

Formally self-dual codes over  $\mathbb{Z}_4$   
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1. FORMALLY SELF-DUAL CODES OVER  $\mathbb{Z}_4$  OF LENGTHS UP TO 10

We list up the generator matrices and Lee weight enumerators of free and non-free formally self-dual codes over  $\mathbb{Z}_4$  of lengths 2,4,6,8, and 10, up to equivalence, obtained by using construction I,II, and III. The \*-marked codes denote the ones with the largest minimum weight. Most of the examples listed below are formally self-dual codes but not self-dual codes.

TABLE 1. Free formally self-dual codes over  $\mathbb{Z}_4$  of length 2

Code	Generator matrix	Lee weight enumerator
$C_{2,1}$	$\begin{bmatrix} 1 & 0 \end{bmatrix}$	$X^4 + 2X^3Y + X^2Y^2$
$C_{2,2}^*$	$\begin{bmatrix} 1 & 1 \end{bmatrix}$	$X^4 + 2X^2Y^2 + Y^4$
$C_{2,3}^*$	$\begin{bmatrix} 1 & 2 \end{bmatrix}$	$X^4 + X^2Y^2 + 2XY^3$

TABLE 2. Non-free formally self-dual codes over  $\mathbb{Z}_4$  of length 2

No.	Generator matrix	Lee weight enumerator
$C_{2,4}^*$	$\begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$	$X^4 + 2X^2Y^2 + Y^4$

Note that  $C_{2,4}^*$  is self-dual code over  $\mathbb{Z}_4$  of length 2.

TABLE 3. Free formally self-dual codes over  $\mathbb{Z}_4$  of length 4

Code	Generator matrix	Lee weight enumerator	construction
$C_{4,1}$	$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix}$	$X^8 + 4X^7Y + 6X^6Y^2 + 4X^5Y^3 + X^4Y^4$	II
$C_{4,2}$	$\begin{bmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix}$	$X^8 + 2X^7Y + 3X^6Y^2 + 4X^5Y^3 + 3X^4Y^4 + 2X^3Y^5 + X^2Y^6$	II
$C_{4,3}$	$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 2 \end{bmatrix}$	$X^8 + 2X^7Y + 2X^6Y^2 + 4X^5Y^3 + 5X^4Y^4 + 2X^3Y^5$	II
$C_{4,4}$	$\begin{bmatrix} 1 & 0 & 2 & 2 \\ 0 & 1 & 2 & 2 \end{bmatrix}$	$X^8 + 6X^6Y^2 + X^4Y^4 + 4X^3Y^5 + 4XY^7$	I-(vi)
$C_{4,5}$	$\begin{bmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \end{bmatrix}$	$X^8 + 4X^6Y^2 + 6X^4Y^4 + 4X^2Y^6 + Y^8$	II
$C_{4,6}$	$\begin{bmatrix} 1 & 0 & 2 & 0 \\ 0 & 1 & 0 & 1 \end{bmatrix}$	$X^8 + 3X^6Y^2 + 2X^5Y^3 + 3X^4Y^4 + 4X^3Y^5 + X^2Y^6 + 2XY^7$	II
$C_{4,7}$	$\begin{bmatrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 \end{bmatrix}$	$X^8 + 2X^6Y^2 + 4X^5Y^3 + X^4Y^4 + 4X^3Y^5 + 4X^2Y^6$	III
$C_{4,8}$	$\begin{bmatrix} 1 & 0 & 2 & 0 \\ 0 & 1 & 0 & 2 \end{bmatrix}$		II,I-(ii)
$C_{4,9}$	$\begin{bmatrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 1 \end{bmatrix}$		III
$C_{4,10}$	$\begin{bmatrix} 1 & 0 & 2 & 0 \\ 0 & 1 & 2 & 2 \end{bmatrix}$	$X^8 + 2X^6Y^2 + 2X^5Y^3 + 5X^4Y^4 + 4X^3Y^5 + 2XY^7$	I-(iii)
$C_{4,11}$	$\begin{bmatrix} 1 & 0 & 1 & 2 \\ 0 & 1 & 0 & 1 \end{bmatrix}$	$X^8 + 2X^6Y^2 + 10X^4Y^4 + 2X^2Y^6 + Y^8$	III
$C_{4,12}$	$\begin{bmatrix} 1 & 0 & 1 & 2 \\ 0 & 1 & 2 & 0 \end{bmatrix}$	$X^8 + X^6Y^2 + 4X^5Y^3 + 3X^4Y^4 + 4X^3Y^5 + 3X^2Y^6$	I-(i)
$C_{4,13}$	$\begin{bmatrix} 1 & 0 & 1 & 2 \\ 0 & 1 & 2 & 2 \end{bmatrix}$		
$C_{4,14}$	$\begin{bmatrix} 1 & 0 & 1 & 2 \\ 0 & 1 & 1 & 1 \end{bmatrix}$	$X^8 + 4X^5Y^3 + 5X^4Y^4 + 4X^3Y^5 + 2X^2Y^6$	III
$C_{4,15}$	$\begin{bmatrix} 1 & 0 & 1 & 3 \\ 0 & 1 & 1 & 1 \end{bmatrix}$		
$C_{4,16}^*$	$\begin{bmatrix} 1 & 0 & 2 & 1 \\ 0 & 1 & 1 & 2 \end{bmatrix}$	$X^8 + 14X^4Y^4 + Y^8$	III

TABLE 4. Non-free formally self-dual codes over  $\mathbb{Z}_4$  of length 4

No.	Generator matrix	Lee weight enumerator	construction
$C_{4,16}$	$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 2 & 0 & 0 \\ 0 & 0 & 2 & 0 \end{bmatrix}$	$X^8 + 2X^7Y + 3X^6Y^2 + 4X^5Y^3 + 3X^4Y^4 + 2X^3Y^5 + X^2Y^6$	II
$C_{4,17}$	$\begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 2 & 0 & 0 \\ 0 & 0 & 2 & 0 \end{bmatrix}$	$X^8 + 4X^6Y^2 + 6X^4Y^4 + 4X^2Y^6 + Y^8$	II
$C_{4,18}$	$\begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & 2 & 0 & 0 \\ 0 & 0 & 2 & 0 \end{bmatrix}$	$X^8 + 3X^6Y^2 + 2X^5Y^3 + 3X^4Y^4 + 4X^3Y^5 + X^2Y^6 + 2XY^7$	II

TABLE 5. Free formally self-dual codes over  $\mathbb{Z}_4$  of length 6

No.	Generator Matrix	Lee weight enumerator	Construction
1	$\begin{bmatrix} I_3 & 0 & 0 & 0 \\ & 0 & 0 & 0 \\ & 0 & 0 & 0 \end{bmatrix}$	$X^{12} + 6X^{11}Y + 15X^{10}Y^2 + 20X^9Y^3 + 15X^8Y^4 + 6X^7Y^5 + X^6Y^6$	II
2	$\begin{bmatrix} I_3 & 1 & 0 & 0 \\ & 0 & 0 & 0 \\ & 0 & 0 & 0 \end{bmatrix}$	$X^{12} + 4X^{11}Y + 8X^{10}Y^2 + 12X^9Y^3 + 14X^8Y^4 + 12X^7Y^5 + 8X^6Y^6 + 4X^5Y^7 + X^4Y^8$	II
3	$\begin{bmatrix} I_3 & 2 & 0 & 0 \\ & 0 & 0 & 0 \\ & 0 & 0 & 0 \end{bmatrix}$	$X^{12} + 4X^{11}Y + 7X^{10}Y^2 + 10X^9Y^3 + 15X^8Y^4 + 16X^7Y^5 + 9X^6Y^6 + 2X^5Y^7$	II
4	$\begin{bmatrix} I_3 & 0 & 0 & 0 \\ & 0 & 2 & 2 \\ & 0 & 2 & 2 \end{bmatrix}$	$X^{12} + 2X^{11}Y + 7X^{10}Y^2 + 12X^9Y^3 + 7X^8Y^4 + 6X^7Y^5 + 9X^6Y^6 + 8X^5Y^7 + 8X^4Y^8 + 4X^3Y^9$	II
5	$\begin{bmatrix} I_3 & 1 & 0 & 0 \\ & 0 & 1 & 0 \\ & 0 & 0 & 0 \end{bmatrix}$	$X^{12} + 2X^{11}Y + 5X^{10}Y^2 + 8X^9Y^3 + 10X^8Y^4 + 12X^7Y^5 + 10X^6Y^6 + 8X^5Y^7 + 5X^4Y^8 + 2X^3Y^9 + X^2Y^{10}$	II
6	$\begin{bmatrix} I_3 & 1 & 0 & 0 \\ & 0 & 0 & 0 \\ & 0 & 0 & 0 \end{bmatrix}$	$X^{12} + 2X^{11}Y + 4X^{10}Y^2 + 8X^9Y^3 + 10X^8Y^4 + 12X^7Y^5 + 12X^6Y^6 + 8X^5Y^7 + 5X^4Y^8 + 2X^3Y^9$	II
7	$\begin{bmatrix} I_3 & 0 & 0 & 0 \\ & 0 & 1 & 1 \\ & 0 & 0 & 1 \end{bmatrix}$	$X^{12} + 2X^{11}Y + 3X^{10}Y^2 + 8X^9Y^3 + 11X^8Y^4 + 10X^7Y^5 + 13X^6Y^6 + 12X^5Y^7 + 4X^4Y^8$	II
8	$\begin{bmatrix} I_3 & 0 & 0 & 0 \\ & 0 & 2 & 0 \\ & 0 & 0 & 2 \end{bmatrix}$		
9	$\begin{bmatrix} I_3 & 0 & 0 & 0 \\ & 0 & 1 & 1 \\ & 0 & 1 & 1 \end{bmatrix}$		
10	$\begin{bmatrix} I_3 & 0 & 0 & 0 \\ & 0 & 2 & 0 \\ & 0 & 2 & 2 \end{bmatrix}$	$X^{12} + 2X^{11}Y + 3X^{10}Y^2 + 6X^9Y^3 + 11X^8Y^4 + 16X^7Y^5 + 13X^6Y^6 + 6X^5Y^7 + 4X^4Y^8 + 2X^3Y^9$	II
11	$\begin{bmatrix} I_3 & 0 & 0 & 0 \\ & 0 & 1 & 2 \\ & 0 & 0 & 1 \end{bmatrix}$	$X^{12} + 2X^{11}Y + 3X^{10}Y^2 + 4X^9Y^3 + 12X^8Y^4 + 20X^7Y^5 + 12X^6Y^6 + 4X^5Y^7 + 3X^4Y^8 + 2X^3Y^9 + X^2Y^{10}$	II
12	$\begin{bmatrix} I_3 & 0 & 0 & 0 \\ & 0 & 1 & 2 \\ & 0 & 2 & 0 \end{bmatrix}$	$X^{12} + 2X^{11}Y + 2X^{10}Y^2 + 6X^9Y^3 + 12X^8Y^4 + 14X^7Y^5 + 14X^6Y^6 + 10X^5Y^7 + 3X^4Y^8$	II
13	$\begin{bmatrix} I_3 & 0 & 0 & 0 \\ & 0 & 1 & 2 \\ & 0 & 2 & 2 \end{bmatrix}$		
14	$\begin{bmatrix} I_3 & 0 & 0 & 0 \\ & 0 & 1 & 2 \\ & 0 & 1 & 1 \end{bmatrix}$		
15	$\begin{bmatrix} I_3 & 0 & 0 & 0 \\ & 0 & 1 & 3 \\ & 0 & 1 & 1 \end{bmatrix}$	$X^{12} + 2X^{11}Y + X^{10}Y^2 + 4X^9Y^3 + 13X^8Y^4 + 18X^7Y^5 + 15X^6Y^6 + 8X^5Y^7 + 2X^4Y^8$	II
16	$\begin{bmatrix} I_3 & 0 & 0 & 0 \\ & 0 & 2 & 1 \\ & 0 & 1 & 2 \end{bmatrix}$	$X^{12} + 2X^{11}Y + X^{10}Y^2 + 14X^8Y^4 + 28X^7Y^5 + 14X^6Y^6 + X^4Y^8 + 2X^3Y^9 + X^2Y^{10}$	II
17	$\begin{bmatrix} I_3 & 2 & 2 & 2 \\ & 2 & 2 & 2 \\ & 2 & 2 & 2 \end{bmatrix}$	$X^{12} + 15X^{10}Y^2 + 15X^8Y^4 + X^6Y^6 + 6X^5Y^7 + 20X^3Y^9 + 6XY^{11}$	I-(v)
18	$\begin{bmatrix} I_3 & 1 & 0 & 0 \\ & 0 & 2 & 2 \\ & 0 & 2 & 2 \end{bmatrix}$	$X^{12} + 8X^{10}Y^2 + 14X^8Y^4 + 4X^7Y^5 + 8X^6Y^6 + 12X^5Y^7 + X^4Y^8 + 12X^3Y^9 + 4XY^{11}$	II, I-(iv),(v)
19	$\begin{bmatrix} I_3 & 2 & 0 & 0 \\ & 0 & 2 & 2 \\ & 2 & 0 & 0 \end{bmatrix}$	$X^{12} + 7X^{10}Y^2 + 4X^9Y^3 + 7X^8Y^4 + 10X^7Y^5 + X^6Y^6 + 16X^5Y^7 + 8X^4Y^8 + 2X^3Y^9 + 8X^2Y^{10}$	I-(ii)
20	$\begin{bmatrix} I_3 & 2 & 2 & 2 \\ & 2 & 0 & 0 \\ & 2 & 0 & 0 \end{bmatrix}$	$X^{12} + 7X^{10}Y^2 + 4X^9Y^3 + 7X^8Y^4 + 8X^7Y^5 + 9X^6Y^6 + 6X^5Y^7 + 8X^4Y^8 + 12X^3Y^9 + 2XY^{11}$	I-(iv)

Table 5. Free formally self-dual codes over  $\mathbb{Z}_4$  of length 6 (cont'd.)

No.	Generator Matrix	Lee weight enumerator	Construction	Even
21	$\begin{bmatrix} I_3 & 2 & 0 & 0 \\ & 0 & 2 & 2 \\ & 0 & 2 & 2 \end{bmatrix}$	$X^{12} + 7X^{10}Y^2 + 2X^9Y^3 + 7X^8Y^4 + 16X^7Y^5 + X^6Y^6 + 10X^5Y^7 + 8X^4Y^8 + 4X^3Y^9 + 8X^2Y^{10}$	II	
22	$\begin{bmatrix} I_3 & 2 & 2 & 0 \\ & 2 & 2 & 2 \\ & 2 & 2 & 2 \end{bmatrix}$	$X^{12} + 7X^{10}Y^2 + 15X^8Y^4 + 2X^7Y^5 + 9X^6Y^6 + 16X^5Y^7 + 10X^3Y^9 + 4XY^{11}$	I-(v)	
23	$\begin{bmatrix} I_3 & 1 & 2 & 2 \\ & 2 & 0 & 0 \\ & 2 & 0 & 0 \end{bmatrix}$	$X^{12} + 6X^{10}Y^2 + 8X^9Y^3 + 2X^8Y^4 + 8X^7Y^5 + 8X^6Y^6 + 8X^5Y^7 + 13X^4Y^8 + 8X^3Y^9 + 2X^2Y^{10}$	I-(i)	
24	$\begin{bmatrix} I_3 & 1 & 2 & 2 \\ & 2 & 2 & 2 \\ & 2 & 2 & 2 \end{bmatrix}$			
25	$\begin{bmatrix} I_3 & 0 & 0 & 1 \\ & 0 & 0 & 1 \\ & 1 & 1 & 0 \end{bmatrix}$	$X^{12} + 6X^{10}Y^2 + 2X^9Y^3 + 9X^8Y^4 + 12X^7Y^5 + X^6Y^6 + 18X^5Y^7 + 6X^4Y^8 + 9X^2Y^{10}$	III	
26	$\begin{bmatrix} I_3 & 1 & 0 & 0 \\ & 0 & 1 & 0 \\ & 0 & 0 & 1 \end{bmatrix}$	$X^{12} + 6X^{10}Y^2 + 15X^8Y^4 + 20X^6Y^6 + 15X^4Y^8 + 6X^2Y^{10} + Y^{12}$	II	○
27	$\begin{bmatrix} I_3 & 0 & 0 & 1 \\ & 0 & 0 & 1 \\ & 1 & 1 & 1 \end{bmatrix}$		III	
28	$\begin{bmatrix} I_3 & 0 & 0 & 1 \\ & 0 & 0 & 1 \\ & 1 & 1 & 2 \end{bmatrix}$	$X^{12} + 6X^{10}Y^2 + 9X^8Y^4 + 18X^7Y^5 + X^6Y^6 + 12X^5Y^7 + 6X^4Y^8 + 2X^3Y^9 + 9X^2Y^{10}$	I	
29	$\begin{bmatrix} I_3 & 1 & 0 & 0 \\ & 0 & 2 & 0 \\ & 0 & 0 & 1 \end{bmatrix}$	$X^{12} + 5X^{10}Y^2 + 2X^9Y^3 + 10X^8Y^4 + 8X^7Y^5 + 10X^6Y^6 + 12X^5Y^7 + 5X^4Y^8 + 8X^3Y^9 + X^2Y^{10} + 2XY^{11}$	II	
30	$\begin{bmatrix} I_3 & 1 & 0 & 0 \\ & 0 & 1 & 1 \\ & 0 & 0 & 1 \end{bmatrix}$	$X^{12} + 4X^{10}Y^2 + 4X^9Y^3 + 6X^8Y^4 + 12X^7Y^5 + 8X^6Y^6 + 12X^5Y^7 + 9X^4Y^8 + 4X^3Y^9 + 4X^2Y^{10}$	II	
31	$\begin{bmatrix} I_3 & 1 & 0 & 0 \\ & 0 & 2 & 0 \\ & 0 & 0 & 2 \end{bmatrix}$		I-(ii),(iii)	
32	$\begin{bmatrix} I_3 & 1 & 0 & 0 \\ & 0 & 1 & 1 \\ & 0 & 1 & 1 \end{bmatrix}$		II	
33	$\begin{bmatrix} I_3 & 1 & 0 & 0 \\ & 0 & 2 & 0 \\ & 0 & 2 & 0 \end{bmatrix}$	$X^{12} + 4X^{10}Y^2 + 2X^9Y^3 + 10X^8Y^4 + 8X^7Y^5 + 12X^6Y^6 + 12X^5Y^7 + 5X^4Y^8 + 8X^3Y^9 + 2XY^{11}$	II, I-(ii),(iii),(iv),(v)	
34	$\begin{bmatrix} I_3 & 1 & 0 & 0 \\ & 0 & 1 & 2 \\ & 0 & 0 & 1 \end{bmatrix}$	$X^{12} + 4X^{10}Y^2 + 15X^8Y^4 + 24X^6Y^6 + 15X^4Y^8 + 4X^2Y^{10} + Y^{12}$	II	○
35	$\begin{bmatrix} I_3 & 1 & 0 & 0 \\ & 0 & 1 & 2 \\ & 2 & 0 & 0 \end{bmatrix}$	$X^{12} + 3X^{10}Y^2 + 8X^9Y^3 + 6X^8Y^4 + 10X^6Y^6 + 24X^5Y^7 + 9X^4Y^8 + 3X^2Y^{10}$	III	
36	$\begin{bmatrix} I_3 & 0 & 0 & 2 \\ & 0 & 0 & 2 \\ & 2 & 1 & 2 \end{bmatrix}$	$X^{12} + 3X^{10}Y^2 + 8X^9Y^3 + 4X^8Y^4 + 4X^7Y^5 + 12X^6Y^6 + 16X^5Y^7 + 11X^4Y^8 + 4X^3Y^9 + X^2Y^{10}$	III	
37	$\begin{bmatrix} I_3 & 2 & 0 & 2 \\ & 0 & 2 & 2 \\ & 2 & 2 & 0 \end{bmatrix}$	$X^{12} + 3X^{10}Y^2 + 8X^9Y^3 + 3X^8Y^4 + 6X^7Y^5 + 13X^6Y^6 + 12X^5Y^7 + 12X^4Y^8 + 6X^3Y^9$	I-(iii)	
38	$\begin{bmatrix} I_3 & 2 & 1 & 1 \\ & 0 & 2 & 2 \\ & 2 & 1 & 1 \end{bmatrix}$		I-(ii)	
39	$\begin{bmatrix} I_3 & 0 & 0 & 2 \\ & 2 & 1 & 1 \\ & 0 & 0 & 1 \end{bmatrix}$		I-(ii),(iii)	
40	$\begin{bmatrix} I_3 & 2 & 0 & 2 \\ & 0 & 2 & 2 \\ & 2 & 2 & 0 \end{bmatrix}$		III	
41	$\begin{bmatrix} I_3 & 2 & 0 & 0 \\ & 0 & 1 & 1 \\ & 0 & 0 & 1 \end{bmatrix}$	$X^{12} + 3X^{10}Y^2 + 6X^9Y^3 + 3X^8Y^4 + 12X^7Y^5 + 13X^6Y^6 + 6X^5Y^7 + 12X^4Y^8 + 8X^3Y^9$	II	
42	$\begin{bmatrix} I_3 & 2 & 0 & 0 \\ & 0 & 2 & 0 \\ & 0 & 0 & 2 \end{bmatrix}$			
43	$\begin{bmatrix} I_3 & 2 & 0 & 0 \\ & 0 & 1 & 1 \\ & 0 & 1 & 1 \end{bmatrix}$			

Table 5. Free formally self-dual codes over  $\mathbb{Z}_4$  of length 6 (cont'd.)

No.	Generator Matrix	Lee weight enumerator	Construction	Even
44	$\begin{bmatrix} I_3 & 2 & 0 & 0 \\ & 0 & 2 & 0 \\ & 0 & 2 & 2 \end{bmatrix}$	$X^{12} + 3X^{10}Y^2 + 4X^9Y^3 + 7X^8Y^4 + 10X^7Y^5 + 9X^6Y^6 + 16X^5Y^7 + 8X^4Y^8 + 2X^3Y^9 + 4X^2Y^{10}$	II	
45	$\begin{bmatrix} I_3 & 1 & 0 & 0 \\ & 0 & 1 & 2 \\ & 0 & 2 & 0 \end{bmatrix}$	$X^{12} + 3X^{10}Y^2 + 4X^9Y^3 + 6X^8Y^4 + 12X^7Y^5 + 10X^6Y^6 + 12X^5Y^7 + 9X^4Y^8 + 4X^3Y^9 + 3X^2Y^{10}$	II, I-(i)	
46	$\begin{bmatrix} I_3 & 1 & 0 & 0 \\ & 0 & 1 & 2 \\ & 0 & 2 & 2 \end{bmatrix}$			
47	$\begin{bmatrix} I_3 & 0 & 0 & 1 \\ & 0 & 1 & 2 \\ & 1 & 2 & 2 \end{bmatrix}$	$X^{12} + 3X^{10}Y^2 + 4X^9Y^3 + 4X^8Y^4 + 16X^7Y^5 + 12X^6Y^6 + 4X^5Y^7 + 11X^4Y^8 + 8X^3Y^9 + X^2Y^{10}$	III	
48	$\begin{bmatrix} I_3 & 2 & 0 & 0 \\ & 0 & 1 & 2 \\ & 0 & 0 & 1 \end{bmatrix}$	$X^{12} + 3X^{10}Y^2 + 2X^9Y^3 + 12X^8Y^4 + 4X^7Y^5 + 12X^6Y^6 + 20X^5Y^7 + 3X^4Y^8 + 4X^3Y^9 + X^2Y^{10} + 2XY^{11}$	II	
49	$\begin{bmatrix} I_3 & 2 & 2 & 2 \\ & 2 & 0 & 2 \\ & 2 & 0 & 0 \end{bmatrix}$	$X^{12} + 3X^{10}Y^2 + 2X^9Y^3 + 11X^8Y^4 + 6X^7Y^5 + 13X^6Y^6 + 16X^5Y^7 + 4X^4Y^8 + 6X^3Y^9 + 2XY^{11}$	I-(iv)	
50	$\begin{bmatrix} I_3 & 0 & 0 & 2 \\ & 0 & 2 & 2 \\ & 2 & 2 & 0 \end{bmatrix}$		IIV)	
51	$\begin{bmatrix} I_3 & 2 & 0 & 0 \\ & 0 & 1 & 2 \\ & 0 & 2 & 0 \end{bmatrix}$	$X^{12} + 3X^{10}Y^2 + 2X^9Y^3 + 7X^8Y^4 + 16X^7Y^5 + 9X^6Y^6 + 10X^5Y^7 + 8X^4Y^8 + 4X^3Y^9 + 4X^2Y^{10}$	II	
52	$\begin{bmatrix} I_3 & 2 & 0 & 0 \\ & 0 & 1 & 2 \\ & 0 & 2 & 2 \end{bmatrix}$			
53	$\begin{bmatrix} I_3 & 2 & 0 & 2 \\ & 0 & 2 & 2 \\ & 2 & 0 & 0 \end{bmatrix}$		I-(ii)	
54	$\begin{bmatrix} I_3 & 2 & 2 & 0 \\ & 0 & 2 & 2 \\ & 2 & 2 & 2 \end{bmatrix}$	$X^{12} + 3X^{10}Y^2 + 11X^8Y^4 + 12X^7Y^5 + 13X^6Y^6 + 10X^5Y^7 + 4X^4Y^8 + 8X^3Y^9 + 2XY^{11}$	I-(iii)	
55	$\begin{bmatrix} I_3 & 2 & 2 & 2 \\ & 2 & 1 & 1 \\ & 2 & 1 & 1 \end{bmatrix}$		I-(iv)	
56	$\begin{bmatrix} I_3 & 2 & 0 & 2 \\ & 2 & 1 & 1 \\ & 0 & 0 & 1 \end{bmatrix}$		I-(iv),(v)	
57	$\begin{bmatrix} I_3 & 2 & 2 & 2 \\ & 2 & 0 & 2 \\ & 0 & 1 & 2 \end{bmatrix}$			
58	$\begin{bmatrix} I_3 & 1 & 0 & 0 \\ & 0 & 1 & 2 \\ & 2 & 0 & 2 \end{bmatrix}$	$X^{12} + 3X^{10}Y^2 + 6X^8Y^4 + 24X^7Y^5 + 10X^6Y^6 + 9X^4Y^8 + 8X^3Y^9 + 3X^2Y^{10}$	III	
59	$\begin{bmatrix} I_3 & 1 & 0 & 0 \\ & 0 & 1 & 1 \\ & 1 & 0 & 1 \end{bmatrix}$	$X^{12} + 2X^{10}Y^2 + 6X^9Y^3 + 5X^8Y^4 + 8X^7Y^5 + 13X^6Y^6 + 14X^5Y^7 + 10X^4Y^8 + 4X^3Y^9 + X^2Y^{10}$	III	
60	$\begin{bmatrix} I_3 & 1 & 1 & 0 \\ & 0 & 1 & 1 \\ & 0 & 1 & 1 \end{bmatrix}$			
61	$\begin{bmatrix} I_3 & 1 & 1 & 1 \\ & 0 & 1 & 1 \\ & 1 & 1 & 1 \end{bmatrix}$			
62	$\begin{bmatrix} I_3 & 0 & 0 & 2 \\ & 2 & 2 & 0 \\ & 0 & 1 & 2 \end{bmatrix}$		I-(iv),(v)	
63	$\begin{bmatrix} I_3 & 0 & 0 & 2 \\ & 2 & 2 & 2 \\ & 0 & 1 & 2 \end{bmatrix}$			
64	$\begin{bmatrix} I_3 & 2 & 0 & 0 \\ & 0 & 1 & 2 \\ & 0 & 2 & 0 \end{bmatrix}$	$X^{12} + 2X^{10}Y^2 + 6X^9Y^3 + 4X^8Y^4 + 10X^7Y^5 + 14X^6Y^6 + 10X^5Y^7 + 11X^4Y^8 + 6X^3Y^9$	III	
65	$\begin{bmatrix} I_3 & 2 & 0 & 0 \\ & 0 & 1 & 2 \\ & 0 & 2 & 2 \end{bmatrix}$			
66	$\begin{bmatrix} I_3 & 1 & 2 & 0 \\ & 2 & 0 & 2 \\ & 0 & 2 & 0 \end{bmatrix}$			
67	$\begin{bmatrix} I_3 & 1 & 2 & 0 \\ & 2 & 2 & 2 \\ & 0 & 2 & 0 \end{bmatrix}$			

Table 5. Free formally self-dual codes over  $\mathbb{Z}_4$  of length 6 (cont'd.)

No.	Generator Matrix	Lee weight enumerator	Construction	Even
68	$\begin{bmatrix} I_3 & 1 & 0 & 0 \\ & 0 & 1 & 2 \\ & 0 & 1 & 1 \end{bmatrix}$	$X^{12} + 2X^{10}Y^2 + 4X^9Y^3 + 6X^8Y^4 + 12X^7Y^5 + 12X^6Y^6 + 12X^5Y^7 + 9X^4Y^8 + 4X^3Y^9 + 2X^2Y^{10}$	II	
69	$\begin{bmatrix} I_3 & 1 & 0 & 0 \\ & 0 & 1 & 3 \\ & 0 & 1 & 1 \end{bmatrix}$			
70	$\begin{bmatrix} I_3 & 1 & 2 & 2 \\ & 2 & 0 & 2 \\ & 2 & 0 & 0 \end{bmatrix}$		I-(i)	
71	$\begin{bmatrix} I_3 & 3 & 2 & 2 \\ & 2 & 3 & 0 \\ & 2 & 2 & 2 \end{bmatrix}$			
72	$\begin{bmatrix} I_3 & 1 & 2 & 2 \\ & 2 & 2 & 2 \\ & 2 & 2 & 0 \end{bmatrix}$			
73	$\begin{bmatrix} I_3 & 1 & 2 & 1 \\ & 1 & 1 & 1 \\ & 1 & 1 & 1 \end{bmatrix}$	$X^{12} + 2X^{10}Y^2 + 4X^9Y^3 + 5X^8Y^4 + 14X^7Y^5 + 13X^6Y^6 + 8X^5Y^7 + 10X^4Y^8 + 6X^3Y^9 + X^2Y^{10}$	III	
74	$\begin{bmatrix} I_3 & 1 & 2 & 3 \\ & 1 & 1 & 3 \\ & 3 & 3 & 1 \end{bmatrix}$			
75	$\begin{bmatrix} I_3 & 1 & 3 & 0 \\ & 1 & 1 & 1 \\ & 0 & 1 & 0 \end{bmatrix}$			
76	$\begin{bmatrix} I_3 & 1 & 0 & 0 \\ & 0 & 1 & 1 \\ & 1 & 0 & 2 \end{bmatrix}$	$X^{12} + 2X^{10}Y^2 + 2X^9Y^3 + 9X^8Y^4 + 12X^7Y^5 + 9X^6Y^6 + 18X^5Y^7 + 6X^4Y^8 + 5X^2Y^{10}$	III	
77	$\begin{bmatrix} I_3 & 1 & 0 & 0 \\ & 0 & 2 & 1 \\ & 0 & 1 & 2 \end{bmatrix}$	$X^{12} + 2X^{10}Y^2 + 15X^8Y^4 + 28X^6Y^6 + 15X^4Y^8 + 2X^2Y^{10} + Y^{12}$	II	○
78	$\begin{bmatrix} I_3 & 1 & 0 & 0 \\ & 0 & 1 & 2 \\ & 2 & 0 & 1 \end{bmatrix}$		III	
79	$\begin{bmatrix} I_3 & 0 & 0 & 1 \\ & 0 & 2 & 1 \\ & 1 & 1 & 1 \end{bmatrix}$			
80	$\begin{bmatrix} I_3 & 2 & 0 & 2 \\ & 2 & 2 & 0 \\ & 0 & 1 & 2 \end{bmatrix}$	$X^{12} + 2X^{10}Y^2 + 12X^8Y^4 + 10X^7Y^5 + 14X^6Y^6 + 14X^5Y^7 + 3X^4Y^8 + 6X^3Y^9 + 2XY^{11}$	I-(iv),(v)	
81	$\begin{bmatrix} I_3 & 2 & 0 & 2 \\ & 0 & 1 & 2 \\ & 2 & 2 & 2 \end{bmatrix}$		III	
82	$\begin{bmatrix} I_3 & 1 & 2 & 2 \\ & 2 & 0 & 2 \\ & 2 & 2 & 0 \end{bmatrix}$	$X^{12} + 2X^{10}Y^2 + 10X^8Y^4 + 16X^7Y^5 + 8X^6Y^6 + 16X^5Y^7 + 5X^4Y^8 + 6X^2Y^{10}$	I-(i)	
83	$\begin{bmatrix} I_3 & 1 & 2 & 2 \\ & 2 & 1 & 1 \\ & 2 & 1 & 1 \end{bmatrix}$			
84	$\begin{bmatrix} I_3 & 1 & 0 & 2 \\ & 2 & 1 & 1 \\ & 0 & 0 & 1 \end{bmatrix}$		I-(i)	
85	$\begin{bmatrix} I_3 & 0 & 0 & 1 \\ & 0 & 2 & 1 \\ & 1 & 1 & 2 \end{bmatrix}$	$X^{12} + 2X^{10}Y^2 + 9X^8Y^4 + 18X^7Y^5 + 9X^6Y^6 + 12X^5Y^7 + 6X^4Y^8 + 2X^3Y^9 + 5X^2Y^{10}$	III	
86	$\begin{bmatrix} I_3 & 2 & 2 & 1 \\ & 2 & 2 & 1 \\ & 1 & 1 & 2 \end{bmatrix}$			
87	$\begin{bmatrix} I_3 & 2 & 1 & 2 \\ & 1 & 2 & 2 \\ & 2 & 2 & 2 \end{bmatrix}$	$X^{12} + X^{10}Y^2 + 8X^9Y^3 + 6X^8Y^4 + 14X^6Y^6 + 24X^5Y^7 + 9X^4Y^8 + X^2Y^{10}$	III	
88	$\begin{bmatrix} I_3 & 2 & 0 & 0 \\ & 0 & 1 & 2 \\ & 0 & 1 & 1 \end{bmatrix}$	$X^{12} + X^{10}Y^2 + 6X^9Y^3 + 5X^8Y^4 + 8X^7Y^5 + 15X^6Y^6 + 14X^5Y^7 + 10X^4Y^8 + 4X^3Y^9$	II	
89	$\begin{bmatrix} I_3 & 2 & 0 & 0 \\ & 0 & 1 & 3 \\ & 0 & 1 & 1 \end{bmatrix}$			
90	$\begin{bmatrix} I_3 & 2 & 0 & 2 \\ & 0 & 1 & 1 \\ & 2 & 1 & 2 \end{bmatrix}$		III	
91	$\begin{bmatrix} I_3 & 2 & 0 & 2 \\ & 0 & 1 & 1 \\ & 2 & 1 & 3 \end{bmatrix}$			

Table 5. Free formally self-dual codes over  $\mathbb{Z}_4$  of length 6 (cont'd.)

No.	Generator Matrix	Lee weight enumerator	Construction	Even
92	$\begin{bmatrix} I_3 & 2 & 0 & 0 \\ & 0 & 1 & 2 \\ & 1 & 2 & 0 \end{bmatrix}$	$X^{12} + X^{10}Y^2 + 4X^9Y^3 + 8X^8Y^4 + 8X^7Y^5 + 12X^6Y^6 + 20X^5Y^7 + 7X^4Y^8 + 3X^2Y^{10}$	III	
93	$\begin{bmatrix} I_3 & 2 & 0 & 0 \\ & 0 & 1 & 2 \\ & 1 & 1 & 0 \end{bmatrix}$	$X^{12} + X^{10}Y^2 + 4X^9Y^3 + 7X^8Y^4 + 10X^7Y^5 + 13X^6Y^6 + 16X^5Y^7 + 8X^4Y^8 + 2X^3Y^9 + 2X^2Y^{10}$	III	
94	$\begin{bmatrix} I_3 & 0 & 0 & 2 \\ & 0 & 2 & 1 \\ & 2 & 1 & 2 \end{bmatrix}$	$X^{12} + X^{10}Y^2 + 4X^9Y^3 + 6X^8Y^4 + 12X^7Y^5 + 14X^6Y^6 + 12X^5Y^7 + 9X^4Y^8 + 4X^3Y^9 + X^2Y^{10}$	III	
95	$\begin{bmatrix} I_3 & 2 & 2 & 0 \\ & 2 & 2 & 1 \\ & 0 & 1 & 2 \end{bmatrix}$			
96	$\begin{bmatrix} I_3 & 2 & 1 & 1 \\ & 0 & 2 & 2 \\ & 2 & 1 & 3 \end{bmatrix}$	$X^{12} + X^{10}Y^2 + 4X^9Y^3 + 5X^8Y^4 + 14X^7Y^5 + 15X^6Y^6 + 8X^5Y^7 + 10X^4Y^8 + 6X^3Y^9$	I-(ii)	
97	$\begin{bmatrix} I_3 & 0 & 2 & 0 \\ & 2 & 1 & 1 \\ & 0 & 1 & 2 \end{bmatrix}$		I-(ii),(iii)	
98	$\begin{bmatrix} I_3 & 1 & 3 & 2 \\ & 1 & 1 & 0 \\ & 2 & 0 & 0 \end{bmatrix}$		III	
99	$\begin{bmatrix} I_3 & 1 & 2 & 2 \\ & 1 & 1 & 2 \\ & 2 & 2 & 0 \end{bmatrix}$			
100	$\begin{bmatrix} I_3 & 2 & 0 & 0 \\ & 0 & 2 & 1 \\ & 0 & 1 & 2 \end{bmatrix}$	$X^{12} + X^{10}Y^2 + 2X^9Y^3 + 14X^8Y^4 + 14X^6Y^6 + 28X^5Y^7 + X^4Y^8 + X^2Y^{10} + 2XY^{11}$	II	
101	$\begin{bmatrix} I_3 & 2 & 0 & 2 \\ & 0 & 1 & 1 \\ & 2 & 1 & 0 \end{bmatrix}$	$X^{12} + X^{10}Y^2 + 2X^9Y^3 + 7X^8Y^4 + 16X^7Y^5 + 13X^6Y^6 + 10X^5Y^7 + 8X^4Y^8 + 4X^3Y^9 + 2X^2Y^{10}$	III	
102	$\begin{bmatrix} I_3 & 2 & 0 & 2 \\ & 0 & 1 & 1 \\ & 2 & 1 & 1 \end{bmatrix}$			
103	$\begin{bmatrix} I_3 & 2 & 2 & 2 \\ & 2 & 1 & 1 \\ & 2 & 1 & 3 \end{bmatrix}$	$X^{12} + X^{10}Y^2 + 13X^8Y^4 + 8X^7Y^5 + 15X^6Y^6 + 18X^5Y^7 + 2X^4Y^8 + 4X^3Y^9 + 2XY^{11}$	I-(iv)	
104	$\begin{bmatrix} I_3 & 2 & 2 & 0 \\ & 2 & 1 & 1 \\ & 0 & 1 & 2 \end{bmatrix}$		I-(iv),(v)	
105	$\begin{bmatrix} I_3 & 1 & 0 & 2 \\ & 0 & 1 & 2 \\ & 2 & 2 & 0 \end{bmatrix}$	$X^{12} + X^{10}Y^2 + 10X^8Y^4 + 16X^7Y^5 + 10X^6Y^6 + 16X^5Y^7 + 5X^4Y^8 + 5X^2Y^{10}$	I	
106	$\begin{bmatrix} I_3 & 1 & 0 & 2 \\ & 0 & 1 & 2 \\ & 2 & 2 & 2 \end{bmatrix}$			
107	$\begin{bmatrix} I_3 & 1 & 2 & 0 \\ & 2 & 0 & 2 \\ & 0 & 1 & 2 \end{bmatrix}$	$X^{12} + X^{10}Y^2 + 8X^8Y^4 + 20X^7Y^5 + 12X^6Y^6 + 8X^5Y^7 + 7X^4Y^8 + 4X^3Y^9 + 3X^2Y^{10}$	III	
108	$\begin{bmatrix} I_3 & 2 & 0 & 2 \\ & 0 & 1 & 2 \\ & 2 & 2 & 1 \end{bmatrix}$	$X^{12} + X^{10}Y^2 + 6X^8Y^4 + 24X^7Y^5 + 14X^6Y^6 + 9X^4Y^8 + 8X^3Y^9 + X^2Y^{10}$	III	
109	$\begin{bmatrix} I_3 & 1 & 0 & 1 \\ & 0 & 1 & 1 \\ & 1 & 1 & 1 \end{bmatrix}$	$X^{12} + 8X^9Y^3 + 6X^8Y^4 + 16X^6Y^6 + 24X^5Y^7 + 9X^4Y^8$	III	
110	$\begin{bmatrix} I_3 & 1 & 0 & 1 \\ & 0 & 1 & 1 \\ & 1 & 1 & 0 \end{bmatrix}$	$X^{12} + 6X^9Y^3 + 6X^8Y^4 + 6X^7Y^5 + 16X^6Y^6 + 18X^5Y^7 + 9X^4Y^8 + 2X^3Y^9$	III	
111	$\begin{bmatrix} I_3 & 1 & 0 & 1 \\ & 0 & 1 & 1 \\ & 1 & 1 & 2 \end{bmatrix}$			
112	$\begin{bmatrix} I_3 & 2 & 0 & 1 \\ & 0 & 1 & 1 \\ & 1 & 1 & 0 \end{bmatrix}$	$X^{12} + 4X^9Y^3 + 7X^8Y^4 + 10X^7Y^5 + 15X^6Y^6 + 16X^5Y^7 + 8X^4Y^8 + 2X^3Y^9 + X^2Y^{10}$	III	
113	$\begin{bmatrix} I_3 & 2 & 0 & 1 \\ & 0 & 1 & 1 \\ & 1 & 1 & 1 \end{bmatrix}$			
114	$\begin{bmatrix} I_3 & 1 & 0 & 1 \\ & 0 & 1 & 1 \\ & 1 & 1 & 3 \end{bmatrix}$	$X^{12} + 4X^9Y^3 + 6X^8Y^4 + 12X^7Y^5 + 16X^6Y^6 + 12X^5Y^7 + 9X^4Y^8 + 4X^3Y^9$	III	

Table 5. Free formally self-dual codes over  $\mathbb{Z}_4$  of length 6 (cont'd.)

