singular? **1 Mark**

Q13. For $A = \begin{bmatrix} 3 & -4 \\ 1 & -1 \end{bmatrix}$ write A^{-1}. **1 Mark**

Q14. If $\begin{bmatrix} x-y & z \\ 2x-y & w \end{bmatrix} = \begin{bmatrix} -1 & 4 \\ 0 & 5 \end{bmatrix}$, find the value of x + y. **1 Mark**

Q15. If $A = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$. find α satisfying $0 < \alpha < \frac{\pi}{2}$ when $A + A^T = \sqrt{2}\, I_2$: where A^T is transpose of A **1 Mark**

Q16. If $A = \begin{pmatrix} 3 & 5 \\ 7 & 9 \end{pmatrix}$ is written as A = P + Q, where P is a symmetric matrix and Q is skew symmetric matrix, then write the matrix P. **1 Mark**

Q17. If A is a square matrix such that $A^2 = A$, then $(I - A)^3 + A$ is equal to: **1 Mark**

A I **B** 0 **C** I - A **D** I + A

Q18. If $\begin{pmatrix} 2 & 3 \\ 5 & 7 \end{pmatrix} \begin{pmatrix} 1 & -3 \\ -2 & 4 \end{pmatrix} = \begin{pmatrix} -4 & 6 \\ -9 & x \end{pmatrix}$ write the value of x.

Q19. Solve the following matrix equation for x; $[x\ 1] \begin{bmatrix} 1 & 0 \\ -2 & 0 \end{bmatrix} = O$.

Q20. Matrix $A = \begin{bmatrix} 0 & 2b & -2 \\ 3 & 1 & 3 \\ 3a & 3 & -1 \end{bmatrix}$ is given to be symmetric, find values of a and b.

Q21. Construct a 2 × 2 matrix $A = [a_{ij}]$ whose elements are given by $a_{ij} = |(i)^2 - j|$.

Q22. If A and B are square matrices of the same order 3, such that |A| = 2 and AB = 21, write the value of |B|.

Q23. For what value of x, is the following matrix singular?
$\begin{vmatrix} 3-2x & x+1 \\ 2 & 4 \end{vmatrix}$.

Q24. Find the cofactors of all the elements of $\begin{bmatrix} 1 & -2 \\ 4 & 3 \end{bmatrix}$.

Q25. Find the value of x - y, if $2\begin{bmatrix} 1 & 3 \\ 0 & x \end{bmatrix} + \begin{bmatrix} y & 0 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 5 & 6 \\ 1 & 8 \end{bmatrix}$. **1 Mark**

Q26. Find the value of a if $\begin{bmatrix} a-b & 2a+c \\ 2a-b & 3c+d \end{bmatrix} = \begin{bmatrix} -1 & 5 \\ 0 & 13 \end{bmatrix}$ **1 Mark**

Q27. If a matrix has 5 elements, write all possible orders it can have. **1 Mark**

Q28. $\begin{bmatrix} x+1 & x-1 \\ x^2+x+1 & x^2-x+1 \end{bmatrix}$ is equal to: **1 Mark**

A $2x^3$ **B** 2 **C** 0 **D** $2x^3 - 2$

Q29. If $\begin{bmatrix} 3x & 7 \\ -2 & 4 \end{bmatrix} = \begin{bmatrix} 8 & 7 \\ 6 & 4 \end{bmatrix}$, find the value of x. **1 Mark**

Q30. For what value of x, is the matrix A = $\begin{bmatrix} 0 & 1 & -2 \\ -1 & 0 & 3 \\ x & -3 & 0 \end{bmatrix}$ a skew-symmetric matrix? **1 Mark**

Q31. For what value of k, the system of linear equations **1 Mark**
$x + y + z = 2$
$2x + y - z = 3$
$3x + 2y + kz = 4$
has a unique solution?

Q32. If $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}\begin{pmatrix} 3 & 1 \\ 2 & 5 \end{pmatrix} = \begin{pmatrix} 7 & 11 \\ k & 23 \end{pmatrix}$,then write the value of k. **1 Mark**

Q33. If $A = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$ nd (31 + 4A) (3I + 4A) = x^2I, then the value(s) x is/ are: **1 Mark**

A $\pm\sqrt{7}$ **B** 0 **C** ± 5 **D** 25

Q34. Simplify: $\cos\theta \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix} + \sin\theta \begin{bmatrix} \sin\theta & -\cos\theta \\ \cos\theta & \sin\theta \end{bmatrix}$.

Q35. If $3A - B = \begin{bmatrix} 5 & 0 \\ 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 3 \\ 2 & 5 \end{bmatrix}$, then find the matrix A.

