



LGS GROUP OF COLLEGES

A PROJECT OF LAHORE GRAMMAR SCHOOL

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Subject: Math

Test No. _____

Date: 23-11-2024

A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	Marks Obtained	
1				6				11				16					
2				7				12				17					
3				8				13				18					
4				9				14				19					
5				10				15				20					

Subjective Type

Short Answers

Ans no:-(1)

❖ Semi Group:

A semi group is a mathematical structure that consist of a set and an associative binary operation on a set. Semi group have similar properties to groups, but the properties of semi group are less strict.

❖ Ex:

❖ Positive integer with multiplication.

Ans no:-(3)

❖ Sol:

$$= A^2 = A \cdot A = \begin{bmatrix} i & 0 \\ 1 & -i \end{bmatrix} \begin{bmatrix} i & 0 \\ 1 & -i \end{bmatrix}$$

$$= A^2 = \begin{bmatrix} i \cdot i + 0(1) & i(0) + 0(-i) \\ 1 \cdot i + (-i)(1) & 1(0) + (-i)(-i) \end{bmatrix}$$

$$= A^2 = \begin{bmatrix} i^2 & 0 \\ 0 & i^2 \end{bmatrix}$$

$$= A^2 = \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$$

$$A^4 = A^2 \cdot A^2$$

$$= \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix} \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$$

$$= A^4 = \begin{bmatrix} (-1)(-1) + (0)(0) & (-1)(0) + (0)(-1) \\ (0)(-1) + (-1)(0) & (0)(0) + (-1)(-1) \end{bmatrix}$$

$$= A^4 = \begin{bmatrix} 1+0 & 0+0 \\ 0+0 & 0+1 \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$



Ans no:-(2)

Q8 Table 8-

$$\begin{aligned}
 & \begin{bmatrix} x \\ 0 \\ 1 \\ 2 \\ 3 \\ 4 \end{bmatrix} \begin{bmatrix} x \\ 0 \\ 1 \\ 2 \\ 3 \\ 4 \end{bmatrix} \begin{bmatrix} 0 \\ 0 \\ 1 \\ 2 \\ 3 \\ 4 \end{bmatrix} \begin{bmatrix} 1 \\ 0 \\ 2 \\ 4 \\ 1 \\ 3 \end{bmatrix} \begin{bmatrix} 2 \\ 0 \\ 4 \\ 1 \\ 1 \\ 2 \end{bmatrix} \begin{bmatrix} 3 \\ 0 \\ 4 \\ 3 \\ 2 \\ 1 \end{bmatrix} \begin{bmatrix} 4 \\ 0 \\ 4 \\ 3 \\ 2 \\ 1 \end{bmatrix} \\
 & = \begin{bmatrix} 0 \\ 0 \\ 1 \\ 2 \\ 3 \\ 4 \end{bmatrix} \begin{bmatrix} 0 \\ 0 \\ 1 \\ 2 \\ 3 \\ 4 \end{bmatrix} \begin{bmatrix} 0 \\ 0 \\ 1 \\ 2 \\ 3 \\ 4 \end{bmatrix} \begin{bmatrix} 0 \\ 0 \\ 1 \\ 2 \\ 3 \\ 4 \end{bmatrix} \begin{bmatrix} 0 \\ 0 \\ 1 \\ 2 \\ 3 \\ 4 \end{bmatrix} \begin{bmatrix} 0 \\ 0 \\ 1 \\ 2 \\ 3 \\ 4 \end{bmatrix} \begin{bmatrix} 0 \\ 0 \\ 1 \\ 2 \\ 3 \\ 4 \end{bmatrix}
 \end{aligned}$$

Note: The element of the set are the residue classes 5, which are $\{0, 1, 2, 3, 4\}$

Long answer

Sol:-

$$\text{Let } A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

$$B = \begin{bmatrix} e & f \\ g & h \end{bmatrix}$$

be two 2×2 non-singular matrices. then their product AB is given by.

$$AB = \begin{bmatrix} ac + bg & af + bh \\ ce + dg & cf + dh \end{bmatrix}$$

Since

A, B are non-singular, their determinant are non-zero. The determinant is given by of AB

$$\det(AB) = (ac + bg)(cf + dh) - (af + bh)(ce + dg)$$

using the properties of determinants we can show that $\det(AB)$ is non-zero and AB is non-singular.