No.	Generator Matrix	Lee weight enumerator	Construction	Even
115	$\begin{bmatrix} I_3 & \begin{matrix} 1 & 0 & 1 \\ 0 & 1 & 2 \\ 2 & 1 & 0 \end{matrix} \end{bmatrix}$	$X^{12} + 2X^9Y^3 + 9X^8Y^4 + 12X^7Y^5 + 13X^6Y^6 + 18X^5Y^7 + 6X^4Y^8 + 3X^2Y^{10}$	III	
116	$\begin{bmatrix} I_3 & \begin{matrix} 1 & 0 & 1 \\ 0 & 1 & 2 \\ 2 & 1 & 1 \end{matrix} \end{bmatrix}$			
117	$\begin{bmatrix} I_3 & \begin{matrix} 1 & 0 & 1 \\ 0 & 1 & 2 \\ 2 & 1 & 2 \end{matrix} \end{bmatrix}$			
118	$\begin{bmatrix} I_3 & \begin{matrix} 1 & 0 & 1 \\ 0 & 1 & 2 \\ 1 & 2 & 0 \end{matrix} \end{bmatrix}$	$X^{12} + 2X^9Y^3 + 8X^8Y^4 + 14X^7Y^5 + 14X^6Y^6 + 14X^5Y^7 + 7X^4Y^8 + 2X^3Y^9 + 2X^2Y^{10}$	III	
119	$\begin{bmatrix} I_3 & \begin{matrix} 1 & 0 & 1 \\ 0 & 1 & 2 \\ 1 & 2 & 1 \end{matrix} \end{bmatrix}$			
120	$\begin{bmatrix} I_3 & \begin{matrix} 1 & 0 & 1 \\ 0 & 1 & 2 \\ 1 & 2 & 2 \end{matrix} \end{bmatrix}$			
121	$\begin{bmatrix} I_3 & \begin{matrix} 2 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 1 & 2 \end{matrix} \end{bmatrix}$	$X^{12} + 2X^9Y^3 + 7X^8Y^4 + 16X^7Y^5 + 15X^6Y^6 + 10X^5Y^7 + 8X^4Y^8 + 4X^3Y^9 + X^2Y^{10}$	III	
123	$\begin{bmatrix} I_3 & \begin{matrix} 2 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 1 & 3 \end{matrix} \end{bmatrix}$			
124	$\begin{bmatrix} I_3 & \begin{matrix} 1 & 2 & 1 \\ 1 & 1 & 2 \\ 2 & 1 & 1 \end{matrix} \end{bmatrix}$	$X^{12} + 2X^9Y^3 + 6X^8Y^4 + 18X^7Y^5 + 16X^6Y^6 + 6X^5Y^7 + 9X^4Y^8 + 6X^3Y^9$	III	
125	$\begin{bmatrix} I_3 & \begin{matrix} 1 & 2 & 1 \\ 1 & 1 & 3 \\ 2 & 0 & 1 \end{matrix} \end{bmatrix}$			
126*	$\begin{bmatrix} I_3 & \begin{matrix} 1 & 2 & 0 \\ 1 & 1 & 1 \\ 1 & 0 & 2 \end{matrix} \end{bmatrix}$	$X^{12} + 15X^8Y^4 + 32X^6Y^6 + 15X^4Y^8 + Y^{12}$	III	○
127*	$\begin{bmatrix} I_3 & \begin{matrix} 1 & 2 & 2 \\ 1 & 1 & 1 \\ 1 & 2 & 0 \end{matrix} \end{bmatrix}$			
128*	$\begin{bmatrix} I_3 & \begin{matrix} 1 & 3 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 3 \end{matrix} \end{bmatrix}$			
129*	$\begin{bmatrix} I_3 & \begin{matrix} 1 & 2 & 2 \\ 2 & 1 & 3 \\ 2 & 1 & 3 \end{matrix} \end{bmatrix}$	$X^{12} + 10X^8Y^4 + 16X^7Y^5 + 12X^6Y^6 + 16X^5Y^7 + 5X^4Y^8 + 4X^2Y^{10}$	I-(i)	
130*	$\begin{bmatrix} I_3 & \begin{matrix} 1 & 2 & 0 \\ 2 & 1 & 1 \\ 0 & 1 & 2 \end{matrix} \end{bmatrix}$		I-(i)	
131*	$\begin{bmatrix} I_3 & \begin{matrix} 1 & 1 & 1 \\ 0 & 1 & 2 \\ 2 & 1 & 3 \end{matrix} \end{bmatrix}$	$X^{12} + 9X^8Y^4 + 18X^7Y^5 + 13X^6Y^6 + 12X^5Y^7 + 6X^4Y^8 + 2X^3Y^9 + 3X^2Y^{10}$	III	
132*	$\begin{bmatrix} I_3 & \begin{matrix} 1 & 2 & 1 \\ 1 & 1 & 2 \\ 2 & 1 & 0 \end{matrix} \end{bmatrix}$			
133*	$\begin{bmatrix} I_3 & \begin{matrix} 1 & 2 & 1 \\ 1 & 1 & 3 \\ 3 & 1 & 1 \end{matrix} \end{bmatrix}$			
134*	$\begin{bmatrix} I_3 & \begin{matrix} 1 & 2 & 1 \\ 1 & 1 & 2 \\ 1 & 2 & 3 \end{matrix} \end{bmatrix}$			
135*	$\begin{bmatrix} I_3 & \begin{matrix} 1 & 2 & 1 \\ 1 & 1 & 2 \\ 2 & 1 & 3 \end{matrix} \end{bmatrix}$	$X^{12} + 6X^8Y^4 + 24X^7Y^5 + 16X^6Y^6 + 9X^4Y^8 + 8X^3Y^9$	III	
136*	$\begin{bmatrix} I_3 & \begin{matrix} 1 & 2 & 1 \\ 1 & 1 & 3 \\ 3 & 1 & 2 \end{matrix} \end{bmatrix}$			

TABLE 6. Non-free formally self-dual codes over  $\mathbb{Z}_4$  of length 6

No.	Generator matrix	Lee weight enumerator	construction
1	$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 2 & 0 & 0 & 0 \\ 0 & 0 & 0 & 2 & 0 & 0 \end{bmatrix}$	$X^{12} + 4X^{11}Y + 8X^{10}Y^2 + 12X^9Y^3 + 14X^8Y^4 + 12X^7Y^5 + 8X^6Y^6 + 4X^5Y^7 + X^4Y^8$	II
2	$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 1 \\ 0 & 0 & 2 & 0 & 0 & 0 \\ 0 & 0 & 0 & 2 & 0 & 0 \end{bmatrix}$	$X^{12} + 2X^{11}Y + 5X^{10}Y^2 + 8X^9Y^3 + 10X^8Y^4 + 12X^7Y^5 + 10X^6Y^6 + 8X^5Y^7 + 5X^4Y^8 + 2X^3Y^9 + X^2Y^{10}$	II
3	$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 2 \\ 0 & 0 & 2 & 0 & 0 & 0 \\ 0 & 0 & 0 & 2 & 0 & 0 \end{bmatrix}$	$X^{12} + 2X^{11}Y + 4X^{10}Y^2 + 8X^9Y^3 + 10X^8Y^4 + 12X^7Y^5 + 12X^6Y^6 + 8X^5Y^7 + 5X^4Y^8 + 2X^3Y^9$	II
4	$\begin{bmatrix} 1 & 0 & 0 & 0 & 2 & 2 \\ 0 & 1 & 0 & 0 & 2 & 2 \\ 0 & 0 & 2 & 0 & 0 & 0 \\ 0 & 0 & 0 & 2 & 0 & 0 \end{bmatrix}$	$X^{12} + 8X^{10}Y^2 + 14X^8Y^4 + 4X^7Y^5 + 8X^6Y^6 + 12X^5Y^7 + X^4Y^8 + 12X^3Y^9 + 4XY^{11}$	I
5	$\begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 0 & 1 \\ 0 & 0 & 2 & 0 & 0 & 0 \\ 0 & 0 & 0 & 2 & 0 & 0 \end{bmatrix}$	$X^{12} + 6X^{10}Y^2 + 15X^8Y^4 + 20X^6Y^6 + 15X^4Y^8 + 6X^2Y^{10} + Y^{12}$	II
6	$\begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 0 & 2 \\ 0 & 0 & 2 & 0 & 0 & 0 \\ 0 & 0 & 0 & 2 & 0 & 0 \end{bmatrix}$	$X^{12} + 5X^{10}Y^2 + 2X^9Y^3 + 10X^8Y^4 + 8X^7Y^5 + 10X^6Y^6 + 12X^5Y^7 + 5X^4Y^8 + 8X^3Y^9 + X^2Y^{10} + 2XY^{11}$	II
7	$\begin{bmatrix} 1 & 0 & 0 & 0 & 2 & 0 \\ 0 & 1 & 0 & 0 & 0 & 2 \\ 0 & 0 & 2 & 0 & 0 & 0 \\ 0 & 0 & 0 & 2 & 0 & 0 \end{bmatrix}$	$X^{12} + 4X^{10}Y^2 + 4X^9Y^3 + 6X^8Y^4 + 12X^7Y^5 + 8X^6Y^6 + 12X^5Y^7 + 9X^4Y^8 + 4X^3Y^9 + 4X^2Y^{10}$	I
8	$\begin{bmatrix} 1 & 0 & 0 & 0 & 2 & 2 \\ 0 & 1 & 0 & 0 & 0 & 2 \\ 0 & 0 & 2 & 0 & 0 & 0 \\ 0 & 0 & 0 & 2 & 0 & 0 \end{bmatrix}$	$X^{12} + 4X^{10}Y^2 + 2X^9Y^3 + 10X^8Y^4 + 8X^7Y^5 + 12X^6Y^6 + 12X^5Y^7 + 5X^4Y^8 + 8X^3Y^9 + 2XY^{11}$	I
9	$\begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 2 \\ 0 & 1 & 0 & 0 & 2 & 2 \\ 0 & 0 & 2 & 0 & 0 & 0 \\ 0 & 0 & 0 & 2 & 0 & 0 \end{bmatrix}$	$X^{12} + 3X^{10}Y^2 + 4X^9Y^3 + 6X^8Y^4 + 12X^7Y^5 + 10X^6Y^6 + 12X^5Y^7 + 9X^4Y^8 + 4X^3Y^9 + 3X^2Y^{10}$	I
10	$\begin{bmatrix} 1 & 0 & 0 & 0 & 3 & 2 \\ 0 & 1 & 0 & 0 & 2 & 0 \\ 0 & 0 & 2 & 0 & 0 & 0 \\ 0 & 0 & 0 & 2 & 0 & 0 \end{bmatrix}$		



TABLE 7. Free formally self-dual codes over  $\mathbb{Z}_4$  of length 8

No.	Generator Matrix	Lee weight enumerator	Construction	Even	Non-SD
1	$\begin{bmatrix} I_4 & \begin{matrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{matrix} \end{bmatrix}$	$X^{16} + 8X^{15}Y + 28X^{14}Y^2 + 56X^{13}Y^3 + 70X^{12}Y^4 + 56X^{11}Y^5 + 28X^{10}Y^6 + 8X^9Y^7 + X^8Y^8$	II		○
2	$\begin{bmatrix} I_4 & \begin{matrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{matrix} \end{bmatrix}$	$X^{16} + 6X^{15}Y + 17X^{14}Y^2 + 32X^{13}Y^3 + 46X^{12}Y^4 + 52X^{11}Y^5 + 46X^{10}Y^6 + 32X^9Y^7 + 17X^8Y^8 + 6X^7Y^9 + X^6Y^{10}$	II		○
3	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{matrix} \end{bmatrix}$	$X^{16} + 6X^{15}Y + 16X^{14}Y^2 + 28X^{13}Y^3 + 42X^{12}Y^4 + 56X^{11}Y^5 + 56X^{10}Y^6 + 36X^9Y^7 + 13X^8Y^8 + 2X^7Y^9$	II		○
4	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 2 & 2 \\ 0 & 0 & 2 & 2 \end{matrix} \end{bmatrix}$	$X^{16} + 4X^{15}Y + 12X^{14}Y^2 + 28X^{13}Y^3 + 38X^{12}Y^4 + 32X^{11}Y^5 + 28X^{10}Y^6 + 32X^9Y^7 + 33X^8Y^8 + 28X^7Y^9 + 16X^6Y^{10} + 4X^5Y^{11}$	II		○
5	$\begin{bmatrix} I_4 & \begin{matrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{matrix} \end{bmatrix}$	$X^{16} + 4X^{15}Y + 10X^{14}Y^2 + 20X^{13}Y^3 + 31X^{12}Y^4 + 40X^{11}Y^5 + 44X^{10}Y^6 + 40X^9Y^7 + 31X^8Y^8 + 20X^7Y^9 + 10X^6Y^{10} + 4X^5Y^{11} + X^4Y^{12}$	II		○
6	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{matrix} \end{bmatrix}$	$X^{16} + 4X^{15}Y + 9X^{14}Y^2 + 18X^{13}Y^3 + 30X^{12}Y^4 + 40X^{11}Y^5 + 46X^{10}Y^6 + 44X^9Y^7 + 33X^8Y^8 + 20X^7Y^9 + 9X^6Y^{10} + 2X^5Y^{11}$	II		○
7	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 0 & 0 \\ 0 & 2 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{matrix} \end{bmatrix}$				
8	$\begin{bmatrix} I_4 & \begin{matrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 \end{matrix} \end{bmatrix}$	$X^{16} + 4X^{15}Y + 8X^{14}Y^2 + 16X^{13}Y^3 + 30X^{12}Y^4 + 40X^{11}Y^5 + 44X^{10}Y^6 + 48X^9Y^7 + 41X^8Y^8 + 20X^7Y^9 + 4X^6Y^{10}$	II		○
9	$\begin{bmatrix} I_4 & \begin{matrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 \end{matrix} \end{bmatrix}$				
10	$\begin{bmatrix} I_4 & \begin{matrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 2 & 0 \\ 0 & 0 & 2 & 2 \end{matrix} \end{bmatrix}$	$X^{16} + 4X^{15}Y + 8X^{14}Y^2 + 14X^{13}Y^3 + 26X^{12}Y^4 + 44X^{11}Y^5 + 56X^{10}Y^6 + 48X^9Y^7 + 29X^8Y^8 + 16X^7Y^9 + 8X^6Y^{10} + 2X^5Y^{11}$	II		○
11	$\begin{bmatrix} I_4 & \begin{matrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 1 \end{matrix} \end{bmatrix}$	$X^{16} + 4X^{15}Y + 8X^{14}Y^2 + 12X^{13}Y^3 + 23X^{12}Y^4 + 48X^{11}Y^5 + 64X^{10}Y^6 + 48X^9Y^7 + 23X^8Y^8 + 12X^7Y^9 + 8X^6Y^{10} + 4X^5Y^{11} + X^4Y^{12}$	II		○
12	$\begin{bmatrix} I_4 & \begin{matrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 2 \\ 0 & 0 & 2 & 0 \end{matrix} \end{bmatrix}$	$X^{16} + 4X^{15}Y + 7X^{14}Y^2 + 12X^{13}Y^3 + 26X^{12}Y^4 + 44X^{11}Y^5 + 54X^{10}Y^6 + 52X^9Y^7 + 37X^8Y^8 + 16X^7Y^9 + 3X^6Y^{10}$	II		○
13	$\begin{bmatrix} I_4 & \begin{matrix} 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 2 \\ 0 & 0 & 2 & 2 \end{matrix} \end{bmatrix}$				
14	$\begin{bmatrix} I_4 & \begin{matrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 3 \\ 0 & 0 & 1 & 1 \end{matrix} \end{bmatrix}$	$X^{16} + 4X^{15}Y + 6X^{14}Y^2 + 8X^{13}Y^3 + 22X^{12}Y^4 + 48X^{11}Y^5 + 64X^{10}Y^6 + 56X^9Y^7 + 33X^8Y^8 + 12X^7Y^9 + 2X^6Y^{10}$	II		○
15	$\begin{bmatrix} I_4 & \begin{matrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 2 \\ 0 & 0 & 1 & 1 \end{matrix} \end{bmatrix}$				

Table 7. Free formally self-dual codes over  $\mathbb{Z}_4$  of length 8 (cont'd.)

No.	Generator Matrix	Lee weight enumerator	Construction	Even	Non-SD
16	$\begin{bmatrix} I_4 & \begin{matrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 2 & 1 \\ 0 & 0 & 1 & 2 \end{matrix} \end{bmatrix}$	$X^{16} + 4X^{15}Y + 6X^{14}Y^2 + 4X^{13}Y^3 + 15X^{12}Y^4 + 56X^{11}Y^5 + 84X^{10}Y^6 + 56X^9Y^7 + 15X^8Y^8 + 4X^7Y^9 + 6X^6Y^{10} + 4X^5Y^{11} + X^4Y^{12}$	II		○
17	$\begin{bmatrix} I_4 & \begin{matrix} 0 & 0 & 0 & 0 \\ 0 & 2 & 2 & 2 \\ 0 & 2 & 2 & 2 \\ 0 & 2 & 2 & 2 \end{matrix} \end{bmatrix}$	$X^{16} + 2X^{15}Y + 16X^{14}Y^2 + 30X^{13}Y^3 + 30X^{12}Y^4 + 30X^{11}Y^5 + 16X^{10}Y^6 + 8X^9Y^7 + 13X^8Y^8 + 26X^7Y^9 + 40X^6Y^{10} + 26X^5Y^{11} + 12X^4Y^{12} + 6X^3Y^{13}$	II		○
18	$\begin{bmatrix} I_4 & \begin{matrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 2 & 2 \\ 0 & 0 & 2 & 2 \end{matrix} \end{bmatrix}$	$X^{16} + 2X^{15}Y + 9X^{14}Y^2 + 16X^{13}Y^3 + 22X^{12}Y^4 + 32X^{11}Y^5 + 30X^{10}Y^6 + 32X^9Y^7 + 33X^8Y^8 + 26X^7Y^9 + 25X^6Y^{10} + 16X^5Y^{11} + 8X^4Y^{12} + 4X^3Y^{13}$	II		○
19	$\begin{bmatrix} I_4 & \begin{matrix} 0 & 0 & 0 & 0 \\ 0 & 2 & 0 & 0 \\ 0 & 0 & 2 & 2 \\ 0 & 2 & 0 & 0 \end{matrix} \end{bmatrix}$	$X^{16} + 2X^{15}Y + 8X^{14}Y^2 + 18X^{13}Y^3 + 22X^{12}Y^4 + 28X^{11}Y^5 + 28X^{10}Y^6 + 28X^9Y^7 + 41X^8Y^8 + 34X^7Y^9 + 20X^6Y^{10} + 18X^5Y^{11} + 8X^4Y^{12}$	II		○
20	$\begin{bmatrix} I_4 & \begin{matrix} 0 & 0 & 0 & 0 \\ 0 & 2 & 2 & 2 \\ 0 & 2 & 0 & 0 \\ 0 & 2 & 0 & 0 \end{matrix} \end{bmatrix}$	$X^{16} + 2X^{15}Y + 8X^{14}Y^2 + 18X^{13}Y^3 + 22X^{12}Y^4 + 26X^{11}Y^5 + 32X^{10}Y^6 + 32X^9Y^7 + 29X^8Y^8 + 34X^7Y^9 + 32X^6Y^{10} + 14X^5Y^{11} + 4X^4Y^{12} + 2X^3Y^{13}$	II		○
21	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 2 & 2 \\ 0 & 0 & 2 & 2 \end{matrix} \end{bmatrix}$	$X^{16} + 2X^{15}Y + 8X^{14}Y^2 + 16X^{13}Y^3 + 18X^{12}Y^4 + 32X^{11}Y^5 + 40X^{10}Y^6 + 28X^9Y^7 + 29X^8Y^8 + 30X^7Y^9 + 24X^6Y^{10} + 20X^5Y^{11} + 8X^4Y^{12}$	II		○
22	$\begin{bmatrix} I_4 & \begin{matrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 \end{matrix} \end{bmatrix}$	$X^{16} + 2X^{15}Y + 7X^{14}Y^2 + 12X^{13}Y^3 + 21X^{12}Y^4 + 30X^{11}Y^5 + 35X^{10}Y^6 + 40X^9Y^7 + 35X^8Y^8 + 30X^7Y^9 + 21X^6Y^{10} + 12X^5Y^{11} + 7X^4Y^{12} + 2X^3Y^{13} + X^2Y^{14}$	II		○
23	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 \end{matrix} \end{bmatrix}$	$X^{16} + 2X^{15}Y + 6X^{14}Y^2 + 12X^{13}Y^3 + 19X^{12}Y^4 + 30X^{11}Y^5 + 36X^{10}Y^6 + 40X^9Y^7 + 39X^8Y^8 + 30X^7Y^9 + 22X^6Y^{10} + 12X^5Y^{11} + 5X^4Y^{12} + 2X^3Y^{13}$	II		○
24	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 2 \end{matrix} \end{bmatrix}$	$X^{16} + 2X^{15}Y + 5X^{14}Y^2 + 12X^{13}Y^3 + 18X^{12}Y^4 + 28X^{11}Y^5 + 38X^{10}Y^6 + 40X^9Y^7 + 41X^8Y^8 + 34X^7Y^9 + 21X^6Y^{10} + 12X^5Y^{11} + 4X^4Y^{12}$	II		○
25	$\begin{bmatrix} I_4 & \begin{matrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 \end{matrix} \end{bmatrix}$				
26	$\begin{bmatrix} I_4 & \begin{matrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 2 & 0 \\ 0 & 0 & 2 & 0 \\ 0 & 0 & 2 & 2 \end{matrix} \end{bmatrix}$	$X^{16} + 2X^{15}Y + 5X^{14}Y^2 + 10X^{13}Y^3 + 18X^{12}Y^4 + 30X^{11}Y^5 + 38X^{10}Y^6 + 44X^9Y^7 + 41X^8Y^8 + 30X^7Y^9 + 21X^6Y^{10} + 10X^5Y^{11} + 4X^4Y^{12} + 2X^3Y^{13}$	II		○
27	$\begin{bmatrix} I_4 & \begin{matrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 1 \end{matrix} \end{bmatrix}$	$X^{16} + 2X^{15}Y + 5X^{14}Y^2 + 8X^{13}Y^3 + 19X^{12}Y^4 + 30X^{11}Y^5 + 39X^{10}Y^6 + 48X^9Y^7 + 39X^8Y^8 + 30X^7Y^9 + 19X^6Y^{10} + 8X^5Y^{11} + 5X^4Y^{12} + 2X^3Y^{13} + X^2Y^{14}$	II		○
28	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 \end{matrix} \end{bmatrix}$				
29	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 2 & 0 \\ 0 & 0 & 0 & 2 \end{matrix} \end{bmatrix}$	$X^{16} + 2X^{15}Y + 4X^{14}Y^2 + 12X^{13}Y^3 + 18X^{12}Y^4 + 24X^{11}Y^5 + 40X^{10}Y^6 + 44X^9Y^7 + 37X^8Y^8 + 38X^7Y^9 + 28X^6Y^{10} + 8X^5Y^{11}$	II		○
30	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 \end{matrix} \end{bmatrix}$				

Table 7. Free formally self-dual codes over  $\mathbb{Z}_4$  of length 8 (cont'd.)

No.	Generator Matrix	Lee weight enumerator	Construction	Even	Non-SD
31	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 2 & 0 \\ 0 & 0 & 2 & 2 \end{matrix} \end{bmatrix}$	$X^{16} + 2X^{15}Y + 4X^{14}Y^2 + 10X^{13}Y^3 + 18X^{12}Y^4 + 28X^{11}Y^5 + 36X^{10}Y^6 + 44X^9Y^7 + 49X^8Y^8 + 34X^7Y^9 + 16X^6Y^{10} + 10X^5Y^{11} + 4X^4Y^{12}$	II		○
32	$\begin{bmatrix} I_4 & \begin{matrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 2 \\ 0 & 0 & 2 & 0 \end{matrix} \end{bmatrix}$	$X^{16} + 2X^{15}Y + 4X^{14}Y^2 + 10X^{13}Y^3 + 17X^{12}Y^4 + 28X^{11}Y^5 + 40X^{10}Y^6 + 44X^9Y^7 + 43X^8Y^8 + 34X^7Y^9 + 20X^6Y^{10} + 10X^5Y^{11} + 3X^4Y^{12}$	II		○
33	$\begin{bmatrix} I_4 & \begin{matrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 2 \\ 0 & 0 & 2 & 2 \end{matrix} \end{bmatrix}$				
34	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 1 \end{matrix} \end{bmatrix}$	$X^{16} + 2X^{15}Y + 4X^{14}Y^2 + 8X^{13}Y^3 + 19X^{12}Y^4 + 30X^{11}Y^5 + 32X^{10}Y^6 + 48X^9Y^7 + 55X^8Y^8 + 30X^7Y^9 + 12X^6Y^{10} + 8X^5Y^{11} + 5X^4Y^{12} + 2X^3Y^{13}$	II)		○
35	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 2 \\ 0 & 0 & 2 & 0 \end{matrix} \end{bmatrix}$	$X^{16} + 2X^{15}Y + 3X^{14}Y^2 + 10X^{13}Y^3 + 18X^{12}Y^4 + 24X^{11}Y^5 + 38X^{10}Y^6 + 48X^9Y^7 + 45X^8Y^8 + 38X^7Y^9 + 23X^6Y^{10} + 6X^5Y^{11}$	II		○
36	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 2 \\ 0 & 0 & 2 & 2 \end{matrix} \end{bmatrix}$				
37	$\begin{bmatrix} I_4 & \begin{matrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 2 \\ 0 & 0 & 1 & 1 \end{matrix} \end{bmatrix}$	$X^{16} + 2X^{15}Y + 3X^{14}Y^2 + 8X^{13}Y^3 + 16X^{12}Y^4 + 28X^{11}Y^5 + 42X^{10}Y^6 + 48X^9Y^7 + 45X^8Y^8 + 34X^7Y^9 + 19X^6Y^{10} + 8X^5Y^{11} + 2X^4Y^{12}$	II		○
38	$\begin{bmatrix} I_4 & \begin{matrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 2 \\ 0 & 0 & 1 & 1 \end{matrix} \end{bmatrix}$				
39	$\begin{bmatrix} I_4 & \begin{matrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 2 & 1 \\ 0 & 0 & 1 & 2 \end{matrix} \end{bmatrix}$	$X^{16} + 2X^{15}Y + 3X^{14}Y^2 + 4X^{13}Y^3 + 17X^{12}Y^4 + 30X^{11}Y^5 + 43X^{10}Y^6 + 56X^9Y^7 + 43X^8Y^8 + 30X^7Y^9 + 17X^6Y^{10} + 4X^5Y^{11} + 3X^4Y^{12} + 2X^3Y^{13} + X^2Y^{14}$	II		○
40	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 2 \\ 0 & 0 & 1 & 1 \end{matrix} \end{bmatrix}$	$X^{16} + 2X^{15}Y + 2X^{14}Y^2 + 8X^{13}Y^3 + 18X^{12}Y^4 + 24X^{11}Y^5 + 36X^{10}Y^6 + 52X^9Y^7 + 53X^8Y^8 + 38X^7Y^9 + 18X^6Y^{10} + 4X^5Y^{11}$	II		○
41	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 3 \\ 0 & 0 & 1 & 1 \end{matrix} \end{bmatrix}$				
42	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 2 & 1 \\ 0 & 0 & 1 & 2 \end{matrix} \end{bmatrix}$	$X^{16} + 2X^{15}Y + 2X^{14}Y^2 + 4X^{13}Y^3 + 19X^{12}Y^4 + 30X^{11}Y^5 + 28X^{10}Y^6 + 56X^9Y^7 + 71X^8Y^8 + 30X^7Y^9 + 2X^6Y^{10} + 4X^5Y^{11} + 5X^4Y^{12} + 2X^3Y^{13}$	II		○
43	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 2 & 2 & 2 \\ 2 & 2 & 2 & 2 \\ 2 & 2 & 2 & 2 \\ 2 & 2 & 2 & 2 \end{matrix} \end{bmatrix}$	$X^{16} + 28X^{14}Y^2 + 70X^{12}Y^4 + 28X^{10}Y^6 + X^8Y^8 + 8X^7Y^9 + 56X^5Y^{11} + 56X^3Y^{13} + 8XY^{15}$	I-(iv)		○
44	$\begin{bmatrix} I_4 & \begin{matrix} 1 & 0 & 0 & 0 \\ 0 & 2 & 2 & 2 \\ 0 & 2 & 2 & 2 \\ 0 & 2 & 2 & 2 \end{matrix} \end{bmatrix}$	$X^{16} + 17X^{14}Y^2 + 46X^{12}Y^4 + 46X^{10}Y^6 + 6X^9Y^7 + 17X^8Y^8 + 32X^7Y^9 + X^6Y^{10} + 52X^5Y^{11} + 32X^3Y^{13} + 6XY^{15}$	I-(i)		○
45	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 0 & 0 \\ 0 & 2 & 2 & 2 \\ 2 & 0 & 0 & 0 \\ 2 & 0 & 0 & 0 \end{matrix} \end{bmatrix}$	$X^{16} + 16X^{14}Y^2 + 6X^{13}Y^3 + 30X^{12}Y^4 + 26X^{11}Y^5 + 16X^{10}Y^6 + 28X^9Y^7 + X^8Y^8 + 36X^7Y^9 + 12X^6Y^{10} + 30X^5Y^{11} + 40X^4Y^{12} + 2X^3Y^{13} + 12X^2Y^{14}$	I-(ii)		○
46	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 0 & 0 \\ 2 & 2 & 2 & 2 \\ 2 & 0 & 0 & 0 \\ 2 & 0 & 0 & 0 \end{matrix} \end{bmatrix}$		I-(v)		

Table 7. Free formally self-dual codes over  $\mathbb{Z}_4$  of length 8 (cont'd.)

No.	Generator Matrix	Lee weight enumerator	Construction	Even	Non-SD
47	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 2 & 2 & 2 \\ 2 & 0 & 0 & 0 \\ 2 & 0 & 0 & 0 \\ 2 & 0 & 0 & 0 \end{matrix} \end{bmatrix}$	$X^{16} + 16X^{14}Y^2 + 6X^{13}Y^3 + 30X^{12}Y^4 + 26X^{11}Y^5 + 16X^{10}Y^6 + 26X^9Y^7 + 13X^8Y^8 + 8X^7Y^9 + 40X^6Y^{10} + 30X^5Y^{11} + 12X^4Y^{12} + 30X^3Y^{13} + 2XY^{15}$	I-(iv)		○
48	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 0 & 0 \\ 0 & 2 & 2 & 2 \\ 0 & 2 & 2 & 2 \\ 0 & 2 & 2 & 2 \end{matrix} \end{bmatrix}$	$X^{16} + 16X^{14}Y^2 + 2X^{13}Y^3 + 30X^{12}Y^4 + 30X^{11}Y^5 + 16X^{10}Y^6 + 36X^9Y^7 + X^8Y^8 + 28X^7Y^9 + 12X^6Y^{10} + 26X^5Y^{11} + 40X^4Y^{12} + 6X^3Y^{13} + 12X^2Y^{14}$	I-(ii)		○
49	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 2 & 2 & 2 \\ 2 & 2 & 2 & 2 \\ 2 & 2 & 2 & 2 \\ 2 & 2 & 2 & 2 \end{matrix} \end{bmatrix}$	$X^{16} + 16X^{14}Y^2 + 42X^{12}Y^4 + 56X^{10}Y^6 + 2X^9Y^7 + 13X^8Y^8 + 36X^7Y^9 + 56X^5Y^{11} + 28X^3Y^{13} + 6XY^{15}$	I-(ii)		○
50	$\begin{bmatrix} I_4 & \begin{matrix} 1 & 2 & 2 & 2 \\ 2 & 2 & 2 & 2 \\ 2 & 2 & 2 & 2 \\ 2 & 2 & 2 & 2 \end{matrix} \end{bmatrix}$	$X^{16} + 15X^{14}Y^2 + 12X^{13}Y^3 + 16X^{12}Y^4 + 40X^{11}Y^5 + 16X^{10}Y^6 + 12X^9Y^7 + 17X^8Y^8 + 12X^7Y^9 + 31X^6Y^{10} + 40X^5Y^{11} + 30X^4Y^{12} + 12X^3Y^{13} + 2X^2Y^{14}$	I-(i)		○
51	$\begin{bmatrix} I_4 & \begin{matrix} 1 & 2 & 2 & 2 \\ 2 & 0 & 0 & 0 \\ 2 & 0 & 0 & 0 \\ 2 & 0 & 0 & 0 \end{matrix} \end{bmatrix}$				
52	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 2 & 2 & 2 \\ 2 & 2 & 0 & 0 \\ 2 & 2 & 2 & 2 \\ 2 & 2 & 0 & 0 \end{matrix} \end{bmatrix}$	$X^{16} + 12X^{14}Y^2 + 38X^{12}Y^4 + 4X^{11}Y^5 + 28X^{10}Y^6 + 28X^9Y^7 + 33X^8Y^8 + 32X^7Y^9 + 16X^6Y^{10} + 32X^5Y^{11} + 28X^3Y^{13} + 4XY^{15}$	I-(iv),(v)		○
53	$\begin{bmatrix} I_4 & \begin{matrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 2 & 2 \\ 0 & 0 & 2 & 2 \end{matrix} \end{bmatrix}$	$X^{16} + 10X^{14}Y^2 + 31X^{12}Y^4 + 4X^{11}Y^5 + 44X^{10}Y^6 + 20X^9Y^7 + 31X^8Y^8 + 40X^7Y^9 + 10X^6Y^{10} + 40X^5Y^{11} + X^4Y^{12} + 20X^3Y^{13} + 4XY^{15}$	I-(iv)		○
54	$\begin{bmatrix} I_4 & \begin{matrix} 1 & 0 & 0 & 0 \\ 0 & 2 & 0 & 0 \\ 0 & 0 & 2 & 2 \\ 0 & 2 & 0 & 0 \end{matrix} \end{bmatrix}$	$X^{16} + 9X^{14}Y^2 + 2X^{13}Y^3 + 22X^{12}Y^4 + 20X^{11}Y^5 + 22X^{10}Y^6 + 44X^9Y^7 + 17X^8Y^8 + 40X^7Y^9 + 25X^6Y^{10} + 18X^5Y^{11} + 24X^4Y^{12} + 4X^3Y^{13} + 8X^2Y^{14}$	I-(v)		○
55	$\begin{bmatrix} I_4 & \begin{matrix} 1 & 0 & 0 & 0 \\ 0 & 2 & 2 & 2 \\ 0 & 2 & 0 & 0 \\ 0 & 2 & 0 & 0 \end{matrix} \end{bmatrix}$	$X^{16} + 9X^{14}Y^2 + 4X^{13}Y^3 + 22X^{12}Y^4 + 16X^{11}Y^5 + 30X^{10}Y^6 + 26X^9Y^7 + 33X^8Y^8 + 32X^7Y^9 + 25X^6Y^{10} + 32X^5Y^{11} + 8X^4Y^{12} + 16X^3Y^{13} + 2XY^{15}$	I-(i)		○
56	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 2 & 0 & 2 & 2 \\ 0 & 0 & 2 & 2 \end{matrix} \end{bmatrix}$	$X^{16} + 9X^{14}Y^2 + 4X^{13}Y^3 + 22X^{12}Y^4 + 18X^{11}Y^5 + 22X^{10}Y^6 + 40X^9Y^7 + 17X^8Y^8 + 44X^7Y^9 + 25X^6Y^{10} + 20X^5Y^{11} + 24X^4Y^{12} + 2X^3Y^{13} + 8X^2Y^{14}$	I-(i)		○
57	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 2 & 0 & 0 \\ 0 & 2 & 2 & 2 \\ 2 & 2 & 0 & 0 \\ 2 & 0 & 2 & 2 \end{matrix} \end{bmatrix}$	$X^{16} + 8X^{14}Y^2 + 16X^{13}Y^3 + 14X^{12}Y^4 + 20X^{11}Y^5 + 12X^{10}Y^6 + 16X^9Y^7 + 41X^8Y^8 + 40X^7Y^9 + 36X^6Y^{10} + 32X^5Y^{11} + 16X^4Y^{12} + 4X^3Y^{13}$	I-(ii)		○
58	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 2 & 2 \\ 0 & 2 & 2 & 2 \\ 2 & 0 & 2 & 2 \\ 2 & 2 & 0 & 0 \end{matrix} \end{bmatrix}$	$X^{16} + 8X^{14}Y^2 + 16X^{13}Y^3 + 14X^{12}Y^4 + 18X^{11}Y^5 + 16X^{10}Y^6 + 20X^9Y^7 + 29X^8Y^8 + 40X^7Y^9 + 48X^6Y^{10} + 28X^5Y^{11} + 12X^4Y^{12} + 6X^3Y^{13}$	I-(iii)		○
59	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 0 & 0 \\ 0 & 2 & 0 & 0 \\ 0 & 0 & 2 & 2 \\ 0 & 2 & 0 & 0 \end{matrix} \end{bmatrix}$	$X^{16} + 8X^{14}Y^2 + 6X^{13}Y^3 + 14X^{12}Y^4 + 28X^{11}Y^5 + 16X^{10}Y^6 + 40X^9Y^7 + 29X^8Y^8 + 20X^7Y^9 + 48X^6Y^{10} + 18X^5Y^{11} + 12X^4Y^{12} + 16X^3Y^{13}$	I-(v)		○
60	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 0 & 0 \\ 0 & 2 & 2 & 2 \\ 0 & 2 & 0 & 0 \\ 0 & 2 & 0 & 0 \end{matrix} \end{bmatrix}$				

