```
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[∑_{k1=1}^n ∑_{k2=1}^n Θ[Cs[[k1]], Cs[[k2]]]];
   z += gEval[∑_{k=1}^n R_1 @@ Cs[[k]]];
   z += gEval[∑_{k=1}^(2 n) Γ_1[φ[[k]], k]];
   {Δ, (Δ /. T -> T_1) (Δ /. T -> T_2) (Δ /. T -> T_3) z} //
    Factor];
```