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Θ[K_] := Θ[K] = Module[ {X, φ, n, A, Δ, G, ev, θ},
  (* 01 *) {X, φ} = Rot[K]; n = Length[X];
  (* 02 *) A = IdentityMatrix[2 n + 1];
  (* 03 *) Cases[X, {s_, i_, j_} => (A[[{i, j}, {i + 1, j + 1}]] += (
    
$$\begin{pmatrix} -T^s & T^s & -1 \\ \theta & & -1 \end{pmatrix}$$

  ))];
  (* 04 *) Δ = T^(-Total[φ]-Total[X[[All,1]]])/2 Det[A];
  (* 05 *) G = Inverse[A];
  (* 06 *) ev[ε_] := Factor[ε /. gv,α,β => (G[[α, β]] /. T → Tv)];
  (* 07 *) θ = ev[Sumk=1n F1[X[[k]]]];
  (* 08 *) θ += ev[Sumk1=1n Sumk2=1n F2[X[[k1]], X[[k2]]]];
  (* 09 *) θ += ev[Sumk=12n F3[φ[[k]], k]];
  (* 10 *) Factor@{Δ, (Δ /. T → T1) (Δ /. T → T2) (Δ /. T → T3) θ}
];

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