Q36. If $\begin{bmatrix} 9 & -1 & 4 \\ -2 & 1 & 3 \end{bmatrix} = A + \begin{bmatrix} 1 & 2 & -1 \\ 0 & 4 & 9 \end{bmatrix}$,then find the matrix A.

Q37. If $A = \begin{bmatrix} 2 & 0 & 0 \\ -1 & 2 & 3 \\ 3 & 3 & 5 \end{bmatrix}$, then find A (adj A).

Q38. Write the adjoint of the following matrix:
$\begin{pmatrix} 2 & -1 \\ 4 & 3 \end{pmatrix}$

Q39. If $(2 \;\; 1 \;\; 3)\begin{pmatrix} -1 & 0 & -1 \\ -1 & 1 & 0 \\ 0 & 1 & 1 \end{pmatrix}\begin{pmatrix} 1 \\ 0 \\ -1 \end{pmatrix} = A$, then write the order of matrix A.

Q40. If $|A| = 3$ and $A^{-1} = \begin{bmatrix} 3 & -1 \\ -\frac{5}{3} & \frac{2}{3} \end{bmatrix}$, then write the adj A. **1 Mark**

Q41. If $\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$ nd (31 + 4A) (3I + 4A) = x^2I, then the value(s) x is/ are: **1 Mark**

A $\pm\sqrt{7}$ **B** 0 **C** ± 5 **D** 25

Q42. If $\begin{bmatrix} 2x & -9 \\ -2 & x \end{bmatrix} = \begin{bmatrix} -4 & 8 \\ 1 & -2 \end{bmatrix}$, the value of x is _____. **1 Mark**

Q43. If $A = (1 \quad 2\,3 \quad -1)$ and $B = (1 \quad -4\,3 \quad -2)$, find$|AB|$. **1 Mark**

Q44. If $\begin{bmatrix} 2x & 5 \\ 8 & x \end{bmatrix} = \begin{bmatrix} 6 & -2 \\ 7 & 3 \end{bmatrix}$, , Write the value of x. **1 Mark**

Q45. Find |AB|, if $A = \begin{bmatrix} 0 & -1 \\ 0 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 5 \\ 0 & 0 \end{bmatrix}$. **1 Mark**

Q46. Use elementary column operation $C_2 \to C_2 + 2C_1$ in the following matrix equation: **1 Mark**

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

Q47. If A is a square matrix such that $A^2 = A$, then write the value of $7A - (I + A)^3$, where I is an identity matrix. **1 Mark**

Q48. If $A^T = \begin{bmatrix} 3 & 4 \\ -1 & 2 \\ 0 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 2 & 1 \\ 1 & 2 & 3 \end{bmatrix}$, then find $A^T - B^T$. **1 Mark**

Q49. If $A + B = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$ and $A - 2B = \begin{bmatrix} -1 & 1 \\ 0 & -1 \end{bmatrix}$, then A = _____.

Q50. Write A^{-1} for $A = \begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$.

Q51. If A is a square matrix satisfying A'A = I, write the value of |A|.

Q52. If A is a square matrix such that $A^2 = I$,then find the simplified value of $(A - I)^3 + (A + I)^3 - 7A$.

Q53. If matrix $A = \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$ and $A^2 = kA$, then write the value of k.

Q54. If $A = \begin{pmatrix} 1 & -2 & 3 \\ -4 & 2 & 5 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & 3 \\ 4 & 5 \\ 2 & 1 \end{pmatrix}$ and $BA = (b_{ij})$, find $b_{21} + b_{32}$.

Q55. If for any 2×2 square matrix A, A(adj A) $= \begin{bmatrix} 8 & 0 \\ 0 & 8 \end{bmatrix}$, then write the value of |A|.

Q56. If $A = \begin{bmatrix} 3 & 4 \\ 5 & 2 \end{bmatrix}$ and 2A + B is a null matrix, then B is equal to: **1 Mark**

A $\begin{bmatrix} 6 & 8 \\ 10 & 4 \end{bmatrix}$ **B** $\begin{bmatrix} -6 & -8 \\ -10 & -4 \end{bmatrix}$

C $\begin{bmatrix} 5 & 8 \\ 10 & 3 \end{bmatrix}$ **D** $\begin{bmatrix} -5 & -8 \\ -10 & -3 \end{bmatrix}$

Q57. Write the number of all possible matrices of order 2×3 with each entry 1 or 2. **1 Mark**

Q58. **1 Mark**

Find the maximum value of $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1+\sin\theta & 1 \\ 1 & 1 & 1+\cos\theta \end{bmatrix}$

Q59. If $A = \begin{pmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{pmatrix}$, then for what value α of is A an identity matrix? **1 Mark**

Q60. If $A = \begin{pmatrix} 0 & 3 & 2 & -5 \end{pmatrix}$ and $KA = \begin{pmatrix} 0 & 4a & -8 & 5b \end{pmatrix}$ find the value of k and a. **1 Mark**

