Second year Higher Secondary Examination

PART III

MATHEMATICS (SCIENCE)

MATRIX ALGEBRA

Maximum: 30 (Scores)

HSE II
2015

TIME: 1 Hour

All questions are compulsory.

1. Let $A=\begin{bmatrix}3 & 6 & 5\\ 6 & 7 & 8\end{bmatrix}$ and $C=\begin{bmatrix}3 & 6 & 5\\ 6 & 7 & 8\end{bmatrix}$ Find the matrix B such that 2A+B=3C 2

2. If A=$\begin{bmatrix}5 & 3 & 10\end{bmatrix}$ *and* $B=\begin{bmatrix}2\\ 4\\ 6\end{bmatrix}$ then find AB 2

3. If $A=\begin{bmatrix}1 & 2\\ 2 & 1\end{bmatrix}$ and $f(x)=x^2-2x-3$, find f(A). 3

4. Find the values of x,y and z from the following equations: $\begin{bmatrix}x+y+z\\ x+z\\ y+z\end{bmatrix}=\begin{bmatrix}9\\ 5\\ 7\end{bmatrix}$ 3

5. A man buys 8 dozen mangoes, 10 dozen apples and 4 dozens bananas. Mangoes cost Rs.18 per dozen, apples Rs. 9 per dozen and bananas Rs.6 per dozen. Represent the quantities bought by a row matrix and the prices by a column matrix and obtain the total cost. 3

6. Let $A=\begin{bmatrix}2 & 4\\ -1 & 1\end{bmatrix}$. Using elementary row transformations, find the inverse of A. 3

7. Let $A=\begin{bmatrix}1 & 2 & -3\\ 2 & 1 & -1\end{bmatrix}$ and $B=\begin{bmatrix}2 & 3\\ 5 & 4\\ 1 & 6\end{bmatrix}$
   a) What is the order of AB? 1
   b) Find A^T and B^T. 2
   c) Verify that $(AB)^T=B^T.A^T$ 2

8. Consider the following statement:
   $P(n): A^n=\begin{bmatrix}1+2n & -4n\\ n & 1-2n\end{bmatrix}$ for all n∈N
   a) Write P(1). 1
   b) If P(k) is true, then show that P(k+1) is true. 3
   c) Show that P(n) is true for all positive integral values of n ∈N. 1

9. Express $A=\begin{bmatrix}3 & 3 & -1\\ -2 & -2 & 1\\ -4 & -5 & 2\end{bmatrix}$ as the sum of a symmetric and a skew-symmetric matrices. 4