Unique Paper Code   : 32371202_OC

Name of the Paper   : Algebra

Name of the Course   : B.Sc. (H) Statistics Under CBCS

Semester   : II

Duration   : 3 hours

Maximum Marks   : 75 Marks

Instructions for candidates:
Attempt any FOUR questions.
All questions carry equal marks.
Show all the intermediate calculations and results.
Use of simple calculator is allowed.

1. For the matrix A=$\begin{bmatrix} 1 & 3 & 6 & -1 \\ 1 & 4 & 5 & 1 \\ 1 & 5 & 4 & 3 \end{bmatrix}$ find the non-singular matrices P and Q such that PAQ is

   in normal form. Hence determine the rank of the matrix A.

2. For what values of λ, does the system of equations:
$$x + y + z = 1$$
$$x + 2y + 4z = \lambda$$
$$x + 4y + 10z = \lambda^2$$
   have a solution? Solve them completely in each case.

3. Find the characteristic equation of the matrix
$$A= \begin{pmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{pmatrix}$$
   and verify Cayley Hamilton theorem. Hence compute A^{-1}.

4. Find the rank, index and signature of the quadratic form
$$2(x_1^2 + x_2^2 + x_3^2) + x_4^2 + 2x_1x_2 - 2x_2x_3 + 2x_3x_1 \;.$$

5. Find generalized inverse of the matrix

$$A= \begin{bmatrix} -1 & 1 & 6 & 8 & 2 \\ 0 & 4 & 1 & 3 & 2 \\ -1 & 5 & 7 & 11 & 4 \end{bmatrix}$$

   and verify AGA=A.

6. Find the inverse of the matrix

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

by partitioned method. Also, verify $AA^{-1} = I$.