

# Model for “D3”

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## General Condition

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- Basis type: 1gs
- SAMB selection:
  - Type: [Q, G]
  - Rank: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11]
  - Irrep.: [A<sub>1</sub>, A<sub>2</sub>, E]
  - Spin (s): [0, 1]
- Atomic selection:
  - Type: [Q, G, M, T]
  - Rank: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11]
  - Irrep.: [A<sub>1</sub>, A<sub>2</sub>, E]
  - Spin (s): [0, 1]
- Site-cluster selection:
  - Rank: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11]
  - Irrep.: [A<sub>1</sub>, A<sub>2</sub>, E]
- Bond-cluster selection:
  - Type: [Q, G, M, T]
  - Rank: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11]
  - Irrep.: [A<sub>1</sub>, A<sub>2</sub>, E]
- Max. neighbor: 10
- Search cell range: (-2, 3), (-2, 3), (-2, 3)
- Toroidal priority: false

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## Group and Unit Cell

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- Group: PG No. 18 D<sub>3</sub> 32 (321 setting) [ trigonal ]
- Unit cell:  
 $a = 1.00000, b = 1.00000, c = 1.00000, \alpha = 90.0, \beta = 90.0, \gamma = 120.0$
- Lattice vectors (conventional cell):  
 $\mathbf{a}_1 = [1.00000, 0.00000, 0.00000]$   
 $\mathbf{a}_2 = [-0.50000, 0.86603, 0.00000]$   
 $\mathbf{a}_3 = [0.00000, 0.00000, 1.00000]$

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**Symmetry Operation**


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Table 1: Symmetry operation

#	SO	#	SO	#	SO	#	SO	#	SO
1	1	2	$3_{001}^+$	3	$3_{001}^-$	4	$2_{110}$	5	$2_{100}$
6	$2_{010}$								

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**Harmonics**


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Table 2: Harmonics

#	symbol	irrep.	rank	X	multiplicity	component	symmetry
1	$\mathbb{G}_0(A_1)$	$A_1$	0	$G, M$	-	-	1
2	$\mathbb{Q}_0(A_1)$	$A_1$	0	$Q, T$	-	-	1
3	$\mathbb{G}_2(A_1)$	$A_1$	2	$G, M$	-	-	$-\frac{x^2}{2} - \frac{y^2}{2} + z^2$
4	$\mathbb{Q}_2(A_1)$	$A_1$	2	$Q, T$	-	-	$-\frac{x^2}{2} - \frac{y^2}{2} + z^2$
5	$\mathbb{G}_3(A_1)$	$A_1$	3	$G, M$	-	-	$\frac{\sqrt{10}x(x^2 - 3y^2)}{4}$
6	$\mathbb{Q}_3(A_1)$	$A_1$	3	$Q, T$	-	-	$\frac{\sqrt{10}x(x^2 - 3y^2)}{4}$
7	$\mathbb{G}_4(A_1, 1)$	$A_1$	4	$G, M$	1	-	$\frac{3x^4}{8} + \frac{3x^2y^2}{4} - 3x^2z^2 + \frac{3y^4}{8} - 3y^2z^2 + z^4$
8	$\mathbb{G}_4(A_1, 2)$	$A_1$	4	$G, M$	2	-	$\frac{\sqrt{70}yz(3x^2 - y^2)}{4}$
9	$\mathbb{Q}_4(A_1, 2)$	$A_1$	4	$Q, T$	2	-	$\frac{\sqrt{70}yz(3x^2 - y^2)}{4}$

continued ...

