UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program : First Semester – Fall 2021

Roll No. .....

Paper: Calculus-I **Course Code: MATH-121** **Time: 3 Hrs.** **Marks: 60**

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

(i)	At what points the function fails to be continuous? Also discuss differentiability at those points as well. $$y = \frac{xtanx}{1+x^2}$$	(5)
(ii)	Find the maximum and minimum on the given interval of $h(x) = -\sqrt{5-x^2}$, $-\sqrt{5} \le x \le 0$	(5)
(iii)	Find the point $'c'$ of Mean Value Theorem for the function $$f(x) = x + \frac{1}{x}, \quad [\frac{1}{2}, 2]$$	(5)
(iv)	Find the Taylor Series for the function at $x = 2$ $$f(x) = \frac{1}{x}$$	(5)
(v)	Find the direction of $\overrightarrow{P_1P_2}$ $$P_1(-1,1,5), P_2(2,5,0)$$	(5)
(vi)	Graph the function $$f(x) = 5 - 2Sinx$$	(5)

Solve the following: **(5x6=30)**

Q.2	Fin the limit of a) $\lim_{t\to 0}(1 - cost)$ b) $\lim_{x\to 4} \frac{4-x}{5-\sqrt{x^2+9}}$	(6)
Q.3	If $x^2 - y^2 = 1$, Find $\frac{dy}{dx}$ and show that $d^2y/dx^2 = -1/y^3$.	(6)
Q.4	Find $\frac{dp}{dq}$ if: a) $p = (1 + cosecq)cosq$ b) $p = \frac{tanq}{1+tanq}$	(6)
Q.5	Does the sequence converge , then find the limit of convergence $$a_n = \left(\frac{n+1}{2n}\right)\left(1 - \frac{1}{n}\right)$$	(6)
Q.6	Find center, foci, vertices of $$\frac{(x+3)^2}{9} + \frac{(y+2)^2}{25} = 1$$	(6)