UNIVERSITY OF THE PUNJAB

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

Roll No. .....

Subject: Calculus and Analytical Geometry **Paper: MS-152 A** **Time: 3 Hrs.** **Marks: 60**

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

(*i*) Find the limit $\lim\limits_{h\to 0}\dfrac{h^2}{1-\cos h}$.

(*ii*) Given $x^3+y^3=3xy^2$. Find $\frac{dy}{dx}$ by implicit differentiation.

(*iii*) Let $y=(\ln x)^{\tan x}$. Find $\frac{dy}{dx}$.

(*iv*) Evaluate the integral $\int \dfrac{e^{\tan^{-1}x}}{1+x^2}dx$.

(*v*) Evaluate the integral $\int \sin^4 x\cos^3 x dx$.

(*vi*) Find an equation of the plane that passes through the points $A(-2,1,1)$, $B(0,2,3)$, and $C(1,0,-1)$.

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

Q.2. Let $f(x)=x^4-12x^3$. Find the relative extrema using both first and second derivative tests.

Q.3. Evaluate the improper integral $\int_{-2}^{2}\dfrac{dx}{x^2}dx$ if it converges.

Q.4. Show that the lines $L_1: x=2-t,\ \ y=2t,\ \ z=1+t$ and $L_2: x=1+2t,\ \ y=3-4t,\ \ z=5-2t$ are parallel, and find the distance between them.