Table 7. Free formally self-dual codes over  $\mathbb{Z}_4$  of length 8 (cont'd)

No.	Generator Matrix	Lee weight enumerator	Construction	Even	Non-SD
61	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 0 & 0 \\ 2 & 2 & 2 & 2 \\ 2 & 0 & 0 & 2 \\ 2 & 0 & 0 & 0 \end{matrix} \end{bmatrix}$	$X^{16} + 8X^{14}Y^2 + 4X^{13}Y^3 + 22X^{12}Y^4 + 14X^{11}Y^5 + 28X^{10}Y^6 + 26X^9Y^7 + 41X^8Y^8 + 36X^7Y^9 + 20X^6Y^{10} + 32X^5Y^{11} + 8X^4Y^{12} + 14X^3Y^{13} + 2XY^{15}$	I-(v)		○
62	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 0 & 0 \\ 0 & 2 & 2 & 2 \\ 2 & 0 & 0 & 2 \\ 2 & 0 & 0 & 0 \end{matrix} \end{bmatrix}$	$X^{16} + 8X^{14}Y^2 + 4X^{13}Y^3 + 22X^{12}Y^4 + 14X^{11}Y^5 + 24X^{10}Y^6 + 44X^9Y^7 + 13X^8Y^8 + 48X^7Y^9 + 32X^6Y^{10} + 16X^5Y^{11} + 20X^4Y^{12} + 2X^3Y^{13} + 8X^2Y^{14}$	I-(iii)		○
63	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 2 & 2 \\ 2 & 2 & 2 & 2 \\ 2 & 0 & 0 & 0 \\ 2 & 0 & 2 & 2 \end{matrix} \end{bmatrix}$	$X^{16} + 8X^{14}Y^2 + 2X^{13}Y^3 + 22X^{12}Y^4 + 14X^{11}Y^5 + 32X^{10}Y^6 + 34X^9Y^7 + 29X^8Y^8 + 32X^7Y^9 + 32X^6Y^{10} + 26X^5Y^{11} + 4X^4Y^{12} + 18X^3Y^{13} + 2XY^{15}$	I-(iv),(v)		○
64	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 2 & 2 \\ 0 & 2 & 2 & 2 \\ 2 & 0 & 0 & 0 \\ 2 & 0 & 2 & 2 \end{matrix} \end{bmatrix}$	$X^{16} + 8X^{14}Y^2 + 2X^{13}Y^3 + 14X^{12}Y^4 + 30X^{11}Y^5 + 24X^{10}Y^6 + 36X^9Y^7 + 33X^8Y^8 + 28X^7Y^9 + 20X^6Y^{10} + 26X^5Y^{11} + 24X^4Y^{12} + 6X^3Y^{13} + 4X^2Y^{14}$	I-(iii)		○
65	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 2 & 2 & 2 \\ 0 & 2 & 2 & 2 \\ 2 & 2 & 2 & 0 \\ 2 & 2 & 2 & 2 \end{matrix} \end{bmatrix}$	$X^{16} + 8X^{14}Y^2 + 30X^{12}Y^4 + 44X^{10}Y^6 + 20X^9Y^7 + 41X^8Y^8 + 48X^7Y^9 + 4X^6Y^{10} + 40X^5Y^{11} + 16X^3Y^{13} + 4XY^{15}$	I-(ii)		○
66	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 2 & 1 & 1 \\ 1 & 2 & 2 & 2 \\ 2 & 2 & 2 & 2 \\ 2 & 2 & 1 & 1 \end{matrix} \end{bmatrix}$		I-(v)		
67	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 2 & 0 & 0 \\ 2 & 2 & 2 & 2 \\ 2 & 2 & 2 & 2 \\ 2 & 2 & 0 & 2 \end{matrix} \end{bmatrix}$	$X^{16} + 8X^{14}Y^2 + 26X^{12}Y^4 + 2X^{11}Y^5 + 56X^{10}Y^6 + 16X^9Y^7 + 29X^8Y^8 + 48X^7Y^9 + 8X^6Y^{10} + 44X^5Y^{11} + 14X^3Y^{13} + 4XY^{15}$	I-(v)		○
68	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 0 & 2 & 2 \\ 2 & 2 & 2 & 2 \\ 2 & 0 & 2 & 2 \\ 2 & 2 & 0 & 0 \end{matrix} \end{bmatrix}$	$X^{16} + 8X^{14}Y^2 + 22X^{12}Y^4 + 18X^{11}Y^5 + 28X^{10}Y^6 + 34X^9Y^7 + 41X^8Y^8 + 28X^7Y^9 + 20X^6Y^{10} + 28X^5Y^{11} + 8X^4Y^{12} + 18X^3Y^{13} + 2XY^{15}$	I-(v)		○
69	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 2 & 2 & 2 \\ 2 & 2 & 0 & 0 \\ 2 & 2 & 0 & 0 \\ 2 & 0 & 2 & 2 \end{matrix} \end{bmatrix}$	$X^{16} + 8X^{14}Y^2 + 18X^{12}Y^4 + 20X^{11}Y^5 + 40X^{10}Y^6 + 30X^9Y^7 + 29X^8Y^8 + 28X^7Y^9 + 24X^6Y^{10} + 32X^5Y^{11} + 8X^4Y^{12} + 16X^3Y^{13} + 2XY^{15}$	I-(ii),(iv)		○
70	$\begin{bmatrix} I_4 & \begin{matrix} 1 & 2 & 2 & 2 \\ 2 & 2 & 2 & 2 \\ 2 & 2 & 2 & 0 \\ 2 & 2 & 2 & 2 \end{matrix} \end{bmatrix}$	$X^{16} + 7X^{14}Y^2 + 8X^{13}Y^3 + 16X^{12}Y^4 + 20X^{11}Y^5 + 16X^{10}Y^6 + 36X^9Y^7 + 33X^8Y^8 + 36X^7Y^9 + 39X^6Y^{10} + 20X^5Y^{11} + 14X^4Y^{12} + 8X^3Y^{13} + 2X^2Y^{14}$	I-(i)		○
71	$\begin{bmatrix} I_4 & \begin{matrix} 3 & 2 & 2 & 2 \\ 2 & 0 & 0 & 0 \\ 2 & 0 & 0 & 2 \\ 2 & 0 & 0 & 0 \end{matrix} \end{bmatrix}$				
72	$\begin{bmatrix} I_4 & \begin{matrix} 1 & 2 & 2 & 2 \\ 2 & 2 & 0 & 0 \\ 2 & 2 & 2 & 0 \\ 2 & 2 & 0 & 0 \end{matrix} \end{bmatrix}$	$X^{16} + 7X^{14}Y^2 + 4X^{13}Y^3 + 8X^{12}Y^4 + 32X^{11}Y^5 + 32X^{10}Y^6 + 28X^9Y^7 + 33X^8Y^8 + 28X^7Y^9 + 23X^6Y^{10} + 32X^5Y^{11} + 22X^4Y^{12} + 4X^3Y^{13} + 2X^2Y^{14}$	I-(i)		○
73	$\begin{bmatrix} I_4 & \begin{matrix} 1 & 2 & 2 & 2 \\ 2 & 0 & 2 & 2 \\ 2 & 0 & 0 & 0 \\ 2 & 0 & 2 & 2 \end{matrix} \end{bmatrix}$				
74	$\begin{bmatrix} I_4 & \begin{matrix} 1 & 2 & 2 & 2 \\ 2 & 0 & 2 & 2 \\ 2 & 0 & 2 & 2 \\ 2 & 2 & 0 & 0 \end{matrix} \end{bmatrix}$	$X^{16} + 7X^{14}Y^2 + 24X^{12}Y^4 + 12X^{11}Y^5 + 24X^{10}Y^6 + 52X^9Y^7 + 17X^8Y^8 + 52X^7Y^9 + 23X^6Y^{10} + 12X^5Y^{11} + 22X^4Y^{12} + 10X^2Y^{14}$	I-(i)		○
75	$\begin{bmatrix} I_4 & \begin{matrix} 1 & 2 & 2 & 2 \\ 2 & 2 & 0 & 0 \\ 2 & 2 & 0 & 0 \\ 2 & 0 & 2 & 2 \end{matrix} \end{bmatrix}$				
76	$\begin{bmatrix} I_4 & \begin{matrix} 2 & 2 & 3 & 3 \\ 2 & 2 & 2 & 2 \\ 2 & 2 & 2 & 2 \\ 2 & 2 & 3 & 1 \end{matrix} \end{bmatrix}$	$X^{16} + 6X^{14}Y^2 + 22X^{12}Y^4 + 64X^{10}Y^6 + 12X^9Y^7 + 33X^8Y^8 + 56X^7Y^9 + 2X^6Y^{10} + 48X^5Y^{11} + 8X^3Y^{13} + 4XY^{15}$	I-(v)		○

Table 7. Free formally self-dual codes over  $\mathbb{Z}_4$  of length 8 (cont'd)

No.	Generator Matrix	Lee weight enumerator	Construction	Even	Non-SD
77	$\begin{bmatrix} I_4 & \begin{bmatrix} 2 & 0 & 2 & 2 \\ 2 & 2 & 2 & 2 \\ 2 & 0 & 0 & 0 \\ 2 & 0 & 2 & 0 \end{bmatrix} \end{bmatrix}$	$X^{16} + 4X^{14}Y^2 + 2X^{13}Y^3 + 18X^{12}Y^4 + 8X^{11}Y^5 + 36X^{10}Y^6 + 30X^9Y^7 + 49X^8Y^8 + 48X^7Y^9 + 16X^6Y^{10} + 30X^5Y^{11} + 4X^4Y^{12} + 8X^3Y^{13} + 2XY^{15}$	I-(iv)		○
78	$\begin{bmatrix} I_4 & \begin{bmatrix} 2 & 0 & 2 & 2 \\ 0 & 2 & 2 & 2 \\ 2 & 0 & 0 & 0 \\ 2 & 0 & 2 & 0 \end{bmatrix} \end{bmatrix}$	$X^{16} + 4X^{14}Y^2 + 2X^{13}Y^3 + 14X^{12}Y^4 + 16X^{11}Y^5 + 28X^{10}Y^6 + 48X^9Y^7 + 29X^8Y^8 + 44X^7Y^9 + 36X^6Y^{10} + 14X^5Y^{11} + 12X^4Y^{12} + 4X^3Y^{13} + 4X^2Y^{14}$	I-(iii)		○
79	$\begin{bmatrix} I_4 & \begin{bmatrix} 2 & 0 & 0 & 2 \\ 2 & 2 & 2 & 2 \\ 2 & 0 & 2 & 0 \\ 2 & 2 & 0 & 0 \end{bmatrix} \end{bmatrix}$	$X^{16} + 4X^{14}Y^2 + 22X^{12}Y^4 + 6X^{11}Y^5 + 28X^{10}Y^6 + 42X^9Y^7 + 49X^8Y^8 + 44X^7Y^9 + 24X^6Y^{10} + 20X^5Y^{11} + 14X^3Y^{13} + 2XY^{15}$	I-(v)		○
80	$\begin{bmatrix} I_4 & \begin{bmatrix} 2 & 0 & 3 & 3 \\ 2 & 2 & 2 & 2 \\ 2 & 0 & 3 & 3 \\ 2 & 2 & 0 & 0 \end{bmatrix} \end{bmatrix}$				
81	$\begin{bmatrix} I_4 & \begin{bmatrix} 2 & 2 & 0 & 0 \\ 0 & 2 & 2 & 2 \\ 2 & 2 & 2 & 2 \\ 2 & 2 & 0 & 2 \end{bmatrix} \end{bmatrix}$	$X^{16} + 4X^{14}Y^2 + 18X^{12}Y^4 + 10X^{11}Y^5 + 36X^{10}Y^6 + 34X^9Y^7 + 49X^8Y^8 + 44X^7Y^9 + 16X^6Y^{10} + 28X^5Y^{11} + 4X^4Y^{12} + 10X^3Y^{13} + 2XY^{15}$	I-(ii)		○
82	$\begin{bmatrix} I_4 & \begin{bmatrix} 2 & 2 & 2 & 2 \\ 2 & 2 & 2 & 0 \\ 2 & 2 & 0 & 2 \\ 2 & 0 & 2 & 2 \end{bmatrix} \end{bmatrix}$	$X^{16} + 4X^{14}Y^2 + 18X^{12}Y^4 + 8X^{11}Y^5 + 40X^{10}Y^6 + 38X^9Y^7 + 37X^8Y^8 + 44X^7Y^9 + 28X^6Y^{10} + 24X^5Y^{11} + 12X^3Y^{13} + 2XY^{15}$	I-(iv)		○
83	$\begin{bmatrix} I_4 & \begin{bmatrix} 2 & 2 & 2 & 2 \\ 2 & 2 & 1 & 1 \\ 2 & 2 & 1 & 1 \\ 2 & 0 & 2 & 2 \end{bmatrix} \end{bmatrix}$				
84	$\begin{bmatrix} I_4 & \begin{bmatrix} 2 & 2 & 2 & 0 \\ 0 & 2 & 2 & 2 \\ 2 & 0 & 2 & 2 \\ 2 & 0 & 2 & 2 \end{bmatrix} \end{bmatrix}$	$X^{16} + 4X^{14}Y^2 + 6X^{12}Y^4 + 32X^{11}Y^5 + 28X^{10}Y^6 + 40X^9Y^7 + 49X^8Y^8 + 24X^7Y^9 + 24X^6Y^{10} + 24X^5Y^{11} + 16X^4Y^{12} + 8X^3Y^{13}$	I-(ii)		○
85	$\begin{bmatrix} I_4 & \begin{bmatrix} 2 & 2 & 1 & 1 \\ 0 & 2 & 2 & 2 \\ 2 & 2 & 1 & 1 \\ 2 & 0 & 2 & 2 \end{bmatrix} \end{bmatrix}$				
86	$\begin{bmatrix} I_4 & \begin{bmatrix} 2 & 0 & 0 & 2 \\ 0 & 2 & 2 & 2 \\ 2 & 0 & 2 & 0 \\ 2 & 2 & 0 & 0 \end{bmatrix} \end{bmatrix}$	$X^{16} + 4X^{14}Y^2 + 6X^{12}Y^4 + 30X^{11}Y^5 + 32X^{10}Y^6 + 44X^9Y^7 + 37X^8Y^8 + 24X^7Y^9 + 36X^6Y^{10} + 20X^5Y^{11} + 12X^4Y^{12} + 10X^3Y^{13}$	I-(iii)		○
87	$\begin{bmatrix} I_4 & \begin{bmatrix} 2 & 0 & 3 & 3 \\ 0 & 2 & 2 & 2 \\ 2 & 0 & 3 & 3 \\ 2 & 2 & 0 & 0 \end{bmatrix} \end{bmatrix}$				
88	$\begin{bmatrix} I_4 & \begin{bmatrix} 1 & 2 & 2 & 2 \\ 2 & 2 & 0 & 0 \\ 2 & 2 & 2 & 2 \\ 2 & 2 & 0 & 2 \end{bmatrix} \end{bmatrix}$	$X^{16} + 3X^{14}Y^2 + 4X^{13}Y^3 + 12X^{12}Y^4 + 16X^{11}Y^5 + 24X^{10}Y^6 + 44X^9Y^7 + 41X^8Y^8 + 44X^7Y^9 + 35X^6Y^{10} + 16X^5Y^{11} + 10X^4Y^{12} + 4X^3Y^{13} + 2X^2Y^{14}$	I-(i)		○
89	$\begin{bmatrix} I_4 & \begin{bmatrix} 3 & 2 & 2 & 2 \\ 2 & 0 & 2 & 2 \\ 2 & 0 & 0 & 0 \\ 2 & 0 & 2 & 0 \end{bmatrix} \end{bmatrix}$				
90	$\begin{bmatrix} I_4 & \begin{bmatrix} 1 & 2 & 2 & 2 \\ 2 & 0 & 0 & 2 \\ 2 & 0 & 0 & 0 \\ 2 & 0 & 2 & 0 \end{bmatrix} \end{bmatrix}$				
91	$\begin{bmatrix} I_4 & \begin{bmatrix} 1 & 2 & 2 & 2 \\ 2 & 2 & 2 & 0 \\ 2 & 2 & 2 & 2 \\ 2 & 2 & 0 & 2 \end{bmatrix} \end{bmatrix}$				
92	$\begin{bmatrix} I_4 & \begin{bmatrix} 1 & 2 & 2 & 2 \\ 2 & 0 & 1 & 1 \\ 2 & 0 & 0 & 0 \\ 2 & 0 & 1 & 1 \end{bmatrix} \end{bmatrix}$				
93	$\begin{bmatrix} I_4 & \begin{bmatrix} 3 & 2 & 2 & 2 \\ 2 & 2 & 3 & 3 \\ 2 & 2 & 2 & 2 \\ 2 & 2 & 3 & 3 \end{bmatrix} \end{bmatrix}$				
	$\begin{bmatrix} I_4 & \begin{bmatrix} 3 & 2 & 2 & 2 \\ 2 & 2 & 3 & 3 \\ 2 & 2 & 2 & 2 \\ 2 & 2 & 3 & 3 \end{bmatrix} \end{bmatrix}$				

Table 7. Free formally self-dual codes over  $\mathbb{Z}_4$  of length 8 (cont'd)

No.	Generator Matrix	Lee weight enumerator	Construction	Even	Non-SD
94	$I_4 \begin{bmatrix} 1 & 2 & 2 & 2 \\ 2 & 2 & 2 & 0 \\ 2 & 2 & 0 & 2 \\ 2 & 0 & 2 & 2 \end{bmatrix}$	$X^{16} + 3X^{14}Y^2 + 4X^{12}Y^4 + 28X^{11}Y^5 + 40X^{10}Y^6 + 36X^9Y^7 + 41X^8Y^8 + 36X^7Y^9 + 19X^6Y^{10} + 28X^5Y^{11} + 18X^4Y^{12} + 2X^2Y^{14}$	I-(i)		○
95	$I_4 \begin{bmatrix} 1 & 2 & 2 & 2 \\ 2 & 2 & 1 & 1 \\ 2 & 2 & 1 & 1 \\ 2 & 0 & 2 & 2 \end{bmatrix}$				
96	$I_4 \begin{bmatrix} 3 & 2 & 2 & 2 \\ 2 & 0 & 3 & 3 \\ 2 & 0 & 3 & 3 \\ 2 & 2 & 0 & 0 \end{bmatrix}$				
97	$I_4 \begin{bmatrix} 3 & 2 & 2 & 2 \\ 2 & 0 & 0 & 2 \\ 2 & 0 & 2 & 0 \\ 2 & 2 & 0 & 0 \end{bmatrix}$				
98	$I_4 \begin{bmatrix} 2 & 0 & 1 & 1 \\ 0 & 2 & 2 & 2 \\ 2 & 0 & 0 & 0 \\ 2 & 0 & 1 & 3 \end{bmatrix}$	$X^{16} + 2X^{14}Y^2 + 2X^{13}Y^3 + 14X^{12}Y^4 + 10X^{11}Y^5 + 28X^{10}Y^6 + 52X^9Y^7 + 33X^8Y^8 + 52X^7Y^9 + 38X^6Y^{10} + 10X^5Y^{11} + 8X^4Y^{12} + 2X^3Y^{13} + 4X^2Y^{14}$	I-(ii)		○
99	$I_4 \begin{bmatrix} 2 & 2 & 2 & 2 \\ 2 & 0 & 1 & 1 \\ 2 & 0 & 0 & 0 \\ 2 & 0 & 1 & 3 \end{bmatrix}$	$X^{16} + 2X^{14}Y^2 + 2X^{13}Y^3 + 14X^{12}Y^4 + 6X^{11}Y^5 + 44X^{10}Y^6 + 26X^9Y^7 + 53X^8Y^8 + 56X^7Y^9 + 10X^6Y^{10} + 34X^5Y^{11} + 4X^4Y^{12} + 2X^3Y^{13} + 2X^2Y^{15}$	I-(iii)		○
100	$I_4 \begin{bmatrix} 2 & 2 & 3 & 3 \\ 0 & 2 & 2 & 2 \\ 2 & 2 & 2 & 2 \\ 2 & 2 & 3 & 1 \end{bmatrix}$	$X^{16} + 2X^{14}Y^2 + 18X^{12}Y^4 + 4X^{11}Y^5 + 36X^{10}Y^6 + 38X^9Y^7 + 53X^8Y^8 + 52X^7Y^9 + 18X^6Y^{10} + 24X^5Y^{11} + 8X^3Y^{13} + 2X^2Y^{15}$	I-(iv)		○
101	$I_4 \begin{bmatrix} 1 & 2 & 2 & 2 \\ 2 & 0 & 1 & 1 \\ 2 & 0 & 0 & 0 \\ 2 & 0 & 1 & 3 \end{bmatrix}$	$X^{16} + X^{14}Y^2 + 4X^{13}Y^3 + 14X^{12}Y^4 + 8X^{11}Y^5 + 20X^{10}Y^6 + 52X^9Y^7 + 45X^8Y^8 + 52X^7Y^9 + 41X^6Y^{10} + 8X^5Y^{11} + 4X^4Y^{12} + 4X^3Y^{13} + 2X^2Y^{14}$	I-(i)		○
102	$I_4 \begin{bmatrix} 3 & 2 & 2 & 2 \\ 2 & 2 & 3 & 3 \\ 2 & 2 & 2 & 2 \\ 2 & 2 & 3 & 1 \end{bmatrix}$				

No.	Generator matrix	Lee weight enumerator	SD
103	[1 0 0 0 1 0 2 2]	$X^{16} + 8X^{14}Y^2 + 8X^{13}Y^3 + 15X^{12}Y^4 + 24X^{11}Y^5 + 18X^{10}Y^6 + 32X^9Y^7 + 31X^8Y^8 + 32X^7Y^9 + 36X^6Y^{10} + 24X^5Y^{11} + 17X^4Y^{12} + 8X^3Y^{13} + 2X^2Y^{14}$	
	[0 1 0 0 2 0 0 0]		
	[0 0 1 0 2 0 0 0]		
	[0 0 0 1 0 1 0 0]		
104	[1 0 0 0 3 0 2 2]	$X^{16} + 9X^{14}Y^2 + 4X^{13}Y^3 + 22X^{12}Y^4 + 18X^{11}Y^5 + 22X^{10}Y^6 + 40X^9Y^7 + 17X^8Y^8 + 44X^7Y^9 + 25X^6Y^{10} + 20X^5Y^{11} + 24X^4Y^{12} + 2X^3Y^{13} + 8X^2Y^{14}$	
	[0 1 0 0 2 0 2 2]		
	[0 0 1 0 2 0 2 2]		
	[0 0 0 1 0 1 0 0]		
105	[1 0 0 0 2 0 0 0]	$X^{16} + 9X^{14}Y^2 + 4X^{13}Y^3 + 22X^{12}Y^4 + 18X^{11}Y^5 + 22X^{10}Y^6 + 40X^9Y^7 + 17X^8Y^8 + 44X^7Y^9 + 25X^6Y^{10} + 20X^5Y^{11} + 24X^4Y^{12} + 2X^3Y^{13} + 8X^2Y^{14}$	
	[0 1 0 0 0 0 2 2]		
	[0 0 1 0 2 0 0 0]		
	[0 0 0 1 0 1 0 0]		
106	[1 0 0 0 2 0 2 2]	$X^{16} + 9X^{14}Y^2 + 30X^{12}Y^4 + 2X^{11}Y^5 + 46X^{10}Y^6 + 20X^9Y^7 + 33X^8Y^8 + 44X^7Y^9 + 9X^6Y^{10} + 40X^5Y^{11} + 18X^3Y^{13} + 4XY^{15}$	
	[0 1 0 0 0 0 2 2]		
	[0 0 1 0 2 0 2 2]		
	[0 0 0 1 0 1 0 0]		
107	[1 0 0 0 2 0 2 0]	$X^{16} + 9X^{14}Y^2 + 4X^{13}Y^3 + 22X^{12}Y^4 + 16X^{11}Y^5 + 30X^{10}Y^6 + 26X^9Y^7 + 33X^8Y^8 + 32X^7Y^9 + 25X^6Y^{10} + 32X^5Y^{11} + 8X^4Y^{12} + 16X^3Y^{13} + 2XY^{15}$	
	[0 1 0 0 2 0 2 2]		
	[0 0 1 0 0 1 0 0]		
	[0 0 0 1 2 0 2 2]		
108	[1 0 0 0 2 0 2 2]	$X^{16} + 17X^{14}Y^2 + 46X^{12}Y^4 + 46X^{10}Y^6 + 6X^9Y^7 + 17X^8Y^8 + 32X^7Y^9 + X^6Y^{10} + 52X^5Y^{11} + 32X^3Y^{13} + 6XY^{15}$	
	[0 1 0 0 2 0 0 0]		
	[0 0 1 0 2 0 0 0]		
	[0 0 0 1 0 1 0 0]		
109	[1 0 0 0 1 0 0 2]	$X^{16} + 5X^{14}Y^2 + 4X^{13}Y^3 + 13X^{12}Y^4 + 20X^{11}Y^5 + 25X^{10}Y^6 + 40X^9Y^7 + 35X^8Y^8 + 40X^7Y^9 + 31X^6Y^{10} + 20X^5Y^{11} + 15X^4Y^{12} + 4X^3Y^{13} + 3X^2Y^{14}$	
	[0 1 0 0 2 0 0 0]		
	[0 0 1 0 0 1 0 0]		
	[0 0 0 1 0 0 1 0]		
110	[1 0 0 0 3 0 0 2]	$X^{16} + 6X^{14}Y^2 + 4X^{13}Y^3 + 15X^{12}Y^4 + 20X^{11}Y^5 + 24X^{10}Y^6 + 40X^9Y^7 + 31X^8Y^8 + 40X^7Y^9 + 30X^6Y^{10} + 20X^5Y^{11} + 17X^4Y^{12} + 4X^3Y^{13} + 4X^2Y^{14}$	
	[0 1 0 0 2 0 0 2]		
	[0 0 1 0 0 1 0 0]		
	[0 0 0 1 0 0 1 0]		
111	[1 0 0 0 2 0 0 0]	$X^{16} + 6X^{14}Y^2 + 4X^{13}Y^3 + 15X^{12}Y^4 + 20X^{11}Y^5 + 24X^{10}Y^6 + 40X^9Y^7 + 31X^8Y^8 + 40X^7Y^9 + 30X^6Y^{10} + 20X^5Y^{11} + 17X^4Y^{12} + 4X^3Y^{13} + 4X^2Y^{14}$	
	[0 1 0 0 0 0 0 2]		
	[0 0 1 0 0 1 0 0]		
	[0 0 0 1 0 0 1 0]		
112	[1 0 0 0 2 0 0 0]	$X^{16} + 6X^{14}Y^2 + 4X^{13}Y^3 + 15X^{12}Y^4 + 20X^{11}Y^5 + 24X^{10}Y^6 + 40X^9Y^7 + 31X^8Y^8 + 40X^7Y^9 + 30X^6Y^{10} + 20X^5Y^{11} + 17X^4Y^{12} + 4X^3Y^{13} + 4X^2Y^{14}$	
	[0 1 0 0 0 0 0 2]		
	[0 0 1 0 0 1 0 0]		
	[0 0 0 1 0 0 1 0]		



113	[1 0 0 0 1 3 1 1] [0 1 0 0 1 1 1 0] [0 0 1 0 1 1 3 3] [0 0 0 1 0 1 3 3]	$X^{16} + 4X^{13}Y^3 + 9X^{12}Y^4 + 16X^{11}Y^5 + 16X^{10}Y^6 + 40X^9Y^7 + 75X^8Y^8 + 48X^7Y^9 + 16X^6Y^{10} + 20X^5Y^{11} + 11X^4Y^{12}$	
114	[1 0 0 0 1 3 1 1] [0 1 0 0 1 1 1 2] [0 0 1 0 1 1 3 3] [0 0 0 1 2 1 3 3]	$X^{16} + 4X^{13}Y^3 + 5X^{12}Y^4 + 16X^{11}Y^5 + 32X^{10}Y^6 + 40X^9Y^7 + 51X^8Y^8 + 48X^7Y^9 + 32X^6Y^{10} + 20X^5Y^{11} + 7X^4Y^{12}$	
115	[1 0 0 0 1 3 1 1] [0 1 0 0 1 1 1 0] [0 0 1 0 1 1 3 1] [0 0 0 1 0 1 1 0]		
116	[1 0 0 0 1 2 0 0] [0 1 0 0 1 1 1 0] [0 0 1 0 1 0 2 1] [0 0 0 1 0 0 1 1]	$X^{16} + 2X^{13}Y^3 + 11X^{12}Y^4 + 12X^{11}Y^5 + 21X^{10}Y^6 + 52X^9Y^7 + 55X^8Y^8 + 48X^7Y^9 + 34X^6Y^{10} + 10X^5Y^{11} + 5X^4Y^{12} + 4X^3Y^{13} + X^2Y^{14}$	
117	[1 0 0 0 1 2 0 1] [0 1 0 0 1 1 1 0] [0 0 1 0 1 0 2 0] [0 0 0 1 0 1 0 1]		
118	[1 0 0 0 1 2 0 0] [0 1 0 0 1 1 1 0] [0 0 1 0 1 0 2 1] [0 0 0 1 0 0 1 3]	$X^{16} + 2X^{13}Y^3 + 9X^{12}Y^4 + 12X^{11}Y^5 + 29X^{10}Y^6 + 52X^9Y^7 + 43X^8Y^8 + 48X^7Y^9 + 42X^6Y^{10} + 10X^5Y^{11} + 3X^4Y^{12} + 4X^3Y^{13} + X^2Y^{14}$	
119	[1 0 0 0 1 2 0 0] [0 1 0 0 1 1 1 3] [0 0 1 0 1 0 2 2] [0 0 0 1 3 0 2 1]	$X^{16} + 2X^{13}Y^3 + 9X^{12}Y^4 + 14X^{11}Y^5 + 25X^{10}Y^6 + 48X^9Y^7 + 55X^8Y^8 + 48X^7Y^9 + 30X^6Y^{10} + 14X^5Y^{11} + 7X^4Y^{12} + 2X^3Y^{13} + X^2Y^{14}$	
120	[1 0 0 0 1 2 0 2] [0 1 0 0 1 1 1 1] [0 0 1 0 1 0 2 0] [0 0 0 1 1 2 0 1]		

121	[1 0 0 0 1 2 0 0] [0 1 0 0 1 1 1 1] [0 0 1 0 1 0 2 0] [0 0 0 1 1 0 0 3]		
122	[1 0 0 0 1 2 0 0] [0 1 0 0 1 1 1 1] [0 0 1 0 1 0 2 2] [0 0 0 1 1 0 2 3]	$X^{16} + 2 \cdot X^{13} \cdot Y^3 + 7 \cdot X^{12} \cdot Y^4 + 14 \cdot X^{11} \cdot Y^5 + 33 \cdot X^{10} \cdot Y^6 + 48 \cdot X^9 \cdot Y^7 + 43 \cdot X^8 \cdot Y^8 + 48 \cdot X^7 \cdot Y^9 + 38 \cdot X^6 \cdot Y^{10} + 14 \cdot X^5 \cdot Y^{11} + 5 \cdot X^4 \cdot Y^{12} + 2 \cdot X^3 \cdot Y^{13} + X^2 \cdot Y^{14}$	
123	[1 0 0 0 1 2 0 1] [0 1 0 0 1 1 1 1] [0 0 1 0 1 0 2 1] [0 0 0 1 1 1 1 2]		
124	[1 0 0 0 1 2 0 0] [0 1 0 0 1 1 1 0] [0 0 1 0 1 0 2 1] [0 0 0 1 0 0 1 2]		
125	[1 0 0 0 1 2 0 0] [0 1 0 0 1 1 1 2] [0 0 1 0 1 0 2 1] [0 0 0 1 2 0 1 2]	$X^{16} + 10 \cdot X^{12} \cdot Y^4 + 14 \cdot X^{11} \cdot Y^5 + 26 \cdot X^{10} \cdot Y^6 + 52 \cdot X^9 \cdot Y^7 + 53 \cdot X^8 \cdot Y^8 + 48 \cdot X^7 \cdot Y^9 + 28 \cdot X^6 \cdot Y^{10} + 12 \cdot X^5 \cdot Y^{11} + 8 \cdot X^4 \cdot Y^{12} + 2 \cdot X^3 \cdot Y^{13} + 2 \cdot X^2 \cdot Y^{14}$	
126	[1 0 0 0 1 2 0 2] [0 1 0 0 1 1 1 2] [0 0 1 0 1 0 2 1] [0 0 0 1 2 2 1 2]		
127	[1 0 0 0 1 3 1 3] [0 1 0 0 1 1 1 2] [0 0 1 0 1 1 3 2] [0 0 0 1 2 3 2 2]		
128	[1 0 0 0 1 2 0 0] [0 1 0 0 1 1 1 0] [0 0 1 0 1 0 2 2] [0 0 0 1 0 0 2 1]	$X^{16} + 16 \cdot X^{12} \cdot Y^4 + 48 \cdot X^{10} \cdot Y^6 + 126 \cdot X^8 \cdot Y^8 + 48 \cdot X^6 \cdot Y^{10}$	
129	[1 0 0 0 1 2 0 2] [0 1 0 0 1 1 1 2] [0 0 1 0 1 0 2 2] [0 0 0 1 2 2 2 1]	$+ 16 \cdot X^4 \cdot Y^{12} + Y^{16}$	

130	[1 0 0 0 1 2 0 0]	$X^{16} + 12X^{12}Y^4 + 8X^{11}Y^5 + 32X^{10}Y^6 + 56X^9Y^7 + 37X^8Y^8 + 56X^7Y^9 + 36X^6Y^{10} + 8X^5Y^{11} + 6X^4Y^{12} + 4X^2Y^{14}$	
	[0 1 0 0 1 1 1 1]		
	[0 0 1 0 1 0 2 0]		
	[0 0 0 1 1 0 0 2]		
131	[1 0 0 0 1 2 0 1]		
	[0 1 0 0 1 1 1 1]		
	[0 0 1 0 1 0 2 1]		
	[0 0 0 1 1 1 1 3]		
132	[1 0 0 0 1 2 0 0]	$X^{16} + 9X^{12}Y^4 + 20X^{11}Y^5 + 16X^{10}Y^6 + 48X^9Y^7 + 75X^8Y^8 + 40X^7Y^9 + 16X^6Y^{10} + 16X^5Y^{11} + 11X^4Y^{12} + 4X^3Y^{13}$	
	[0 1 0 0 1 1 1 1]		
	[0 0 1 0 1 0 2 1]		
	[0 0 0 1 1 0 1 2]		
133	[1 0 0 0 1 2 0 1]		
	[0 1 0 0 1 1 1 0]		
	[0 0 1 0 1 0 2 3]		
	[0 0 0 1 0 1 3 3]		
134	[1 0 0 0 1 3 1 0]	$X^{16} + 9X^{12}Y^4 + 12X^{11}Y^5 + 35X^{10}Y^6 + 52X^9Y^7 + 39X^8Y^8 + 52X^7Y^9 + 34X^6Y^{10} + 12X^5Y^{11} + 7X^4Y^{12} + 3X^2Y^{14}$	
	[0 1 0 0 1 1 1 1]		
	[0 0 1 0 1 1 3 2]		
	[0 0 0 1 1 0 2 3]		
135	[1 0 0 0 1 3 1 0]	$X^{16} + 7X^{12}Y^4 + 18X^{11}Y^5 + 28X^{10}Y^6 + 52X^9Y^7 + 51X^8Y^8 + 40X^7Y^9 + 36X^6Y^{10} + 12X^5Y^{11} + 5X^4Y^{12} + 6X^3Y^{13}$	
	[0 1 0 0 1 1 1 1]		
	[0 0 1 0 1 1 3 1]		
	[0 0 0 1 1 0 1 2]		
136	[1 0 0 0 1 3 1 0]	$X^{16} + 8X^{12}Y^4 + 14X^{11}Y^5 + 34X^{10}Y^6 + 52X^9Y^7 + 41X^8Y^8 + 48X^7Y^9 + 36X^6Y^{10} + 12X^5Y^{11} + 6X^4Y^{12} + 2X^3Y^{13} + 2X^2Y^{14}$	
	[0 1 0 0 1 1 1 2]		
	[0 0 1 0 1 1 3 1]		
	[0 0 0 1 2 0 1 0]		
137	[1 0 0 0 1 3 1 1]		
	[0 1 0 0 1 1 1 2]		
	[0 0 1 0 1 1 3 2]		
	[0 0 0 1 2 1 2 0]		
138	[1 0 0 0 1 3 1 0]	$X^{16} + 8X^{12}Y^4 + 16X^{11}Y^5 + 30X^{10}Y^6 + 48X^9Y^7 + 53X^8Y^8 + 48X^7Y^9 + 24X^6Y^{10} + 16X^5Y^{11} + 10X^4Y^{12} + 2X^2Y^{14}$	
	[0 1 0 0 1 1 1 1]		
	[0 0 1 0 1 1 3 2]		
	[0 0 0 1 1 0 2 0]		
139	[1 0 0 0 1 3 1 0]	$X^{16} + 11X^{12}Y^4 + 12X^{11}Y^5 + 27X^{10}Y^6 + 52X^9Y^7 + 51X^8Y^8 + 52X^7Y^9 + 26X^6Y^{10} + 12X^5Y^{11} + 9X^4Y^{12} + 3X^2Y^{14}$	
	[0 1 0 0 1 1 1 1]		
	[0 0 1 0 1 1 3 2]		
	[0 0 0 1 1 0 2 1]		

140	[1 0 0 0 1 3 1 0] [0 1 0 0 1 1 1 1] [0 0 1 0 1 1 3 2] [0 0 0 1 1 0 2 2]	$X^{16} + 6X^{12}Y^4 + 16X^{11}Y^5 + 38X^{10}Y^6 + 48X^9Y^7 + 41X^8Y^8 + 48X^7Y^9 + 32X^6Y^{10} + 16X^5Y^{11} + 8X^4Y^{12} + 2X^2Y^{14}$	
141	[1 0 0 0 1 3 1 0] [0 1 0 0 1 1 1 1] [0 0 1 0 1 1 3 3] [0 0 0 1 1 0 3 1]		
142	[1 0 0 0 1 3 1 0] [0 1 0 0 1 1 1 1] [0 0 1 0 1 1 3 3] [0 0 0 1 1 0 3 2]	$X^{16} + 5X^{12}Y^4 + 20X^{11}Y^5 + 32X^{10}Y^6 + 48X^9Y^7 + 51X^8Y^8 + 40X^7Y^9 + 32X^6Y^{10} + 16X^5Y^{11} + 7X^4Y^{12} + 4X^3Y^{13}$	
143	[1 0 0 0 1 3 1 1] [0 1 0 0 1 1 1 1] [0 0 1 0 1 1 3 2] [0 0 0 1 1 1 2 0]		
144	[1 0 0 0 1 3 1 1] [0 1 0 0 1 1 1 1] [0 0 1 0 1 1 3 2] [0 0 0 1 1 1 2 3]		
145	[1 0 0 0 1 3 1 0] [0 1 0 0 1 1 1 2] [0 0 1 0 1 1 3 1] [0 0 0 1 2 0 1 1]	$X^{16} + 5X^{12}Y^4 + 18X^{11}Y^5 + 37X^{10}Y^6 + 48X^9Y^7 + 43X^8Y^8 + 44X^7Y^9 + 34X^6Y^{10} + 16X^5Y^{11} + 7X^4Y^{12} + 2X^3Y^{13} + X^2Y^{14}$	
146	[1 0 0 0 1 3 1 1] [0 1 0 0 1 1 1 2] [0 0 1 0 1 1 3 2] [0 0 0 1 2 1 2 1]		
147	[1 0 0 0 1 3 1 0] [0 1 0 0 1 1 1 2] [0 0 1 0 1 1 3 1] [0 0 0 1 2 0 1 3]	$X^{16} + 7X^{12}Y^4 + 18X^{11}Y^5 + 29X^{10}Y^6 + 48X^9Y^7 + 55X^8Y^8 + 44X^7Y^9 + 26X^6Y^{10} + 16X^5Y^{11} + 9X^4Y^{12} + 2X^3Y^{13} + X^2Y^{14}$	
148	[1 0 0 0 1 3 1 1] [0 1 0 0 1 1 1 2] [0 0 1 0 1 1 3 2] [0 0 0 1 2 1 2 3]		

