

WEST BENGAL STATE UNIVERSITY

DEROZIO MEMORIAL COLLEGE

B.SC Honours Semester IV Internal Assessment 2020(online mode)

Subject: MTMA

Paper Code:COR09T

Time Allotted:1hour

Full Marks:10

Answer any five from the following questions 5x2 = 10

1.Let f be a real valued function on $[1, \infty)$ then show that

$f(x) + f(y) = f(xy)$ where $f'(x) = \frac{1}{x}$ for all $x \in [1, \infty)$ & $f(1) = 0$ 2

2.Show that $ax^2+2hxy+by^2$ and $Ax^2+2Hxy+By^2$ are independent unless $\frac{a}{A} = \frac{b}{B} = \frac{h}{H}$ 2

3.Find the value of the double limit $\lim_{(x,y) \rightarrow (0,0)} (1 + y^2) \frac{\sin x}{x}$ 2

4.Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be a twice differentiable function. If $g(u,v) = f(u^2 - v^2)$, then

Find the value $\frac{\partial^2 g}{\partial u^2} + \frac{\partial^2 g}{\partial v^2} = ?$ 2

5.What is the minimum distance from the origin (0,0) to the hyperbola $x^2+8xy+7y^2=225$ 2

6.Verify Green's theorem in the xy – plane for $\oint_C \{(xy + y^2)dx + x^2dy\}$

Where C is the closed curve of the region bounded by $y=x$ and $y = x^2$ 2

7.Compute the circulation of the vector point function $\mathbf{F} = y^2\mathbf{i} + x\mathbf{j} - z^2\mathbf{k}$ around the circle: $x^2+y^2=9, Z=2$, using Stokes Theorem 2

8.Evaluate $\iiint (x^2 + y^2 + z^2) dv$, where V is the closed spherical region bounded by the sphere $x^2+y^2+z^2=9$ 2