Q61. If $\begin{bmatrix} 3 & -2 & 0 \end{bmatrix} \begin{bmatrix} 2 \\ k \\ -5 \end{bmatrix} = 0$ where O is the null matrix, then the value of k is _____. **1 Mark**

Q62. If A is a skew symmetric matrix of order 3, then the value of |A| is: **1 Mark**

A 3 **B** 0 **C** 9 **D** 27

Q63. If $\begin{bmatrix} x & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 \\ -2 & 0 \end{bmatrix} = 0$, then x equals:

A 0 **B** -2 **C** -1 **D** 2

Q64. For a 2 × 2 matrix, A = $[a_{ij}]$, whose elements are given by $a_{ij} = \frac{i}{j}$, write the value of a_{12}.

Q65. If $2\begin{bmatrix} 3 & 4 \\ 5 & x \end{bmatrix} + \begin{bmatrix} 1 & y \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 7 & 0 \\ 10 & 5 \end{bmatrix}$ find $(x - y)$.

Q66. If $\begin{bmatrix} x+1 & x-1 \\ x-3 & x+2 \end{bmatrix} = \begin{bmatrix} 4 & -1 \\ 1 & 3 \end{bmatrix}$, then write the value of x.

Q67. If matrix A = (1, 2, 3), write AA' , where A' is the transpose of matrix A.

Q68. Find the value of x and y if: $2\begin{bmatrix} 1 & 3 \\ 0 & X \end{bmatrix} + \begin{bmatrix} y & 0 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 5 & 6 \\ 1 & 8 \end{bmatrix}$

Q69. If $A = \begin{bmatrix} -2 & 0 & 0 \\ 0 & -2 & 0 \\ 0 & 0 & -2 \end{bmatrix}$, then the value of |adj A| is

A 64 **B** 16 **C** 0 **D** -8

Q70. If $\begin{bmatrix} x & 2 \\ 3 & x-1 \end{bmatrix}$ is a singular matrix, then the product of all possible values of x is: **1 Mark**

A 6 **B** -6 **C** 0 **D** -7

Q71. The matrix $\begin{bmatrix} 2 & -1 & 3 \\ \lambda & 0 & 7 \\ -1 & 1 & 4 \end{bmatrix}$ is not invertible for: **1 Mark**

A $\lambda = -1$ **B** $\lambda = 0$
C $\lambda = 1$ **D** $\lambda \in R - (1)$

Q72. Find the value of x, if **1 Mark**

$$\begin{pmatrix} 3x + y & -y \\ 2y - x & 3 \end{pmatrix} = \begin{pmatrix} 1 & 2 \\ -5 & 3 \end{pmatrix}.$$

Q73. Let $A = \begin{bmatrix} 200 & 50 \\ 10 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 50 & 40 \\ 2 & 3 \end{bmatrix}$, then $|AB|$ is equal to **1 Mark**

A 460 **B** 2000 **C** 3000 **D** -7000

Q74. If $\begin{bmatrix} 3 & 4 \\ 5 & 2 \end{bmatrix}$ and 2A + B is a null matrix, then B is equal to: **1 Mark**

A $\begin{bmatrix} 6 & 8 \\ 10 & 4 \end{bmatrix}$ **B** $\begin{bmatrix} -6 & -8 \\ -10 & -4 \end{bmatrix}$

C $\begin{bmatrix} 5 & 8 \\ 10 & 3 \end{bmatrix}$ **D** $\begin{bmatrix} -5 & -8 \\ -10 & -3 \end{bmatrix}$

Q75. matrix 3×3 If A is a and $|3A| = K|A|$, then write the value of k.

Q76. If A is a matrix of order 3 × 2, then the order of the matrix A' is _____.

Q77. A square matrix A is said to be skew-symmetric, if _____.

Q78. If the matrix A is both symmetric and skew symmetric, then A is a _____.

Q79. On applying elementary column operation $C_2 \rightarrow C_2 - 3C_1$ in the matrix equation $\begin{bmatrix} 4 & -2 \\ 5 & 3 \end{bmatrix} = \begin{bmatrix} 2 & 1 \\ -3 & 4 \end{bmatrix} \begin{bmatrix} 1 & -1 \\ 2 & 0 \end{bmatrix}$, the RHS (Right Hand Side) of the equation becomes _____.

Q80. If $A = \begin{bmatrix} -3 & 2 \\ 1 & -1 \end{bmatrix}$ and $I = \begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix}$, Find scalar k so that $A^2 + I = kA$.

Q81. If $A = \begin{bmatrix} -3 & 6 \\ -2 & 4 \end{bmatrix}$ then show that $A^3 = A$.

Q82. Show that all the diagonal elements of a skew symmetric matrix are zero.