149	[1 0 0 0 1 3 1 1]	$X^{16} + 5X^{12}Y^4 + 20X^{11}Y^5 + 33X^{10}Y^6 + 44X^9Y^7 + 55X^8Y^8 + 44X^7Y^9 + 22X^6Y^{10} + 20X^5Y^{11} + 11X^4Y^{12} + X^2Y^{14}$	
	[0 1 0 0 1 1 1 3]		
	[0 0 1 0 1 1 3 1]		
	[0 0 0 1 3 1 1 0]		
150	[1 0 0 0 1 3 1 2]		
	[0 1 0 0 1 1 1 1]		
	[0 0 1 0 1 1 3 2]		
	[0 0 0 1 1 2 2 1]		
151	[1 0 0 0 1 3 1 1]	$X^{16} + 3X^{12}Y^4 + 16X^{11}Y^5 + 50X^{10}Y^6 + 48X^9Y^7 + 23X^8Y^8 + 48X^7Y^9 + 44X^6Y^{10} + 16X^5Y^{11} + 5X^4Y^{12} + 2X^2Y^{14}$	
	[0 1 0 0 1 1 1 2]		
	[0 0 1 0 1 1 3 1]		
	[0 0 0 1 2 1 1 1]		
152	[1 0 0 0 1 3 1 1]	$X^{16} + 3X^{12}Y^4 + 22X^{11}Y^5 + 36X^{10}Y^6 + 44X^9Y^7 + 51X^8Y^8 + 40X^7Y^9 + 28X^6Y^{10} + 20X^5Y^{11} + 9X^4Y^{12} + 2X^3Y^{13}$	
	[0 1 0 0 1 1 1 2]		
	[0 0 1 0 1 1 3 1]		
	[0 0 0 1 2 1 1 0]		
153	[1 0 0 0 1 3 1 1]		
	[0 1 0 0 1 1 1 3]		
	[0 0 1 0 1 1 3 2]		
	[0 0 0 1 3 1 2 2]		
154	[1 0 0 0 1 3 1 2]		
	[0 1 0 0 1 1 1 1]		
	[0 0 1 0 1 1 3 3]		
	[0 0 0 1 1 2 3 2]		
155	[1 0 0 0 1 3 1 1]	$X^{16} + 14X^{12}Y^4 + 8X^{11}Y^5 + 24X^{10}Y^6 + 56X^9Y^7 + 49X^8Y^8 + 56X^7Y^9 + 28X^6Y^{10} + 8X^5Y^{11} + 8X^4Y^{12} + 4X^2Y^{14}$	
	[0 1 0 0 1 1 1 1]		
	[0 0 1 0 1 1 3 3]		
	[0 0 0 1 1 1 3 1]		
156	[1 0 0 0 1 3 1 2]		
	[0 1 0 0 1 1 1 1]		
	[0 0 1 0 1 1 3 2]		
	[0 0 0 1 1 2 2 0]		
157	[1 0 0 0 1 3 1 1]	$X^{16} + X^{12}Y^4 + 20X^{11}Y^5 + 48X^{10}Y^6 + 48X^9Y^7 + 27X^8Y^8 + 40X^7Y^9 + 48X^6Y^{10} + 16X^5Y^{11} + 3X^4Y^{12} + 4X^3Y^{13}$	
	[0 1 0 0 1 1 1 3]		
	[0 0 1 0 1 1 3 2]		
	[0 0 0 1 3 1 2 1]		

158	[1 0 0 0 2 1 1 1] [0 1 0 0 1 2 3 0] [0 0 1 0 1 1 2 3] [0 0 0 1 0 1 3 2]		
159	[1 0 0 0 2 1 1 1] [0 1 0 0 1 2 3 2] [0 0 1 0 1 1 2 0] [0 0 0 1 2 1 0 3]	$X^{16} + 24X^{11}Y^5 + 44X^{10}Y^6 + 40X^9Y^7 + 45X^8Y^8 + 40X^7Y^9 + 28X^6Y^{10} + 24X^5Y^{11} + 10X^4Y^{12}$	
160	[1 0 0 0 2 1 1 2] [0 1 0 0 1 2 3 3] [0 0 1 0 1 1 2 0] [0 0 0 1 3 2 0 3]		
161	[1 0 0 0 1 2 1 1] [0 1 0 0 1 1 3 2] [0 0 1 0 3 1 2 1] [0 0 0 1 2 1 1 0]	$X^{16} + 20X^{11}Y^5 + 53X^{10}Y^6 + 44X^9Y^7 + 25X^8Y^8 + 44X^7Y^9 + 42X^6Y^{10} + 20X^5Y^{11} + 6X^4Y^{12} + X^2Y^{14}$	
162	[1 0 0 0 1 2 1 1] [0 1 0 0 1 1 3 2] [0 0 1 0 3 1 2 1] [0 0 0 1 2 1 1 2]		
163	[1 0 0 0 1 2 1 1] [0 1 0 0 1 1 3 2] [0 0 1 0 3 1 2 1] [0 0 0 1 2 1 1 3]	$X^{16} + 112X^{10}Y^6 + 30X^8Y^8 + 112X^6Y^{10} + Y^{16}$	O

Table 8. Non-free formally self-dual codes over  $Z_4$  of length 8

No.	Generator matrix	Lee weight enumerator	Const.
1	[1 0 0 0 0 1 2 2]	$X^{16} + 8X^{14}Y^2 + 8X^{13}Y^3 + 15X^{12}Y^4 + 24X^{11}Y^5 + 18X^{10}Y^6 + 32X^9Y^7 + 31X^8Y^8 + 32X^7Y^9 + 36X^6Y^{10} + 24X^5Y^{11} + 17X^4Y^{12} + 8X^3Y^{13} + 2X^2Y^{14}$	I-i
	[0 1 0 0 0 2 0 0]		
2	[0 0 1 0 0 2 0 0]	$X^{16} + 9X^{14}Y^2 + 4X^{13}Y^3 + 22X^{12}Y^4 + 18X^{11}Y^5 + 22X^{10}Y^6 + 40X^9Y^7 + 17X^8Y^8 + 44X^7Y^9 + 25X^6Y^{10} + 20X^5Y^{11} + 24X^4Y^{12} + 2X^3Y^{13} + 8X^2Y^{14}$	I-i
	[0 0 0 2 0 0 0 0]		
3	[0 0 0 2 0 0 0 0]	$X^{16} + 9X^{14}Y^2 + 30X^{12}Y^4 + 2X^{11}Y^5 + 46X^{10}Y^6 + 20X^9Y^7 + 33X^8Y^8 + 44X^7Y^9 + 9X^6Y^{10} + 40X^5Y^{11} + 18X^3Y^{13} + 4X^2Y^{14}$	I-ii,iii
	[0 0 0 0 2 0 0 0]		
4	[1 0 0 0 0 2 2 2]	$X^{16} + 9X^{14}Y^2 + 4X^{13}Y^3 + 22X^{12}Y^4 + 16X^{11}Y^5 + 30X^{10}Y^6 + 26X^9Y^7 + 33X^8Y^8 + 32X^7Y^9 + 25X^6Y^{10} + 32X^5Y^{11} + 8X^4Y^{12} + 16X^3Y^{13} + 2X^2Y^{14}$	I-iv,v
	[0 1 0 0 0 2 0 0]		
5	[0 0 1 0 0 2 0 0]	$X^{16} + 17X^{14}Y^2 + 46X^{12}Y^4 + 46X^{10}Y^6 + 6X^9Y^7 + 17X^8Y^8 + 32X^7Y^9 + X^6Y^{10} + 52X^5Y^{11} + 32X^3Y^{13} + 6X^2Y^{14}$	I-iv,v
	[0 0 0 2 0 0 0 0]		
6	[0 0 0 2 0 0 0 0]		
	[0 0 0 0 2 0 0 0]		

7	[1 0 0 0 0 1 2 0]	$X^{16} + 5X^{14}Y^2 + 4X^{13}Y^3 + 13X^{12}Y^4 + 20X^{11}Y^5 + 25X^{10}Y^6 + 40X^9Y^7 + 35X^8Y^8 + 40X^7Y^9 + 31X^6Y^{10} + 20X^5Y^{11} + 15X^4Y^{12} + 4X^3Y^{13} + 3X^2Y^{14}$	I-i
	[0 1 0 0 0 2 0 0]		
	[0 0 1 0 0 0 0 1]		
	[0 0 0 2 0 0 0 0]		
	[0 0 0 0 2 0 0 0]		
8	[1 0 0 0 0 3 2 0]	$X^{16} + 6X^{14}Y^2 + 4X^{13}Y^3 + 15X^{12}Y^4 + 20X^{11}Y^5 + 24X^{10}Y^6 + 40X^9Y^7 + 31X^8Y^8 + 40X^7Y^9 + 30X^6Y^{10} + 20X^5Y^{11} + 17X^4Y^{12} + 4X^3Y^{13} + 4X^2Y^{14}$	I-i,II
	[0 1 0 0 0 2 2 0]		
	[0 0 1 0 0 0 0 1]		
	[0 0 0 2 0 0 0 0]		
	[0 0 0 0 2 0 0 0]		
9	[1 0 0 0 0 2 0 0]	$X^{16} + 6X^{14}Y^2 + 4X^{13}Y^3 + 15X^{12}Y^4 + 20X^{11}Y^5 + 24X^{10}Y^6 + 40X^9Y^7 + 31X^8Y^8 + 40X^7Y^9 + 30X^6Y^{10} + 20X^5Y^{11} + 17X^4Y^{12} + 4X^3Y^{13} + 4X^2Y^{14}$	I-ii,II
	[0 1 0 0 0 0 2 0]		
	[0 0 1 0 0 0 0 1]		
	[0 0 0 2 0 0 0 0]		
	[0 0 0 0 2 0 0 0]		
10	[1 0 0 0 0 2 2 0]	$X^{16} + 6X^{14}Y^2 + 2X^{13}Y^3 + 19X^{12}Y^4 + 12X^{11}Y^5 + 36X^{10}Y^6 + 30X^9Y^7 + 39X^8Y^8 + 40X^7Y^9 + 22X^6Y^{10} + 30X^5Y^{11} + 5X^4Y^{12} + 12X^3Y^{13} + 2X^2Y^{15}$	I-iii, II
	[0 1 0 0 0 0 2 0]		
	[0 0 1 0 0 0 0 1]		
	[0 0 0 2 0 0 0 0]		
	[0 0 0 0 2 0 0 0]		
11	[1 0 0 0 0 2 2 0]	$X^{16} + 10X^{14}Y^2 + 31X^{12}Y^4 + 4X^{11}Y^5 + 44X^{10}Y^6 + 20X^9Y^7 + 31X^8Y^8 + 40X^7Y^9 + 10X^6Y^{10} + 40X^5Y^{11} + X^4Y^{12} + 20X^3Y^{13} + 4X^2Y^{15}$	I-v
	[0 1 0 0 0 2 2 0]		
	[0 0 1 0 0 0 0 1]		
	[0 0 0 2 0 0 0 0]		
	[0 0 0 0 2 0 0 0]		
12	[1 0 0 0 0 2 0 0]	$X^{16} + 5X^{14}Y^2 + 4X^{13}Y^3 + 14X^{12}Y^4 + 18X^{11}Y^5 + 26X^{10}Y^6 + 40X^9Y^7 + 33X^8Y^8 + 44X^7Y^9 + 29X^6Y^{10} + 20X^5Y^{11} + 16X^4Y^{12} + 2X^3Y^{13} + 4X^2Y^{14}$	I-ii,II
	[0 1 0 0 0 0 2 2]		
	[0 0 1 0 0 0 0 2]		
	[0 0 0 2 0 0 0 0]		
	[0 0 0 0 2 0 0 0]		
13	[1 0 0 0 0 2 2 2]	$X^{16} + 5X^{14}Y^2 + 2X^{13}Y^3 + 18X^{12}Y^4 + 10X^{11}Y^5 + 38X^{10}Y^6 + 30X^9Y^7 + 41X^8Y^8 + 44X^7Y^9 + 21X^6Y^{10} + 30X^5Y^{11} + 4X^4Y^{12} + 10X^3Y^{13} + 2X^2Y^{15}$	I-iv,v
	[0 1 0 0 0 0 2 2]		
	[0 0 1 0 0 0 0 2]		
	[0 0 0 2 0 0 0 0]		
	[0 0 0 0 2 0 0 0]		
14	[1 0 0 0 0 0 0 0]	$X^{16} + 2X^{15}Y + 7X^{14}Y^2 + 12X^{13}Y^3 + 21X^{12}Y^4 + 30X^{11}Y^5 + 35X^{10}Y^6 + 40X^9Y^7 + 35X^8Y^8 + 30X^7Y^9 + 21X^6Y^{10} + 12X^5Y^{11} + 7X^4Y^{12} + 2X^3Y^{13} + X^2Y^{14}$	II
	[0 1 0 0 0 0 1 0]		
	[0 0 1 0 0 0 0 1]		
	[0 0 0 2 0 0 0 0]		
	[0 0 0 0 2 0 0 0]		



15	[1 0 0 0 0 2 0 0] [0 1 0 0 0 0 1 0] [0 0 1 0 0 0 0 1] [0 0 0 2 0 0 0 0] [0 0 0 0 2 0 0 0]	$X^{16} + 7X^{14}Y^2 + 2X^{13}Y^3 + 21X^{12}Y^4 + 12X^{11}Y^5 + 35X^{10}Y^6 + 30X^9Y^7 + 35X^8Y^8 + 40X^7Y^9 + 21X^6Y^{10} + 30X^5Y^{11} + 7X^4Y^{12} + 12X^3Y^{13} + X^2Y^{14} + 2XY^{15}$	II
16	[1 0 0 0 0 1 0 0] [0 1 0 0 0 0 1 0] [0 0 1 0 0 0 0 1] [0 0 0 2 0 0 0 0] [0 0 0 0 2 0 0 0]	$X^{16} + 8X^{14}Y^2 + 28X^{12}Y^4 + 56X^{10}Y^6 + 70X^8Y^8 + 56X^6Y^{10} + 28X^4Y^{12} + 8X^2Y^{14} + Y^{16}$	II
17	[1 0 0 0 0 0 0 0] [0 1 0 0 0 0 1 0] [0 0 1 0 0 0 0 2] [0 0 0 2 0 0 0 0] [0 0 0 0 2 0 0 0]	$X^{16} + 2X^{15}Y + 6X^{14}Y^2 + 12X^{13}Y^3 + 19X^{12}Y^4 + 30X^{11}Y^5 + 36X^{10}Y^6 + 40X^9Y^7 + 39X^8Y^8 + 30X^7Y^9 + 22X^6Y^{10} + 12X^5Y^{11} + 5X^4Y^{12} + 2X^3Y^{13}$	II
18	[1 0 0 0 0 0 0 0] [0 1 0 0 0 0 2 0] [0 0 1 0 0 0 0 2] [0 0 0 2 0 0 0 0] [0 0 0 0 2 0 0 0]	$X^{16} + 2X^{15}Y + 5X^{14}Y^2 + 12X^{13}Y^3 + 18X^{12}Y^4 + 28X^{11}Y^5 + 38X^{10}Y^6 + 40X^9Y^7 + 41X^8Y^8 + 34X^7Y^9 + 21X^6Y^{10} + 12X^5Y^{11} + 4X^4Y^{12}$	II
19	[1 0 0 0 0 2 0 0] [0 1 0 0 0 0 2 0] [0 0 1 0 0 0 0 2] [0 0 0 2 0 0 0 0] [0 0 0 0 2 0 0 0]	$X^{16} + 5X^{14}Y^2 + 6X^{13}Y^3 + 10X^{12}Y^4 + 24X^{11}Y^5 + 22X^{10}Y^6 + 36X^9Y^7 + 41X^8Y^8 + 32X^7Y^9 + 37X^6Y^{10} + 22X^5Y^{11} + 12X^4Y^{12} + 8X^3Y^{13}$	II
20	[1 0 0 0 0 0 0 0] [0 1 0 0 0 0 2 2] [0 0 1 0 0 0 0 2] [0 0 0 2 0 0 0 0] [0 0 0 0 2 0 0 0]	$X^{16} + 2X^{15}Y + 5X^{14}Y^2 + 10X^{13}Y^3 + 18X^{12}Y^4 + 30X^{11}Y^5 + 38X^{10}Y^6 + 44X^9Y^7 + 41X^8Y^8 + 30X^7Y^9 + 21X^6Y^{10} + 10X^5Y^{11} + 4X^4Y^{12} + 2X^3Y^{13}$	II
21	[1 0 0 0 0 0 0 0] [0 1 0 0 0 0 1 2] [0 0 1 0 0 0 2 2] [0 0 0 2 0 0 0 0] [0 0 0 0 2 0 0 0]	$X^{16} + 2X^{15}Y + 4X^{14}Y^2 + 10X^{13}Y^3 + 17X^{12}Y^4 + 28X^{11}Y^5 + 40X^{10}Y^6 + 44X^9Y^7 + 43X^8Y^8 + 34X^7Y^9 + 20X^6Y^{10} + 10X^5Y^{11} + 3X^4Y^{12}$	II

22	[1 0 0 0 0 1 0 2]	$X^{16} + 3X^{14}Y^2 + 13X^{12}Y^4 + 16X^{11}Y^5 + 31X^{10}Y^6 + 48X^9Y^7 + 35X^8Y^8 + 48X^7Y^9 + 25X^6Y^{10} + 16X^5Y^{11} + 15X^4Y^{12} + 5X^2Y^{14}$	I-i
	[0 1 0 0 0 2 2 2]		
	[0 0 1 0 0 0 1 2]		
	[0 0 0 2 0 0 0 0]		
	[0 0 0 0 2 0 0 0]		
23	[1 0 0 0 0 3 0 2]	$X^{16} + 4X^{14}Y^2 + 6X^{13}Y^3 + 9X^{12}Y^4 + 22X^{11}Y^5 + 24X^{10}Y^6 + 36X^9Y^7 + 43X^8Y^8 + 36X^7Y^9 + 36X^6Y^{10} + 22X^5Y^{11} + 11X^4Y^{12} + 6X^3Y^{13}$	I-i
	[0 1 0 0 0 2 2 0]		
	[0 0 1 0 0 0 1 2]		
	[0 0 0 2 0 0 0 0]		
	[0 0 0 0 2 0 0 0]		
24	[1 0 0 0 0 2 2 2]	$X^{16} + 4X^{14}Y^2 + 17X^{12}Y^4 + 10X^{11}Y^5 + 40X^{10}Y^6 + 34X^9Y^7 + 43X^8Y^8 + 44X^7Y^9 + 20X^6Y^{10} + 28X^5Y^{11} + 3X^4Y^{12} + 10X^3Y^{13} + 2X^2Y^{14}$	I-ii
	[0 1 0 0 0 0 0 2]		
	[0 0 1 0 0 0 1 2]		
	[0 0 0 2 0 0 0 0]		
	[0 0 0 0 2 0 0 0]		
25	[1 0 0 0 0 2 2 0]	$X^{16} + 4X^{14}Y^2 + 17X^{12}Y^4 + 10X^{11}Y^5 + 40X^{10}Y^6 + 34X^9Y^7 + 43X^8Y^8 + 44X^7Y^9 + 20X^6Y^{10} + 28X^5Y^{11} + 3X^4Y^{12} + 10X^3Y^{13} + 2X^2Y^{14}$	I-iii
	[0 1 0 0 0 0 0 2]		
	[0 0 1 0 0 0 1 2]		
	[0 0 0 2 0 0 0 0]		
	[0 0 0 0 2 0 0 0]		
26	[1 0 0 0 0 2 0 2]	$X^{16} + 4X^{14}Y^2 + 4X^{13}Y^3 + 11X^{12}Y^4 + 20X^{11}Y^5 + 26X^{10}Y^6 + 40X^9Y^7 + 39X^8Y^8 + 40X^7Y^9 + 32X^6Y^{10} + 20X^5Y^{11} + 13X^4Y^{12} + 4X^3Y^{13} + 2X^2Y^{14}$	I-iv
	[0 1 0 0 0 2 2 2]		
	[0 0 1 0 0 0 1 2]		
	[0 0 0 2 0 0 0 0]		
	[0 0 0 0 2 0 0 0]		
27	[1 0 0 0 0 2 2 0]	$X^{16} + 4X^{14}Y^2 + 4X^{13}Y^3 + 11X^{12}Y^4 + 20X^{11}Y^5 + 26X^{10}Y^6 + 40X^9Y^7 + 39X^8Y^8 + 40X^7Y^9 + 32X^6Y^{10} + 20X^5Y^{11} + 13X^4Y^{12} + 4X^3Y^{13} + 2X^2Y^{14}$	I-v
	[0 1 0 0 0 2 0 2]		
	[0 0 1 0 0 0 1 2]		
	[0 0 0 2 0 0 0 0]		
	[0 0 0 0 2 0 0 0]		
28	[1 0 0 0 0 1 2 2]	$X^{16} + 4X^{14}Y^2 + 4X^{13}Y^3 + 11X^{12}Y^4 + 20X^{11}Y^5 + 26X^{10}Y^6 + 40X^9Y^7 + 39X^8Y^8 + 40X^7Y^9 + 32X^6Y^{10} + 20X^5Y^{11} + 13X^4Y^{12} + 4X^3Y^{13} + 2X^2Y^{14}$	I-i
	[0 1 0 0 0 2 0 2]		
	[0 0 1 0 0 2 2 2]		
	[0 0 0 2 0 0 0 0]		
	[0 0 0 0 2 0 0 0]		
29	[1 0 0 0 0 3 2 2]	$X^{16} + 4X^{14}Y^2 + 4X^{13}Y^3 + 11X^{12}Y^4 + 20X^{11}Y^5 + 26X^{10}Y^6 + 40X^9Y^7 + 39X^8Y^8 + 40X^7Y^9 + 32X^6Y^{10} + 20X^5Y^{11} + 13X^4Y^{12} + 4X^3Y^{13} + 2X^2Y^{14}$	I-i
	[0 1 0 0 0 2 2 0]		
	[0 0 1 0 0 2 0 0]		
	[0 0 0 2 0 0 0 0]		
	[0 0 0 0 2 0 0 0]		

30	[1 0 0 0 0 2 0 2] [0 1 0 0 0 0 2 2] [0 0 1 0 0 2 2 2] [0 0 0 2 0 0 0 0] [0 0 0 0 2 0 0 0]	$X^{16} + 5X^{14}Y^2 + 18X^{12}Y^4 + 12X^{11}Y^5 + 38X^{10}Y^6 + 34X^9Y^7 + 41X^8Y^8 + 40X^7Y^9 + 21X^6Y^{10} + 28X^5Y^{11} + 4X^4Y^{12} + 12X^3Y^{13} + 2XY^{15}$	I-ii
31	[1 0 0 0 0 2 2 0] [0 1 0 0 0 0 2 2] [0 0 1 0 0 2 0 0] [0 0 0 2 0 0 0 0] [0 0 0 0 2 0 0 0]	$X^{16} + 5X^{14}Y^2 + 2X^{13}Y^3 + 14X^{12}Y^4 + 20X^{11}Y^5 + 26X^{10}Y^6 + 44X^9Y^7 + 33X^8Y^8 + 40X^7Y^9 + 29X^6Y^{10} + 18X^5Y^{11} + 16X^4Y^{12} + 4X^3Y^{13} + 4X^2Y^{14}$	I-iii
32	[1 0 0 0 0 2 2 2] [0 1 0 0 0 2 0 2] [0 0 1 0 0 2 2 2] [0 0 0 2 0 0 0 0] [0 0 0 0 2 0 0 0]	$X^{16} + 9X^{14}Y^2 + 30X^{12}Y^4 + 2X^{11}Y^5 + 46X^{10}Y^6 + 20X^9Y^7 + 33X^8Y^8 + 44X^7Y^9 + 9X^6Y^{10} + 40X^5Y^{11} + 18X^3Y^{13} + 4XY^{15}$	I-iv

Table 9. Free formally self-dual codes over  $Z_4$  of length 10

No.	Generator matrix	Lee weight enumerator	Const.
1	[1 0 0 0 0 0 0 0 0 0] [0 1 0 0 0 0 1 2 1 1] [0 0 1 0 0 0 1 1 3 2] [0 0 0 1 0 0 3 1 2 1] [0 0 0 0 1 0 2 1 1 3]	$X^{20} + 2X^{19}Y + X^{18}Y^2 + 112X^{14}Y^6 + 224X^{13}Y^7 + 142X^{12}Y^8 + 60X^{11}Y^9 + 142X^{10}Y^{10} + 224X^9Y^{11} + 112X^8Y^{12} + X^4Y^{16} + 2X^3Y^{17} + X^2Y^{18}$	II
2	[1 0 0 0 0 0 0 0 0 0] [0 1 0 0 0 0 1 2 0 1] [0 0 1 0 0 0 1 1 1 1] [0 0 0 1 0 0 1 0 2 1] [0 0 0 0 1 0 1 1 1 3]	$X^{20} + 2X^{19}Y + X^{18}Y^2 + 12X^{16}Y^4 + 32X^{15}Y^5 + 60X^{14}Y^6 + 128X^{13}Y^7 + 181X^{12}Y^8 + 186X^{11}Y^9 + 185X^{10}Y^{10} + 136X^9Y^{11} + 58X^8Y^{12} + 20X^7Y^{13} + 10X^6Y^{14} + 8X^5Y^{15} + 4X^4Y^{16}$	II
3	[1 0 0 0 0 0 0 0 0 0] [0 1 0 0 0 0 2 1 1 1] [0 0 1 0 0 0 1 2 3 0] [0 0 0 1 0 0 1 1 2 3] [0 0 0 0 1 0 0 1 3 2]	$X^{20} + 2X^{19}Y + X^{18}Y^2 + 24X^{15}Y^5 + 92X^{14}Y^6 + 152X^{13}Y^7 + 169X^{12}Y^8 + 170X^{11}Y^9 + 153X^{10}Y^{10} + 120X^9Y^{11} + 86X^8Y^{12} + 44X^7Y^{13} + 10X^6Y^{14}$	II
4	[1 0 0 0 0 1 0 0 0 0] [0 1 0 0 0 0 2 0 0 0] [0 0 1 0 0 0 0 0 0 0] [0 0 0 1 0 0 0 0 2 2] [0 0 0 0 1 0 0 0 2 2]	$X^{20} + 2X^{19}Y + 10X^{18}Y^2 + 20X^{17}Y^3 + 35X^{16}Y^4 + 66X^{15}Y^5 + 84X^{14}Y^6 + 108X^{13}Y^7 + 127X^{12}Y^8 + 118X^{11}Y^9 + 122X^{10}Y^{10} + 108X^9Y^{11} + 85X^8Y^{12} + 70X^7Y^{13} + 40X^6Y^{14} + 20X^5Y^{15} + 8X^4Y^{16}$	II
5	[1 0 0 0 0 0 0 0 0 0] [0 1 0 0 0 0 2 0 0 0] [0 0 1 0 0 0 0 0 0 0] [0 0 0 1 0 0 0 0 2 2] [0 0 0 0 1 0 0 0 2 2]	$X^{20} + 4X^{19}Y + 13X^{18}Y^2 + 34X^{17}Y^3 + 58X^{16}Y^4 + 84X^{15}Y^5 + 122X^{14}Y^6 + 140X^{13}Y^7 + 125X^{12}Y^8 + 116X^{11}Y^9 + 113X^{10}Y^{10} + 98X^9Y^{11} + 72X^8Y^{12} + 36X^7Y^{13} + 8X^6Y^{14}$	II
6	[1 0 0 0 0 2 0 0 0 0] [0 1 0 0 0 0 2 0 0 0] [0 0 1 0 0 0 0 0 0 0] [0 0 0 1 0 0 0 0 2 2] [0 0 0 0 1 0 0 0 2 2]	$X^{20} + 2X^{19}Y + 9X^{18}Y^2 + 20X^{17}Y^3 + 30X^{16}Y^4 + 64X^{15}Y^5 + 90X^{14}Y^6 + 96X^{13}Y^7 + 133X^{12}Y^8 + 138X^{11}Y^9 + 109X^{10}Y^{10} + 108X^9Y^{11} + 92X^8Y^{12} + 68X^7Y^{13} + 48X^6Y^{14} + 16X^5Y^{15}$	II
7	[1 0 0 0 0 1 0 0 0 0] [0 1 0 0 0 0 0 0 0 0] [0 0 1 0 0 0 0 0 0 0] [0 0 0 1 0 0 0 0 1 2] [0 0 0 0 1 0 0 0 2 0]	$X^{20} + 4X^{19}Y + 9X^{18}Y^2 + 20X^{17}Y^3 + 41X^{16}Y^4 + 72X^{15}Y^5 + 113X^{14}Y^6 + 152X^{13}Y^7 + 171X^{12}Y^8 + 164X^{11}Y^9 + 131X^{10}Y^{10} + 84X^9Y^{11} + 43X^8Y^{12} + 16X^7Y^{13} + 3X^6Y^{14}$	II

8	[1 0 0 0 0 0 0 0 0 0] [0 1 0 0 0 0 0 0 0 0] [0 0 1 0 0 0 0 0 0 0] [0 0 0 1 0 0 0 0 1 2] [0 0 0 0 1 0 0 0 2 0]	$X^{20} + 6X^{19}Y + 16X^{18}Y^2 + 30X^{17}Y^3 + 57X^{16}Y^4 + 108X^{15}Y^5 + 168X^{14}Y^6 + 204X^{13}Y^7 + 195X^{12}Y^8 + 142X^{11}Y^9 + 72X^{10}Y^{10} + 22X^9Y^{11} + 3X^8Y^{12}$	II
9	[1 0 0 0 0 2 0 0 0 0] [0 1 0 0 0 0 0 0 0 0] [0 0 1 0 0 0 0 0 0 0] [0 0 0 1 0 0 0 0 1 2] [0 0 0 0 1 0 0 0 2 0]	$X^{20} + 4X^{19}Y + 8X^{18}Y^2 + 18X^{17}Y^3 + 41X^{16}Y^4 + 70X^{15}Y^5 + 104X^{14}Y^6 + 148X^{13}Y^7 + 179X^{12}Y^8 + 176X^{11}Y^9 + 144X^{10}Y^{10} + 90X^9Y^{11} + 35X^8Y^{12} + 6X^7Y^{13}$	II
10	[1 0 0 0 0 1 0 0 0 0] [0 1 0 0 0 0 0 0 0 0] [0 0 1 0 0 0 0 0 0 0] [0 0 0 1 0 0 0 0 1 3] [0 0 0 0 1 0 0 0 1 1]	$X^{20} + 4X^{19}Y + 8X^{18}Y^2 + 16X^{17}Y^3 + 35X^{16}Y^4 + 68X^{15}Y^5 + 114X^{14}Y^6 + 160X^{13}Y^7 + 183X^{12}Y^8 + 172X^{11}Y^9 + 132X^{10}Y^{10} + 80X^9Y^{11} + 37X^8Y^{12} + 12X^7Y^{13} + 2X^6Y^{14}$	II
11	[1 0 0 0 0 0 0 0 0 0] [0 1 0 0 0 0 0 0 0 0] [0 0 1 0 0 0 0 0 0 0] [0 0 0 1 0 0 0 0 1 3] [0 0 0 0 1 0 0 0 1 1]	$X^{20} + 6X^{19}Y + 15X^{18}Y^2 + 24X^{17}Y^3 + 44X^{16}Y^4 + 100X^{15}Y^5 + 182X^{14}Y^6 + 232X^{13}Y^7 + 209X^{12}Y^8 + 134X^{11}Y^9 + 59X^{10}Y^{10} + 16X^9Y^{11} + 2X^8Y^{12}$	II
12	[1 0 0 0 0 2 0 0 0 0] [0 1 0 0 0 0 0 0 0 0] [0 0 1 0 0 0 0 0 0 0] [0 0 0 1 0 0 0 0 1 3] [0 0 0 0 1 0 0 0 1 1]	$X^{20} + 4X^{19}Y + 7X^{18}Y^2 + 14X^{17}Y^3 + 36X^{16}Y^4 + 68X^{15}Y^5 + 102X^{14}Y^6 + 148X^{13}Y^7 + 193X^{12}Y^8 + 196X^{11}Y^9 + 147X^{10}Y^{10} + 78X^9Y^{11} + 26X^8Y^{12} + 4X^7Y^{13}$	II
13	[1 0 0 0 0 1 0 0 0 0] [0 1 0 0 0 0 2 0 0 0] [0 0 1 0 0 0 0 1 0 0] [0 0 0 1 0 0 0 0 0 0] [0 0 0 0 1 0 0 0 0 0]	$X^{20} + 4X^{19}Y + 11X^{18}Y^2 + 26X^{17}Y^3 + 49X^{16}Y^4 + 80X^{15}Y^5 + 115X^{14}Y^6 + 142X^{13}Y^7 + 155X^{12}Y^8 + 148X^{11}Y^9 + 121X^{10}Y^{10} + 86X^9Y^{11} + 51X^8Y^{12} + 24X^7Y^{13} + 9X^6Y^{14} + 2X^5Y^{15}$	II
14	[1 0 0 0 0 0 0 0 0 0] [0 1 0 0 0 0 2 0 0 0] [0 0 1 0 0 0 0 1 0 0] [0 0 0 1 0 0 0 0 0 0] [0 0 0 0 1 0 0 0 0 0]	$X^{20} + 6X^{19}Y + 18X^{18}Y^2 + 40X^{17}Y^3 + 75X^{16}Y^4 + 118X^{15}Y^5 + 156X^{14}Y^6 + 176X^{13}Y^7 + 167X^{12}Y^8 + 130X^{11}Y^9 + 82X^{10}Y^{10} + 40X^9Y^{11} + 13X^8Y^{12} + 2X^7Y^{13}$	II
15	[1 0 0 0 0 2 0 0 0 0] [0 1 0 0 0 0 2 0 0 0] [0 0 1 0 0 0 0 1 0 0] [0 0 0 1 0 0 0 0 0 0] [0 0 0 0 1 0 0 0 0 0]	$X^{20} + 4X^{19}Y + 10X^{18}Y^2 + 24X^{17}Y^3 + 47X^{16}Y^4 + 76X^{15}Y^5 + 112X^{14}Y^6 + 144X^{13}Y^7 + 159X^{12}Y^8 + 156X^{11}Y^9 + 130X^{10}Y^{10} + 88X^9Y^{11} + 49X^8Y^{12} + 20X^7Y^{13} + 4X^6Y^{14}$	II

16	[1 0 0 0 0 1 0 0 0 0] [0 1 0 0 0 0 0 0 0 0] [0 0 1 0 0 0 0 2 2 2] [0 0 0 1 0 0 0 2 2 2] [0 0 0 0 1 0 0 2 2 2]	$X^{20} + 2X^{19}Y + 18X^{18}Y^2 + 34X^{17}Y^3 + 63X^{16}Y^4 + 92X^{15}Y^5 + 92X^{14}Y^6 + 98X^{13}Y^7 + 75X^{12}Y^8 + 72X^{11}Y^9 + 82X^{10}Y^{10} + 86X^9Y^{11} + 105X^8Y^{12} + 84X^7Y^{13} + 64X^6Y^{14} + 38X^5Y^{15} + 12X^4Y^{16} + 6X^3Y^{17}$	II
17	[1 0 0 0 0 0 0 0 0 0] [0 1 0 0 0 0 0 0 0 0] [0 0 1 0 0 0 0 2 2 2] [0 0 0 1 0 0 0 2 2 2] [0 0 0 0 1 0 0 2 2 2]	$X^{20} + 4X^{19}Y + 21X^{18}Y^2 + 64X^{17}Y^3 + 106X^{16}Y^4 + 120X^{15}Y^5 + 106X^{14}Y^6 + 70X^{13}Y^7 + 45X^{12}Y^8 + 60X^{11}Y^9 + 105X^{10}Y^{10} + 132X^9Y^{11} + 104X^8Y^{12} + 56X^7Y^{13} + 24X^6Y^{14} + 6X^5Y^{15}$	II
18	[1 0 0 0 0 2 0 0 0 0] [0 1 0 0 0 0 0 0 0 0] [0 0 1 0 0 0 0 2 2 2] [0 0 0 1 0 0 0 2 2 2] [0 0 0 0 1 0 0 2 2 2]	$X^{20} + 2X^{19}Y + 17X^{18}Y^2 + 34X^{17}Y^3 + 50X^{16}Y^4 + 92X^{15}Y^5 + 106X^{14}Y^6 + 98X^{13}Y^7 + 89X^{12}Y^8 + 66X^{11}Y^9 + 69X^{10}Y^{10} + 78X^9Y^{11} + 104X^8Y^{12} + 112X^7Y^{13} + 64X^6Y^{14} + 30X^5Y^{15} + 12X^4Y^{16}$	II
19	[1 0 0 0 0 1 0 0 0 0] [0 1 0 0 0 0 1 2 1 1] [0 0 1 0 0 0 1 1 3 2] [0 0 0 1 0 0 3 1 2 1] [0 0 0 0 1 0 2 1 1 3]	$X^{20} + 2X^{18}Y^2 + X^{16}Y^4 + 112X^{14}Y^6 + 254X^{12}Y^8 + 284X^{10}Y^{10} + 254X^8Y^{12} + 112X^6Y^{14} + X^4Y^{16} + 2X^2Y^{18} + Y^{20}$	I
20	[1 0 0 0 0 2 0 0 0 0] [0 1 0 0 0 0 1 2 1 1] [0 0 1 0 0 0 1 1 3 2] [0 0 0 1 0 0 3 1 2 1] [0 0 0 0 1 0 2 1 1 3]	$X^{20} + X^{18}Y^2 + 2X^{17}Y^3 + 112X^{14}Y^6 + 142X^{12}Y^8 + 224X^{11}Y^9 + 142X^{10}Y^{10} + 60X^9Y^{11} + 112X^8Y^{12} + 224X^7Y^{13} + X^4Y^{16} + X^2Y^{18} + 2XY^{19}$	II
21	[1 0 0 0 0 2 1 1 3 1] [0 1 0 0 0 0 2 2 2 2] [0 0 1 0 0 2 1 3 1 1] [0 0 0 1 0 2 1 1 1 1] [0 0 0 0 1 2 1 1 3 3]	$X^{20} + X^{18}Y^2 + 8X^{17}Y^3 + 14X^{16}Y^4 + 16X^{15}Y^5 + 38X^{14}Y^6 + 64X^{13}Y^7 + 89X^{12}Y^8 + 162X^{11}Y^9 + 189X^{10}Y^{10} + 160X^9Y^{11} + 148X^8Y^{12} + 92X^7Y^{13} + 28X^6Y^{14} + 8X^5Y^{15} + 4X^4Y^{16} + 2X^3Y^{17}$	I- ii,iii
22	[1 0 0 0 0 2 3 3 1 3] [0 1 0 0 0 2 2 2 2 2] [0 0 1 0 0 2 3 1 3 3] [0 0 0 1 0 2 3 3 3 3] [0 0 0 0 1 2 3 3 1 1]	$X^{20} + X^{18}Y^2 + 14X^{16}Y^4 + 8X^{15}Y^5 + 54X^{14}Y^6 + 24X^{13}Y^7 + 185X^{12}Y^8 + 120X^{11}Y^9 + 189X^{10}Y^{10} + 210X^9Y^{11} + 52X^8Y^{12} + 112X^7Y^{13} + 12X^6Y^{14} + 36X^5Y^{15} + 4X^4Y^{16} + 2XY^{19}$	I- vi,v
23	[1 0 0 0 0 2 1 1 1 3] [0 1 0 0 0 0 2 2 2 2] [0 0 1 0 0 2 1 2 0 1] [0 0 0 1 0 2 1 1 1 1] [0 0 0 0 1 2 1 0 2 1]	$X^{20} + X^{18}Y^2 + 8X^{17}Y^3 + 12X^{16}Y^4 + 12X^{15}Y^5 + 44X^{14}Y^6 + 80X^{13}Y^7 + 85X^{12}Y^8 + 138X^{11}Y^9 + 185X^{10}Y^{10} + 176X^9Y^{11} + 154X^8Y^{12} + 88X^7Y^{13} + 26X^6Y^{14} + 8X^5Y^{15} + 4X^4Y^{16} + 2X^3Y^{17}$	I- ii,iii

