

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION MAY 2019
(First Semester)

Branch – STATISTICS

MATRICES

Time : Three Hours

Maximum : 75 Marks

SECTION-A (20 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

- 1 What is order of a matrix?
- 2 Define scalar matrix.
- 3 Find the determinant of $A = \begin{bmatrix} -2 & 1 \\ 7 & 6 \end{bmatrix}$.
- 4 Define determinant of order 2.
- 5 Define rank of a matrix.
- 6 Write any two elementary transformations of a matrix.
- 7 State Cayley Hamilton theorem.
- 8 Define characteristic vector.
- 9 When two vectors are said to be equal?
- 10 Define linearly independent set of vectors.

SECTION - B (25 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks (5 x 5 = 25)

- 11 a Define symmetric and skew symmetric matrices.
OR
b Show that the determinant of a Hermitian matrix is always a real number.
- 12 a Find the value of the determinant : $\begin{vmatrix} 3 & 4 & 7 \\ 2 & 1 & 3 \\ 7 & 2 & 1 \end{vmatrix}$.
OR
b What are the properties of determinants?
- 13 a Find the rank of $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \\ 3 & 5 & 6 \end{bmatrix}$.
OR
b How to compute an inverse?
- 14 a Show that 0 is a characteristic root of a matrix if and only if the matrix is singular.
OR
b Explain matrix polynomial.
- 15 a Show that the vectors $X_1 = (1, 2, 4)$, $X_2 = (3, 6, 12)$ are linearly dependent.
OR
b Prove that the quadratic form $6x_1^2 + 3x_2^2 + 3x_3^2 - 4x_1x_2 - 2x_2x_3 + 4x_3x_1$ in three variables is positive definite.

SECTION - C (30 Marks)Answer any **THREE** Questions :**ALL** Questions Carry **EQUAL** Marks (3 x 10 = 30)

- 16 Define Skew-Hermitian matrix. If A is a Hermitian matrix, show that iA is skew Hermitian.
- 17 Solve the following equation by Cramer's rule :
 $2x - y + 3z = 9$
 $x + y + z = 6$
 $x - y + z = 2$
- 18 Find the inverse of the matrix $A = \begin{bmatrix} 1 & 2 & 1 \\ 3 & 2 & 3 \\ 1 & 1 & 2 \end{bmatrix}$ by using elementary transformations.
- 19 Find the characteristics equation of the matrix $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ and verify that it is satisfied by A and hence obtain A^{-1} .
- 20 Obtain the matrices corresponding to the following quadratic forms :
 (i) $x^2 + 2y^2 + 3z^2 + 4xy + 5yz + 6zx$
 (ii) $ax^2 + by^2 + cz^2 + zfyz + zgzx + zhxy$

Z-Z-Z

END