WEST BENGAL STATE UNIVERSITY

DEROZIO MEMORIAL COLLEGE

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

Subject: MTMA Paper Code:COR10T

Time Allotted: 1Hour Full Marks:10

Answer any five from the following questions 5x2 = 10

1. In a commutative ring of characteristic 2, prove that the idempotent elements form a subring. 2
2. Show that any ring isomorphic to a field is itself a field. 2
3. Find the field of quotients of the integral domain $\mathbf{z}[\sqrt{2}]$ = $\{a+b\sqrt{2}:a,b\in\mathbf{z}\}$ 2
4. Let $\phi:\mathbf{R}\rightarrow\mathbf{R}'$ be a ring homomorphism .Prove that $\phi(a^n) = [\phi(a)]^n$ for all $a\in\mathbf{R}$ and all $n\in N$ 2
5. Let V be a finite dimensional vector space over a field F and $T_1 :V\rightarrow V$, $T_2:V\rightarrow V$ are linear mappings. Prove that rank of T_2T_1=rank of T_1 , if T_2 be invertible 2

6.A linear mapping $T:\mathbf{R}^3\rightarrow\mathbf{R}^3$ maps the basis vectors α , β , γ to α+β, B+γ , γ respectively .Show that T is an isomorphism. 2

7.Find the dimension of the subspace W of $\mathbf{R}^3$ defined by

W={(x,y,z): x,y,z ∈**R** , x-y+z=0,2x+y-z=0} 2

8.Find the maximal ideals and prime ideals in the ring $\mathbf{Z}_{20}$ 2