

Raghunathpur College
Internal Examination-2020
Semester-V, Mathematics (Hons)
Paper- BMTMCCHT501
Algebra-III

Answer any **one** question.

$1 \times 10 = 10$

1. (i) If G is a group then show that $Z(G)$, the center of G , is a normal subgroup of G . Prove that the center of the symmetric group S_3 is trivial. $3 + 2 = 5$.
(ii) Let $\varphi: R \rightarrow S$ be an onto ring homomorphism. If A be an ideal of R prove that $\varphi(A)$ is an ideal of S . Let F be a field and R be any ring. If $\varphi: F \rightarrow R$ is a homomorphism then prove that either φ is injective or $\varphi(x) = 0, \forall x \in F$.
 $3+2=5$.

2. (i) Let R be a commutative ring with unity. Suppose that the only ideals of R are $\{0\}$ and R . Show that R is a field. 5.
(ii) State and prove Cayley's theorem for finite group. Find the symmetric group isomorphic to the Klein's 4-group K_4 . $3+2=5$.