Q83. Find the matrix A such that $A \begin{bmatrix} 1 & 2 \\ -1 & 0 \end{bmatrix} = \begin{bmatrix} 3 & 4 \\ -1 & 6 \end{bmatrix}$.

Q84. If A and B are symmetric matrices, such that AB and BA are both defined, then prove that AB - BA is a skew symmetric matrix **2 Mark**

Q85. Find the value of (x - y) from the matrix equation **2 Mark**

$$2\begin{bmatrix} x & 5 \\ 7 & y-3 \end{bmatrix} + \begin{bmatrix} -3 & -4 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 7 & 6 \\ 15 & 14 \end{bmatrix}.$$

Q86. Find $(AB)^{-1}$ if $A = \begin{bmatrix} 1 & 0 \\ -4 & 2 \end{bmatrix}$ and $B^{-1} = \begin{bmatrix} 3 & 1 \\ 5 & 2 \end{bmatrix}$. **2 Mark**

Q87. If $A = \begin{bmatrix} 3 & 9 & 0 \\ 1 & 8 & -2 \\ 7 & 5 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 0 & 2 \\ 7 & 1 & 4 \\ 2 & 2 & 6 \end{bmatrix}$, then find the matrix B'A'. **2 Mark**

Q88. Given $A = \begin{bmatrix} 2 & -3 \\ -4 & 7 \end{bmatrix}$, compute A^{-1} and show that $2A^{-1} = 9I - A$. **2 Marks**

Q89. Express $A = \begin{bmatrix} 4 & -3 \\ 2 & -1 \end{bmatrix}$ as a sum of a symmetric and a skew symmetric matrix. **2 Marks**

Q90. Find a matrix A such that 2A - 3B + 5C = O, where $B = \begin{bmatrix} -2 & 2 & 0 \\ 3 & 1 & 4 \end{bmatrix}$ and $C = \begin{bmatrix} 2 & 0 & -2 \\ 7 & 1 & 6 \end{bmatrix}$. **2 Marks**

Q91. If $A = \begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}$, then find $(A^2 - 5A)$. **2 Marks**

Q92. If A and B are square matrices of order 3 such that |A| = – 1, |B| = 3, then find the value of |2AB|.

Q93. If $A = \begin{bmatrix} p & 2 \\ 2 & p \end{bmatrix}$ and $|A^3| = 125$, then find the values of p.

Q94. If $A = \begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$, show that (A - 2I) (A - 3I) = 0.

Q95. If $A = \begin{bmatrix} 0 & 2 \\ 3 & -4 \end{bmatrix}$ and $kA = \begin{bmatrix} 0 & 3a \\ 2b & 24 \end{bmatrix}$, then find the values of k, a and b.

Q96. For the matrix $A = \begin{bmatrix} 2 & 3 \\ 5 & 7 \end{bmatrix}$, find (A + A') and verify that it is a symmetric matrix.

Q97. Find a matrix A such that $2A - 3B + 5c = 0$, where $B = \begin{bmatrix} -2 & 2 & 0 \\ 3 & 1 & 4 \end{bmatrix}$ and $C = \begin{bmatrix} 2 & 0 & -2 \\ 7 & 1 & 6 \end{bmatrix}$.

Q98. Express the matrix $\begin{bmatrix} 0 & \frac{9}{2} & \frac{9}{2} \\ -\frac{9}{2} & 0 & -\frac{3}{2} \\ -\frac{9}{2} & \frac{3}{2} & 0 \end{bmatrix}$ as the sum of a symmetric and skew symmetric matrix. **3 Marks**

Q99. Express the following matrix as the sum of a symmetric and a skew symmetric matrix: **3 Marks**

$$\begin{bmatrix} 1 & 3 & 5 \\ -6 & 8 & 3 \\ -4 & 6 & 5 \end{bmatrix}$$

Q100. 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 ₹ 9,000, whereas in batch II, it has 5 poor and 25 rich children and total monthly collection is ₹ 26,000. Using matrix method, find monthly fees paid by each child of two types. What values the coaching institute is inculcating in the society? **4 Marks**

Q101. On her birthday Seema decided to donate some money to children of an orphanage home. If there were 8 children less, everyone would have got? 10 more. However, if there were 16 children more, everyone would have got? 10 less. Using matrix method, find the number of children and the amount distributed by Seema. What values are reflected by Seema's decision? **4 Marks**

Q102. The monthly incomes of Aryan and Babban are in the ratio 3 : 4 and their monthly expenditures are in the ratio 5 : 7. If each saves 15,000 per month, find their monthly incomes using matrix method. This problem reflects which value? **4 Marks**

Q103. A typist charges ₹ 145 for typing 10 English and 3 Hindi pages, while charges for typing 3 English and 10 Hindi pages are ₹ 180. Using matrices, find the charges of typing one English and one Hindi page separately. However typist charged only ₹ 2 per page from a poor student Shyam for 5 Hindi pages. How much less was charged from this poor boy? Which values are reflected in this problem? **4 Marks**

Q104. Using elementary row operations, find the inverse of the following matrix:
$\begin{pmatrix} 2 & 5 \\ 1 & 3 \end{pmatrix}$.

