# UNIVERSITY OF THE PUNJAB

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

Roll No. .....

**Paper: Mathematics A-I [Calculus(I)]**

**Course Code: MATH-101 / MATH 11010**

**Time: 3 Hrs.** **Marks: 60**

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

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|---|---|---|
| (i) | Does the limit of $f(x)=\frac{cosx}{1-\pi}$ exist at $x=\pi$ | (5) |
| (ii) | Solve $z^4-3z^2+2=0$, where $z$ is a complex number. | (5) |
| (iii) | Solve the inequality $\left\|\frac{2}{x}-4\right\|<3$ | (5) |
| (iv) | Find the value or values of c that satisfy the mean value theorem for the function $f(x)=\sqrt{x-1}$ in [1,3] | (5) |
| (v) | Find $lim_{x\to 0}(\frac{1}{sinx}-\frac{1}{x})$. | (5) |
| (vi) | At what point the function is continuous: $f(x)=\frac{xtanx}{x^2+1}$ | (5) |

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

| | | |
|---|---|---|
| Q.2 | Graph the function and comment on continuity and differentiability at x=1 $f(x)=\begin{cases} x, & 0\le x\le 1 \\ 2-x, & 1<x\le 2 \end{cases}$ | (6) |
| Q.3 | Discuss the continuity of the following function at x=2 and x=-2 $g(x)=\begin{cases} \frac{x^3-8}{x^2-4}, & x\neq 2,-2 \\ 3, & x=2 \\ 4, & x=-2 \end{cases}$ | (6) |
| Q.4 | Evaluate $\int_0^{\pi/2}\frac{\cos\theta\, d\theta}{(3+2sin\theta)(1-sin\theta)}$. | (6) |
| Q.5 | For what values of $a, m$ and $b$ does the function $g(x)=\begin{cases} 3, & x=0 \\ -x^2+3x+a, & 0<x<1 \\ mx+b, & 1\le x\le 2 \end{cases}$ Satisfy the mean value theorem on [0,2]. | (6) |
| Q.6 | Find the volume of solid generated by revolving the region bounded by $y=\sqrt{x}$ and the lines y=1, x=4, about the line y=1. | (6) |