UNIVERSITY OF THE PUNJAB

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

Roll No. .....

Paper: Mathematics. **Course Code: MATH-207** **Time: 3 Hrs. Marks: 60**

THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED

Q.1. Solve the following: **(5x6=30)**

(i) Solve $4^x - 3.2^{x+3} + 128 = 0$.

(ii) If α, β are the roots of quadratic equation $ax^2 + bx + c = 0$, form the quadratic equation whose roots are α^2, β^2.

(iii) If the 5th term of an arithmetic progression is 13 and 17th term of is 49. Then find the nth term and 13th term.

(iv) Expand $(1 - x - x^2)^4$ in the ascending power of x.

(v) Prove that $\frac{1+\cos\theta}{1-\cos\theta} = (\csc\theta + \cot\theta)^2$.

Q.2. Solve the following: **(5x6=30)**

(i) The third term of a geometric sequence is 5, and the sixth term is -40. Find the eighth term and the sum of first eight terms of geometric sequence.

(ii) Show that $\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix} = (a-b)(b-c)(c-a)$

(iii) Find the value of λ for which the following system have non-trivial solution. Also solve the system for the value of λ.

$$x_1 + 4x_2 + \lambda x_3 = 0$$
$$2x_1 + x_2 - 3x_3 = 0$$
$$3x_1 + \lambda x_2 - 4x_3 = 0$$

(iv) Expand and simplify by using binomial theorem $\left(\frac{a}{2} - \frac{2}{a}\right)^6$ and find its general term.

(v) Prove the identity $\frac{\tan\theta + \sec\theta - 1}{\tan\theta - \sec\theta + 1} = \tan\theta + \sec\theta$.