14STU02

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2019
(First Semester)

Branch – **STATISTICS**

MATRICES

Time : Three Hours | Maximum : 75 Marks

SECTION-A (20 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 x 2 = 20)

1 Define Hermitian matrix.

2 Define Transpose of a matrix.

3 If $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$ the $|A|$=?

4 Define inverse of a matrix.

5 Define rank of a matrix.

6 Find the rank of $A = \begin{pmatrix} 1 & 4 & 2 \\ 2 & 0 & 1 \end{pmatrix}$

7 Define characteristic equation of a matrix.

8 State Cayley-Hamilton theorem.

9 Define vector space.

10 Define matrix of quadratic form.

SECTION - B (25 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 5 = 25)

11 a Show that , a necessary and sufficient condition for a square matrix A to be symmetric is that A^t=A.

OR

b Show that, each diagonal element of a Hermitian matrix is purely real.

12 a Show that the value of a determinant remains unaltered if its rows and columns are interchanged.

OR

b Find the inverse of the matrix $A = \begin{pmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{pmatrix}$.

13 a Find the rank of $A = \begin{pmatrix} 0 & i & -i \\ -i & 0 & i \\ i & -i & 0 \end{pmatrix}$.

OR

b Does the following system of equations possess a common non-zero solution?

2x-3y+z=0

x+2y-3z=0

4x-y+2z=0

14 a Obtain the characteristic equation and characteristic roots of the matrix $A = \begin{pmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{pmatrix}$

OR

b Show that the characteristic roots of a real symmetric matrix are real.

15 a Prove that the intersection of two sunspaces of a vector space is a sub-space.

OR

b Obtain the matrix of the quadratic form $3x_1^2 + x_1x_2 - 4x_2^2$ in x_1 and x_2.

SECTION - C (30 Marks)

Answer any **THREE** Questions

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

16 Verify that the matrix $\frac{1}{3}\begin{pmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ -2 & 2 & -1 \end{pmatrix}$ is orthogonal.

17 Solve the following equations with the help of determinants.

5x-6y+4z=15

7x+4y-3z=19

2x+y+6z=46

18 Find the rank of a matrix $A = \begin{pmatrix} 1 & 2 & -1 & 3 \\ 4 & 1 & 2 & 1 \\ 3 & -1 & 1 & 2 \\ 1 & 2 & 0 & 1 \end{pmatrix}$

19 Verify Cayley-Hamilton theorem for the matrix $A = \begin{pmatrix} -3 & 5 & 1 \\ 2 & 0 & -1 \\ 1 & -2 & 3 \end{pmatrix}$

20 Show that, in $V_3(R)$ the vectors (1,2,1), (2,1,0) and (1,-1,2) are linearly independent.

Z-Z-Z END