

## **UNIVERSITY OF THE PUNJAB**

B.S. 4 Years Program / First Semester - Spring 2023

Paper: Elementary Mathematics-I (Algebra) Course Code: MATH-111

Roll No. ...... Time: 3 Hrs. Marks: 60

aport Elementary mathematics i (ragosta) — coaled code: mrtiii i i i

## THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED

Q.1. Solve the following:

(6x5=30)

- (i) Expand the following in ascending power of x:  $(1 x + x^2)^4$
- (ii) If  $a_n = (-1)^n (2n 3)$ , then find first four terms of the sequence.
- (iii) Verify the given equation:

$$2\sin\frac{\pi}{4} + \frac{1}{2}\cos c\frac{\pi}{4} = \frac{3}{\sqrt{2}}$$

- (iv) Solve by completing square:  $2x^2 + 12x 110 = 0$
- (v) If  $A = \begin{bmatrix} 1 \\ 1+i \\ i \end{bmatrix}$ , then find  $A(\bar{A})^t$
- (vi) Express the complex number  $z = 1 + i\sqrt{3}$  in polar form.

Solve the following:

(3x10=30)

Q.2 Show that

$$\begin{bmatrix} r\cos\phi & 0 & -\sin\phi \\ 0 & r & 0 \\ r\sin\phi & 0 & \cos\phi \end{bmatrix} \begin{bmatrix} r\cos\phi & 0 & -\sin\phi \\ 0 & r & 0 \\ r\sin\phi & 0 & \cos\phi \end{bmatrix} = r\,I_3$$

- Q.3 If the matrices  $\begin{pmatrix} 3 & -2 & -2 \\ -1 & 1 & 1 \\ 3 & -1 & -2 \end{pmatrix}$  and  $\begin{pmatrix} 1 & a & 0 \\ -1 & b & 1 \\ 2 & c & -1 \end{pmatrix}$  are inverses of each other, what is the value of c.
- Q.4 Show that the reciprocal of the terms of the geometric sequence  $a_1$ ,  $a_1r^2$ ,  $a_1r^4$ ... form another geometric sequence.