UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / Second Semester – Spring 2023

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. **(6x5=30)**

(i) Find the sum of the 20 terms of the series whose rth term is $3r + 1$.

(ii) *For* $A = \{1, 2, 3, 4\}$, *find given relations* $\{(x, y) \mid x + y \geq 5\}$

Also write down domain and range of relation.

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

(iv) If x is so small that its square and higher powers can be neglected, show that $\frac{\sqrt{1+2x}}{\sqrt{1-x}} \approx 1 + \frac{3}{2}x$

(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 Show that

$$\cot(\alpha - \beta) = \frac{\cos\alpha\, cos\beta + 1}{\cos\beta - cos\alpha}$$

Q.3 Solve the system of linear equations by Cramer's rule

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

Q.4 Solve the simulataneos system of the equations: $\begin{cases} 3x + 4y = 25 \\ \frac{3}{x} + \frac{4}{y} = 2 \end{cases}$