UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / Second Semester – Spring 2022

Roll No. .....

Paper: Elementary Mathematics-I (Algebra) **Course Code: MATH-111** **Time: 3 Hrs. Marks: 60**

THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED

Q.1. Solve the following Questions. **(6x5=30)**

(i) If $\frac{1}{k}, \frac{1}{2k+1}, \frac{1}{4k-1}$ are in H.P. find k.

(ii) Solve the system of linear equations by Cramer's rule

$$2x_1 - x_2 + x_3 = 8$$
$$x_1 + 2x_2 + 2x_3 = 6$$
$$x_1 - 2x_2 - x_3 = 1$$

(iii) Solve the system of equations

$$x^2 - 5x + 6y^2 = 0, x^2 + y^2 = 45$$

(iv) Find the 6^{th} term in the expansion of $\left(x^2 - \frac{3}{2x}\right)^{10}$

(v) Expand by binomial theorem of $(2 + x - x^2)^4$

(vi) Prove that $\sec^2\theta - cose^2\theta = \tan^2\theta - \cot^2\theta$

Solve the following. **(3x10=30)**

Q.2 (a)Find x and y if $\begin{bmatrix} x+3 & 1 \\ -3 & 3y-4 \end{bmatrix} = \begin{bmatrix} y & 1 \\ -3 & 2x \end{bmatrix}$

(b) Show that $\begin{vmatrix} a+l & a & a \\ a & a+l & a \\ a & a & a+l \end{vmatrix} = l^2(3a+l)$

Q.3 (a)If A and B are non-singular matrices, then show that $(AB)^{-1} = B^{-1}A^{-1}$.
(b)Define a reciprocal equation and give an example.

Q.4 (a) Express the complex number $z = 1 + i\sqrt{3}$ in polar form.

(b) Simplify $\left(-\frac{1}{2} + \frac{\sqrt{3}}{2}i\right)^3$