

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION DECEMBER 2018
(First Semester)

Branch- STATISTICS

MATRICES

Time : Three Hours

Maximum : 75 Marks

SECTION-A (20 Marks)

Answer ALL questions

ALL questions carry EQUAL marks (10x2 = 20)

- 1 Define a Matrix.
- 2 Define Unit Matrix.
- 3 Find the determinant of $A = \begin{pmatrix} 3 & 2 \\ 1 & 5 \end{pmatrix}$
- 4 What is Inverse of a Matrix?
- 5 Define Minor of a Matrix.
- 6 Show that the rank of a matrix every element of which is unity, is 1.
- 7 State Cayley Hamilton theorem.
- 8 When two matrix polynomials are said to be equal?
- 9 Define Vector Space.
- 10 Define Quadratic form.

SECTION - B (25 Marks!)

Answer ALL Questions

ALL Questions Carry EQUAL Marks (5x5 = 25)

- 11 a Show that the determinant of a Hermitian matrix is always a real number.
OR
b Define Conjugate of a matrix.
- 12 a What are the difference between matrices and determinants?
OR
b Find the value of determinant
$$\begin{vmatrix} 3 & -2 & 1 \\ 2 & 3 & -1 \\ 1 & 1 & 1 \end{vmatrix}$$
- 13 a Show that the rank of a matrix is greater than or equal to the rank of every sub matrix there of.
OR
b Find the inverse of $A = \begin{bmatrix} 2 & 2 \\ -3 & 5 \end{bmatrix}$
- 14 a Show that the matrices A and A' have the same eigen values.
OR
b Determine the characteristic roots of the matrix
$$\begin{vmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{vmatrix}$$
- 15 a Show that the set consisting only of the zero vector, 0, is linearly dependent.
OR

h PIYWP that thp miadratic form $6x^2 + 3x^2 + 14x^3 + 4x^7X^3 + 18X^3X + 4x^5X^7$

SECTION - C (30 Marks)

Answer any THREE Questions

ALL Questions Carry EQUAL Marks (3 x 10 = 30)

- 16 Show that the matrix $\begin{pmatrix} \cos O & \sin O \\ -\sin O & \cos O \end{pmatrix}$ is orthogonal.
- 17 Solve the following system of linear equations with the help of Cramer's rule:
 $x+2y+3z=6,$
 $2x+4y+z=7,$
 $2x+2y+9z=14$
- 18 Determine the rank of a matrix:
- $$\begin{vmatrix} 2 & -1 & 3 & 4 \\ 0 & 3 & 4 & 1 \\ 2 & 3 & 7 & 5 \\ 2 & 5 & 11 & 6 \end{vmatrix}$$
- 19 Determine the characteristic roots of the matrix:
- $$\begin{vmatrix} 0 & 1 & 2 \\ 1 & 0 & -1 \\ 2 & -1 & 0 \end{vmatrix}$$
- 20 Write down the matrix of each of the following quadratic forms and verify that they can be written as matrix products X^TAX :
- (i) $x^2 - 18x^2 + 5x^2$
- (ii) $x^2 + 2x^2 - 5x_3 - x_j x_2 + 4x_2 x_3 - 3x_3 x_j$

Z-Z-Z

END