Q105. Ishan wants to donate a rectangular plot of land for a school in his village. When he was asked to give dimensions of the plot, he told that if its length is decreased by 50 m and breadth is increased by 50 m, then its area will remain same, but if length is decreased by 10 m and breadth is decreased by 20 m, then its area will decrease by $5300\ \mathrm{m}^2$. Using matrices, find the dimensions of the plot. Also give reason why he wants to donate the plot for a school.

Q106. A trust invested some money in two type of bonds. The first bond pays 10% interest and bond pays 12% interest. The trust received 2,800 as interest. However, if trust had interchanged money in bonds, they would have got 100 less as interest. Using matrix method, find the amount invested by the trust. Which value is reflected in this question?

Q107. Express the following matrix as the sum of a symmetric and a skew symmetric matrix, and verify your result:
$\begin{pmatrix} 3 & -2 & -4 \\ 3 & -2 & -5 \\ -1 & 1 & 2 \end{pmatrix}$

Q108. $\mathrm{Let\ A} = \begin{bmatrix} 3 & 2 & 5 \\ 4 & 1 & 3 \\ 0 & 6 & 7 \end{bmatrix}$. Express A as sum of two matrices such that one is symmetric and the other is skew symmetric.

Q109. $\mathrm{If\ A} = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$, verify that $\mathrm{A}^2 - 4\mathrm{A} - 5\mathrm{I} = 0$ **4 Marks**

Q110. $\mathrm{If\ A} = \begin{bmatrix} 1 & -2 & 3 \\ 0 & -1 & 4 \\ -2 & 2 & 1 \end{bmatrix}$, $\mathrm{find}\ (\mathrm{A'})^{-1}$. **4 Marks**

Q111. **4 Marks**

If $A = \begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}$ find $A^2 - 5A + 4I$ and hence find a matrix X such that $A^2 - 5A + 4I + X = 0$

Q112. Find matrix A such that **4 Marks**

$$\begin{bmatrix} 2 & -1 \\ 1 & 0 \\ -3 & 4 \end{bmatrix} A = \begin{bmatrix} -1 & -8 \\ 1 & -2 \\ 9 & 22 \end{bmatrix}$$

Q113. Let $A = \begin{pmatrix} 2 & -1 \\ 3 & 4 \end{pmatrix}, = B = \begin{pmatrix} 5 & 2 \\ 7 & 4 \end{pmatrix}, C = \begin{pmatrix} 2 & 5 \\ 3 & 8 \end{pmatrix}$,find a matrix D such that CD – AB = O. **4 Marks**

Q114. Find matrix X so that $X \begin{pmatrix} 1 & 2 & 3 \\ & & \\ 4 & 5 & 6 \end{pmatrix} = \begin{pmatrix} -7 & -8 & -9 \\ & & \\ 4 & 5 & 6 \end{pmatrix}$.

Q115. Find matrix A such that

$$\begin{pmatrix} 2 & -1 \\ 1 & 0 \\ -3 & 4 \end{pmatrix} A = \begin{pmatrix} -1 & -8 \\ 1 & -2 \\ 9 & 22 \end{pmatrix}$$

Q116. Solve the following system of equations by matrix method:
x + 2y + 3z = 6
2x - y + z = 2
3x + 2y - 2z = 3

Q117. If $A = \begin{bmatrix} 1 & -2 & 0 \\ 2 & -1 & -1 \\ 0 & -2 & 1 \end{bmatrix}$ find A^{-1} and use it to solve the following system of equations:
x - 2y = 10, 2x - y – z = 8, - 2y + z = 7

Q118. If $A = \begin{bmatrix} -1 & a & 0 \\ 1 & 2 & x \\ 3 & 1 & 1 \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} 1 & -1 & 1 \\ -8 & 7 & -5 \\ b & y & 3 \end{bmatrix}$,find the value of (a + x) – (b + y).

Q119. If $A = \begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$ and $B^{-1} = \begin{bmatrix} 3 & -1 & 1 \\ -15 & 6 & -5 \\ 5 & -2 & 2 \end{bmatrix}$, find $(AB)^{-1}$. **5 Marks**

Q120. If $A = \begin{bmatrix} 2 & 3 & 1 \\ 1 & 2 & 2 \\ -3 & 1 & -1 \end{bmatrix}$, find A–1 and hence solve the system of equations 2x + y – 3z = 13, 3x + 2y + z = 4, x + 2y – z = 8. **6 Marks**

Q121. Two schools A and B want to award their selected students on the values of sincerity, truthfulness and helpfulness. The school A wants to award ₹ x each, ₹ y each and ₹ z each for the three respective values to 3, 2 and 1 students respectively with a total award money of ₹ 1,600. School B wants to spend ₹ 2,300 to award its 4, 1 and 3 students on the respective **6 Marks**

values (by giving the same award money to the three values as before). If the total amount of award for one prize on each value is ₹ 900, using matrices, find the award money for each value. Apart from these three values, suggest one more value which should be considered for award.

