## 8665/MH

## AS/2057

## ALGEBRA-I

Paper-IV

## Semester-II

Time Allowed : 3 Hours]
[Maximum Marks : 36

Note : $\quad$ The candidates are required to attempt two questions each from Sections A and B carrying
5.5 marks each and the entire Section $C$ consisting of 7 short answer type questions 7 carrying 2 marks each.

## SECTION-A

1. Find the value of $\lambda$ for which the equations

$$
(\lambda+1) x+(3 \lambda+1) y+2 \lambda z=0,
$$

$(\lambda-1) x+(4 \lambda-2) y+(\lambda+3) z=0$,
$2 x+(3 \lambda+1) y+3(\lambda-1) z=0$
consistent and find the values of $\mathrm{x}, \mathrm{y}$ and z corresponding to each of these values of $\lambda$.
2. Find the inverse of the matrix

$$
\left|\begin{array}{rrr}
2 & 0 & -1 \\
5 & 1 & 0 \\
0 & 1 & 3
\end{array}\right|
$$

by elementary row operations.
5.5
3. If

$$
N=\left[\begin{array}{lc}
0 & 1+2 i \\
-1+2 i & 0
\end{array}\right]
$$

obtain the matrix $(\mathrm{I}-\mathrm{N})(\mathrm{I}+\mathrm{N})^{-1}$, and show that it is unitary.
4. Find the eigen values and eigen vectors of the matrix

$$
A=\left|\begin{array}{lll}
2 & 1 & 1 \\
0 & 1 & 0 \\
1 & 1 & 2
\end{array}\right|
$$

## SECTION-B

5. Solve $x^{4}+8 x^{3}+9 x^{2}-8 x-10=0$ by Descarte's method.
6. Solve by Cardon's method $28 x^{3}-9 x^{2}+1=0$. 5.5
7. Find sum of the series
$1+x \cosh a+x^{2} \cosh 2 a+x^{3} \cosh 3 a+x^{4} \cosh 4 a+\ldots \ldots$. to n terms.
8. Solve the equation :
$x^{7}+x^{4}+x^{3}+1=0$.
5.5

## SECTION-C

9. Answer the following :
$7 \times 2=14$
(i) Explain Orthogonal matrix with example.
(ii) If $\lambda$ be an eigen value of a non-singular matrix $A$. Show that $\frac{|A|}{\lambda}$ is an eigen value of adj. A.
(iii) State Cayley's Hamilton theorem.
(iv) State two applications of De Moivre's theorem.
(v) Explain Ferrari's method for Biquadratic equation.
(vi) Solve the equation :
$x^{4}+2 x^{3}-21 x^{2}-22 x+40=0$
whose roots are in A.P.
(vii) Define Direct and Inverse circular functions with example.