24	[1 0 0 0 0 2 2 2 2 2] [0 1 0 0 0 2 1 1 1 3] [0 0 1 0 0 2 1 2 0 1] [0 0 0 1 0 2 1 1 1 1] [0 0 0 0 1 2 1 0 2 1]	$X^{20} + X^{18}Y^2 + 12X^{16}Y^4 + 8X^{15}Y^5 + 60X^{14}Y^6 + 20X^{13}Y^7 + 181X^{12}Y^8 + 136X^{11}Y^9 + 185X^{10}Y^{10} + 186X^9Y^{11} + 58X^8Y^{12} + 128X^7Y^{13} + 10X^6Y^{14} + 32X^5Y^{15} + 4X^4Y^{16} + 2XY^{19}$	I- vi,v
25	[1 0 0 0 0 1 0 0 0 0] [0 1 0 0 0 0 1 2 0 1] [0 0 1 0 0 0 1 1 1 1] [0 0 0 1 0 0 1 0 2 1] [0 0 0 0 1 0 1 1 1 3]	$X^{20} + 2X^{18}Y^2 + 13X^{16}Y^4 + 8X^{15}Y^5 + 56X^{14}Y^6 + 72X^{13}Y^7 + 113X^{12}Y^8 + 176X^{11}Y^9 + 142X^{10}Y^{10} + 176X^9Y^{11} + 115X^8Y^{12} + 72X^7Y^{13} + 52X^6Y^{14} + 8X^5Y^{15} + 14X^4Y^{16} + 4X^2Y^{18}$	II
26	[1 0 0 0 0 2 0 0 0 0] [0 1 0 0 0 0 1 2 0 1] [0 0 1 0 0 0 1 1 1 1] [0 0 0 1 0 0 1 0 2 1] [0 0 0 0 1 0 1 1 1 3]	$X^{20} + X^{18}Y^2 + 2X^{17}Y^3 + 12X^{16}Y^4 + 8X^{15}Y^5 + 44X^{14}Y^6 + 88X^{13}Y^7 + 85X^{12}Y^8 + 176X^{11}Y^9 + 185X^{10}Y^{10} + 138X^9Y^{11} + 154X^8Y^{12} + 80X^7Y^{13} + 26X^6Y^{14} + 12X^5Y^{15} + 4X^4Y^{16} + 8X^3Y^{17}$	II
27	[1 0 0 0 0 1 0 0 0 0] [0 1 0 0 0 0 1 2 1 1] [0 0 1 0 0 0 1 1 3 2] [0 0 0 1 0 0 3 1 2 1] [0 0 0 0 1 0 2 1 1 3]	$X^{20} + 2X^{18}Y^2 + X^{16}Y^4 + 112X^{14}Y^6 + 254X^{12}Y^8 + 284X^{10}Y^{10} + 254X^8Y^{12} + 112X^6Y^{14} + X^4Y^{16} + 2X^2Y^{18} + Y^{20}$	II
28	[1 0 0 0 0 2 0 0 0 0] [0 1 0 0 0 0 1 2 1 1] [0 0 1 0 0 0 1 1 3 2] [0 0 0 1 0 0 3 1 2 1] [0 0 0 0 1 0 2 1 1 3]	$X^{20} + X^{18}Y^2 + 2X^{17}Y^3 + 112X^{14}Y^6 + 142X^{12}Y^8 + 224X^{11}Y^9 + 142X^{10}Y^{10} + 60X^9Y^{11} + 112X^8Y^{12} + 224X^7Y^{13} + X^4Y^{16} + X^2Y^{18} + 2XY^{19}$	II
29	[1 0 0 0 0 1 0 0 0 0] [0 1 0 0 0 0 2 1 1 1] [0 0 1 0 0 0 1 2 3 0] [0 0 0 1 0 0 1 1 2 3] [0 0 0 0 1 0 0 1 3 2]	$X^{20} + 2X^{18}Y^2 + X^{16}Y^4 + 24X^{15}Y^5 + 44X^{14}Y^6 + 88X^{13}Y^7 + 133X^{12}Y^8 + 144X^{11}Y^9 + 162X^{10}Y^{10} + 144X^9Y^{11} + 111X^8Y^{12} + 88X^7Y^{13} + 48X^6Y^{14} + 24X^5Y^{15} + 10X^4Y^{16}$	II
30	[1 0 0 0 0 2 0 0 0 0] [0 1 0 0 0 0 2 1 1 1] [0 0 1 0 0 0 1 2 3 0] [0 0 0 1 0 0 1 1 2 3] [0 0 0 0 1 0 0 1 3 2]	$X^{20} + X^{18}Y^2 + 2X^{17}Y^3 + 24X^{15}Y^5 + 44X^{14}Y^6 + 64X^{13}Y^7 + 137X^{12}Y^8 + 168X^{11}Y^9 + 153X^{10}Y^{10} + 154X^9Y^{11} + 118X^8Y^{12} + 80X^7Y^{13} + 58X^6Y^{14} + 20X^5Y^{15}$	II
31	[1 0 0 0 0 2 2 1 1 2] [0 1 0 0 0 0 0 0 0 2] [0 0 1 0 0 0 1 2 1 1] [0 0 0 1 0 0 1 1 3 2] [0 0 0 0 1 0 3 1 2 1]	$X^{20} + X^{18}Y^2 + 2X^{17}Y^3 + 12X^{15}Y^5 + 53X^{14}Y^6 + 104X^{13}Y^7 + 118X^{12}Y^8 + 114X^{11}Y^9 + 155X^{10}Y^{10} + 194X^9Y^{11} + 136X^8Y^{12} + 64X^7Y^{13} + 47X^6Y^{14} + 20X^5Y^{15} + X^4Y^{16} + 2X^3Y^{17}$	II

32	[1 0 0 0 0 2 0 0 0 2] [0 1 0 0 0 2 2 1 1 2] [0 0 1 0 0 0 1 2 1 1] [0 0 0 1 0 0 1 1 3 2] [0 0 0 0 1 0 3 1 2 1]	$X^{20} + X^{18}Y^2 + 2X^{15}Y^5 + 93X^{14}Y^6 + 32X^{13}Y^7 + 166X^{12}Y^8 + 148X^{11}Y^9 + 155X^{10}Y^{10} + 138X^9Y^{11} + 88X^8Y^{12} + 170X^7Y^{13} + 7X^6Y^{14} + 20X^5Y^{15} + X^4Y^{16} + 2XY^{19}$	II
33	[1 0 0 0 0 1 2 2 2 2] [0 1 0 0 0 2 0 0 1 1] [0 0 1 0 0 2 0 0 0 0] [0 0 0 1 0 2 0 0 0 0] [0 0 0 0 1 2 0 0 1 3]	$X^{20} + 6X^{18}Y^2 + 8X^{17}Y^3 + 23X^{16}Y^4 + 16X^{15}Y^5 + 70X^{14}Y^6 + 96X^{13}Y^7 + 59X^{12}Y^8 + 136X^{11}Y^9 + 132X^{10}Y^{10} + 136X^9Y^{11} + 161X^8Y^{12} + 96X^7Y^{13} + 46X^6Y^{14} + 16X^5Y^{15} + 12X^4Y^{16} + 8X^3Y^{17} + 2X^2Y^{18}$	I-i
34	[1 0 0 0 0 3 2 2 2 2] [0 1 0 0 0 2 2 2 3 3] [0 0 1 0 0 2 2 2 2 2] [0 0 0 1 0 2 2 2 2 2] [0 0 0 0 1 2 2 2 3 1]		I-i
35	[1 0 0 0 0 2 0 0 1 1] [0 1 0 0 0 0 2 2 2 2] [0 0 1 0 0 2 0 0 0 0] [0 0 0 1 0 2 0 0 0 0] [0 0 0 0 1 2 0 0 1 3]	$X^{20} + 7X^{18}Y^2 + 4X^{17}Y^3 + 28X^{16}Y^4 + 12X^{15}Y^5 + 86X^{14}Y^6 + 60X^{13}Y^7 + 97X^{12}Y^8 + 170X^{11}Y^9 + 59X^{10}Y^{10} + 196X^9Y^{11} + 114X^8Y^{12} + 56X^7Y^{13} + 96X^6Y^{14} + 12X^5Y^{15} + 16X^4Y^{16} + 2X^3Y^{17} + 8X^2Y^{18}$	I-ii
36	[1 0 0 0 0 2 2 2 3 3] [0 1 0 0 0 0 2 2 2 2] [0 0 1 0 0 2 2 2 2 2] [0 0 0 1 0 2 2 2 2 2] [0 0 0 0 1 2 2 2 3 1]	$X^{20} + 7X^{18}Y^2 + 36X^{16}Y^4 + 102X^{14}Y^6 + 4X^{13}Y^7 + 193X^{12}Y^8 + 78X^{11}Y^9 + 147X^{10}Y^{10} + 196X^9Y^{11} + 26X^8Y^{12} + 148X^7Y^{13} + 68X^5Y^{15} + 14X^3Y^{17} + 4XY^{19}$	I-iii
37	[1 0 0 0 0 2 2 2 2 2] [0 1 0 0 0 2 0 0 1 1] [0 0 1 0 0 2 0 0 0 0] [0 0 0 1 0 2 0 0 0 0] [0 0 0 0 1 2 0 0 1 3]	$X^{20} + 7X^{18}Y^2 + 4X^{17}Y^3 + 28X^{16}Y^4 + 12X^{15}Y^5 + 86X^{14}Y^6 + 56X^{13}Y^7 + 121X^{12}Y^8 + 108X^{11}Y^9 + 147X^{10}Y^{10} + 134X^9Y^{11} + 98X^8Y^{12} + 140X^7Y^{13} + 16X^6Y^{14} + 44X^5Y^{15} + 8X^4Y^{16} + 12X^3Y^{17} + 2XY^{19}$	I-iv
38	[1 0 0 0 0 2 2 2 3 3] [0 1 0 0 0 2 2 2 2 2] [0 0 1 0 0 2 2 2 2 2] [0 0 0 1 0 2 2 2 2 2] [0 0 0 0 1 2 2 2 3 1]	$X^{20} + 15X^{18}Y^2 + 44X^{16}Y^4 + 182X^{14}Y^6 + 209X^{12}Y^8 + 16X^{11}Y^9 + 59X^{10}Y^{10} + 134X^9Y^{11} + 2X^8Y^{12} + 232X^7Y^{13} + 100X^5Y^{15} + 24X^3Y^{17} + 6XY^{19}$	I-v
39	[1 0 0 0 0 1 0 0 2 2] [0 1 0 0 0 2 2 0 0 0] [0 0 1 0 0 0 1 0 2 2] [0 0 0 1 0 2 2 0 0 0] [0 0 0 0 1 0 0 1 0 0]	$X^{20} + 8X^{18}Y^2 + 20X^{16}Y^4 + 32X^{15}Y^5 + 60X^{14}Y^6 + 96X^{13}Y^7 + 118X^{12}Y^8 + 128X^{11}Y^9 + 116X^{10}Y^{10} + 128X^9Y^{11} + 84X^8Y^{12} + 96X^7Y^{13} + 68X^6Y^{14} + 32X^5Y^{15} + 33X^4Y^{16} + 4X^2Y^{18}$	I-i



40	[1 0 0 0 0 2 2 0 0 0] [0 1 0 0 0 0 0 2 2] [0 0 1 0 0 0 1 0 2 2] [0 0 0 1 0 2 2 0 0 0] [0 0 0 0 1 0 0 1 0 0]	$X^{20} + 9X^{18}Y^2 + 4X^{17}Y^3 + 23X^{16}Y^4 + 42X^{15}Y^5 + 49X^{14}Y^6 + 104X^{13}Y^7 + 97X^{12}Y^8 + 118X^{11}Y^9 + 131X^{10}Y^{10} + 100X^9Y^{11} + 117X^8Y^{12} + 86X^7Y^{13} + 67X^6Y^{14} + 48X^5Y^{15} + 18X^4Y^{16} + 10X^3Y^{17}$	I- ii,iii
41	[1 0 0 0 0 2 0 0 2 2] [0 1 0 0 0 2 2 0 0 0] [0 0 1 0 0 0 1 0 2 2] [0 0 0 1 0 2 2 0 0 0] [0 0 0 0 1 0 0 1 0 0]	$X^{20} + 9X^{18}Y^2 + 39X^{16}Y^4 + 12X^{15}Y^5 + 81X^{14}Y^6 + 66X^{13}Y^7 + 113X^{12}Y^8 + 128X^{11}Y^9 + 131X^{10}Y^{10} + 126X^9Y^{11} + 101X^8Y^{12} + 92X^7Y^{13} + 35X^6Y^{14} + 62X^5Y^{15} + 2X^4Y^{16} + 24X^3Y^{17} + 2XY^{19}$	I- iv,v
42	[0 0 0 0 1 2 0 2 2] [0 1 0 0 0 2 2 0 0 0] [0 0 1 0 0 2 2 0 0 0] [0 0 0 1 0 2 0 0 2 2] [0 0 0 0 1 0 0 1 0 0]	$X^{20} + 9X^{18}Y^2 + 39X^{16}Y^4 + 12X^{15}Y^5 + 79X^{14}Y^6 + 76X^{13}Y^7 + 89X^{12}Y^8 + 168X^{11}Y^9 + 81X^{10}Y^{10} + 168X^9Y^{11} + 85X^8Y^{12} + 76X^7Y^{13} + 77X^6Y^{14} + 12X^5Y^{15} + 42X^4Y^{16} + 10X^2Y^{18}$	I-i
43	[1 0 0 0 0 2 2 0 0 0] [0 1 0 0 0 0 2 0 2 2] [0 0 1 0 0 2 2 0 0 0] [0 0 0 1 0 2 0 0 2 2] [0 0 0 0 1 0 0 1 0 0]	$X^{20} + 10X^{18}Y^2 + 16X^{17}Y^3 + 31X^{16}Y^4 + 52X^{15}Y^5 + 48X^{14}Y^6 + 72X^{13}Y^7 + 79X^{12}Y^8 + 92X^{11}Y^9 + 130X^{10}Y^{10} + 128X^9Y^{11} + 129X^8Y^{12} + 108X^7Y^{13} + 68X^6Y^{14} + 40X^5Y^{15} + 16X^4Y^{16} + 4X^3Y^{17}$	I-ii
44	[1 0 0 0 0 2 0 0 2 2] [0 1 0 0 0 0 2 0 2 2] [0 0 1 0 0 2 0 0 2 2] [0 0 0 1 0 2 2 0 0 0] [0 0 0 0 1 0 0 1 0 0]	$X^{20} + 10X^{18}Y^2 + 16X^{17}Y^3 + 31X^{16}Y^4 + 50X^{15}Y^5 + 52X^{14}Y^6 + 72X^{13}Y^7 + 75X^{12}Y^8 + 98X^{11}Y^9 + 122X^{10}Y^{10} + 128X^9Y^{11} + 37X^8Y^{12} + 102X^7Y^{13} + 72X^6Y^{14} + 40X^5Y^{15} + 12X^4Y^{16} + 6X^3Y^{17}$	I-iii
45	[1 0 0 0 0 2 2 0 2 2] [0 1 0 0 0 2 2 0 0 0] [0 0 1 0 0 2 2 0 0 0] [0 0 0 1 0 2 0 0 2 2] [0 0 0 0 1 0 0 1 0 0]	$X^{20} + 10X^{18}Y^2 + 35X^{16}Y^4 + 20X^{15}Y^5 + 84X^{14}Y^6 + 70X^{13}Y^7 + 127X^{12}Y^8 + 108X^{11}Y^9 + 122X^{10}Y^{10} + 118X^9Y^{11} + 85X^8Y^{12} + 108X^7Y^{13} + 40X^6Y^{14} + 66X^5Y^{15} + 8X^4Y^{16} + 20X^3Y^{17} + 2XY^{19}$	I-iv
46	[1 0 0 0 0 2 0 0 2 2] [0 1 0 0 0 2 2 0 2 2] [0 0 1 0 0 2 0 0 2 2] [0 0 0 1 0 2 2 0 0 0] [0 0 0 0 1 0 0 1 0 0]	$X^{20} + 10X^{18}Y^2 + 39X^{16}Y^4 + 18X^{15}Y^5 + 80X^{14}Y^6 + 70X^{13}Y^7 + 119X^{12}Y^8 + 114X^{11}Y^9 + 130X^{10}Y^{10} + 118X^9Y^{11} + 89X^8Y^{12} + 102X^7Y^{13} + 36X^6Y^{14} + 66X^5Y^{15} + 8X^4Y^{16} + 22X^3Y^{17} + 2XY^{19}$	I-v
47	[1 0 0 0 0 1 2 0 2 2] [0 1 0 0 0 2 2 0 2 2] [0 0 1 0 0 2 2 0 2 2] [0 0 0 1 0 2 0 0 2 2] [0 0 0 0 1 0 0 1 0 0]	$X^{20} + 9X^{18}Y^2 + 8X^{17}Y^3 + 31X^{16}Y^4 + 36X^{15}Y^5 + 55X^{14}Y^6 + 84X^{13}Y^7 + 81X^{12}Y^8 + 128X^{11}Y^9 + 121X^{10}Y^{10} + 128X^9Y^{11} + 125X^8Y^{12} + 84X^7Y^{13} + 69X^6Y^{14} + 36X^5Y^{15} + 18X^4Y^{16} + 8X^3Y^{17} + 2X^2Y^{18}$	I-i

48	[1 0 0 0 0 2 2 0 2 2] [0 1 0 0 0 0 2 0 2 2] [0 0 1 0 0 2 2 0 2 2] [0 0 0 1 0 2 0 0 2 2] [0 0 0 0 1 0 0 1 0 0]	$X^{20} + 10X^{18}Y^2 + 47X^{16}Y^4 + 112X^{14}Y^6 + 20X^{13}Y^7 + 159X^{12}Y^8 + 88X^{11}Y^9 + 130X^{10}Y^{10} + 156X^9Y^{11} + 49X^8Y^{12} + 144X^7Y^{13} + 4X^6Y^{14} + 76X^5Y^{15} + 24X^3Y^{17} + 4XY^{19}$	I-ii
49	[1 0 0 0 0 2 0 0 0 0] [0 1 0 0 0 0 2 0 2 2] [0 0 1 0 0 2 0 0 0 0] [0 0 0 1 0 2 2 0 0 0] [0 0 0 0 1 0 0 1 0 0]	$X^{20} + 10X^{18}Y^2 + 4X^{17}Y^3 + 39X^{16}Y^4 + 22X^{15}Y^5 + 76X^{14}Y^6 + 76X^{13}Y^7 + 83X^{12}Y^8 + 150X^{11}Y^9 + 82X^{10}Y^{10} + 156X^9Y^{11} + 97X^8Y^{12} + 82X^7Y^{13} + 80X^6Y^{14} + 20X^5Y^{15} + 36X^4Y^{16} + 2X^3Y^{17} + 8X^2Y^{18}$	I-iii
50	[1 0 0 0 0 2 2 0 2 2] [0 1 0 0 0 2 2 0 2 2] [0 0 1 0 0 2 2 0 2 2] [0 0 0 1 0 2 0 0 2 2] [0 0 0 0 1 0 0 1 0 0]	$X^{20} + 18X^{18}Y^2 + 75X^{16}Y^4 + 156X^{14}Y^6 + 2X^{13}Y^7 + 167X^{12}Y^8 + 40X^{11}Y^9 + 82X^{10}Y^{10} + 130X^9Y^{11} + 13X^8Y^{12} + 176X^7Y^{13} + 118X^5Y^{15} + 40X^3Y^{17} + 6XY^{19}$	I-iv
51	[1 0 0 0 0 2 0 0 0 0] [0 1 0 0 0 2 2 0 2 2] [0 0 1 0 0 2 0 0 0 0] [0 0 0 1 0 2 2 0 0 0] [0 0 0 0 1 0 0 1 0 0]	$X^{20} + 10X^{18}Y^2 + 4X^{17}Y^3 + 39X^{16}Y^4 + 22X^{15}Y^5 + 80X^{14}Y^6 + 58X^{13}Y^7 + 119X^{12}Y^8 + 102X^{11}Y^9 + 130X^{10}Y^{10} + 130X^9Y^{11} + 89X^8Y^{12} + 114X^7Y^{13} + 36X^6Y^{14} + 62X^5Y^{15} + 8X^4Y^{16} + 18X^3Y^{17} + 2XY^{19}$	I-v
52	[1 0 0 0 0 1 2 2 2 2] [0 1 0 0 0 2 0 2 2 2] [0 0 1 0 0 2 0 0 0 0] [0 0 0 1 0 2 0 2 2 2] [0 0 0 0 1 2 0 2 2 2]	$X^{20} + 16X^{18}Y^2 + 4X^{17}Y^3 + 31X^{16}Y^4 + 72X^{15}Y^5 + 56X^{14}Y^6 + 112X^{13}Y^7 + 123X^{12}Y^8 + 68X^{11}Y^9 + 82X^{10}Y^{10} + 68X^9Y^{11} + 57X^8Y^{12} + 112X^7Y^{13} + 100X^6Y^{14} + 72X^5Y^{15} + 44X^4Y^{16} + 4X^3Y^{17} + 2X^2Y^{18}$	I-i
53	[1 0 0 0 0 3 2 2 2 2] [0 1 0 0 0 2 2 0 0 0] [0 0 1 0 0 2 2 2 2 2] [0 0 0 1 0 2 2 0 0 0] [0 0 0 0 1 2 2 0 0 0]		I-i
54	[1 0 0 0 0 2 0 2 2 2] [0 1 0 0 0 0 2 2 2 2] [0 0 1 0 0 2 0 0 0 0] [0 0 0 1 0 2 0 2 2 2] [0 0 0 0 1 2 0 2 2 2]	$X^{20} + 17X^{18}Y^2 + 2X^{17}Y^3 + 46X^{16}Y^4 + 56X^{15}Y^5 + 58X^{14}Y^6 + 140X^{13}Y^7 + 81X^{12}Y^8 + 64X^{11}Y^9 + 105X^{10}Y^{10} + 66X^9Y^{11} + 68X^8Y^{12} + 112X^7Y^{13} + 72X^6Y^{14} + 64X^5Y^{15} + 60X^4Y^{16} + 8X^3Y^{17} + 4X^2Y^{18},$	I-ii
55	[1 0 0 0 0 2 2 0 0 0] [0 1 0 0 0 0 2 2 2 2] [0 0 1 0 0 2 2 2 2 2] [0 0 0 1 0 2 2 0 0 0] [0 0 0 0 1 2 2 0 0 0]	$X^{20} + 17X^{18}Y^2 + 50X^{16}Y^4 + 30X^{15}Y^5 + 106X^{14}Y^6 + 112X^{13}Y^7 + 89X^{12}Y^8 + 78X^{11}Y^9 + 69X^{10}Y^{10} + 66X^9Y^{11} + 104X^8Y^{12} + 98X^7Y^{13} + 64X^6Y^{14} + 92X^5Y^{15} + 12X^4Y^{16} + 34X^3Y^{17} + 2XY^{19}$	I-iii

56	[1 0 0 0 0 2 2 2 2 2] [0 1 0 0 0 2 0 2 2 2] [0 0 1 0 0 2 0 0 0 0] [0 0 0 1 0 2 0 2 2 2] [0 0 0 0 1 2 0 2 2 2]	$X^{20} + 17X^{18}Y^2 + 2X^{17}Y^3 + 58X^{16}Y^4 + 32X^{15}Y^5 + 98X^{14}Y^6 + 84X^{13}Y^7 + 81X^{12}Y^8 + 118X^{11}Y^9 + 69X^{10}Y^{10} + 60X^9Y^{11} + 112X^8Y^{12} + 84X^7Y^{13} + 72X^6Y^{14} + 92X^5Y^{15} + 4X^4Y^{16} + 38X^3Y^{17} + 2XY^{19}$ ,	I-iv
57	[1 0 0 0 0 2 2 0 0 0] [0 1 0 0 0 2 2 2 2 2] [0 0 1 0 0 2 2 2 2 2] [0 0 0 1 0 2 2 0 0 0] [0 0 0 0 1 2 2 0 0 0]	$X^{20} + 21X^{18}Y^2 + 106X^{16}Y^4 + 6X^{15}Y^5 + 106X^{14}Y^6 + 56X^{13}Y^7 + 45X^{12}Y^8 + 132X^{11}Y^9 + 105X^{10}Y^{10} + 60X^9Y^{11} + 104X^8Y^{12} + 70X^7Y^{13} + 24X^6Y^{14} + 120X^5Y^{15} + 64X^3Y^{17} + 4XY^{19}$	I-v
58	[1 0 0 0 0 1 2 2 2 2] [0 1 0 0 0 2 0 0 1 1] [0 0 1 0 0 2 2 0 0 0] [0 0 0 1 0 2 0 0 0 0] [0 0 0 0 1 2 0 0 1 1]	$X^{20} + 4X^{18}Y^2 + 4X^{17}Y^3 + 19X^{16}Y^4 + 24X^{15}Y^5 + 44X^{14}Y^6 + 64X^{13}Y^7 + 111X^{12}Y^8 + 164X^{11}Y^9 + 142X^{10}Y^{10} + 164X^9Y^{11} + 117X^8Y^{12} + 64X^7Y^{13} + 64X^6Y^{14} + 24X^5Y^{15} + 8X^4Y^{16} + 4X^3Y^{17} + 2X^2Y^{18}$	I-i
59	[1 0 0 0 0 3 2 2 2 2] [0 1 0 0 0 2 2 2 3 3] [0 0 1 0 0 2 0 2 2 2] [0 0 0 1 0 2 2 2 2 2] [0 0 0 0 1 2 2 2 3 3]		I-i
60	[1 0 0 0 0 2 0 0 1 1] [0 1 0 0 0 0 2 2 2 2] [0 0 1 0 0 2 2 0 0 0] [0 0 0 1 0 2 0 0 0 0] [0 0 0 0 1 2 0 0 1 1]	$X^{20} + 5X^{18}Y^2 + 2X^{17}Y^3 + 22X^{16}Y^4 + 14X^{15}Y^5 + 58X^{14}Y^6 + 92X^{13}Y^7 + 93X^{12}Y^8 + 142X^{11}Y^9 + 141X^{10}Y^{10} + 162X^9Y^{11} + 116X^8Y^{12} + 82X^7Y^{13} + 48X^6Y^{14} + 16X^5Y^{15} + 24X^4Y^{16} + 2X^3Y^{17} + 4X^2Y^{18}$	I-ii
61	[1 0 0 0 0 2 2 2 3 3] [0 1 0 0 0 0 2 2 2 2] [0 0 1 0 0 2 0 2 2 2] [0 0 0 1 0 2 2 2 2 2] [0 0 0 0 1 2 2 2 3 3]	$X^{20} + 5X^{18}Y^2 + 26X^{16}Y^4 + 82X^{14}Y^6 + 64X^{13}Y^7 + 125X^{12}Y^8 + 120X^{11}Y^9 + 153X^{10}Y^{10} + 162X^9Y^{11} + 104X^8Y^{12} + 104X^7Y^{13} + 16X^6Y^{14} + 44X^5Y^{15} + 16X^3Y^{17} + 2XY^{19}$	I-iii
62	[1 0 0 0 0 2 2 2 2 2] [0 1 0 0 0 2 0 0 1 1] [0 0 1 0 0 2 2 0 0 0] [0 0 0 1 0 2 0 0 0 0] [0 0 0 0 1 2 0 0 1 1]	$X^{20} + 5X^{18}Y^2 + 2X^{17}Y^3 + 22X^{16}Y^4 + 14X^{15}Y^5 + 74X^{14}Y^6 + 36X^{13}Y^7 + 153X^{12}Y^8 + 124X^{11}Y^9 + 153X^{10}Y^{10} + 156X^9Y^{11} + 76X^8Y^{12} + 126X^7Y^{13} + 24X^6Y^{14} + 44X^5Y^{15} + 4X^4Y^{16} + 8X^3Y^{17} + 2XY^{19}$	I-iv
63	[1 0 0 0 0 2 2 2 3 3] [0 1 0 0 0 2 2 2 2 2] [0 0 1 0 0 2 0 2 2 2] [0 0 0 1 0 2 2 2 2 2] [0 0 0 0 1 2 2 2 3 3]	$X^{20} + 9X^{18}Y^2 + 46X^{16}Y^4 + 106X^{14}Y^6 + 8X^{13}Y^7 + 165X^{12}Y^8 + 102X^{11}Y^9 + 141X^{10}Y^{10} + 156X^9Y^{11} + 44X^8Y^{12} + 148X^7Y^{13} + 72X^5Y^{15} + 22X^3Y^{17} + 4XY^{19}$	I-v

64	[1 0 0 0 0 1 0 2 2 2] [0 1 0 0 0 2 0 2 2 2] [0 0 1 0 0 0 1 0 0 0] [0 0 0 1 0 2 0 2 2 2] [0 0 0 0 1 2 0 2 2 2]	$X^{20} + 17X^{18}Y^2 + 12X^{17}Y^3 + 47X^{16}Y^4 + 64X^{15}Y^5 + 63X^{14}Y^6 + 104X^{13}Y^7 + 65X^{12}Y^8 + 76X^{11}Y^9 + 81X^{10}Y^{10} + 76X^9Y^{11} + 109X^8Y^{12} + 104X^7Y^{13} + 93X^6Y^{14} + 64X^5Y^{15} + 34X^4Y^{16} + 12X^3Y^{17} + 2X^2Y^{18}$	I-i
65	[1 0 0 0 0 2 0 2 2 2] [0 1 0 0 0 0 0 2 2 2] [0 0 1 0 0 0 1 0 0 0] [0 0 0 1 0 2 0 2 2 2] [0 0 0 0 1 2 0 2 2 2]	$X^{20} + 18X^{18}Y^2 + 75X^{16}Y^4 + 156X^{14}Y^6 + 2X^{13}Y^7 + 167X^{12}Y^8 + 40X^{11}Y^9 + 82X^{10}Y^{10} + 130X^9Y^{11} + 13X^8Y^{12} + 176X^7Y^{13} + 118X^5Y^{15} + 40X^3Y^{17} + 6X^2Y^{19}$	I-ii
66	[1 0 0 0 0 2 0 0 0 0] [0 1 0 0 0 0 0 2 2 2] [0 0 1 0 0 0 1 0 0 0] [0 0 0 1 0 2 0 0 0 0] [0 0 0 0 1 2 0 0 0 0]	$X^{20} + 18X^{18}Y^2 + 6X^{17}Y^3 + 63X^{16}Y^4 + 38X^{15}Y^5 + 92X^{14}Y^6 + 86X^{13}Y^7 + 63X^{12}Y^8 + 118X^{11}Y^9 + 30X^{10}Y^{10} + 130X^9Y^{11} + 65X^8Y^{12} + 98X^7Y^{13} + 104X^6Y^{14} + 34X^5Y^{15} + 64X^4Y^{16} + 2X^3Y^{17} + 12X^2Y^{18}$	I-iii
67	[1 0 0 0 0 2 0 2 2 2] [0 1 0 0 0 2 0 2 2 2] [0 0 1 0 0 0 1 0 0 0] [0 0 0 1 0 2 0 2 2 2] [0 0 0 0 1 2 0 2 2 2]	$X^{20} + 30X^{18}Y^2 + 127X^{16}Y^4 + 196X^{14}Y^6 + 127X^{12}Y^8 + 8X^{11}Y^9 + 30X^{10}Y^{10} + 72X^9Y^{11} + X^8Y^{12} + 176X^7Y^{13} + 176X^5Y^{15} + 72X^3Y^{17} + 8X^2Y^{19}$	I-iv
68	[1 0 0 0 0 2 0 0 0 0] [0 1 0 0 0 2 0 2 2 2] [0 0 1 0 0 0 1 0 0 0] [0 0 0 1 0 2 0 0 0 0] [0 0 0 0 1 2 0 0 0 0]	$X^{20} + 18X^{18}Y^2 + 6X^{17}Y^3 + 63X^{16}Y^4 + 38X^{15}Y^5 + 92X^{14}Y^6 + 84X^{13}Y^7 + 75X^{12}Y^8 + 86X^{11}Y^9 + 82X^{10}Y^{10} + 72X^9Y^{11} + 105X^8Y^{12} + 98X^7Y^{13} + 64X^6Y^{14} + 92X^5Y^{15} + 12X^4Y^{16} + 34X^3Y^{17} + 2X^2Y^{19}$	I-v
69	[1 0 0 0 0 1 2 2 2 2] [0 1 0 0 0 2 2 2 2 2] [0 0 1 0 0 2 2 2 2 2] [0 0 0 1 0 2 2 2 2 2] [0 0 0 0 1 2 2 2 2 2]	$X^{20} + 28X^{18}Y^2 + 16X^{17}Y^3 + 71X^{16}Y^4 + 112X^{15}Y^5 + 56X^{14}Y^6 + 112X^{13}Y^7 + 71X^{12}Y^8 + 16X^{11}Y^9 + 30X^{10}Y^{10} + 16X^9Y^{11} + 57X^8Y^{12} + 112X^7Y^{13} + 140X^6Y^{14} + 112X^5Y^{15} + 56X^4Y^{16} + 16X^3Y^{17} + 2X^2Y^{18}$ ,	I-i
70	[1 0 0 0 0 3 2 2 2 2] [0 1 0 0 0 2 0 0 0 0] [0 0 1 0 0 2 0 0 0 0] [0 0 0 1 0 2 0 0 0 0] [0 0 0 0 1 2 0 0 0 0]		I-i
71	[1 0 0 0 0 2 2 2 2 2] [0 1 0 0 0 0 2 2 2 2] [0 0 1 0 0 2 2 2 2 2] [0 0 0 1 0 2 2 2 2 2] [0 0 0 0 1 2 2 2 2 2]	$X^{20} + 29X^{18}Y^2 + 114X^{16}Y^4 + 210X^{14}Y^6 + 141X^{12}Y^8 + 2X^{11}Y^9 + 17X^{10}Y^{10} + 64X^9Y^{11} + 204X^7Y^{13} + 168X^5Y^{15} + 66X^3Y^{17} + 8X^2Y^{19}$ ,	I-ii

72	[1 0 0 0 0 2 0 0 0 0] [0 1 0 0 0 0 2 2 2 2] [0 0 1 0 0 2 0 0 0 0] [0 0 0 1 0 2 0 0 0 0] [0 0 0 0 1 2 0 0 0 0]	$X^{20} + 29X^{18}Y^2 + 8X^{17}Y^3 + 98X^{16}Y^4 + 64X^{15}Y^5 + 98X^{14}Y^6 + 112X^{13}Y^7 + 29X^{12}Y^8 + 66X^{11}Y^9 + X^{10}Y^{10} + 64X^9Y^{11} + 16X^8Y^{12} + 140X^7Y^{13} + 112X^6Y^{14} + 56X^5Y^{15} + 112X^4Y^{16} + 2X^3Y^{17} + 16X^2Y^{18}$	I-iii
73	[1 0 0 0 0 2 2 2 2 2] [0 1 0 0 0 2 2 2 2 2] [0 0 1 0 0 2 2 2 2 2] [0 0 0 1 0 2 2 2 2 2] [0 0 0 0 1 2 2 2 2 2]	$X^{20} + 45X^{18}Y^2 + 210X^{16}Y^4 + 210X^{14}Y^6 + 45X^{12}Y^8 + X^{10}Y^{10} + 10X^9Y^{11} + 120X^7Y^{13} + 252X^5Y^{15} + 120X^3Y^{17} + 10XY^{19}$	I-iv
74	[1 0 0 0 0 2 0 0 0 0] [0 1 0 0 0 2 2 2 2 2] [0 0 1 0 0 2 0 0 0 0] [0 0 0 1 0 2 0 0 0 0] [0 0 0 0 1 2 0 0 0 0]	$X^{20} + 29X^{18}Y^2 + 8X^{17}Y^3 + 98X^{16}Y^4 + 64X^{15}Y^5 + 98X^{14}Y^6 + 112X^{13}Y^7 + 29X^{12}Y^8 + 64X^{11}Y^9 + 17X^{10}Y^{10} + 10X^9Y^{11} + 112X^8Y^{12} + 56X^7Y^{13} + 112X^6Y^{14} + 140X^5Y^{15} + 16X^4Y^{16} + 56X^3Y^{17} + 2XY^{19}$	I-v
75	[1 0 0 0 0 1 2 1 1 0] [0 1 0 0 0 1 1 3 2 0] [0 0 1 0 0 3 1 2 1 0] [0 0 0 1 0 2 1 1 2 1] [0 0 0 0 1 0 0 0 1 1]	$X^{20} + 2X^{17}Y^3 + 8X^{15}Y^5 + 63X^{14}Y^6 + 68X^{13}Y^7 + 102X^{12}Y^8 + 202X^{11}Y^9 + 155X^{10}Y^{10} + 122X^9Y^{11} + 152X^8Y^{12} + 108X^7Y^{13} + 37X^6Y^{14} + X^4Y^{16} + 2X^3Y^{17} + X^2Y^{18}$	III
76	[1 0 0 0 0 1 2 1 1 0] [0 1 0 0 0 1 1 3 2 0] [0 0 1 0 0 3 1 2 1 0] [0 0 0 1 0 2 1 1 2 1] [0 0 0 0 1 0 0 0 1 3]	$X^{20} + 2X^{17}Y^3 + 63X^{14}Y^6 + 108X^{13}Y^7 + 102X^{12}Y^8 + 122X^{11}Y^9 + 155X^{10}Y^{10} + 202X^9Y^{11} + 152X^8Y^{12} + 68X^7Y^{13} + 37X^6Y^{14} + 8X^5Y^{15} + X^4Y^{16} + 2X^3Y^{17} + X^2Y^{18}$	III
77	[1 0 0 0 0 1 2 1 1 0] [0 1 0 0 0 1 1 3 2 0] [0 0 1 0 0 3 1 2 1 1] [0 0 0 1 0 2 1 1 2 0] [0 0 0 0 1 0 1 0 0 1]	$X^{20} + 2X^{17}Y^3 + 12X^{15}Y^5 + 47X^{14}Y^6 + 88X^{13}Y^7 + 117X^{12}Y^8 + 144X^{11}Y^9 + 174X^{10}Y^{10} + 170X^9Y^{11} + 134X^8Y^{12} + 84X^7Y^{13} + 35X^6Y^{14} + 12X^5Y^{15} + 4X^4Y^{16}$	III
78	[1 0 0 0 0 1 2 1 1 2] [0 1 0 0 0 1 1 3 2 3] [0 0 1 0 0 3 1 2 1 2] [0 0 0 1 0 2 1 1 2 3] [0 0 0 0 1 2 2 3 3 2]	$X^{20} + 2X^{17}Y^3 + 12X^{15}Y^5 + 47X^{14}Y^6 + 88X^{13}Y^7 + 117X^{12}Y^8 + 144X^{11}Y^9 + 174X^{10}Y^{10} + 170X^9Y^{11} + 134X^8Y^{12} + 84X^7Y^{13} + 35X^6Y^{14} + 12X^5Y^{15} + 4X^4Y^{16}$	III
79	[1 0 0 0 0 1 2 1 1 0] [0 1 0 0 0 1 1 3 2 0] [0 0 1 0 0 3 1 2 1 1] [0 0 0 1 0 2 1 1 2 0] [0 0 0 0 1 0 1 0 0 3]	$X^{20} + 2X^{17}Y^3 + 10X^{15}Y^5 + 49X^{14}Y^6 + 94X^{13}Y^7 + 111X^{12}Y^8 + 140X^{11}Y^9 + 178X^{10}Y^{10} + 166X^9Y^{11} + 138X^8Y^{12} + 90X^7Y^{13} + 29X^6Y^{14} + 10X^5Y^{15} + 6X^4Y^{16}$	III