Q122. A school wants to award its students for the values of Honesty, Regularity and Hard work with a total cash award of ₹ 6,000. Three times the award money for Hard work added to that given for honesty amounts to ₹11,000. The award money given for Honesty and Hardwork together is double the one given for Regularity. Represent the above situation algebraically and find the award money for each value, using matrix method. Apart from these values, namely, Honesty, Regularity and Hard work, suggest one more value which the school must include for awards. **6 Marks**

Q123. Using matrices, solve the following system of equations: **6 Marks**
x + 2y + z = 7.
x + 3z = 11.
3x - 3y = 1.

Q124. If $A = \begin{bmatrix} 2 & -3 & 5 \\ 3 & 2 & -4 \\ 1 & 1 & -2 \end{bmatrix}$, then find A^{-1} and hence solve the system of linear equations 2x – 3y + 5z = 11, 3x + 2y – 4z = – 5 and x + y – 2z = – 3.

Q125. Using matrices, solve the following system of equations:
$x + 2y - 3z = 6$
$3x + 2y - 2z = 3$
$2x - y + z = 2$

Q126. If $A = \begin{bmatrix} 1 & 2 & 5 \\ 1 & -1 & -1 \\ 2 & 3 & -1 \end{bmatrix}$ find A^{-1} and hence solve the system of equations x + 2y + 5z = 10, x – y – z = – 2 and 2x + 3y – z = – 11.

Q127. Using matrices, solve the following system of equations:
2x + 3y + 3z = 5, x – 2y + z = – 4, 3x – y – 2z = 3.

Q128. If $A = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}$ and $B = A = \begin{bmatrix} 2 & 2 & -4 \\ -4 & 2 & -4 \\ 2 & -1 & 5 \end{bmatrix}$ are two square matrices, find AB and hence solve the system of linear equations x – y = 3, 2x + 3y + 4z = 17 and y + 2z = 7.

Q129. If $A = \begin{bmatrix} 1 & -2 & 0 \\ 2 & 1 & 3 \\ 0 & -2 & 1 \end{bmatrix}$ If A =, find A^{-1} and hence solve the system of equations x – 2y = 10, 2x + y + 3z = 8 and – 2y + z = 7. **6 Marks**

Q130. Using matrices, solve the following system of equations: **6 Marks**
$2x - 3y + 5z = 11$
$3x + 2y - 4z = -5$
$x + y - 2z = -3$

Q131. **6 Marks**

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 + 3z = 9, – x + 2y – 2z = 4, 2x – 3y + 4z = –3.

Q132. Amongst all open (from the top) right circular cylindrical boxes of volume $125\pi \text{cm}^3$, find the dimensions of the box which has the least surface area. **6 Marks**

Q133. Two schools P and Q want to award their selected students on the values of Discipline, Politeness and Punctuality. The school P wants to award ₹ x each,₹ y each and ₹ z each for the three respective values to its 3, 2 and 1 students with a total award money of ₹ 1,000. School Q wants to spend ₹ 1,500 to award its 4, 1 and 3 students on the respective values (by giving the same award money for the three values as before). If the total amount of awards for one prize one each value is ₹ 600, using matrices, find the award money for each value. Apart from the above three values, suggest one more value for awards. **6 Marks**

Q134. If $A = \begin{pmatrix} 2 & -3 & 5 \\ 3 & 2 & -4 \\ 1 & 1 & -2 \end{pmatrix}$ find A^{-1}. Hence using A^{-1} solve the system of equations 2x – 3y + 5z = 11, 3x + 2y – 4z = – 5, x + y – 2z = – 3.

Q135. Using matrices, solve the following system of equations:
$x + y + z = 3, x - 2y + 3z = 2$ and $2x - y + z = 2$

Q136. The management committee of a residential colony decided to award some of its members (say x) for honesty, some (say y) for helping others and some others (say z) for supervising the workers to keep the colony neat and clean. The sum of all the awardees is 12. Three times the sum of awardees for cooperation and supervision added to two times the number of awardees for honesty is 33. If the sum of the number of awardees for honesty and supervision is twice the number of awardees for helping others, using matrix method, find the number of awardees of each category. Apart from these values, namely, honesty, cooperation and supervision, suggest one more value which the management of the colony must include for awards.

