Remark: The list of topics below is not exhaustive. It is likely that there will be things on the exam which do not appear in this study guide.

Know the definition of ...

(1) ... a ring,
(2) ... a field,
(3) ... a unit
(4) ... a zero divisor,
(5) ... a ring with a 1,
(6) ... a ring homomorphism,
(7) ... the direct product of two rings,
(8) ... an integral domain,
(9) ... the characteristic of a ring,
(10) ... the field of fractions of an integral domain,
(11) ... the polynomial ring in one variable with coefficients in a ring,
(12) ... the evaluation homomorphism,
(13) ... a root of a polynomial,
(14) ... a reducible/irreducible polynomial in $K[x]$,
(15) ... an ideal $I \subset R$,
(16) ... the quotient (or factor) ring $R/I$,
(17) ... a maximal ideal,
(18) ... the ideal generated by $f \in R$, denoted $(f)$,
(19) ... a prime ideal.

Know the following examples of rings ...

(1) ... $\mathbb{Z}$, $\mathbb{Q}$, $\mathbb{R}$, $\mathbb{C}$,
(2) ... $\mathbb{Z}/n\mathbb{Z}$,
(3) ... $\text{Mat}_n(\mathbb{R})$, $\text{Mat}_n(S)$,
(4) ... $C(\mathbb{R})$,
(5) ... $R[x]$.

Know our theorems.

Know how to calculate in $\mathbb{Z}/n\mathbb{Z}$.

Know the division algorithm for polynomials in $K[x]$.

Know the various tests for polynomial irreducibility.

Know the Fundamental Isomorphism Theorem.

Know when $K[x]/(f(x))$ is a field.

Know when $R/I$ is a field/integral domain.