Table 2

#	symbol	irrep.	rank	X	multiplicity	component	symmetry
10	$\mathbb{G}_1(A_2)$	$A_2$	1	$G, M$	-	-	$z$
11	$\mathbb{Q}_1(A_2)$	$A_2$	1	$Q, T$	-	-	$z$
12	$\mathbb{G}_3(A_2, 1)$	$A_2$	3	$G, M$	1	-	$-\frac{z(3x^2+3y^2-2z^2)}{2}$
13	$\mathbb{G}_3(A_2, 2)$	$A_2$	3	$G, M$	2	-	$\frac{\sqrt{10}y(3x^2-y^2)}{4}$
14	$\mathbb{Q}_3(A_2, 1)$	$A_2$	3	$Q, T$	1	-	$-\frac{z(3x^2+3y^2-2z^2)}{2}$
15	$\mathbb{Q}_3(A_2, 2)$	$A_2$	3	$Q, T$	2	-	$\frac{\sqrt{10}y(3x^2-y^2)}{4}$
16	$\mathbb{G}_4(A_2)$	$A_2$	4	$G, M$	-	-	$\frac{\sqrt{70}xz(x^2-3y^2)}{4}$
17	$\mathbb{Q}_4(A_2)$	$A_2$	4	$Q, T$	-	-	$\frac{\sqrt{70}xz(x^2-3y^2)}{4}$
18	$\mathbb{G}_{1,1}(E)$	$E$	1	$G, M$	-	1	$x$
19	$\mathbb{G}_{1,2}(E)$					2	$y$
20	$\mathbb{Q}_{1,1}(E)$	$E$	1	$Q, T$	-	1	$x$
21	$\mathbb{Q}_{1,2}(E)$					2	$y$
22	$\mathbb{G}_{2,1}(E, 1)$	$E$	2	$G, M$	1	1	$\sqrt{3}yz$
23	$\mathbb{G}_{2,2}(E, 1)$					2	$-\sqrt{3}xz$
24	$\mathbb{G}_{2,1}(E, 2)$	$E$	2	$G, M$	2	1	$\frac{\sqrt{3}(x-y)(x+y)}{2}$
25	$\mathbb{G}_{2,2}(E, 2)$					2	$-\sqrt{3}xy$
26	$\mathbb{Q}_{2,1}(E, 1)$	$E$	2	$Q, T$	1	1	$\sqrt{3}yz$
27	$\mathbb{Q}_{2,2}(E, 1)$					2	$-\sqrt{3}xz$
28	$\mathbb{Q}_{2,1}(E, 2)$	$E$	2	$Q, T$	2	1	$\frac{\sqrt{3}(x-y)(x+y)}{2}$
29	$\mathbb{Q}_{2,2}(E, 2)$					2	$-\sqrt{3}xy$
30	$\mathbb{G}_{3,1}(E, 1)$	$E$	3	$G, M$	1	1	$-\frac{\sqrt{6}x(x^2+y^2-4z^2)}{4}$

continued ...

Table 2

#	symbol	irrep.	rank	X	multiplicity	component	symmetry
31	$\mathbb{G}_{3,2}(E, 1)$					2	$-\frac{\sqrt{6}y(x^2+y^2-4z^2)}{4}$
32	$\mathbb{G}_{3,1}(E, 2)$	E	3	$G, M$	2	1	$\sqrt{15}xyz$
33	$\mathbb{G}_{3,2}(E, 2)$					2	$\frac{\sqrt{15}z(x-y)(x+y)}{2}$
34	$\mathbb{Q}_{3,1}(E, 1)$	E	3	$Q, T$	1	1	$-\frac{\sqrt{6}x(x^2+y^2-4z^2)}{4}$
35	$\mathbb{Q}_{3,2}(E, 1)$					2	$-\frac{\sqrt{6}y(x^2+y^2-4z^2)}{4}$
36	$\mathbb{Q}_{3,1}(E, 2)$	E	3	$Q, T$	2	1	$\sqrt{15}xyz$
37	$\mathbb{Q}_{3,2}(E, 2)$					2	$\frac{\sqrt{15}z(x-y)(x+y)}{2}$
38	$\mathbb{G}_{4,1}(E, 1)$	E	4	$G, M$	1	1	$-\frac{\sqrt{10}yz(3x^2+3y^2-4z^2)}{4}$
39	$\mathbb{G}_{4,2}(E, 1)$					2	$\frac{\sqrt{10}xz(3x^2+3y^2-4z^2)}{4}$
40	$\mathbb{G}_{4,1}(E, 2)$	E	4	$G, M$	2	1	$\frac{\sqrt{35}(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$
41	$\mathbb{G}_{4,2}(E, 2)$					2	$\frac{\sqrt{35}xy(x-y)(x+y)}{2}$
42	$\mathbb{G}_{4,1}(E, 3)$	E	4	$G, M$	3	1	$-\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$
43	$\mathbb{G}_{4,2}(E, 3)$					2	$\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$
44	$\mathbb{Q}_{4,1}(E, 1)$	E	4	$Q, T$	1	1	$-\frac{\sqrt{10}yz(3x^2+3y^2-4z^2)}{4}$
45	$\mathbb{Q}_{4,2}(E, 1)$					2	$\frac{\sqrt{10}xz(3x^2+3y^2-4z^2)}{4}$
46	$\mathbb{Q}_{4,1}(E, 2)$	E	4	$Q, T$	2	1	$\frac{\sqrt{35}(x^2-2xy-y^2)(x^2+2xy-y^2)}{8}$
47	$\mathbb{Q}_{4,2}(E, 2)$					2	$\frac{\sqrt{35}xy(x-y)(x+y)}{2}$
48	$\mathbb{Q}_{4,1}(E, 3)$	E	4	$Q, T$	3	1	$-\frac{\sqrt{5}(x-y)(x+y)(x^2+y^2-6z^2)}{4}$
49	$\mathbb{Q}_{4,2}(E, 3)$					2	$\frac{\sqrt{5}xy(x^2+y^2-6z^2)}{2}$

