# Raghunathpur College

## Internal Examination-2020

## Mode of Examination: Assignment writing

## Subject: Mathematics

## Paper: BMTMCCHT301 (Real analysis-II)

### Full Marks: 10

**Answer any one questions:** $10\times1=10$

1. (a)Define uniform continuity of a function of real variable.

(b) If $f:[0,1]\to R$ is continuous and assumes rational values only and $f(\frac{1}{3})=\frac{1}{3}$, then show that $f(x)=\frac{1}{3}$ for all $x\in[0,1]$.

(c) Examine whether the function $f(x,y)=\begin{cases}2xy\dfrac{x^2-y^2}{x^2+y^2} & if\,(x,y)\neq(0,0)\\ 0 & if\,(x,y)=(0,0)\end{cases}$

Is continuous at $(0,0)$.

2+3+5=10

2(a). Define maxima of a function in an interval.

(b) Show that the minimum value of $\dfrac{(2x-1)(x-8)}{x^2-5x+4}$ is greater that its maximum value.

(c) A function $f$ is defined on $\mathbb{R}$ by $f(x)=x^2\sin\dfrac{1}{x}, x\neq0$ and $f(0)=0$. Show that $f$ is differentiable on $\mathbb{R}$ but $f'$ is not continuous on $\mathbb{R}$. 2+4+4=10