80	[1 0 0 0 0 1 2 1 1 0] [0 1 0 0 0 1 1 3 2 1] [0 0 1 0 0 3 1 2 1 0] [0 0 0 1 0 2 1 1 2 0] [0 0 0 0 1 0 0 1 0 1]	$X^{20} + 2X^{17}Y^3 + 14X^{15}Y^5 + 45X^{14}Y^6 + 82X^{13}Y^7 + 123X^{12}Y^8 + 148X^{11}Y^9 + 170X^{10}Y^{10} + 174X^9Y^{11} + 130X^8Y^{12} + 78X^7Y^{13} + 41X^6Y^{14} + 14X^5Y^{15} + 2X^4Y^{16}$	III
81	[1 0 0 0 0 1 2 1 1 1] [0 1 0 0 0 1 1 3 2 1] [0 0 1 0 0 3 1 2 1 2] [0 0 0 1 0 2 1 1 2 2] [0 0 0 0 1 1 2 1 2 1]	$X^{20} + 2X^{17}Y^3 + 2X^{16}Y^4 + 10X^{15}Y^5 + 47X^{14}Y^6 + 88X^{13}Y^7 + 111X^{12}Y^8 + 150X^{11}Y^9 + 174X^{10}Y^{10} + 170X^9Y^{11} + 140X^8Y^{12} + 78X^7Y^{13} + 35X^6Y^{14} + 12X^5Y^{15} + 2X^4Y^{16} + 2X^3Y^{17}$	III
82	[1 0 0 0 0 1 2 1 1 1] [0 1 0 0 0 1 1 3 2 0] [0 0 1 0 0 3 1 2 1 0] [0 0 0 1 0 2 1 1 2 1] [0 0 0 0 1 1 0 0 1 0]	$X^{20} + 2X^{17}Y^3 + 2X^{16}Y^4 + 14X^{15}Y^5 + 42X^{14}Y^6 + 80X^{13}Y^7 + 118X^{12}Y^8 + 156X^{11}Y^9 + 180X^{10}Y^{10} + 162X^9Y^{11} + 130X^8Y^{12} + 86X^7Y^{13} + 34X^6Y^{14} + 12X^5Y^{15} + 5X^4Y^{16}$	III
83	[1 0 0 0 0 1 2 1 1 1] [0 1 0 0 0 1 1 3 2 1] [0 0 1 0 0 3 1 2 1 1] [0 0 0 1 0 2 1 1 2 1] [0 0 0 0 1 1 1 1 1 1]	$X^{20} + 2X^{17}Y^3 + 2X^{16}Y^4 + 14X^{15}Y^5 + 38X^{14}Y^6 + 88X^{13}Y^7 + 130X^{12}Y^8 + 124X^{11}Y^9 + 172X^{10}Y^{10} + 210X^9Y^{11} + 122X^8Y^{12} + 54X^7Y^{13} + 46X^6Y^{14} + 20X^5Y^{15} + X^4Y^{16}$	III
84	[1 0 0 0 0 1 2 1 1 1] [0 1 0 0 0 1 1 3 2 1] [0 0 1 0 0 3 1 2 1 1] [0 0 0 1 0 2 1 1 2 2] [0 0 0 0 1 1 1 1 2 2]	$X^{20} + 2X^{17}Y^3 + 10X^{15}Y^5 + 46X^{14}Y^6 + 100X^{13}Y^7 + 120X^{12}Y^8 + 116X^{11}Y^9 + 172X^{10}Y^{10} + 202X^9Y^{11} + 132X^8Y^{12} + 66X^7Y^{13} + 38X^6Y^{14} + 16X^5Y^{15} + 3X^4Y^{16}$	III
85	[1 0 0 0 0 1 2 1 1 1] [0 1 0 0 0 1 1 3 2 1] [0 0 1 0 0 3 1 2 1 3] [0 0 0 1 0 2 1 1 2 1] [0 0 0 0 1 1 3 1 1 1]	$X^{20} + 2X^{17}Y^3 + 14X^{15}Y^5 + 44X^{14}Y^6 + 84X^{13}Y^7 + 126X^{12}Y^8 + 140X^{11}Y^9 + 168X^{10}Y^{10} + 186X^9Y^{11} + 128X^8Y^{12} + 70X^7Y^{13} + 44X^6Y^{14} + 16X^5Y^{15} + X^4Y^{16}$	III
86	[1 0 0 0 0 1 2 1 1 1] [0 1 0 0 0 1 1 3 2 2] [0 0 1 0 0 3 1 2 1 3] [0 0 0 1 0 2 1 1 2 2] [0 0 0 0 1 1 3 2 2 1]	$X^{20} + 2X^{17}Y^3 + 10X^{15}Y^5 + 48X^{14}Y^6 + 96X^{13}Y^7 + 114X^{12}Y^8 + 132X^{11}Y^9 + 176X^{10}Y^{10} + 178X^9Y^{11} + 136X^8Y^{12} + 82X^7Y^{13} + 32X^6Y^{14} + 12X^5Y^{15} + 5X^4Y^{16}$	III
87	[1 0 0 0 0 1 2 1 1 1] [0 1 0 0 0 1 1 3 2 3] [0 0 1 0 0 3 1 2 1 1] [0 0 0 1 0 2 1 1 2 1] [0 0 0 0 1 1 1 3 1 3]	$X^{20} + 2X^{17}Y^3 + 14X^{15}Y^5 + 45X^{14}Y^6 + 82X^{13}Y^7 + 123X^{12}Y^8 + 148X^{11}Y^9 + 170X^{10}Y^{10} + 174X^9Y^{11} + 130X^8Y^{12} + 78X^7Y^{13} + 41X^6Y^{14} + 14X^5Y^{15} + 2X^4Y^{16}$	III

88	[1 0 0 0 0 1 2 1 1 2] [0 1 0 0 0 1 1 3 2 2] [0 0 1 0 0 3 1 2 1 1] [0 0 0 1 0 2 1 1 2 1] [0 0 0 0 1 2 1 2 1 1]	$X^{20} + 2X^{17}Y^3 + 4X^{16}Y^4 + 12X^{15}Y^5 + 44X^{14}Y^6 + 72X^{13}Y^7 + 123X^{12}Y^8 + 160X^{11}Y^9 + 165X^{10}Y^{10} + 186X^9Y^{11} + 126X^8Y^{12} + 68X^7Y^{13} + 46X^6Y^{14} + 12X^5Y^{15} + 2X^4Y^{16} + X^2Y^{18}$	III
89	[1 0 0 0 0 1 2 1 1 2] [0 1 0 0 0 1 1 3 2 2] [0 0 1 0 0 3 1 2 1 1] [0 0 0 1 0 2 1 1 2 2] [0 0 0 0 1 2 1 2 2 2]	$X^{20} + 2X^{17}Y^3 + 3X^{16}Y^4 + 14X^{15}Y^5 + 39X^{14}Y^6 + 82X^{13}Y^7 + 120X^{12}Y^8 + 148X^{11}Y^9 + 182X^{10}Y^{10} + 174X^9Y^{11} + 127X^8Y^{12} + 78X^7Y^{13} + 35X^6Y^{14} + 14X^5Y^{15} + 5X^4Y^{16}$	III
90	[1 0 0 0 0 1 2 1 1 1] [0 1 0 0 0 1 1 3 2 1] [0 0 1 0 0 3 1 2 1 1] [0 0 0 1 0 2 1 1 3 3] [0 0 0 0 1 1 1 1 3 3]	$X^{20} + 2X^{17}Y^3 + 4X^{15}Y^5 + 44X^{14}Y^6 + 134X^{13}Y^7 + 126X^{12}Y^8 + 40X^{11}Y^9 + 168X^{10}Y^{10} + 286X^9Y^{11} + 128X^8Y^{12} + 20X^7Y^{13} + 44X^6Y^{14} + 26X^5Y^{15} + X^4Y^{16}$	III
91	[1 0 0 0 0 1 2 1 1 0] [0 1 0 0 0 1 1 3 2 0] [0 0 1 0 0 3 1 2 1 1] [0 0 0 1 0 2 1 1 3 1] [0 0 0 0 1 0 1 0 1 0]	$X^{20} + 2X^{17}Y^3 + 8X^{15}Y^5 + 48X^{14}Y^6 + 106X^{13}Y^7 + 114X^{12}Y^8 + 112X^{11}Y^9 + 176X^{10}Y^{10} + 198X^9Y^{11} + 136X^8Y^{12} + 72X^7Y^{13} + 32X^6Y^{14} + 14X^5Y^{15} + 5X^4Y^{16}$	III
92	[1 0 0 0 0 1 2 1 1 0] [0 1 0 0 0 1 1 3 2 1] [0 0 1 0 0 3 1 2 1 1] [0 0 0 1 0 2 1 1 3 2] [0 0 0 0 1 0 1 1 2 3]		III
93	[1 0 0 0 0 1 2 1 1 1] [0 1 0 0 0 1 1 3 2 1] [0 0 1 0 0 3 1 2 1 1] [0 0 0 1 0 2 1 1 3 1] [0 0 0 0 1 1 1 1 1 1]	$X^{20} + 2X^{17}Y^3 + 12X^{15}Y^5 + 44X^{14}Y^6 + 94X^{13}Y^7 + 126X^{12}Y^8 + 120X^{11}Y^9 + 168X^{10}Y^{10} + 206X^9Y^{11} + 128X^8Y^{12} + 60X^7Y^{13} + 44X^6Y^{14} + 18X^5Y^{15} + X^4Y^{16}$	III
94	[1 0 0 0 0 1 2 2 2 2] [0 1 0 0 0 2 1 1 3 1] [0 0 1 0 0 2 1 3 1 1] [0 0 0 1 0 2 1 1 1 1] [0 0 0 0 1 2 1 1 3 3]	$X^{20} + 23X^{16}Y^4 + 40X^{14}Y^6 + 32X^{13}Y^7 + 119X^{12}Y^8 + 224X^{11}Y^9 + 150X^{10}Y^{10} + 224X^9Y^{11} + 105X^8Y^{12} + 32X^7Y^{13} + 60X^6Y^{14} + 8X^4Y^{16} + 6X^2Y^{18}$	I-i
95	[1 0 0 0 0 1 2 2 2 2] [0 1 0 0 0 2 1 1 1 3] [0 0 1 0 0 2 1 2 0 1] [0 0 0 1 0 2 1 1 1 1] [0 0 0 0 1 2 1 0 2 1]	$X^{20} + 21X^{16}Y^4 + 44X^{14}Y^6 + 32X^{13}Y^7 + 121X^{12}Y^8 + 224X^{11}Y^9 + 142X^{10}Y^{10} + 224X^9Y^{11} + 107X^8Y^{12} + 32X^7Y^{13} + 64X^6Y^{14} + 6X^4Y^{16} + 6X^2Y^{18}$	I-i

96	[1 0 0 0 0 1 0 0 0 2] [0 1 0 0 0 2 2 1 1 2] [0 0 1 0 0 0 1 2 1 1] [0 0 0 1 0 0 1 1 3 2] [0 0 0 0 1 0 3 1 2 1]	$X^{20} + 3X^{16}Y^4 + 65X^{14}Y^6 + 80X^{13}Y^7 + 109X^{12}Y^8 + 176X^{11}Y^9 + 145X^{10}Y^{10} + 176X^9Y^{11} + 137X^8Y^{12} + 80X^7Y^{13} + 43X^6Y^{14} + 6X^4Y^{16} + 3X^2Y^{18}$	I-i
97	[1 0 0 0 0 1 2 0 0 0] [0 1 0 0 0 1 1 1 3 0] [0 0 1 0 0 1 0 2 2 0] [0 0 0 1 0 3 0 2 1 1] [0 0 0 0 1 0 0 0 1 2]	$X^{20} + 14X^{16}Y^4 + 8X^{15}Y^5 + 36X^{14}Y^6 + 54X^{13}Y^7 + 119X^{12}Y^8 + 200X^{11}Y^9 + 175X^{10}Y^{10} + 180X^9Y^{11} + 112X^8Y^{12} + 64X^7Y^{13} + 42X^6Y^{14} + 6X^5Y^{15} + 10X^4Y^{16} + 3X^2Y^{18}$	III
98	[1 0 0 0 0 1 2 0 0 0] [0 1 0 0 0 1 1 1 3 2] [0 0 1 0 0 1 0 2 2 2] [0 0 0 1 0 3 0 2 1 1] [0 0 0 0 1 0 2 2 1 2]		III
99	[1 0 0 0 0 1 2 0 0 0] [0 1 0 0 0 1 1 1 3 0] [0 0 1 0 0 1 0 2 2 0] [0 0 0 1 0 3 0 2 1 2] [0 0 0 0 1 0 0 0 2 1]	$X^{20} + 10X^{16}Y^4 + 14X^{15}Y^5 + 27X^{14}Y^6 + 70X^{13}Y^7 + 124X^{12}Y^8 + 172X^{11}Y^9 + 195X^{10}Y^{10} + 172X^9Y^{11} + 110X^8Y^{12} + 70X^7Y^{13} + 33X^6Y^{14} + 14X^5Y^{15} + 11X^4Y^{16} + X^2Y^{18}$	III
100	[1 0 0 0 0 1 2 0 0 0] [0 1 0 0 0 1 1 1 3 0] [0 0 1 0 0 1 0 2 2 1] [0 0 0 1 0 3 0 2 1 1] [0 0 0 0 1 0 1 0 1 2]	$X^{20} + 5X^{16}Y^4 + 18X^{15}Y^5 + 30X^{14}Y^6 + 70X^{13}Y^7 + 125X^{12}Y^8 + 180X^{11}Y^9 + 196X^{10}Y^{10} + 140X^9Y^{11} + 115X^8Y^{12} + 90X^7Y^{13} + 30X^6Y^{14} + 14X^5Y^{15} + 10X^4Y^{16}$	III
101	[1 0 0 0 0 1 2 0 0 1] [0 1 0 0 0 1 1 1 3 1] [0 0 1 0 0 1 0 2 2 1] [0 0 0 1 0 3 0 2 1 0] [0 0 0 0 1 1 1 1 0 3]		III
102	[1 0 0 0 0 1 2 0 0 0] [0 1 0 0 0 1 1 1 3 0] [0 0 1 0 0 1 0 2 2 2] [0 0 0 1 0 3 0 2 1 1] [0 0 0 0 1 0 2 0 1 0]	$X^{20} + 14X^{16}Y^4 + 10X^{15}Y^5 + 34X^{14}Y^6 + 48X^{13}Y^7 + 125X^{12}Y^8 + 204X^{11}Y^9 + 171X^{10}Y^{10} + 184X^9Y^{11} + 108X^8Y^{12} + 58X^7Y^{13} + 48X^6Y^{14} + 8X^5Y^{15} + 8X^4Y^{16} + 3X^2Y^{18}$	III



103	[1 0 0 0 0 1 2 0 0 0]	$X^{20} + 8X^{16}Y^4 + 8X^{15}Y^5 + 48X^{14}Y^6 + 54X^{13}Y^7 + 125X^{12}Y^8 + 200X^{11}Y^9 + 151X^{10}Y^{10} + 180X^9Y^{11} + 118X^8Y^{12} + 64X^7Y^{13} + 54X^6Y^{14} + 6X^5Y^{15} + 4X^4Y^{16} + 3X^2Y^{18}$	III
	[0 1 0 0 0 1 1 1 3 0]		
	[0 0 1 0 0 1 0 2 2 2]		
	[0 0 0 1 0 3 0 2 1 1]		
104	[0 0 0 0 1 0 2 0 1 2]	$X^{20} + 7X^{16}Y^4 + 14X^{15}Y^5 + 33X^{14}Y^6 + 72X^{13}Y^7 + 118X^{12}Y^8 + 184X^{11}Y^9 + 186X^{10}Y^{10} + 152X^9Y^{11} + 127X^8Y^{12} + 70X^7Y^{13} + 37X^6Y^{14} + 16X^5Y^{15} + 3X^4Y^{16} + 4X^3Y^{17}$	III
	[1 0 0 0 0 1 2 0 0 2]		
	[0 1 0 0 0 1 1 1 3 2]		
	[0 0 1 0 0 1 0 2 2 0]		
105	[0 0 0 1 0 3 0 2 1 1]	$X^{20} + 9X^{16}Y^4 + 10X^{15}Y^5 + 33X^{14}Y^6 + 82X^{13}Y^7 + 112X^{12}Y^8 + 170X^{11}Y^9 + 186X^{10}Y^{10} + 172X^9Y^{11} + 133X^8Y^{12} + 54X^7Y^{13} + 37X^6Y^{14} + 18X^5Y^{15} + X^4Y^{16} + 6X^3Y^{17}$	III
	[0 0 0 0 1 2 0 0 0]		
	[0 1 0 0 0 1 1 1 3 1]		
	[0 0 1 0 0 1 0 2 2 3]		
106	[0 0 0 1 0 3 0 2 1 0]	$X^{20} + 5X^{16}Y^4 + 16X^{15}Y^5 + 31X^{14}Y^6 + 76X^{13}Y^7 + 130X^{12}Y^8 + 162X^{11}Y^9 + 182X^{10}Y^{10} + 176X^9Y^{11} + 117X^8Y^{12} + 60X^7Y^{13} + 43X^6Y^{14} + 20X^5Y^{15} + 3X^4Y^{16} + 2X^3Y^{17}$	III
	[0 0 0 0 1 0 1 1 0 3]		
	[1 0 0 0 0 1 2 0 0 0]		
	[0 1 0 0 0 1 1 1 3 1]		
107	[0 0 1 0 0 1 0 2 2 3]	$X^{20} + 12X^{16}Y^4 + 8X^{15}Y^5 + 40X^{14}Y^6 + 54X^{13}Y^7 + 121X^{12}Y^8 + 200X^{11}Y^9 + 167X^{10}Y^{10} + 180X^9Y^{11} + 114X^8Y^{12} + 64X^7Y^{13} + 46X^6Y^{14} + 6X^5Y^{15} + 8X^4Y^{16} + 3X^2Y^{18}$	III
	[0 0 0 1 0 3 0 2 1 2]		
	[0 0 0 0 1 2 0 0 0]		
	[0 1 0 0 0 1 1 1 3 0]		
108	[0 0 1 0 0 1 0 2 2 0]	$X^{20} + 3X^{16}Y^4 + 18X^{15}Y^5 + 34X^{14}Y^6 + 70X^{13}Y^7 + 127X^{12}Y^8 + 180X^{11}Y^9 + 188X^{10}Y^{10} + 140X^9Y^{11} + 117X^8Y^{12} + 90X^7Y^{13} + 34X^6Y^{14} + 14X^5Y^{15} + 8X^4Y^{16}$	III
	[0 0 0 1 0 3 0 2 1 1]		
	[0 0 0 0 1 2 2 0 1 2]		
	[0 1 0 0 0 1 1 1 3 2]		
109	[0 0 0 1 0 3 0 2 1 1]	$X^{20} + 3X^{16}Y^4 + 18X^{15}Y^5 + 34X^{14}Y^6 + 70X^{13}Y^7 + 127X^{12}Y^8 + 180X^{11}Y^9 + 188X^{10}Y^{10} + 140X^9Y^{11} + 117X^8Y^{12} + 90X^7Y^{13} + 34X^6Y^{14} + 14X^5Y^{15} + 8X^4Y^{16}$	III
	[0 0 0 0 1 2 0 1 2]		
	[0 1 0 0 0 1 1 1 3 0]		
	[0 0 1 0 0 1 0 2 2 2]		
110	[0 0 0 1 0 3 0 2 1 1]	$X^{20} + 3X^{16}Y^4 + 18X^{15}Y^5 + 34X^{14}Y^6 + 70X^{13}Y^7 + 127X^{12}Y^8 + 180X^{11}Y^9 + 188X^{10}Y^{10} + 140X^9Y^{11} + 117X^8Y^{12} + 90X^7Y^{13} + 34X^6Y^{14} + 14X^5Y^{15} + 8X^4Y^{16}$	III
	[0 0 0 0 1 0 1 2 1 0]		
	[1 0 0 0 0 1 2 0 0 0]		
	[0 1 0 0 0 1 1 1 3 2]		

111	[1 0 0 0 0 1 2 0 0 0] [0 1 0 0 0 1 1 1 3 2] [0 0 1 0 0 1 0 2 2 2] [0 0 0 1 0 3 0 2 1 1] [0 0 0 0 1 0 2 2 1 0]	$X^{20} + 10X^{16}Y^4 + 6X^{15}Y^5 + 46X^{14}Y^6 + 60X^{13}Y^7 + 117X^{12}Y^8 + 196X^{11}Y^9 + 163X^{10}Y^{10} + 176X^9Y^{11} + 120X^8Y^{12} + 70X^7Y^{13} + 44X^6Y^{14} + 4X^5Y^{15} + 8X^4Y^{16} + 3X^2Y^{18}$	III
112	[1 0 0 0 0 1 2 0 0 0] [0 1 0 0 0 1 1 1 3 2] [0 0 1 0 0 1 0 2 2 2] [0 0 0 1 0 3 0 2 1 1] [0 0 0 0 1 0 2 2 1 3]	$X^{20} + 7X^{16}Y^4 + 14X^{15}Y^5 + 30X^{14}Y^6 + 80X^{13}Y^7 + 119X^{12}Y^8 + 166X^{11}Y^9 + 196X^{10}Y^{10} + 160X^9Y^{11} + 121X^8Y^{12} + 74X^7Y^{13} + 30X^6Y^{14} + 16X^5Y^{15} + 8X^4Y^{16} + 2X^3Y^{17}$	III
113	[1 0 0 0 0 1 2 0 0 1] [0 1 0 0 0 1 1 1 3 0] [0 0 1 0 0 1 0 2 2 1] [0 0 0 1 0 3 0 2 1 1] [0 0 0 0 1 1 1 0 1 1]	$X^{20} + 3X^{16}Y^4 + 18X^{15}Y^5 + 35X^{14}Y^6 + 66X^{13}Y^7 + 132X^{12}Y^8 + 182X^{11}Y^9 + 174X^{10}Y^{10} + 156X^9Y^{11} + 119X^8Y^{12} + 70X^7Y^{13} + 47X^6Y^{14} + 18X^5Y^{15} + X^4Y^{16} + 2X^3Y^{17}$	III
114	[1 0 0 0 0 1 2 0 0 1] [0 1 0 0 0 1 1 1 3 0] [0 0 1 0 0 1 0 2 2 1] [0 0 0 1 0 3 0 2 1 2] [0 0 0 0 1 1 1 0 2 1]	$X^{20} + 3X^{16}Y^4 + 14X^{15}Y^5 + 39X^{14}Y^6 + 78X^{13}Y^7 + 120X^{12}Y^8 + 174X^{11}Y^9 + 182X^{10}Y^{10} + 148X^9Y^{11} + 127X^8Y^{12} + 82X^7Y^{13} + 35X^6Y^{14} + 14X^5Y^{15} + 5X^4Y^{16} + 2X^3Y^{17}$	III
115	[1 0 0 0 0 1 2 0 0 1] [0 1 0 0 0 1 1 1 3 0] [0 0 1 0 0 1 0 2 2 3] [0 0 0 1 0 3 0 2 1 3] [0 0 0 0 1 1 3 0 3 1]	$X^{20} + 5X^{16}Y^4 + 18X^{15}Y^5 + 31X^{14}Y^6 + 66X^{13}Y^7 + 130X^{12}Y^8 + 182X^{11}Y^9 + 182X^{10}Y^{10} + 156X^9Y^{11} + 117X^8Y^{12} + 70X^7Y^{13} + 43X^6Y^{14} + 18X^5Y^{15} + 3X^4Y^{16} + 2X^3Y^{17}$	III
116	[1 0 0 0 0 1 2 0 0 1] [0 1 0 0 0 1 1 1 3 1] [0 0 1 0 0 1 0 2 2 0] [0 0 0 1 0 3 0 2 1 1] [0 0 0 0 1 1 0 1 1 1]	$X^{20} + 3X^{16}Y^4 + 16X^{15}Y^5 + 33X^{14}Y^6 + 82X^{13}Y^7 + 130X^{12}Y^8 + 152X^{11}Y^9 + 186X^{10}Y^{10} + 172X^9Y^{11} + 115X^8Y^{12} + 72X^7Y^{13} + 37X^6Y^{14} + 18X^5Y^{15} + 7X^4Y^{16}$	III
117	[1 0 0 0 0 1 2 0 0 1] [0 1 0 0 0 1 1 1 3 1] [0 0 1 0 0 1 0 2 2 0] [0 0 0 1 0 3 0 2 1 1] [0 0 0 0 1 1 0 1 1 3]	$X^{20} + 3X^{16}Y^4 + 18X^{15}Y^5 + 33X^{14}Y^6 + 72X^{13}Y^7 + 130X^{12}Y^8 + 172X^{11}Y^9 + 186X^{10}Y^{10} + 152X^9Y^{11} + 115X^8Y^{12} + 82X^7Y^{13} + 37X^6Y^{14} + 16X^5Y^{15} + 7X^4Y^{16}$	III
118	[1 0 0 0 0 1 2 0 0 1] [0 1 0 0 0 1 1 1 3 1] [0 0 1 0 0 1 0 2 2 1] [0 0 0 1 0 3 0 2 1 0] [0 0 0 0 1 1 1 1 0 0]	$X^{20} + 13X^{16}Y^4 + 14X^{15}Y^5 + 27X^{14}Y^6 + 52X^{13}Y^7 + 128X^{12}Y^8 + 196X^{11}Y^9 + 184X^{10}Y^{10} + 176X^9Y^{11} + 105X^8Y^{12} + 62X^7Y^{13} + 43X^6Y^{14} + 12X^5Y^{15} + 9X^4Y^{16} + 2X^2Y^{18}$	III

119	[1 0 0 0 0 1 2 0 0 1]	$X^{20} + 7X^{16}Y^4 + 12X^{15}Y^5 + 41X^{14}Y^6 + 58X^{13}Y^7 + 128X^{12}Y^8 + 192X^{11}Y^9 + 164X^{10}Y^{10} + 172X^9Y^{11} + 115X^8Y^{12} + 68X^7Y^{13} + 49X^6Y^{14} + 10X^5Y^{15} + 5X^4Y^{16} + 2X^2Y^{18}$	III
	[0 1 0 0 0 1 1 1 3 1]		
	[0 0 1 0 0 1 0 2 2 1]		
	[0 0 0 1 0 3 0 2 1 0]		
120	[0 0 0 0 1 1 1 1 0 2]	$X^{20} + 3X^{16}Y^4 + 16X^{15}Y^5 + 37X^{14}Y^6 + 72X^{13}Y^7 + 126X^{12}Y^8 + 178X^{11}Y^9 + 178X^{10}Y^{10} + 152X^9Y^{11} + 123X^8Y^{12} + 76X^7Y^{13} + 41X^6Y^{14} + 16X^5Y^{15} + 3X^4Y^{16} + 2X^3Y^{17}$	III
	[1 0 0 0 0 1 2 0 0 1]		
	[0 1 0 0 0 1 1 1 3 1]		
	[0 0 1 0 0 1 0 2 2 1]		
121	[0 0 0 1 0 3 0 2 1 0]	$X^{20} + 8X^{16}Y^4 + 14X^{15}Y^5 + 26X^{14}Y^6 + 86X^{13}Y^7 + 116X^{12}Y^8 + 156X^{11}Y^9 + 212X^{10}Y^{10} + 156X^9Y^{11} + 116X^8Y^{12} + 86X^7Y^{13} + 18X^6Y^{14} + 14X^5Y^{15} + 15X^4Y^{16}$	III
	[0 0 0 0 1 1 1 1 0 2]		
	[1 0 0 0 0 1 2 0 0 1]		
	[0 1 0 0 0 1 1 1 3 1]		
122	[0 0 0 1 0 3 0 2 1 0]	$X^{20} + 3X^{16}Y^4 + 14X^{15}Y^5 + 37X^{14}Y^6 + 82X^{13}Y^7 + 126X^{12}Y^8 + 158X^{11}Y^9 + 178X^{10}Y^{10} + 172X^9Y^{11} + 123X^8Y^{12} + 66X^7Y^{13} + 41X^6Y^{14} + 18X^5Y^{15} + 3X^4Y^{16} + 2X^3Y^{17}$	III
	[0 0 0 0 1 1 1 2 0 1]		
	[1 0 0 0 0 1 2 0 0 1]		
	[0 1 0 0 0 1 1 1 3 1]		
123	[0 0 1 0 0 1 0 2 2 1]	$X^{20} + 6X^{16}Y^4 + 18X^{15}Y^5 + 26X^{14}Y^6 + 74X^{13}Y^7 + 130X^{12}Y^8 + 164X^{11}Y^9 + 196X^{10}Y^{10} + 164X^9Y^{11} + 110X^8Y^{12} + 74X^7Y^{13} + 34X^6Y^{14} + 18X^5Y^{15} + 9X^4Y^{16}$	III
	[0 0 0 1 0 3 0 2 1 1]		
	[1 0 0 0 0 1 2 0 0 1]		
	[0 1 0 0 0 1 1 1 3 1]		
124	[0 0 0 1 0 3 0 2 1 0]	$X^{20} + 11X^{16}Y^4 + 10X^{15}Y^5 + 35X^{14}Y^6 + 64X^{13}Y^7 + 118X^{12}Y^8 + 188X^{11}Y^9 + 184X^{10}Y^{10} + 168X^9Y^{11} + 115X^8Y^{12} + 74X^7Y^{13} + 35X^6Y^{14} + 8X^5Y^{15} + 11X^4Y^{16} + 2X^2Y^{18}$	III
	[0 0 0 0 1 1 1 2 0 1]		
	[1 0 0 0 0 1 2 0 0 1]		
	[0 1 0 0 0 1 1 1 3 1]		
125	[0 0 1 0 0 1 0 2 2 1]	$X^{20} + 11X^{16}Y^4 + 10X^{15}Y^5 + 35X^{14}Y^6 + 64X^{13}Y^7 + 118X^{12}Y^8 + 188X^{11}Y^9 + 184X^{10}Y^{10} + 168X^9Y^{11} + 115X^8Y^{12} + 74X^7Y^{13} + 35X^6Y^{14} + 8X^5Y^{15} + 11X^4Y^{16} + 2X^2Y^{18}$	III
	[0 0 0 1 0 3 0 2 1 1]		
	[1 0 0 0 0 1 2 0 0 1]		
	[0 1 0 0 0 1 1 1 3 1]		
126	[0 0 0 0 1 1 1 1 3]	$X^{20} + 11X^{16}Y^4 + 10X^{15}Y^5 + 35X^{14}Y^6 + 64X^{13}Y^7 + 118X^{12}Y^8 + 188X^{11}Y^9 + 184X^{10}Y^{10} + 168X^9Y^{11} + 115X^8Y^{12} + 74X^7Y^{13} + 35X^6Y^{14} + 8X^5Y^{15} + 11X^4Y^{16} + 2X^2Y^{18}$	III
	[0 0 0 0 1 1 1 2 0]		
	[1 0 0 0 0 1 2 0 0 1]		
	[0 1 0 0 0 1 1 1 3 1]		

127	[1 0 0 0 0 1 2 0 0 1] [0 1 0 0 0 1 1 1 3 1] [0 0 1 0 0 1 0 2 2 1] [0 0 0 1 0 3 0 2 1 2] [0 0 0 0 1 1 1 1 2 3]	$X^{20} + 5X^{16}Y^4 + 14X^{15}Y^5 + 30X^{14}Y^6 + 90X^{13}Y^7 + 125X^{12}Y^8 + 140X^{11}Y^9 + 196X^{10}Y^{10} + 180X^9Y^{11} + 115X^8Y^{12} + 70X^7Y^{13} + 30X^6Y^{14} + 18X^5Y^{15} + 10X^4Y^{16}$	III
128	[1 0 0 0 0 1 2 0 0 1] [0 1 0 0 0 1 1 1 3 1] [0 0 1 0 0 1 0 2 2 3] [0 0 0 1 0 3 0 2 1 0] [0 0 0 0 1 1 3 1 0 0]	$X^{20} + 5X^{16}Y^4 + 18X^{15}Y^5 + 29X^{14}Y^6 + 72X^{13}Y^7 + 128X^{12}Y^8 + 172X^{11}Y^9 + 194X^{10}Y^{10} + 152X^9Y^{11} + 113X^8Y^{12} + 82X^7Y^{13} + 33X^6Y^{14} + 16X^5Y^{15} + 9X^4Y^{16}$	III
129	[1 0 0 0 0 1 2 0 0 2] [0 1 0 0 0 1 1 1 3 2] [0 0 1 0 0 1 0 2 2 1] [0 0 0 1 0 3 0 2 1 1] [0 0 0 0 1 2 1 2 1 3]		III
130	[1 0 0 0 0 1 2 0 0 1] [0 1 0 0 0 1 1 1 3 1] [0 0 1 0 0 1 0 2 2 3] [0 0 0 1 0 3 0 2 1 0] [0 0 0 0 1 1 3 1 0 1]	$X^{20} + 5X^{16}Y^4 + 12X^{15}Y^5 + 48X^{14}Y^6 + 52X^{13}Y^7 + 121X^{12}Y^8 + 216X^{11}Y^9 + 162X^{10}Y^{10} + 136X^9Y^{11} + 123X^8Y^{12} + 92X^7Y^{13} + 44X^6Y^{14} + 4X^5Y^{15} + 6X^4Y^{16} + 2X^2Y^{18}$	III
131	[1 0 0 0 0 1 2 0 0 1] [0 1 0 0 0 1 1 1 3 1] [0 0 1 0 0 1 0 2 2 3] [0 0 0 1 0 3 0 2 1 0] [0 0 0 0 1 1 3 1 0 2]	$X^{20} + 3X^{16}Y^4 + 16X^{15}Y^5 + 35X^{14}Y^6 + 78X^{13}Y^7 + 124X^{12}Y^8 + 168X^{11}Y^9 + 190X^{10}Y^{10} + 148X^9Y^{11} + 119X^8Y^{12} + 88X^7Y^{13} + 31X^6Y^{14} + 14X^5Y^{15} + 9X^4Y^{16}$	III
132	[1 0 0 0 0 1 2 0 0 1] [0 1 0 0 0 1 1 1 3 1] [0 0 1 0 0 1 0 2 2 3] [0 0 0 1 0 3 0 2 1 2] [0 0 0 0 1 1 3 1 2 2]		III
133	[1 0 0 0 0 1 2 0 0 1] [0 1 0 0 0 1 1 1 3 1] [0 0 1 0 0 1 0 2 2 3] [0 0 0 1 0 3 0 2 1 0] [0 0 0 0 1 1 3 1 0 3]	$X^{20} + 5X^{16}Y^4 + 10X^{15}Y^5 + 48X^{14}Y^6 + 62X^{13}Y^7 + 121X^{12}Y^8 + 196X^{11}Y^9 + 162X^{10}Y^{10} + 156X^9Y^{11} + 123X^8Y^{12} + 82X^7Y^{13} + 44X^6Y^{14} + 6X^5Y^{15} + 6X^4Y^{16} + 2X^2Y^{18}$	III

134	[1 0 0 0 0 1 2 1 1 0] [0 1 0 0 0 1 1 3 2 0] [0 0 1 0 0 3 1 2 1 1] [0 0 0 1 0 2 1 1 3 1] [0 0 0 0 1 0 1 0 1 2]		III
135	[1 0 0 0 0 1 2 1 1 0] [0 1 0 0 0 1 1 3 2 1] [0 0 1 0 0 3 1 2 1 1] [0 0 0 1 0 2 1 1 3 2] [0 0 0 0 1 0 1 1 2 1]	$X^{20} + 6X^{15}Y^5 + 48X^{14}Y^6 + 112X^{13}Y^7 + 114X^{12}Y^8 + 118X^{11}Y^9 + 176X^{10}Y^{10} + 192X^9Y^{11} + 136X^8Y^{12} + 66X^7Y^{13} + 32X^6Y^{14} + 16X^5Y^{15} + 5X^4Y^{16} + 2X^3Y^{17}$	III
136	[1 0 0 0 0 1 2 1 1 2] [0 1 0 0 0 1 1 3 2 2] [0 0 1 0 0 3 1 2 1 3] [0 0 0 1 0 2 1 1 3 1] [0 0 0 0 1 2 3 2 1 1]		III
137	[1 0 0 0 0 1 2 1 1 0] [0 1 0 0 0 1 1 3 2 0] [0 0 1 0 0 3 1 2 1 1] [0 0 0 1 0 2 1 1 3 2] [0 0 0 0 1 0 1 0 2 1]	$X^{20} + 6X^{15}Y^5 + 51X^{14}Y^6 + 102X^{13}Y^7 + 122X^{12}Y^8 + 124X^{11}Y^9 + 163X^{10}Y^{10} + 204X^9Y^{11} + 128X^8Y^{12} + 62X^7Y^{13} + 41X^6Y^{14} + 14X^5Y^{15} + 5X^4Y^{16} + X^2Y^{18}$	III
138	[1 0 0 0 0 1 2 1 1 0] [0 1 0 0 0 1 1 3 2 1] [0 0 1 0 0 3 1 2 1 1] [0 0 0 1 0 2 1 1 3 1] [0 0 0 0 1 0 1 1 1 2]		III
139	[1 0 0 0 0 1 2 1 1 1] [0 1 0 0 0 1 1 3 2 1] [0 0 1 0 0 3 1 2 1 1] [0 0 0 1 0 2 1 1 3 1] [0 0 0 0 1 1 1 1 1 3]	$X^{20} + 2X^{15}Y^5 + 44X^{14}Y^6 + 140X^{13}Y^7 + 126X^{12}Y^8 + 46X^{11}Y^9 + 168X^{10}Y^{10} + 280X^9Y^{11} + 128X^8Y^{12} + 14X^7Y^{13} + 44X^6Y^{14} + 28X^5Y^{15} + X^4Y^{16} + 2X^3Y^{17}$	III
140	[1 0 0 0 0 1 2 1 1 1] [0 1 0 0 0 1 1 3 2 1] [0 0 1 0 0 3 1 2 1 1] [0 0 0 1 0 2 1 1 3 3] [0 0 0 0 1 1 1 1 3 1]	$X^{20} + 10X^{15}Y^5 + 44X^{14}Y^6 + 100X^{13}Y^7 + 126X^{12}Y^8 + 126X^{11}Y^9 + 168X^{10}Y^{10} + 200X^9Y^{11} + 128X^8Y^{12} + 54X^7Y^{13} + 44X^6Y^{14} + 20X^5Y^{15} + X^4Y^{16} + 2X^3Y^{17}$	III