Q137. Using matrices, solve the following system of equations:
3x - y + z = 5
2x - 2y + 3z = 7
x + y - z = -1.

Q138. Using matrices, solve the following system of equations:
4x + 3y + 2z = 60.
x + 2y + 3z = 45.
6x + 2y + 3z = 70.

Q139. Determine the product and use it to $\begin{bmatrix} -4 & 4 & 4 \\ -7 & 1 & 3 \\ 5 & -3 & -1 \end{bmatrix} \begin{bmatrix} 1 & -1 & 1 \\ 1 & -2 & -2 \\ 2 & 1 & 3 \end{bmatrix}$ solve the system of equations x – y + z = 4, x – 2y – 2z = 9, 2x + y + 3z = 1. **6 Marks**

Q140. If $A = \begin{pmatrix} 2 & 3 & 10 \\ 4 & -6 & 5 \\ 6 & 9 & -20 \end{pmatrix}$, find A^{-1}. Using A^{-1} Solve the system of equation $\frac{2}{x} + \frac{3}{y} + \frac{10}{z} = 2; \frac{4}{x} - \frac{6}{y} + \frac{5}{z} = 5; \frac{6}{x} + \frac{9}{y} - \frac{20}{z} = -4$ **6 Marks**

Q141. **6 Marks**

Show that $*$ is commutative and associative. Find the identity element for $*$ on A. Also find the inverse of every element (a, b) $\in$ A

Q142. If $A = \begin{bmatrix} 5 & -1 & 4 \\ 2 & 3 & 5 \\ 5 & -2 & 6 \end{bmatrix}$, find A^{-1} and use it to solve the following system of equations: **6 Marks**

5x - y + 4z = 5
2x + 3y + 5z = 2
5x - 2y + 6z = -1

Q143. If $A = \begin{bmatrix} 27 & -3 & 5 \\ 3 & 2 & -4 \\ 1 & 1 & -2 \end{bmatrix}$, the find A^{-1}. Using A^{-1}, solve the following system of equations: **6 Marks**

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

Q144. If $A = \begin{bmatrix} 1 & 2 & -3 \\ 3 & 2 & -2 \\ 2 & -1 & 1 \end{bmatrix}$, then find A^{-1} and use it to solve the following system of the equations:

x + 2y - 3z = 6
3x + 2y -2z = 3
2x - y + z = 2.

Q145. If $A = \begin{bmatrix} 2 & -3 & 5 \\ 3 & 2 & -4 \\ 1 & 1 & -2 \end{bmatrix}$, then find A^{-1}. Hence solve the following system of equations: 2x - 3y + 5z = 11, 3x + 2y - 4z = -5, x + y - 2z = -3.

Q146. $A = \begin{bmatrix} 1 & 3 & 2 \\ 2 & 0 & -1 \\ 1 & 2 & 3 \end{bmatrix}$, then show that $A^3 - 4A^2 - 3A + 11$ I = 0 Hence find A^{-1}.

Q147. If $A = \begin{pmatrix} \cos\alpha & -\sin\alpha & 0 \\ \sin\alpha & \cos\alpha & 0 \\ 0 & 0 & 1 \end{pmatrix}$, find adj.A and verify that $A(\text{adj. } A) = (\text{adj.}A)A|A = |I_3$.

Q148. Using elementary row transformations, find the inverse of the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 5 & 7 \\ -2 & -4 & -5 \end{bmatrix}$. **6 Marks**

Q149. Using matrices, solve the following system of linear equations: **6 Marks**

2x + 3y + 10z = 4
4x - 6y + 5z = 1
6x + 9y - 20z = 2

Q150. If $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 0 & 2 \\ 3 & 1 & 1 \end{bmatrix}$, find A^{-1}. Hence, solve the system of equations x + y + z = 6, x + 2z = 7, 3x + y + z = 12. **6 Marks**

Q151. If a, b, c are p^{th}, q^{th} and ^{rth} terms respectively of a G.P, then prove that $\begin{vmatrix} \log a & p & 1 \\ \log b & q & 1 \\ \log c & r & 1 \end{vmatrix} = 0$ **6 Marks**

Q152. Show that for the matrix $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & -3 \\ 2 & -1 & 3 \end{bmatrix}$, $A^3 - 6A^2 + 5A + 11I$ Hence, find A^{-1}. **6 Marks**

Q153. Using matrix method, solve the following system of equations: **6 Marks**
3x - 2y + 3z = 8
2x + y - z = 1
4x - 3y + 2z = 4

Q154. Using elementary row operations, find the inverse of the following matrix: **6 Marks**
$A = \begin{pmatrix} 2 & -1 & 3 \\ -5 & 3 & 1 \\ -3 & 2 & 3 \end{pmatrix}$

Q155. Solve the following system of equations by matrix method:
x – y + 2z = 7
2x – y + 3z = 12
3x + 2y – z = 5

Q156. A shopkeeper has 3 varieties of pens 'A', 'B' and 'C'. Meenu purchased 1 pen of each variety for a total of 21. Jeevan purchased 4 pens of 'A' variety, 3 pens of 'B' variety and 2 pens of 'C' variety for 60. While Shikha purchased 6 pens of 'A' variety, 2 pens of 'B' variety and 3 pens of 'C' variety for 70. Using matrix method, find cost of each variety of pen.

