# Q1) Integral Slot Winding

In this part, 20 pole, 120 slot, 3-phase machines winding diagram is designed. Distribution factor, pitch factor, winding factor is calculated for fundamental, 3rd and 5th components.

Q(number of slots) = 120, p(pole pairs) = 10, m(number of phases) = 3;

slots per pole per phase slot angle

Double layer, short pitch winding diagram for one pole pair;

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 120 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|  | A1 | A2 | -C1 | -C2 | B1 | B2 | -A3 | -A4 | C3 | C4 | -B3 | -B4 |
| A3 | A4 | -C3 | -C4 | B3 | B4 | -A1 | -A2 | C1 | C2 | -B1 | -B2 |  |

λ (coil pitch) = 150°

* Fundamental component;

Distribution factor

Pitch factor

Winding factor

* 3rd harmonic component;

Distribution factor

Pitch factor

Winding factor

* 5th harmonic component;

Distribution factor

Pitch factor

Winding factor

# Q2) Fractional Slot Winding Design