```
Θ[K_] := Module[{Cs, φ, n, A, s, i, j, k, Δ, G, ν, α, β, gEval, c, z},
  {Cs, φ} = Rot[K]; n = Length[Cs];
  A = IdentityMatrix[2 n + 1];
  Cases[Cs, {s_, i_, j_} :>
    (A[[{i, j}, {i + 1, j + 1}]] += {{-T^s, T^s - 1}, {0, -1}})];
  Δ = T^((-Total[φ] - Total[Cs[[All, 1]]])/2) Det[A];
  G = Inverse[A];
  gEval[ℰ_] := Factor[ℰ /. g_{ν_, α_, β_} :> (G[[α, β]] /. T -> T_ν)];
  z = gEval[Sum[Sum[Θ[Cs[[k1]], Cs[[k2]]], {k2, 1, n}], {k1, 1, n}]];
  z += gEval[Sum[R_1 @@ Cs[[k]], {k, 1, n}]];
  z += gEval[Sum[Γ_1[φ[[k]], k], {k, 1, 2 n}]];
  {Δ, (Δ /. T -> T_1) (Δ /. T -> T_2) (Δ /. T -> T_3) z} // Factor];
```