141	[1 0 0 0 0 1 2 1 1 0] [0 1 0 0 0 1 1 3 2 0] [0 0 1 0 0 3 1 2 1 1] [0 0 0 1 0 2 1 1 2 2] [0 0 0 0 1 0 1 0 2 1]		III
142	[1 0 0 0 0 1 2 1 1 1] [0 1 0 0 0 1 1 3 2 1] [0 0 1 0 0 3 1 2 1 2] [0 0 0 1 0 2 1 1 2 3] [0 0 0 0 1 1 2 1 3 0]	$X^{20} + 10X^{15}Y^5 + 47X^{14}Y^6 + 94X^{13}Y^7 + 117X^{12}Y^8 + 150X^{11}Y^9 + 174X^{10}Y^{10} + 164X^9Y^{11} + 134X^8Y^{12} + 78X^7Y^{13} + 35X^6Y^{14} + 14X^5Y^{15} + 4X^4Y^{16} + 2X^3Y^{17}$	III
143	[1 0 0 0 0 1 2 1 1 1] [0 1 0 0 0 1 1 3 2 2] [0 0 1 0 0 3 1 2 1 2] [0 0 0 1 0 2 1 1 2 3] [0 0 0 0 1 1 2 2 3 0]		III
144	[1 0 0 0 0 1 2 1 1 0] [0 1 0 0 0 1 1 3 2 0] [0 0 1 0 0 3 1 2 1 2] [0 0 0 1 0 2 1 1 2 1] [0 0 0 0 1 0 2 0 1 1]	$X^{20} + 14X^{15}Y^5 + 47X^{14}Y^6 + 70X^{13}Y^7 + 134X^{12}Y^8 + 172X^{11}Y^9 + 55X^{10}Y^{10} + 172X^9Y^{11} + 120X^8Y^{12} + 70X^7Y^{13} + 53X^6Y^{14} + 14X^5Y^{15} + X^4Y^{16} + X^2Y^{18}$	III
145	[1 0 0 0 0 1 2 1 1 2] [0 1 0 0 0 1 1 3 2 0] [0 0 1 0 0 3 1 2 1 2] [0 0 0 1 0 2 1 1 2 1] [0 0 0 0 1 2 2 0 1 1]		III
146	[1 0 0 0 0 1 2 1 1 0] [0 1 0 0 0 1 1 3 2 1] [0 0 1 0 0 3 1 2 1 0] [0 0 0 1 0 2 1 1 2 2] [0 0 0 0 1 0 0 1 2 1]	$X^{20} + 6X^{15}Y^5 + 53X^{14}Y^6 + 100X^{13}Y^7 + 107X^{12}Y^8 + 152X^{11}Y^9 + 70X^{10}Y^{10} + 160X^9Y^{11} + 146X^8Y^{12} + 78X^7Y^{13} + 33X^6Y^{14} + 12X^5Y^{15} + 2X^4Y^{16} + 4X^3Y^{17}$	III
147	[1 0 0 0 0 1 2 1 1 0] [0 1 0 0 0 1 1 3 2 1] [0 0 1 0 0 3 1 2 1 1] [0 0 0 1 0 2 1 1 2 1] [0 0 0 0 1 0 1 1 1 2]	$X^{20} + 12X^{15}Y^5 + 42X^{14}Y^6 + 96X^{13}Y^7 + 124X^{12}Y^8 + 136X^{11}Y^9 + 180X^{10}Y^{10} + 176X^9Y^{11} + 124X^8Y^{12} + 76X^7Y^{13} + 34X^6Y^{14} + 16X^5Y^{15} + 7X^4Y^{16}$	III

148	[1 0 0 0 0 1 2 1 1 0] [0 1 0 0 0 1 1 3 2 1] [0 0 1 0 0 3 1 2 1 1] [0 0 0 1 0 2 1 1 2 2] [0 0 0 0 1 0 1 1 2 1]	$X^{20} + 14X^{15}Y^5 + 42X^{14}Y^6 + 86X^{13}Y^7 + 124X^{12}Y^8 + 156X^{11}Y^9 + 180X^{10}Y^{10} + 156X^9Y^{11} + 124X^8Y^{12} + 86X^7Y^{13} + 34X^6Y^{14} + 14X^5Y^{15} + 7X^4Y^{16}$	III
149	[1 0 0 0 0 1 2 1 1 1] [0 1 0 0 0 1 1 3 2 1] [0 0 1 0 0 3 1 2 1 1] [0 0 0 1 0 2 1 1 2 3] [0 0 0 0 1 1 1 1 3 1]	$X^{20} + 12X^{15}Y^5 + 43X^{14}Y^6 + 94X^{13}Y^7 + 121X^{12}Y^8 + 144X^{11}Y^9 + 182X^{10}Y^{10} + 164X^9Y^{11} + 126X^8Y^{12} + 84X^7Y^{13} + 31X^6Y^{14} + 14X^5Y^{15} + 8X^4Y^{16}$	III
150	[1 0 0 0 0 1 2 1 1 0] [0 1 0 0 0 1 1 3 2 1] [0 0 1 0 0 3 1 2 1 2] [0 0 0 1 0 2 1 1 2 1] [0 0 0 0 1 0 2 1 1 2]	$X^{20} + 10X^{15}Y^5 + 50X^{14}Y^6 + 84X^{13}Y^7 + 125X^{12}Y^8 + 156X^{11}Y^9 + 161X^{10}Y^{10} + 176X^9Y^{11} + 126X^8Y^{12} + 74X^7Y^{13} + 44X^6Y^{14} + 12X^5Y^{15} + 4X^4Y^{16} + X^2Y^{18}$	III
151	[1 0 0 0 0 1 2 1 1 0] [0 1 0 0 0 1 1 3 2 1] [0 0 1 0 0 3 1 2 1 2] [0 0 0 1 0 2 1 1 2 3] [0 0 0 0 1 0 2 1 3 1]	$X^{20} + 8X^{15}Y^5 + 49X^{14}Y^6 + 100X^{13}Y^7 + 111X^{12}Y^8 + 146X^{11}Y^9 + 178X^{10}Y^{10} + 160X^9Y^{11} + 138X^8Y^{12} + 84X^7Y^{13} + 29X^6Y^{14} + 12X^5Y^{15} + 6X^4Y^{16} + 2X^3Y^{17}$	III
152	[1 0 0 0 0 1 2 1 1 2] [0 1 0 0 0 1 1 3 2 2] [0 0 1 0 0 3 1 2 1 2] [0 0 0 1 0 2 1 1 2 1] [0 0 0 0 1 2 2 2 1 3]	$X^{20} + 10X^{15}Y^5 + 47X^{14}Y^6 + 90X^{13}Y^7 + 134X^{12}Y^8 + 132X^{11}Y^9 + 155X^{10}Y^{10} + 212X^9Y^{11} + 120X^8Y^{12} + 50X^7Y^{13} + 53X^6Y^{14} + 18X^5Y^{15} + X^4Y^{16} + X^2Y^{18}$	III
153	[1 0 0 0 0 1 2 1 1 2] [0 1 0 0 0 1 1 3 2 2] [0 0 1 0 0 3 1 2 1 2] [0 0 0 1 0 2 1 1 2 1] [0 0 0 0 1 2 2 2 1 1]	$X^{20} + 18X^{15}Y^5 + 47X^{14}Y^6 + 50X^{13}Y^7 + 134X^{12}Y^8 + 212X^{11}Y^9 + 155X^{10}Y^{10} + 132X^9Y^{11} + 120X^8Y^{12} + 90X^7Y^{13} + 53X^6Y^{14} + 10X^5Y^{15} + X^4Y^{16} + X^2Y^{18}$	III
154	[1 0 0 0 0 1 2 1 1 2] [0 1 0 0 0 1 1 3 2 1] [0 0 1 0 0 3 1 2 1 3] [0 0 0 1 0 2 1 1 2 1] [0 0 0 0 1 2 3 1 1 0]	$X^{20} + 12X^{15}Y^5 + 40X^{14}Y^6 + 100X^{13}Y^7 + 130X^{12}Y^8 + 120X^{11}Y^9 + 176X^{10}Y^{10} + 200X^9Y^{11} + 120X^8Y^{12} + 60X^7Y^{13} + 40X^6Y^{14} + 20X^5Y^{15} + 5X^4Y^{16}$	III

156	[1 0 0 0 0 1 2 1 1 2] [0 1 0 0 0 1 1 3 2 2] [0 0 1 0 0 3 1 2 1 1] [0 0 0 1 0 2 1 1 2 3] [0 0 0 0 1 2 1 2 3 1]	$X^{20} + 8X^{15}Y^5 + 52X^{14}Y^6 + 90X^{13}Y^7 + 119X^{12}Y^8 + 152X^{11}Y^9 + 165X^{10}Y^{10} + 172X^9Y^{11} + 130X^8Y^{12} + 80X^7Y^{13} + 38X^6Y^{14} + 10X^5Y^{15} + 6X^4Y^{16} + X^2Y^{18}$	III	
157	[1 0 0 0 0 2 1 1 1 0] [0 1 0 0 0 1 2 3 1 2] [0 0 1 0 0 1 1 2 0 1] [0 0 0 1 0 1 0 1 2 3] [0 0 0 0 1 0 1 2 1 3]		III	
158	[1 0 0 0 0 2 1 1 1 2] [0 1 0 0 0 1 2 3 1 2] [0 0 1 0 0 1 1 2 0 1] [0 0 0 1 0 1 0 1 2 3] [0 0 0 0 1 0 1 2 1 3]		III	
159	[1 0 0 0 0 1 2 1 0 1] [0 1 0 0 0 1 1 3 2 2] [0 0 1 0 0 3 1 2 1 2] [0 0 0 1 0 2 0 1 3 3] [0 0 0 0 1 2 1 2 3 1]		III	
160	[1 0 0 0 0 1 2 1 0 3] [0 1 0 0 0 1 1 3 2 0] [0 0 1 0 0 3 1 2 1 2] [0 0 0 1 0 2 0 1 3 1] [0 0 0 0 1 2 1 2 3 1]		$X^{20} + 90X^{14}Y^6 + 255X^{12}Y^8 + 332X^{10}Y^{10} + 255X^8Y^{12} + 90X^6Y^{14} + Y^{20}$	III
161	[1 0 0 0 0 1 1 1 1 3] [0 1 0 0 0 0 1 2 3 1] [0 0 1 0 0 2 1 3 2 3] [0 0 0 1 0 3 1 2 1 2] [0 0 0 0 1 1 3 3 2 0]		III	
162	[1 0 0 0 0 1 1 1 1 3] [0 1 0 0 0 0 1 2 3 1] [0 0 1 0 0 2 1 3 2 3] [0 0 0 1 0 3 1 2 1 0] [0 0 0 0 1 1 3 3 0 2]		III	
163	[1 0 0 0 0 1 2 1 1 2] [0 1 0 0 0 1 1 2 2 1] [0 0 1 0 0 2 1 0 3 3] [0 0 0 1 0 2 1 3 1 2] [0 0 0 0 1 1 2 3 2 3]		III	



Table 10. Non-free formally self-dual codes over  $Z_4$  of length 10

No.	Generator matrix	Lee weight enumerator	Const.
1	$[1\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0]$ $[0\ 1\ 0\ 0\ 0\ 0\ 0\ 1\ 2\ 2]$ $[0\ 0\ 1\ 0\ 0\ 0\ 0\ 2\ 0\ 0]$ $[0\ 0\ 0\ 1\ 0\ 0\ 0\ 2\ 0\ 0]$ $[0\ 0\ 0\ 0\ 2\ 0\ 0\ 0\ 0\ 0]$ $[0\ 0\ 0\ 0\ 0\ 2\ 0\ 0\ 0\ 0]$	$X^{20} + 2X^{19}Y + 9X^{18}Y^2 + 24X^{17}Y^3 + 39X^{16}Y^4 + 62X^{15}Y^5 + 81X^{14}Y^6 + 92X^{13}Y^7 + 113X^{12}Y^8 + 126X^{11}Y^9 + 131X^{10}Y^{10} + 128X^9Y^{11} + 101X^8Y^{12} + 66X^7Y^{13} + 35X^6Y^{14} + 12X^5Y^{15} + 2X^4Y^{16}$	II
2	$[1\ 0\ 0\ 0\ 0\ 0\ 2\ 0\ 0\ 0]$ $[0\ 1\ 0\ 0\ 0\ 0\ 0\ 1\ 2\ 2]$ $[0\ 0\ 1\ 0\ 0\ 0\ 0\ 2\ 0\ 0]$ $[0\ 0\ 0\ 1\ 0\ 0\ 0\ 2\ 0\ 0]$ $[0\ 0\ 0\ 0\ 2\ 0\ 0\ 0\ 0\ 0]$ $[0\ 0\ 0\ 0\ 0\ 2\ 0\ 0\ 0\ 0]$	$X^{20} + 9X^{18}Y^2 + 10X^{17}Y^3 + 23X^{16}Y^4 + 48X^{15}Y^5 + 49X^{14}Y^6 + 86X^{13}Y^7 + 97X^{12}Y^8 + 100X^{11}Y^9 + 131X^{10}Y^{10} + 118X^9Y^{11} + 117X^8Y^{12} + 104X^7Y^{13} + 67X^6Y^{14} + 42X^5Y^{15} + 18X^4Y^{16} + 4X^3Y^{17}$	II
3	$[1\ 0\ 0\ 0\ 0\ 0\ 1\ 0\ 0\ 0]$ $[0\ 1\ 0\ 0\ 0\ 0\ 0\ 1\ 2\ 2]$ $[0\ 0\ 1\ 0\ 0\ 0\ 0\ 2\ 0\ 0]$ $[0\ 0\ 0\ 1\ 0\ 0\ 0\ 2\ 0\ 0]$ $[0\ 0\ 0\ 0\ 2\ 0\ 0\ 0\ 0\ 0]$ $[0\ 0\ 0\ 0\ 0\ 2\ 0\ 0\ 0\ 0]$	$X^{20} + 10X^{18}Y^2 + 8X^{17}Y^3 + 32X^{16}Y^4 + 40X^{15}Y^5 + 56X^{14}Y^6 + 88X^{13}Y^7 + 82X^{12}Y^8 + 120X^{11}Y^9 + 116X^{10}Y^{10} + 120X^9Y^{11} + 120X^8Y^{12} + 88X^7Y^{13} + 72X^6Y^{14} + 40X^5Y^{15} + 21X^4Y^{16} + 8X^3Y^{17} + 2X^2Y^{18}$	II
4	$[1\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0]$ $[0\ 1\ 0\ 0\ 0\ 0\ 0\ 2\ 0\ 0]$ $[0\ 0\ 1\ 0\ 0\ 0\ 0\ 0\ 2\ 2]$ $[0\ 0\ 0\ 1\ 0\ 0\ 0\ 2\ 0\ 0]$ $[0\ 0\ 0\ 0\ 2\ 0\ 0\ 0\ 0\ 0]$ $[0\ 0\ 0\ 0\ 0\ 2\ 0\ 0\ 0\ 0]$	$X^{20} + 2X^{19}Y + 10X^{18}Y^2 + 22X^{17}Y^3 + 39X^{16}Y^4 + 66X^{15}Y^5 + 80X^{14}Y^6 + 102X^{13}Y^7 + 119X^{12}Y^8 + 118X^{11}Y^9 + 130X^{10}Y^{10} + 114X^9Y^{11} + 89X^8Y^{12} + 70X^7Y^{13} + 36X^6Y^{14} + 18X^5Y^{15} + 8X^4Y^{16}$	II
5	$[1\ 0\ 0\ 0\ 0\ 0\ 2\ 0\ 0\ 0]$ $[0\ 1\ 0\ 0\ 0\ 0\ 0\ 2\ 0\ 0]$ $[0\ 0\ 1\ 0\ 0\ 0\ 0\ 0\ 2\ 2]$ $[0\ 0\ 0\ 1\ 0\ 0\ 0\ 2\ 0\ 0]$ $[0\ 0\ 0\ 0\ 2\ 0\ 0\ 0\ 0\ 0]$ $[0\ 0\ 0\ 0\ 0\ 2\ 0\ 0\ 0\ 0]$	$X^{20} + 10X^{18}Y^2 + 6X^{17}Y^3 + 31X^{16}Y^4 + 40X^{15}Y^5 + 52X^{14}Y^6 + 102X^{13}Y^7 + 75X^{12}Y^8 + 128X^{11}Y^9 + 122X^{10}Y^{10} + 98X^9Y^{11} + 137X^8Y^{12} + 72X^7Y^{13} + 72X^6Y^{14} + 50X^5Y^{15} + 12X^4Y^{16} + 16X^3Y^{17}$	II
6	$[1\ 0\ 0\ 0\ 0\ 0\ 1\ 0\ 0\ 0]$ $[0\ 1\ 0\ 0\ 0\ 0\ 0\ 2\ 0\ 0]$ $[0\ 0\ 1\ 0\ 0\ 0\ 0\ 0\ 2\ 2]$ $[0\ 0\ 0\ 1\ 0\ 0\ 0\ 2\ 0\ 0]$ $[0\ 0\ 0\ 0\ 2\ 0\ 0\ 0\ 0\ 0]$ $[0\ 0\ 0\ 0\ 0\ 2\ 0\ 0\ 0\ 0]$	$X^{20} + 11X^{18}Y^2 + 4X^{17}Y^3 + 41X^{16}Y^4 + 26X^{15}Y^5 + 75X^{14}Y^6 + 80X^{13}Y^7 + 83X^{12}Y^8 + 142X^{11}Y^9 + 81X^{10}Y^{10} + 148X^9Y^{11} + 91X^8Y^{12} + 86X^7Y^{13} + 81X^6Y^{14} + 24X^5Y^{15} + 40X^4Y^{16} + 2X^3Y^{17} + 8X^2Y^{18}$	II

7	[1 0 0 0 0 0 0 0 0 0] [0 1 0 0 0 0 0 2 2 2] [0 0 1 0 0 0 0 0 2 2] [0 0 0 1 0 0 0 2 2 2] [0 0 0 0 2 0 0 0 0 0] [0 0 0 0 0 2 0 0 0 0]	$X^{20} + 2X^{19}Y + 10X^{18}Y^2 + 18X^{17}Y^3 + 39X^{16}Y^4 + 62X^{15}Y^5 + 80X^{14}Y^6 + 114X^{13}Y^7 + 119X^{12}Y^8 + 130X^{11}Y^9 + 130X^{10}Y^{10} + 102X^9Y^{11} + 89X^8Y^{12} + 58X^7Y^{13} + 36X^6Y^{14} + 22X^5Y^{15} + 8X^4Y^{16} + 4X^3Y^{17}$	II
8	[1 0 0 0 0 0 2 0 0 0] [0 1 0 0 0 0 0 2 2 2] [0 0 1 0 0 0 0 0 2 2] [0 0 0 1 0 0 0 2 2 2] [0 0 0 0 2 0 0 0 0 0] [0 0 0 0 0 2 0 0 0 0]	$X^{20} + 10X^{18}Y^2 + 2X^{17}Y^3 + 39X^{16}Y^4 + 20X^{15}Y^5 + 76X^{14}Y^6 + 82X^{13}Y^7 + 83X^{12}Y^8 + 156X^{11}Y^9 + 82X^{10}Y^{10} + 150X^9Y^{11} + 97X^8Y^{12} + 76X^7Y^{13} + 80X^6Y^{14} + 22X^5Y^{15} + 36X^4Y^{16} + 4X^3Y^{17} + 8X^2Y^{18}$	II
9	[1 0 0 0 0 0 1 0 0 0] [0 1 0 0 0 0 0 2 2 2] [0 0 1 0 0 0 0 0 2 2] [0 0 0 1 0 0 0 2 2 2] [0 0 0 0 2 0 0 0 0 0] [0 0 0 0 0 2 0 0 0 0]	$X^{20} + 11X^{18}Y^2 + 49X^{16}Y^4 + 2X^{15}Y^5 + 115X^{14}Y^6 + 24X^{13}Y^7 + 155X^{12}Y^8 + 86X^{11}Y^9 + 121X^{10}Y^{10} + 148X^9Y^{11} + 51X^8Y^{12} + 142X^7Y^{13} + 9X^6Y^{14} + 80X^5Y^{15} + 26X^3Y^{17} + 4XY^{19}$	II
10	[1 0 0 0 0 0 0 0 0 0] [0 1 0 0 0 0 0 2 2 2] [0 0 1 0 0 0 0 2 0 0] [0 0 0 1 0 0 0 2 0 0] [0 0 0 0 2 0 0 0 0 0] [0 0 0 0 0 2 0 0 0 0]	$X^{20} + 2X^{19}Y + 10X^{18}Y^2 + 22X^{17}Y^3 + 39X^{16}Y^4 + 64X^{15}Y^5 + 84X^{14}Y^6 + 102X^{13}Y^7 + 115X^{12}Y^8 + 124X^{11}Y^9 + 122X^{10}Y^{10} + 114X^9Y^{11} + 97X^8Y^{12} + 64X^7Y^{13} + 40X^6Y^{14} + 18X^5Y^{15} + 4X^4Y^{16} + 2X^3Y^{17}$	II
11	[1 0 0 0 0 0 2 0 0 0] [0 1 0 0 0 0 0 2 2 2] [0 0 1 0 0 0 0 2 0 0] [0 0 0 1 0 0 0 2 0 0] [0 0 0 0 2 0 0 0 0 0] [0 0 0 0 0 2 0 0 0 0]	$X^{20} + 10X^{18}Y^2 + 6X^{17}Y^3 + 31X^{16}Y^4 + 38X^{15}Y^5 + 60X^{14}Y^6 + 86X^{13}Y^7 + 95X^{12}Y^8 + 118X^{11}Y^9 + 110X^{10}Y^{10} + 130X^9Y^{11} + 97X^8Y^{12} + 98X^7Y^{13} + 72X^6Y^{14} + 34X^5Y^{15} + 32X^4Y^{16} + 2X^3Y^{17} + 4X^2Y^{18}$	II
12	[1 0 0 0 0 0 1 0 0 0] [0 1 0 0 0 0 0 2 2 2] [0 0 1 0 0 0 0 2 0 0] [0 0 0 1 0 0 0 2 0 0] [0 0 0 0 2 0 0 0 0 0] [0 0 0 0 0 2 0 0 0 0]	$X^{20} + 11X^{18}Y^2 + 4X^{17}Y^3 + 41X^{16}Y^4 + 24X^{15}Y^5 + 83X^{14}Y^6 + 62X^{13}Y^7 + 115X^{12}Y^8 + 100X^{11}Y^9 + 121X^{10}Y^{10} + 122X^9Y^{11} + 91X^8Y^{12} + 112X^7Y^{13} + 41X^6Y^{14} + 66X^5Y^{15} + 8X^4Y^{16} + 20X^3Y^{17} + 2XY^{19}$	II

13	[1 0 0 0 0 0 0 0 0 0] [0 1 0 0 0 0 0 2 2 2] [0 0 1 0 0 0 0 2 2 2] [0 0 0 1 0 0 0 2 2 2] [0 0 0 0 2 0 0 0 0 0] [0 0 0 0 0 2 0 0 0 0]	$X^{20} + 2X^{19}Y + 18X^{18}Y^2 + 34X^{17}Y^3 + 63X^{16}Y^4 + 92X^{15}Y^5 + 92X^{14}Y^6 + 98X^{13}Y^7 + 75X^{12}Y^8 + 72X^{11}Y^9 + 82X^{10}Y^{10} + 86X^9Y^{11} + 105X^8Y^{12} + 84X^7Y^{13} + 4X^6Y^{14} + 38X^5Y^{15} + 12X^4Y^{16} + 6X^3Y^{17}$	II
14	[1 0 0 0 0 0 2 0 0 0] [0 1 0 0 0 0 0 2 2 2] [0 0 1 0 0 0 0 2 2 2] [0 0 0 1 0 0 0 2 2 2] [0 0 0 0 2 0 0 0 0 0] [0 0 0 0 0 2 0 0 0 0]	$X^{20} + 18X^{18}Y^2 + 2X^{17}Y^3 + 63X^{16}Y^4 + 34X^{15}Y^5 + 92X^{14}Y^6 + 98X^{13}Y^7 + 63X^{12}Y^8 + 130X^{11}Y^9 + 30X^{10}Y^{10} + 118X^9Y^{11} + 65X^8Y^{12} + 86X^7Y^{13} + 104X^6Y^{14} + 38X^5Y^{15} + 64X^4Y^{16} + 6X^3Y^{17} + 12X^2Y^{18}$	II
15	[1 0 0 0 0 0 1 0 0 0] [0 1 0 0 0 0 0 2 2 2] [0 0 1 0 0 0 0 2 2 2] [0 0 0 1 0 0 0 2 2 2] [0 0 0 0 2 0 0 0 0 0] [0 0 0 0 0 2 0 0 0 0]	$X^{20} + 19X^{18}Y^2 + 81X^{16}Y^4 + 155X^{14}Y^6 + 6X^{13}Y^7 + 155X^{12}Y^8 + 44X^{11}Y^9 + 81X^{10}Y^{10} + 122X^9Y^{11} + 19X^8Y^{12} + 168X^7Y^{13} + X^6Y^{14} + 122X^5Y^{15} + 44X^3Y^{17} + 6XY^{19}$	II
16	[1 0 0 0 0 0 0 0 0 0] [0 1 0 0 0 0 0 1 2 0] [0 0 1 0 0 0 0 2 0 0] [0 0 0 1 0 0 0 0 0 1] [0 0 0 0 2 0 0 0 0 0] [0 0 0 0 0 2 0 0 0 0]	$X^{20} + 2X^{19}Y + 6X^{18}Y^2 + 14X^{17}Y^3 + 26X^{16}Y^4 + 50X^{15}Y^5 + 78X^{14}Y^6 + 110X^{13}Y^7 + 140X^{12}Y^8 + 150X^{11}Y^9 + 146X^{10}Y^{10} + 122X^9Y^{11} + 86X^8Y^{12} + 54X^7Y^{13} + 26X^6Y^{14} + 10X^5Y^{15} + 3X^4Y^{16}$	II
17	[1 0 0 0 0 0 2 0 0 0] [0 1 0 0 0 0 0 1 2 0] [0 0 1 0 0 0 0 2 0 0] [0 0 0 1 0 0 0 0 0 1] [0 0 0 0 2 0 0 0 0 0] [0 0 0 0 0 2 0 0 0 0]	$X^{20} + 6X^{18}Y^2 + 6X^{17}Y^3 + 18X^{16}Y^4 + 34X^{15}Y^5 + 46X^{14}Y^6 + 86X^{13}Y^7 + 100X^{12}Y^8 + 130X^{11}Y^9 + 146X^{10}Y^{10} + 130X^9Y^{11} + 126X^8Y^{12} + 86X^7Y^{13} + 58X^6Y^{14} + 34X^5Y^{15} + 11X^4Y^{16} + 6X^3Y^{17}$	II

18	[1 0 0 0 0 0 1 2 2 2] [0 1 0 0 0 0 2 2 0 0] [0 0 1 0 0 0 2 2 2 0] [0 0 0 1 0 0 2 2 2 2] [0 0 0 0 2 0 0 0 0 0] [0 0 0 0 0 2 0 0 0 0]	$X^{20} + 5X^{18}Y^2 + 4X^{17}Y^3 + 19X^{16}Y^4 + 24X^{15}Y^5 + 51X^{14}Y^6 + 80X^{13}Y^7 + 101X^{12}Y^8 + 148X^{11}Y^9 + 141X^{10}Y^{10} + 148X^9Y^{11} + 121X^8Y^{12} + 80X^7Y^{13} + 57X^6Y^{14} + 24X^5Y^{15} + 14X^4Y^{16} + 4X^3Y^{17} + 2X^2Y^{18}$	I-i
19	[1 0 0 0 0 0 1 2 2 2] [0 1 0 0 0 0 2 0 0 2] [0 0 1 0 0 0 2 0 0 0] [0 0 0 1 0 0 2 0 2 2] [0 0 0 0 2 0 0 0 0 0] [0 0 0 0 0 2 0 0 0 0]		
20	[1 0 0 0 0 0 2 2 0 0] [0 1 0 0 0 0 0 2 2 2] [0 0 1 0 0 0 2 2 2 0] [0 0 0 1 0 0 2 2 2 2] [0 0 0 0 2 0 0 0 0 0] [0 0 0 0 0 2 0 0 0 0]	$X^{20} + 6X^{18}Y^2 + 27X^{16}Y^4 + 10X^{15}Y^5 + 76X^{14}Y^6 + 54X^{13}Y^7 + 139X^{12}Y^8 + 122X^{11}Y^9 + 150X^{10}Y^{10} + 150X^9Y^{11} + 85X^8Y^{12} + 110X^7Y^{13} + 24X^6Y^{14} + 50X^5Y^{15} + 4X^4Y^{16} + 14X^3Y^{17} + 2X^2Y^{19}$	I-ii,iii
21	[1 0 0 0 0 0 2 0 2 2] [0 1 0 0 0 0 0 2 2 2] [0 0 1 0 0 0 2 0 0 2] [0 0 0 1 0 0 2 0 0 0] [0 0 0 0 2 0 0 0 0 0] [0 0 0 0 0 2 0 0 0 0]	$X^{20} + 6X^{18}Y^2 + 2X^{17}Y^3 + 23X^{16}Y^4 + 20X^{15}Y^5 + 60X^{14}Y^6 + 82X^{13}Y^7 + 99X^{12}Y^8 + 156X^{11}Y^9 + 122X^{10}Y^{10} + 150X^9Y^{11} + 113X^8Y^{12} + 76X^7Y^{13} + 64X^6Y^{14} + 22X^5Y^{15} + 20X^4Y^{16} + 4X^3Y^{17} + 4X^2Y^{18}$	I-ii,iii
22	[1 0 0 0 0 0 2 2 2 2] [0 1 0 0 0 0 2 2 0 0] [0 0 1 0 0 0 2 2 2 0] [0 0 0 1 0 0 2 2 2 2] [0 0 0 0 2 0 0 0 0 0] [0 0 0 0 0 2 0 0 0 0]	$X^{20} + 10X^{18}Y^2 + 43X^{16}Y^4 + 2X^{15}Y^5 + 116X^{14}Y^6 + 20X^{13}Y^7 + 167X^{12}Y^8 + 82X^{11}Y^9 + 122X^{10}Y^{10} + 156X^9Y^{11} + 45X^8Y^{12} + 150X^7Y^{13} + 8X^6Y^{14} + 76X^5Y^{15} + 22X^3Y^{17} + 4X^2Y^{19}$	I-iv,v
23	[1 0 0 0 0 0 2 0 2 2] [0 1 0 0 0 0 2 2 2 2] [0 0 1 0 0 0 2 0 0 2] [0 0 0 1 0 0 2 0 0 0] [0 0 0 0 2 0 0 0 0 0] [0 0 0 0 0 2 0 0 0 0]	$X^{20} + 6X^{18}Y^2 + 2X^{17}Y^3 + 27X^{16}Y^4 + 12X^{15}Y^5 + 76X^{14}Y^6 + 48X^{13}Y^7 + 139X^{12}Y^8 + 116X^{11}Y^9 + 150X^{10}Y^{10} + 156X^9Y^{11} + 85X^8Y^{12} + 116X^7Y^{13} + 24X^6Y^{14} + 48X^5Y^{15} + 4X^4Y^{16} + 12X^3Y^{17} + 2X^2Y^{19}$	I-iv,v

24	[1 0 0 0 0 0 1 0 2 2] [0 1 0 0 0 0 2 2 2 2] [0 0 1 0 0 0 0 1 2 2] [0 0 0 1 0 0 2 2 0 2] [0 0 0 0 2 0 0 0 0 0] [0 0 0 0 0 2 0 0 0 0]	$X^{20} + 4X^{18}Y^2 + 16X^{16}Y^4 + 16X^{15}Y^5 + 56X^{14}Y^6 + 80X^{13}Y^7 + 114X^{12}Y^8 + 160X^{11}Y^9 + 136X^{10}Y^{10} + 160X^9Y^{11} + 104X^8Y^{12} + 80X^7Y^{13} + 56X^6Y^{14} + 16X^5Y^{15} + 21X^4Y^{16} + 4X^2Y^{18}$	I-i
25	[1 0 0 0 0 0 2 2 2 2] [0 1 0 0 0 0 0 0 2 2] [0 0 1 0 0 0 0 1 2 2] [0 0 0 1 0 0 2 2 0 2] [0 0 0 0 2 0 0 0 0 0] [0 0 0 0 0 2 0 0 0 0]	$X^{20} + 5X^{18}Y^2 + 4X^{17}Y^3 + 15X^{16}Y^4 + 30X^{15}Y^5 + 45X^{14}Y^6 + 88X^{13}Y^7 + 105X^{12}Y^8 + 138X^{11}Y^9 + 151X^{10}Y^{10} + 132X^9Y^{11} + 125X^8Y^{12} + 82X^7Y^{13} + 55X^6Y^{14} + 32X^5Y^{15} + 10X^4Y^{16} + 6X^3Y^{17}$	I-ii
26	[1 0 0 0 0 0 2 2 0 0] [0 1 0 0 0 0 0 0 2 2] [0 0 1 0 0 0 0 1 2 2] [0 0 0 1 0 0 2 2 2 0] [0 0 0 0 2 0 0 0 0 0] [0 0 0 0 0 2 0 0 0 0]	$X^{20} + 5X^{18}Y^2 + 23X^{16}Y^4 + 8X^{15}Y^5 + 77X^{14}Y^6 + 50X^{13}Y^7 + 145X^{12}Y^8 + 124X^{11}Y^9 + 151X^{10}Y^{10} + 158X^9Y^{11} + 85X^8Y^{12} + 112X^7Y^{13} + 23X^6Y^{14} + 46X^5Y^{15} + 2X^4Y^{16} + 12X^3Y^{17} + 2XY^{19}$	I-iii
27	[1 0 0 0 0 0 2 0 2 2] [0 1 0 0 0 0 2 2 2 2] [0 0 1 0 0 0 0 1 2 2] [0 0 0 1 0 0 2 2 0 2] [0 0 0 0 2 0 0 0 0 0] [0 0 0 0 0 2 0 0 0 0]	$X^{20} + 5X^{18}Y^2 + 23X^{16}Y^4 + 8X^{15}Y^5 + 77X^{14}Y^6 + 50X^{13}Y^7 + 145X^{12}Y^8 + 124X^{11}Y^9 + 151X^{10}Y^{10} + 158X^9Y^{11} + 85X^8Y^{12} + 112X^7Y^{13} + 23X^6Y^{14} + 46X^5Y^{15} + 2X^4Y^{16} + 12X^3Y^{17} + 2XY^{19}$	I-iv
28	[1 0 0 0 0 0 2 2 0 0] [0 1 0 0 0 0 2 0 2 2] [0 0 1 0 0 0 0 1 2 2] [0 0 0 1 0 0 2 2 2 0] [0 0 0 0 2 0 0 0 0 0] [0 0 0 0 0 2 0 0 0 0]	$X^{20} + 5X^{18}Y^2 + 23X^{16}Y^4 + 8X^{15}Y^5 + 77X^{14}Y^6 + 50X^{13}Y^7 + 145X^{12}Y^8 + 124X^{11}Y^9 + 151X^{10}Y^{10} + 158X^9Y^{11} + 85X^8Y^{12} + 112X^7Y^{13} + 23X^6Y^{14} + 46X^5Y^{15} + 2X^4Y^{16} + 12X^3Y^{17} + 2XY^{19}$	I-v

29	[1 0 0 0 0 0 1 2 0 0]	$X^{20} + 7X^{18}Y^2 + 4X^{17}Y^3 + 24X^{16}Y^4 + 28X^{15}Y^5 + 56X^{14}Y^6 + 84X^{13}Y^7 + 98X^{12}Y^8 + 140X^{11}Y^9 + 126X^{10}Y^{10} + 140X^9Y^{11} + 112X^8Y^{12} + 84X^7Y^{13} + 64X^6Y^{14} + 28X^5Y^{15} + 21X^4Y^{16} + 4X^3Y^{17} + 3X^2Y^{18}$	I-i
	[0 1 0 0 0 0 2 0 0 0]		
	[0 0 1 0 0 0 0 0 1 0]		
	[0 0 0 1 0 0 0 0 0 1]		
	[0 0 0 0 2 0 0 0 0 0]		
	[0 0 0 0 0 2 0 0 0 0]		
30	[1 0 0 0 0 0 3 2 0 0]	$X^{20} + 8X^{18}Y^2 + 4X^{17}Y^3 + 28X^{16}Y^4 + 28X^{15}Y^5 + 60X^{14}Y^6 + 84X^{13}Y^7 + 94X^{12}Y^8 + 140X^{11}Y^9 + 116X^{10}Y^{10} + 140X^9Y^{11} + 108X^8Y^{12} + 84X^7Y^{13} + 68X^6Y^{14} + 28X^5Y^{15} + 25X^4Y^{16} + 4X^3Y^{17} + 4X^2Y^{18}$	I-ii
	[0 1 0 0 0 0 2 2 0 0]		
	[0 0 1 0 0 0 0 0 1 0]		
	[0 0 0 1 0 0 0 0 0 1]		
	[0 0 0 0 2 0 0 0 0 0]		
	[0 0 0 0 0 2 0 0 0 0]		
31	[1 0 0 0 0 0 2 0 0 0]	$X^{20} + 8X^{18}Y^2 + 2X^{17}Y^3 + 32X^{16}Y^4 + 16X^{15}Y^5 + 80X^{14}Y^6 + 56X^{13}Y^7 + 130X^{12}Y^8 + 112X^{11}Y^9 + 136X^{10}Y^{10} + 140X^9Y^{11} + 88X^8Y^{12} + 112X^7Y^{13} + 32X^6Y^{14} + 56X^5Y^{15} + 5X^4Y^{16} + 16X^3Y^{17} + 2X^2Y^{19}$	I-iii,iv
	[0 1 0 0 0 0 0 2 0 0]		
	[0 0 1 0 0 0 0 0 1 0]		
	[0 0 0 1 0 0 0 0 0 1]		
	[0 0 0 0 2 0 0 0 0 0]		
	[0 0 0 0 0 2 0 0 0 0]		
32	[1 0 0 0 0 0 2 2 0 0]	$X^{20} + 12X^{18}Y^2 + 52X^{16}Y^4 + 4X^{15}Y^5 + 116X^{14}Y^6 + 28X^{13}Y^7 + 150X^{12}Y^8 + 84X^{11}Y^9 + 116X^{10}Y^{10} + 140X^9Y^{11} + 52X^8Y^{12} + 140X^7Y^{13} + 12X^6Y^{14} + 84X^5Y^{15} + X^4Y^{16} + 28X^3Y^{17} + 4X^2Y^{19}$	I-v
	[0 1 0 0 0 0 2 2 0 0]		
	[0 0 1 0 0 0 0 0 1 0]		
	[0 0 0 1 0 0 0 0 0 1]		
	[0 0 0 0 2 0 0 0 0 0]		
	[0 0 0 0 0 2 0 0 0 0]		
33	[1 0 0 0 0 0 1 2 2 2]	$X^{20} + 5X^{18}Y^2 + 4X^{17}Y^3 + 19X^{16}Y^4 + 24X^{15}Y^5 + 51X^{14}Y^6 + 80X^{13}Y^7 + 101X^{12}Y^8 + 148X^{11}Y^9 + 141X^{10}Y^{10} + 148X^9Y^{11} + 121X^8Y^{12} + 80X^7Y^{13} + 57X^6Y^{14} + 24X^5Y^{15} + 14X^4Y^{16} + 4X^3Y^{17} + 2X^2Y^{18}$	I-i
	[0 1 0 0 0 0 2 0 0 2]		
	[0 0 1 0 0 0 2 0 0 0]		
	[0 0 0 1 0 0 2 0 2 2]		
	[0 0 0 0 2 0 0 0 0 0]		
	[0 0 0 0 0 2 0 0 0 0]		