Q157. If $A = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 1 & 3 \\ 1 & -2 & 1 \end{bmatrix}$ find A^{-1}
Hence, solve the following system of equations:
x + y + z = 6,
y + 3z = 11
and x - 2y + z = 0

Q158. Using elementary transformations, find the inverse of the following matrix:
$\begin{bmatrix} 1 & 2 & 3 \\ 2 & 5 & 7 \\ -2 & -4 & -5 \end{bmatrix}$

Q159. Using matrices, solve the following system of linear equations; **6 Marks**
x + 2y - 3z = –4.
2x + 3y + 2z = 2.
3x – 3y – 4z = 11.

Q160. Using matrices, solve the following system of linear equations: **6 Marks**
x – y + 2z = 7.
3x + 4y - 5z = –5.
2x – y + 3z = 12.

Q161. Using elementary operations, find the inverse of the following matrix: **6 Marks**

$$\begin{pmatrix} -1 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{pmatrix}$$

Q162. Using elementary transformations, find the inverse of the matrix **6 Marks**

$$\begin{pmatrix} 1 & 3 & -2 \\ -3 & 0 & -1 \\ 2 & 1 & 0 \end{pmatrix}.$$

Q163. Using matrix method, solve the following system of equations: **6 Marks**

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

Q164. **6 Marks**

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 it

to solve the following system of linear equations:

$8x + 4y + 3z = 19$

$2x + y + z = 5$

$x + 2y + 2z = 7$

Q165. if $A = \begin{bmatrix} 2 & -3 & 5 \\ 3 & 2 & -4 \\ 1 & 1 & -2 \end{bmatrix}$, find A^{-1}. Use it to solve the system of equations

2x - 3y + 5z = 11

3x + 2y – 4z = -5

x + y - 2z = -3.

Q166. Using elementary row transformations, find the inverse of the matrix $\begin{bmatrix} 2 & -3 & 5 \\ 3 & 2 & -4 \\ 1 & 1 & -2 \end{bmatrix}$.

Q167. Using matrices, solve the following system of linear equations:

x + 2y - 3z = -4

2x + 3y + 2z = 2

3x - 3y - 4z = 11

Q168. Using elementary row operations find the inverse of matrix $A = \begin{pmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{pmatrix}$ and hence

solve the following system of equations

$3x - 3y + 4z = 21, 2x - 3y + 4z = 20, -y + z = 5.$

Q169. **6 Marks**

If $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$ and $A^3 - 6A^2 + 7A + kI_3 = O$ find k.

Q170. **6 Marks**

If $A = \begin{bmatrix} 1 & -1 & 1 \\ 2 & -1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$, find A^2 and show that $A^2 = A^{-1}$.

Q171. Using matrix method, solve the following system of equations: **6 Marks**

2x - 3y + 5z = 13
3x + 2y - 4z = -2
x + y - 2z = -2

Q172. Using matrices, solve the following system of equations: **6 Marks**
x + y + z = 6
x + 2z = 7
3x + y + z = 12

Q173. Obtain the Inverse of the following matrix using elementary operations: **6 Marks**

$$A = \begin{vmatrix} 3 & 0 & -1 \\ 2 & 3 & 0 \\ 0 & 4 & 1 \end{vmatrix}.$$

Q174. **6 Marks**

If $A \begin{bmatrix} 1 & 3 & 4 \\ 2 & 1 & 2 \\ 5 & 1 & 1 \end{bmatrix}$, find A^{-1}

Hence solve the system of equations
x + 3y + 4z = 8
2x + y + 2z = 5
and 5x + y + z = 7

Q175. Find the inverse of the following matrix, using elementary transformations:

$$A = \begin{bmatrix} 2 & 0 & -1 \\ 5 & 1 & 0 \\ 0 & 1 & 3 \end{bmatrix}$$

Q176.

Find the inverse of the following matrix using elementary operations. $A = \begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$

Q177. Obtain the inverse of the following matrix using elementary operations:

$$A = \begin{bmatrix} 2 & 1 & -3 \\ -1 & -1 & 4 \\ 3 & 0 & 2 \end{bmatrix}$$

Q178. Find the inverse of fhe following matrix using elementary operations:

$$A = \begin{pmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{pmatrix}$$