35	[1 0 0 0 0 0 1 2 0 2] [0 1 0 0 0 0 2 0 2 2] [0 0 1 0 0 0 2 0 0 0] [0 0 0 1 0 0 0 0 1 2] [0 0 0 0 2 0 0 0 0 0] [0 0 0 0 0 2 0 0 0 0]	$X^{20} + 4X^{18}Y^2 + 4X^{17}Y^3 + 18X^{16}Y^4 + 20X^{15}Y^5 + 50X^{14}Y^6 + 76X^{13}Y^7 + 100X^{12}Y^8 + 156X^{11}Y^9 + 146X^{10}Y^{10} + 156X^9Y^{11} + 126X^8Y^{12} + 76X^7Y^{13} + 54X^6Y^{14} + 20X^5Y^{15} + 11X^4Y^{16} + 4X^3Y^{17} + 2X^2Y^{18}$	I-i
36	[1 0 0 0 0 0 2 0 2 2] [0 1 0 0 0 0 0 2 0 2] [0 0 1 0 0 0 2 0 0 0] [0 0 0 1 0 0 0 0 1 2] [0 0 0 0 2 0 0 0 0 0] [0 0 0 0 0 2 0 0 0 0]	$X^{20} + 5X^{18}Y^2 + 2X^{17}Y^3 + 21X^{16}Y^4 + 18X^{15}Y^5 + 57X^{14}Y^6 + 78X^{13}Y^7 + 103X^{12}Y^8 + 158X^{11}Y^9 + 131X^{10}Y^{10} + 158X^9Y^{11} + 111X^8Y^{12} + 78X^7Y^{13} + 59X^6Y^{14} + 18X^5Y^{15} + 20X^4Y^{16} + 2X^3Y^{17} + 4X^2Y^{18}$	I-ii
37	[1 0 0 0 0 0 2 2 2 0] [0 1 0 0 0 0 0 2 0 2] [0 0 1 0 0 0 2 2 0 2] [0 0 0 1 0 0 0 0 1 2] [0 0 0 0 2 0 0 0 0 0] [0 0 0 0 0 2 0 0 0 0]	$X^{20} + 5X^{18}Y^2 + 25X^{16}Y^4 + 6X^{15}Y^5 + 77X^{14}Y^6 + 50X^{13}Y^7 + 139X^{12}Y^8 + 130X^{11}Y^9 + 151X^{10}Y^{10} + 158X^9Y^{11} + 91X^8Y^{12} + 106X^7Y^{13} + 23X^6Y^{14} + 46X^5Y^{15} + 14X^3Y^{17} + 2X^2Y^{19}$	I-iii
38	[1 0 0 0 0 0 2 2 0 2] [0 1 0 0 0 0 2 0 2 2] [0 0 1 0 0 0 2 0 0 0] [0 0 0 1 0 0 0 0 1 2] [0 0 0 0 2 0 0 0 0 0] [0 0 0 0 0 2 0 0 0 0]	$X^{20} + 5X^{18}Y^2 + 2X^{17}Y^3 + 21X^{16}Y^4 + 12X^{15}Y^5 + 77X^{14}Y^6 + 44X^{13}Y^7 + 151X^{12}Y^8 + 112X^{11}Y^9 + 151X^{10}Y^{10} + 164X^9Y^{11} + 79X^8Y^{12} + 124X^7Y^{13} + 23X^6Y^{14} + 4X^5Y^{15} + 4X^4Y^{16} + 8X^3Y^{17} + 2X^2Y^{19}$	I-iv
39	[1 0 0 0 0 0 2 2 2 0] [0 1 0 0 0 0 2 2 0 2] [0 0 1 0 0 0 2 2 0 2] [0 0 0 1 0 0 0 0 1 2] [0 0 0 0 2 0 0 0 0 0] [0 0 0 0 0 2 0 0 0 0]	$X^{20} + 9X^{18}Y^2 + 41X^{16}Y^4 + 113X^{14}Y^6 + 16X^{13}Y^7 + 171X^{12}Y^8 + 84X^{11}Y^9 + 131X^{10}Y^{10} + 164X^9Y^{11} + 43X^8Y^{12} + 152X^7Y^{13} + 3X^6Y^{14} + 72X^5Y^{15} + 20X^3Y^{17} + 4X^2Y^{19}$	I-v

40	[1 0 0 0 0 0 1 0 0 2]	$X^{20} + 3X^{18}Y^2 + 24X^{16}Y^4 + 64X^{14}Y^6 +$ $64X^{13}Y^7 + 98X^{12}Y^8 + 192X^{11}Y^9 +$ $126X^{10}Y^{10} + 192X^9Y^{11} + 112X^8Y^{12} +$ $64X^7Y^{13} + 56X^6Y^{14} + 21X^4Y^{16} + 7X^2Y^{18}$	I-i,ii
	[0 1 0 0 0 0 2 2 2 2]		
	[0 0 1 0 0 0 0 1 0 2]		
	[0 0 0 1 0 0 0 0 1 2]		
	[0 0 0 0 2 0 0 0 0 0]		
	[0 0 0 0 0 2 0 0 0 0]		
41	[1 0 0 0 0 0 3 0 0 2]	$X^{20} + 4X^{18}Y^2 + 10X^{17}Y^3 + 16X^{16}Y^4 +$ $30X^{15}Y^5 + 44X^{14}Y^6 + 66X^{13}Y^7 + 98X^{12}Y^8 +$ $134X^{11}Y^9 + 156X^{10}Y^{10} + 158X^9Y^{11} +$ $136X^8Y^{12} + 90X^7Y^{13} + 52X^6Y^{14} + 22X^5Y^{15}$ $+ 5X^4Y^{16} + 2X^3Y^{17}$	I-ii
	[0 1 0 0 0 0 2 2 2 2]		
	[0 0 1 0 0 0 0 1 0 2]		
	[0 0 0 1 0 0 0 0 1 2]		
	[0 0 0 0 2 0 0 0 0 0]		
	[0 0 0 0 0 2 0 0 0 0]		
42	[1 0 0 0 0 0 2 2 2 0]	$X^{20} + 3X^{18}Y^2 + 24X^{16}Y^4 + 64X^{14}Y^6 +$ $64X^{13}Y^7 + 98X^{12}Y^8 + 192X^{11}Y^9 +$ $126X^{10}Y^{10} + 192X^9Y^{11} + 112X^8Y^{12} +$ $64X^7Y^{13} + 56X^6Y^{14} + 21X^4Y^{16} + 7X^2Y^{18}$	I-iv
	[0 1 0 0 0 0 0 0 0 2]		
	[0 0 1 0 0 0 0 1 0 2]		
	[0 0 0 1 0 0 0 0 1 2]		
	[0 0 0 0 2 0 0 0 0 0]		
	[0 0 0 0 0 2 0 0 0 0]		
43	[1 0 0 0 0 0 2 0 0 2]	$X^{20} + 4X^{18}Y^2 + 10X^{17}Y^3 + 16X^{16}Y^4 +$ $30X^{15}Y^5 + 44X^{14}Y^6 + 66X^{13}Y^7 + 98X^{12}Y^8 +$ $134X^{11}Y^9 + 156X^{10}Y^{10} + 158X^9Y^{11} +$ $136X^8Y^{12} + 90X^7Y^{13} + 52X^6Y^{14} + 22X^5Y^{15}$ $+ 5X^4Y^{16} + 2X^3Y^{17}$	I-iii
	[0 1 0 0 0 0 2 2 2 2]		
	[0 0 1 0 0 0 0 1 0 2]		
	[0 0 0 1 0 0 0 0 1 2]		
	[0 0 0 0 2 0 0 0 0 0]		
	[0 0 0 0 0 2 0 0 0 0]		
44	[1 0 0 0 0 0 2 2 2 0]	$X^{20} + 3X^{18}Y^2 + 24X^{16}Y^4 + 64X^{14}Y^6 +$ $64X^{13}Y^7 + 98X^{12}Y^8 + 192X^{11}Y^9 +$ $126X^{10}Y^{10} + 192X^9Y^{11} + 112X^8Y^{12} +$ $64X^7Y^{13} + 56X^6Y^{14} + 21X^4Y^{16} + 7X^2Y^{18}$	I-iii
	[0 1 0 0 0 0 2 0 0 2]		
	[0 0 1 0 0 0 0 1 0 2]		
	[0 0 0 1 0 0 0 0 1 2]		
	[0 0 0 0 2 0 0 0 0 0]		
	[0 0 0 0 0 2 0 0 0 0]		



45	[1 0 0 0 0 0 1 2 2 2]	$X^{20} + 5X^{18}Y^2 + 23X^{16}Y^4 + 12X^{15}Y^5 + 63X^{14}Y^6 + 76X^{13}Y^7 + 105X^{12}Y^8 + 168X^{11}Y^9 + 121X^{10}Y^{10} + 168X^9Y^{11} + 101X^8Y^{12} + 76X^7Y^{13} + 61X^6Y^{14} + 12X^5Y^{15} + 26X^4Y^{16} + 6X^2Y^{18}$	I-i
	[0 1 0 0 0 0 2 2 0 0]		
	[0 0 1 0 0 0 2 2 2 0]		
	[0 0 0 1 0 0 2 0 2 2]		
	[0 0 0 0 2 0 0 0 0 0]		
	[0 0 0 0 0 2 0 0 0 0]		
46	[1 0 0 0 0 0 3 2 2 2]	$X^{20} + 6X^{18}Y^2 + 8X^{17}Y^3 + 19X^{16}Y^4 + 34X^{15}Y^5 + 48X^{14}Y^6 + 80X^{13}Y^7 + 95X^{12}Y^8 + 130X^{11}Y^9 + 142X^{10}Y^{10} + 136X^9Y^{11} + 133X^8Y^{12} + 86X^7Y^{13} + 60X^6Y^{14} + 32X^5Y^{15} + 8X^4Y^{16} + 6X^3Y^{17}$	I-ii
	[0 1 0 0 0 0 2 0 2 2]		
	[0 0 1 0 0 0 2 0 0 2]		
	[0 0 0 1 0 0 2 2 0 0]		
	[0 0 0 0 2 0 0 0 0 0]		
	[0 0 0 0 0 2 0 0 0 0]		
47	[1 0 0 0 0 0 2 2 0 0]	$X^{20} + 6X^{18}Y^2 + 8X^{17}Y^3 + 19X^{16}Y^4 + 36X^{15}Y^5 + 44X^{14}Y^6 + 80X^{13}Y^7 + 99X^{12}Y^8 + 124X^{11}Y^9 + 150X^{10}Y^{10} + 136X^9Y^{11} + 125X^8Y^{12} + 92X^7Y^{13} + 56X^6Y^{14} + 32X^5Y^{15} + 12X^4Y^{16} + 4X^3Y^{17}$	I-iii
	[0 1 0 0 0 0 0 2 2 2]		
	[0 0 1 0 0 0 2 2 2 0]		
	[0 0 0 1 0 0 2 0 2 2]		
	[0 0 0 0 2 0 0 0 0 0]		
	[0 0 0 0 0 2 0 0 0 0]		
48	[1 0 0 0 0 0 2 0 2 2]	$X^{20} + 6X^{18}Y^2 + 8X^{17}Y^3 + 19X^{16}Y^4 + 36X^{15}Y^5 + 44X^{14}Y^6 + 80X^{13}Y^7 + 99X^{12}Y^8 + 124X^{11}Y^9 + 150X^{10}Y^{10} + 136X^9Y^{11} + 125X^8Y^{12} + 92X^7Y^{13} + 56X^6Y^{14} + 32X^5Y^{15} + 12X^4Y^{16} + 4X^3Y^{17}$	I-iv
	[0 1 0 0 0 0 0 2 2 2]		
	[0 0 1 0 0 0 2 0 0 2]		
	[0 0 0 1 0 0 2 2 0 0]		
	[0 0 0 0 2 0 0 0 0 0]		
	[0 0 0 0 0 2 0 0 0 0]		

## 2. BINARY FORMALLY SELF-DUAL CODES BY THE GRAY MAP

We list up the binary formally self-dual codes of lengths 4 and 8 by the Gray map.

Table 11. Binary formally self-dual codes of length 4 by the Gray map

Code	Generator matrix of $\phi(C_{2,i})$	Hamming weight enumerator	SD	Extremal code
$\phi(C_{2,1})$	$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix}$	$X^4 + 2X^3Y + X^2Y^2$		
$\phi(C_{2,2})$	$\begin{bmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \end{bmatrix}$	$X^4 + 2X^2Y^2 + Y^4$	○	○
$\phi(C_{2,3})$	$\begin{bmatrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 1 \end{bmatrix}$	$X^4 + X^2Y^2 + 2XY^3$		○

Table 12. Binary formally self-dual codes of length 8 by the Gray map

Code	Generator matrix of $\phi(C_{4,i})$	Hamming weight enumerator	SD
$\phi(C_{4,1})$	$I_4$ $\begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$	$X^8 + 4X^7Y + 6X^6Y^2 + 4X^5Y^3 + X^4Y^4$	
$\phi(C_{4,2})$	$I_4$ $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$	$X^8 + 2X^7Y + 3X^6Y^2 + 4X^5Y^3 + 3X^4Y^4 + 2X^3Y^5 + X^2Y^6$	
$\phi(C_{4,3})$	$I_4$ $\begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 \end{bmatrix}$	$X^8 + 2X^7Y + 2X^6Y^2 + 4X^5Y^3 + 5X^4Y^4 + 2X^3Y^5$	
$\phi(C_{4,4})$	$I_4$ $\begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \end{bmatrix}$	$X^8 + 6X^6Y^2 + X^4Y^4 + 4X^3Y^5 + 4XY^7$	
$\phi(C_{4,5})$	$I_4$ $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$	$X^8 + 4X^6Y^2 + 6X^4Y^4 + 4X^2Y^6 + Y^8$	○
$\phi(C_{4,6})$	$I_4$ $\begin{bmatrix} 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$	$X^8 + 3X^6Y^2 + 2X^5Y^3 + 3X^4Y^4 + 4X^3Y^5 + X^2Y^6 + 2XY^7$	
$\phi(C_{4,7})$	<b>Non-linear</b>		
$\phi(C_{4,8})$	$I_4$ $\begin{bmatrix} 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 \end{bmatrix}$	$X^8 + 2X^6Y^2 + 4X^5Y^3 + X^4Y^4 + 4X^3Y^5 + 4X^2Y^6$	
$\phi(C_{4,9})$	<b>Non-linear</b>		
$\phi(C_{4,10})$	$I_4$ $\begin{bmatrix} 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \end{bmatrix}$	$X^8 + 2X^6Y^2 + 2X^5Y^3 + 5X^4Y^4 + 4X^3Y^5 + 2XY^7$	
$\phi(C_{4,11})$	$I_4$ $\begin{bmatrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$	$X^8 + 2X^6Y^2 + 10X^4Y^4 + 2X^2Y^6 + Y^8$	
$\phi(C_{4,12})$	$I_4$ $\begin{bmatrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 1 \\ 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 \end{bmatrix}$	$X^8 + X^6Y^2 + 4X^5Y^3 + 3X^4Y^4 + 4X^3Y^5 + 3X^2Y^6$	
$\phi(C_{4,13})$	$I_4$ $\begin{bmatrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \end{bmatrix}$		
$\phi(C_{4,14})$	<b>Non-linear</b>		
$\phi(C_{4,15})$	<b>Non-linear</b>		
$\phi(C_{4,16})$	$I_4$ $\begin{bmatrix} 1 & 1 & 1 & 0 \\ 1 & 1 & 0 & 1 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 1 \end{bmatrix}$	$X^8 + 14X^4Y^4 + Y^8$	○

We note that  $\phi(C_{4,16})$  is the only extremal formally self-dual code over  $\mathbb{F}_2$  of length 8.

### 3. LARGER MINIMUM LEE WEIGHT THAN THAT OF THE SELF-DUAL CODES OF THE SAME LENGTH

We put formally self-dual codes whose minimum Lee weights are larger than those of self-dual codes of the same length.

Table 13. Free formally self-dual codes with minimum Lee weights larger than the upper bound of the minimum Lee weights of self-dual codes (where SD denotes self-dual codes)

Code	$A_i$ of generator Matrix $G_i = [I_n \mid A_i]$	Lee Weight Enumerator	$d_L$	Upper bound of SD code
$C_{10,1}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 0 \\ 1 & 2 & 3 & 1 & 0 \\ 1 & 1 & 2 & 0 & 1 \\ 1 & 0 & 1 & 2 & 1 \\ 0 & 1 & 0 & 1 & 2 \end{bmatrix}$	$X^{20} + 8X^{15}Y^5 + 54X^{14}Y^6 + 84X^{13}Y^7 + 121X^{12}Y^8 + 162X^{11}Y^9 + 153X^{10}Y^{10} + 176X^9Y^{11} + 134X^8Y^{12} + 68X^7Y^{13} + 48X^6Y^{14} + 12X^5Y^{15} + 2X^3Y^{17} + X^2Y^{18}$	5	4
$C_{10,2}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 1 \\ 1 & 2 & 3 & 1 & 0 \\ 1 & 1 & 2 & 0 & 3 \\ 1 & 0 & 1 & 2 & 1 \\ 1 & 3 & 0 & 1 & 2 \end{bmatrix}$			
$C_{10,3}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 1 \\ 1 & 2 & 3 & 1 & 3 \\ 1 & 1 & 2 & 0 & 1 \\ 1 & 0 & 1 & 2 & 2 \\ 1 & 1 & 3 & 2 & 1 \end{bmatrix}$			
$C_{10,4}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 0 \\ 1 & 2 & 3 & 1 & 0 \\ 1 & 1 & 2 & 0 & 1 \\ 1 & 0 & 1 & 2 & 2 \\ 0 & 1 & 0 & 2 & 1 \end{bmatrix}$	$X^{20} + 8X^{15}Y^5 + 52X^{14}Y^6 + 92X^{13}Y^7 + 110X^{12}Y^8 + 164X^{11}Y^9 + 168X^{10}Y^{10} + 152X^9Y^{11} + 144X^8Y^{12} + 80X^7Y^{13} + 36X^6Y^{14} + 12X^5Y^{15} + X^4Y^{16} + 4X^3Y^{17}$		
$C_{10,5}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 0 \\ 1 & 2 & 3 & 1 & 1 \\ 1 & 1 & 2 & 0 & 2 \\ 1 & 0 & 1 & 2 & 1 \\ 0 & 2 & 1 & 1 & 2 \end{bmatrix}$			
$C_{10,6}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 0 \\ 1 & 2 & 3 & 1 & 1 \\ 1 & 1 & 2 & 0 & 0 \\ 1 & 0 & 1 & 2 & 1 \\ 0 & 0 & 1 & 1 & 2 \end{bmatrix}$	$X^{20} + 14X^{15}Y^5 + 42X^{14}Y^6 + 86X^{13}Y^7 + 124X^{12}Y^8 + 156X^{11}Y^9 + 180X^{10}Y^{10} + 156X^9Y^{11} + 124X^8Y^{12} + 86X^7Y^{13} + 34X^6Y^{14} + 14X^5Y^{15} + 7X^4Y^{16}$		
$C_{10,7}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 1 \\ 1 & 2 & 3 & 1 & 3 \\ 1 & 1 & 2 & 0 & 2 \\ 1 & 0 & 1 & 2 & 3 \\ 1 & 2 & 3 & 3 & 0 \end{bmatrix}$			
$C_{10,8}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 2 \\ 1 & 2 & 3 & 1 & 1 \\ 1 & 1 & 2 & 0 & 2 \\ 1 & 0 & 1 & 2 & 1 \\ 2 & 2 & 1 & 1 & 0 \end{bmatrix}$	$X^{20} + 14X^{15}Y^5 + 44X^{14}Y^6 + 80X^{13}Y^7 + 126X^{12}Y^8 + 166X^{11}Y^9 + 168X^{10}Y^{10} + 160X^9Y^{11} + 128X^8Y^{12} + 74X^7Y^{13} + 44X^6Y^{14} + 16X^5Y^{15} + X^4Y^{16} + 2X^3Y^{17}$		
$C_{10,9}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 0 \\ 1 & 2 & 3 & 1 & 1 \\ 1 & 1 & 2 & 0 & 1 \\ 1 & 0 & 1 & 2 & 0 \\ 0 & 1 & 1 & 0 & 2 \end{bmatrix}$	$X^{20} + 12X^{15}Y^5 + 46X^{14}Y^6 + 86X^{13}Y^7 + 120X^{12}Y^8 + 162X^{11}Y^9 + 172X^{10}Y^{10} + 156X^9Y^{11} + 132X^8Y^{12} + 80X^7Y^{13} + 38X^6Y^{14} + 14X^5Y^{15} + 3X^4Y^{16} + 2X^3Y^{17}$		
$C_{10,10}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 0 \\ 1 & 2 & 3 & 1 & 2 \\ 1 & 1 & 2 & 0 & 1 \\ 1 & 0 & 1 & 2 & 2 \\ 0 & 1 & 2 & 2 & 1 \end{bmatrix}$			
$C_{10,11}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 0 \\ 1 & 2 & 3 & 1 & 1 \\ 1 & 1 & 2 & 0 & 1 \\ 1 & 0 & 1 & 2 & 2 \\ 0 & 1 & 1 & 2 & 1 \end{bmatrix}$	$X^{20} + 12X^{15}Y^5 + 43X^{14}Y^6 + 94X^{13}Y^7 + 121X^{12}Y^8 + 144X^{11}Y^9 + 182X^{10}Y^{10} + 164X^9Y^{11} + 126X^8Y^{12} + 84X^7Y^{13} + 31X^6Y^{14} + 14X^5Y^{15} + 8X^4Y^{16}$		
$C_{10,12}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 1 \\ 1 & 2 & 3 & 1 & 1 \\ 1 & 1 & 2 & 0 & 1 \\ 1 & 0 & 1 & 2 & 1 \\ 1 & 1 & 1 & 1 & 3 \end{bmatrix}$			
$C_{10,13}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 1 \\ 1 & 2 & 3 & 1 & 2 \\ 1 & 1 & 2 & 0 & 2 \\ 1 & 0 & 1 & 2 & 1 \\ 1 & 2 & 2 & 1 & 0 \end{bmatrix}$			
$C_{10,14}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 2 \\ 1 & 2 & 3 & 1 & 1 \\ 1 & 1 & 2 & 0 & 3 \\ 1 & 0 & 1 & 2 & 2 \\ 2 & 3 & 1 & 2 & 1 \end{bmatrix}$			

Table 13. Free formally self-dual codes with minimum Lee weights larger than the upper bound of the minimum Lee weights of self-dual codes (where SD denotes self-dual codes; cont'd)

Code	$A_i$ of generator Matrix $G_i = [I_n   A_i]$	Lee Weight Enumerator	$d_L$	Upper bound of SD code
$C_{10,15}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 0 \\ 1 & 2 & 3 & 1 & 1 \\ 1 & 1 & 2 & 0 & 1 \\ 1 & 0 & 1 & 2 & 3 \\ 0 & 1 & 1 & 3 & 1 \end{bmatrix}$	$X^{20} + 18X^{15}Y^5 + 39X^{14}Y^6 + 72X^{13}Y^7 + 133X^{12}Y^8 + 172X^{11}Y^9 + 174X^{10}Y^{10} + 152X^9Y^{11} + 118X^8Y^{12} + 82X^7Y^{13} + 43X^6Y^{14} + 16X^5Y^{15} + 4X^4Y^{16}$	5	4
$C_{10,16}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 2 \\ 1 & 2 & 3 & 1 & 1 \\ 1 & 1 & 2 & 0 & 0 \\ 1 & 1 & 2 & 0 & 0 \\ 1 & 0 & 1 & 2 & 0 \\ 2 & 0 & 1 & 0 & 1 \end{bmatrix}$			
$C_{10,17}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 2 \\ 1 & 2 & 3 & 1 & 1 \\ 1 & 1 & 2 & 0 & 2 \\ 1 & 0 & 1 & 2 & 2 \\ 2 & 2 & 1 & 2 & 1 \end{bmatrix}$			
$C_{10,18}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 0 \\ 1 & 2 & 3 & 1 & 1 \\ 1 & 1 & 2 & 0 & 2 \\ 1 & 0 & 1 & 2 & 0 \\ 0 & 2 & 1 & 0 & 1 \end{bmatrix}$	$X^{20} + 14X^{15}Y^5 + 43X^{14}Y^6 + 84X^{13}Y^7 + 121X^{12}Y^8 + 164X^{11}Y^9 + 182X^{10}Y^{10} + 144X^9Y^{11} + 126X^8Y^{12} + 94X^7Y^{13} + 31X^6Y^{14} + 12X^5Y^{15} + 8X^4Y^{16}$		
$C_{10,19}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 0 \\ 1 & 2 & 3 & 1 & 1 \\ 1 & 1 & 2 & 0 & 3 \\ 1 & 0 & 1 & 2 & 3 \\ 0 & 3 & 1 & 3 & 1 \end{bmatrix}$			
$C_{10,20}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 2 \\ 1 & 2 & 3 & 1 & 3 \\ 1 & 1 & 2 & 0 & 3 \\ 1 & 0 & 1 & 2 & 1 \\ 2 & 3 & 3 & 1 & 1 \end{bmatrix}$			
$C_{10,21}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 2 \\ 1 & 2 & 3 & 1 & 1 \\ 1 & 1 & 2 & 0 & 2 \\ 1 & 0 & 1 & 2 & 0 \\ 2 & 2 & 1 & 0 & 1 \end{bmatrix}$			
$C_{10,22}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 0 \\ 1 & 2 & 3 & 1 & 1 \\ 1 & 1 & 2 & 0 & 1 \\ 1 & 0 & 1 & 2 & 0 \\ 0 & 1 & 1 & 0 & 2 \end{bmatrix}$			
$C_{10,23}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 0 \\ 1 & 2 & 3 & 1 & 1 \\ 1 & 1 & 2 & 0 & 2 \\ 1 & 0 & 1 & 2 & 1 \\ 0 & 2 & 1 & 1 & 1 \end{bmatrix}$	$X^{20} + 12X^{15}Y^5 + 47X^{14}Y^6 + 84X^{13}Y^7 + 117X^{12}Y^8 + 170X^{11}Y^9 + 174X^{10}Y^{10} + 144X^9Y^{11} + 134X^8Y^{12} + 88X^7Y^{13} + 35X^6Y^{14} + 12X^5Y^{15} + 4X^4Y^{16} + 2X^3Y^{17}$		
$C_{10,24}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 2 \\ 1 & 2 & 3 & 1 & 1 \\ 1 & 1 & 2 & 0 & 3 \\ 1 & 0 & 1 & 2 & 3 \\ 2 & 3 & 1 & 3 & 1 \end{bmatrix}$			
$C_{10,25}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 0 \\ 1 & 2 & 3 & 1 & 1 \\ 1 & 1 & 2 & 0 & 3 \\ 1 & 0 & 1 & 2 & 0 \\ 0 & 3 & 1 & 0 & 2 \end{bmatrix}$	$X^{20} + 16X^{15}Y^5 + 40X^{14}Y^6 + 80X^{13}Y^7 + 130X^{12}Y^8 + 160X^{11}Y^9 + 176X^{10}Y^{10} + 160X^9Y^{11} + 120X^8Y^{12} + 80X^7Y^{13} + 40X^6Y^{14} + 16X^5Y^{15} + 5X^4Y^{16}$		
$C_{10,26}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 0 \\ 1 & 2 & 3 & 1 & 2 \\ 1 & 1 & 2 & 0 & 2 \\ 1 & 0 & 1 & 2 & 1 \\ 0 & 2 & 2 & 1 & 1 \end{bmatrix}$			

Table 13. Free formally self-dual codes with minimum Lee weights larger than the upper bound of the minimum Lee weights of self-dual codes (where SD denotes self-dual codes; cont'd)

Code	$A_i$ of generator Matrix $G_i = [I_n   A_i]$	Lee Weight Enumerator	$d_L$	Upper bound of SD code
$C_{10,27}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 0 \\ 1 & 2 & 3 & 1 & 2 \\ 1 & 1 & 2 & 0 & 1 \\ 1 & 0 & 1 & 2 & 3 \\ 0 & 1 & 2 & 1 & 3 \end{bmatrix}$	$X^{20} + 90X^{14}Y^6 + 255X^{12}Y^8 + 332X^{10}Y^{10} + 255X^8Y^{12} + 90X^6Y^{14} + Y^{20}$	6	4
$C_{10,28}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 2 \\ 1 & 2 & 3 & 1 & 2 \\ 1 & 1 & 2 & 0 & 1 \\ 1 & 0 & 1 & 2 & 3 \\ 0 & 1 & 2 & 1 & 3 \end{bmatrix}$			
$C_{10,29}$	$\begin{bmatrix} 1 & 2 & 1 & 0 & 1 \\ 1 & 1 & 3 & 2 & 2 \\ 3 & 1 & 2 & 1 & 2 \\ 2 & 0 & 1 & 3 & 3 \\ 2 & 1 & 2 & 3 & 1 \end{bmatrix}$			
$C_{10,30}$	$\begin{bmatrix} 1 & 2 & 1 & 0 & 3 \\ 1 & 1 & 3 & 2 & 0 \\ 3 & 1 & 2 & 1 & 2 \\ 2 & 0 & 1 & 3 & 1 \\ 0 & 3 & 2 & 1 & 3 \end{bmatrix}$			
$C_{10,31}$	$\begin{bmatrix} 1 & 1 & 1 & 1 & 3 \\ 0 & 1 & 2 & 3 & 1 \\ 2 & 1 & 3 & 2 & 3 \\ 3 & 1 & 2 & 1 & 2 \\ 1 & 3 & 3 & 2 & 0 \end{bmatrix}$			
$C_{10,32}$	$\begin{bmatrix} 1 & 1 & 1 & 1 & 3 \\ 0 & 1 & 2 & 3 & 1 \\ 2 & 1 & 3 & 2 & 3 \\ 3 & 1 & 2 & 1 & 0 \\ 1 & 3 & 3 & 0 & 2 \end{bmatrix}$			
$C_{10,33}$	$\begin{bmatrix} 1 & 2 & 1 & 1 & 2 \\ 1 & 1 & 2 & 2 & 1 \\ 2 & 1 & 0 & 3 & 3 \\ 2 & 1 & 3 & 1 & 2 \\ 1 & 2 & 3 & 2 & 3 \end{bmatrix}$			
$C_{12,1}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 2 & 0 \\ 1 & 2 & 3 & 1 & 1 & 0 \\ 1 & 1 & 2 & 0 & 2 & 2 \\ 1 & 0 & 1 & 2 & 1 & 2 \\ 2 & 2 & 1 & 1 & 0 & 1 \\ 0 & 2 & 0 & 2 & 1 & 3 \end{bmatrix}$	$X^{24} + 37X^{18}Y^6 + 102X^{17}Y^7 + 180X^{16}Y^8 + 326X^{15}Y^9 + 483X^{14}Y^{10} + 582X^{13}Y^{11} + 628X^{12}Y^{12} + 630X^{11}Y^{13} + 507X^{10}Y^{14} + 322X^9Y^{15} + 183X^8Y^{16} + 66X^7Y^{17} + 29X^6Y^{18} + 18X^5Y^{19} + 2X^3Y^{21}$	6	4
$C_{12,2}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 2 & 2 \\ 1 & 2 & 3 & 1 & 1 & 3 \\ 1 & 1 & 2 & 0 & 2 & 3 \\ 1 & 0 & 1 & 2 & 1 & 0 \\ 2 & 2 & 1 & 1 & 0 & 3 \\ 2 & 3 & 3 & 0 & 3 & 0 \end{bmatrix}$	$X^{24} + 60X^{18}Y^6 + 399X^{16}Y^8 + 900X^{14}Y^{10} + 1376X^{12}Y^{12} + 900X^{10}Y^{14} + 399X^8Y^{16} + 60X^6Y^{18} + Y^{24}$		
$C_{12,3}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 2 & 0 \\ 1 & 2 & 3 & 1 & 1 & 1 \\ 1 & 1 & 2 & 0 & 2 & 1 \\ 1 & 0 & 1 & 2 & 1 & 0 \\ 2 & 2 & 1 & 1 & 0 & 1 \\ 0 & 1 & 1 & 0 & 1 & 2 \end{bmatrix}$			
$C_{12,4}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 2 & 2 \\ 1 & 2 & 3 & 1 & 1 & 2 \\ 1 & 1 & 2 & 0 & 2 & 0 \\ 1 & 0 & 1 & 2 & 1 & 1 \\ 2 & 2 & 1 & 1 & 0 & 1 \\ 2 & 0 & 2 & 1 & 1 & 3 \end{bmatrix}$	$X^{24} + 39X^{18}Y^6 + 88X^{17}Y^7 + 212X^{16}Y^8 + 312X^{15}Y^9 + 442X^{14}Y^{10} + 624X^{13}Y^{11} + 634X^{12}Y^{12} + 624X^{11}Y^{13} + 504X^{10}Y^{14} + 312X^9Y^{15} + 171X^8Y^{16} + 88X^7Y^{17} + 38X^6Y^{18} + 6X^4Y^{20} + X^2Y^{22}$		
$C_{12,5}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 2 & 2 \\ 1 & 2 & 3 & 1 & 1 & 2 \\ 1 & 1 & 2 & 0 & 2 & 1 \\ 1 & 0 & 1 & 2 & 1 & 1 \\ 2 & 2 & 1 & 1 & 0 & 1 \\ 2 & 1 & 2 & 1 & 1 & 0 \end{bmatrix}$	$X^{24} + 32X^{18}Y^6 + 114X^{17}Y^7 + 177X^{16}Y^8 + 316X^{15}Y^9 + 498X^{14}Y^{10} + 558X^{13}Y^{11} + 637X^{12}Y^{12} + 648X^{11}Y^{13} + 492X^{10}Y^{14} + 334X^9Y^{15} + 174X^8Y^{16} + 60X^7Y^{17} + 34X^6Y^{18} + 18X^5Y^{19} + 3X^4Y^{20}$		
$C_{12,6}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 2 & 1 \\ 1 & 2 & 3 & 1 & 1 & 3 \\ 1 & 1 & 2 & 0 & 2 & 2 \\ 1 & 0 & 1 & 2 & 1 & 2 \\ 2 & 2 & 1 & 1 & 0 & 2 \\ 1 & 2 & 3 & 2 & 2 & 1 \end{bmatrix}$	$X^{24} + 32X^{18}Y^6 + 110X^{17}Y^7 + 188X^{16}Y^8 + 320X^{15}Y^9 + 464X^{14}Y^{10} + 574X^{13}Y^{11} + 666X^{12}Y^{12} + 624X^{11}Y^{13} + 496X^{10}Y^{14} + 330X^9Y^{15} + 163X^8Y^{16} + 80X^7Y^{17} + 32X^6Y^{18} + 10X^5Y^{19} + 6X^4Y^{20}$		
$C_{12,7}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 2 & 1 \\ 1 & 2 & 3 & 1 & 1 & 1 \\ 1 & 1 & 2 & 0 & 2 & 3 \\ 1 & 0 & 1 & 2 & 1 & 1 \\ 2 & 2 & 1 & 1 & 0 & 3 \\ 1 & 3 & 1 & 1 & 3 & 2 \end{bmatrix}$	$X^{24} + 30X^{18}Y^6 + 112X^{17}Y^7 + 195X^{16}Y^8 + 316X^{15}Y^9 + 452X^{14}Y^{10} + 572X^{13}Y^{11} + 683X^{12}Y^{12} + 632X^{11}Y^{13} + 478X^{10}Y^{14} + 328X^9Y^{15} + 172X^8Y^{16} + 76X^7Y^{17} + 32X^6Y^{18} + 12X^5Y^{19} + 5X^4Y^{20}$		
$C_{12,8}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 2 & 1 \\ 1 & 2 & 3 & 1 & 1 & 3 \\ 1 & 1 & 2 & 0 & 2 & 3 \\ 1 & 0 & 1 & 2 & 1 & 2 \\ 2 & 2 & 1 & 1 & 0 & 0 \\ 1 & 3 & 3 & 2 & 0 & 1 \end{bmatrix}$			

Table 13. Free formally self-dual codes with minimum Lee weights larger than the upper bound of the minimum Lee weights of self-dual codes (where SD denotes self-dual codes; cont'd)

Code	$A_i$ of generator Matrix $G_i = [I_n   A_i]$	Lee Weight Enumerator	$d_L$	Upper bound of SD code
$\mathcal{C}_{12,9}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 2 & 1 \\ 1 & 2 & 3 & 1 & 1 & 0 \\ 1 & 1 & 2 & 0 & 2 & 2 \\ 1 & 0 & 1 & 2 & 1 & 0 \\ 2 & 2 & 1 & 1 & 0 & 3 \\ 1 & 2 & 0 & 0 & 3 & 1 \end{bmatrix}$	$X^{24} + 32X^{18}Y^6 + 112X^{17}Y^7 + 183X^{16}Y^8 + 316X^{15}Y^9 + 482X^{14}Y^{10} + 572X^{13}Y^{11} + 643X^{12}Y^{12} + 632X^{11}Y^{13} + 508X^{10}Y^{14} + 328X^9Y^{15} + 160X^8Y^{16} + 76X^7Y^{17} + 34X^6Y^{18} + 12X^5Y^{19} + 5X^4Y^{20}$	6	4
$\mathcal{C}_{12,10}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 2 & 1 \\ 1 & 2 & 3 & 1 & 1 & 0 \\ 1 & 1 & 2 & 0 & 2 & 0 \\ 1 & 0 & 1 & 2 & 1 & 1 \\ 2 & 2 & 1 & 1 & 0 & 2 \\ 1 & 0 & 0 & 1 & 2 & 3 \end{bmatrix}$	$X^{24} + 36X^{18}Y^6 + 108X^{17}Y^7 + 167X^{16}Y^8 + 332X^{15}Y^9 + 502X^{14}Y^{10} + 552X^{13}Y^{11} + 643X^{12}Y^{12} + 632X^{11}Y^{13} + 488X^{10}Y^{14} + 348X^9Y^{15} + 176X^8Y^{16} + 60X^7Y^{17} + 30X^6Y^{18} + 16X^5Y^{19} + 5X^4Y^{20}$		
$\mathcal{C}_{14,1}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 0 & 0 & 1 \\ 1 & 2 & 3 & 1 & 0 & 3 & 0 \\ 1 & 1 & 2 & 0 & 1 & 2 & 0 \\ 1 & 0 & 1 & 2 & 2 & 0 & 1 \\ 0 & 1 & 0 & 2 & 1 & 3 & 2 \\ 0 & 2 & 3 & 0 & 3 & 1 & 3 \\ 1 & 0 & 0 & 1 & 2 & 3 & 3 \end{bmatrix}$	$X^{28} + 84X^{21}Y^7 + 253X^{20}Y^8 + 438X^{19}Y^9 + 770X^{18}Y^{10} + 1258X^{17}Y^{11} + 1782X^{16}Y^{12} + 2310X^{15}Y^{13} + 2546X^{14}Y^{14} + 2322X^{13}Y^{15} + 1849X^{12}Y^{16} + 1266X^{11}Y^{17} + 758X^{10}Y^{18} + 430X^9Y^{19} + 210X^8Y^{20} + 82X^7Y^{21} + 22X^6Y^{22} + 2X^5Y^{23} + X^4Y^{24}$	7	6
$\mathcal{C}_{14,2}$	$\begin{bmatrix} 2 & 1 & 1 & 1 & 2 & 1 & 0 \\ 1 & 2 & 3 & 1 & 1 & 2 & 2 \\ 1 & 1 & 2 & 0 & 2 & 0 & 1 \\ 1 & 0 & 1 & 2 & 1 & 3 & 0 \\ 2 & 2 & 1 & 1 & 0 & 3 & 1 \\ 1 & 0 & 2 & 3 & 3 & 3 & 2 \\ 0 & 1 & 2 & 0 & 1 & 2 & 3 \end{bmatrix}$	$X^{28} + 72X^{21}Y^7 + 281X^{20}Y^8 + 448X^{19}Y^9 + 704X^{18}Y^{10} + 1312X^{17}Y^{11} + 1768X^{16}Y^{12} + 2240X^{15}Y^{13} + 2688X^{14}Y^{14} + 2288X^{13}Y^{15} + 1763X^{12}Y^{16} + 1344X^{11}Y^{17} + 704X^{10}Y^{18} + 416X^9Y^{19} + 280X^8Y^{20} + 64X^7Y^{21} + 8X^5Y^{23} + 3X^4Y^{24}$		