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Basis in full matrix

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Table 3: dimension = 48

#	orbital@atom(SL)								
0	$ s, \uparrow\rangle @A(1)$	1	$ s, \downarrow\rangle @A(1)$	2	$ p_x, \uparrow\rangle @A(1)$	3	$ p_x, \downarrow\rangle @A(1)$	4	$ p_y, \uparrow\rangle @A(1)$
5	$ p_y, \downarrow\rangle @A(1)$	6	$ p_z, \uparrow\rangle @A(1)$	7	$ p_z, \downarrow\rangle @A(1)$	8	$ s, \uparrow\rangle @A(2)$	9	$ s, \downarrow\rangle @A(2)$
10	$ p_x, \uparrow\rangle @A(2)$	11	$ p_x, \downarrow\rangle @A(2)$	12	$ p_y, \uparrow\rangle @A(2)$	13	$ p_y, \downarrow\rangle @A(2)$	14	$ p_z, \uparrow\rangle @A(2)$
15	$ p_z, \downarrow\rangle @A(2)$	16	$ s, \uparrow\rangle @A(3)$	17	$ s, \downarrow\rangle @A(3)$	18	$ p_x, \uparrow\rangle @A(3)$	19	$ p_x, \downarrow\rangle @A(3)$
20	$ p_y, \uparrow\rangle @A(3)$	21	$ p_y, \downarrow\rangle @A(3)$	22	$ p_z, \uparrow\rangle @A(3)$	23	$ p_z, \downarrow\rangle @A(3)$	24	$ s, \uparrow\rangle @A(4)$
25	$ s, \downarrow\rangle @A(4)$	26	$ p_x, \uparrow\rangle @A(4)$	27	$ p_x, \downarrow\rangle @A(4)$	28	$ p_y, \uparrow\rangle @A(4)$	29	$ p_y, \downarrow\rangle @A(4)$
30	$ p_z, \uparrow\rangle @A(4)$	31	$ p_z, \downarrow\rangle @A(4)$	32	$ s, \uparrow\rangle @A(5)$	33	$ s, \downarrow\rangle @A(5)$	34	$ p_x, \uparrow\rangle @A(5)$
35	$ p_x, \downarrow\rangle @A(5)$	36	$ p_y, \uparrow\rangle @A(5)$	37	$ p_y, \downarrow\rangle @A(5)$	38	$ p_z, \uparrow\rangle @A(5)$	39	$ p_z, \downarrow\rangle @A(5)$
40	$ s, \uparrow\rangle @A(6)$	41	$ s, \downarrow\rangle @A(6)$	42	$ p_x, \uparrow\rangle @A(6)$	43	$ p_x, \downarrow\rangle @A(6)$	44	$ p_y, \uparrow\rangle @A(6)$
45	$ p_y, \downarrow\rangle @A(6)$	46	$ p_z, \uparrow\rangle @A(6)$	47	$ p_z, \downarrow\rangle @A(6)$				

Table 4: Atomic basis (orbital part only)

orbital	definition
$ s\rangle$	1
$ p_x\rangle$	$x$
$ p_y\rangle$	$y$
$ p_z\rangle$	$z$

- A : 'A' site-cluster
  - \* bra:  $\langle s, \uparrow |, \langle s, \downarrow |$
  - \* ket:  $|s, \uparrow \rangle, |s, \downarrow \rangle$
  - \* wyckoff: 6c

$$\boxed{\text{z1}} \quad \mathbb{Q}_0^{(c)}(A_1) = \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z129}} \quad \mathbb{Q}_1^{(c)}(A_2) = \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_1^{(s)}(A_2)$$

$$\boxed{\text{z249}} \quad \mathbb{Q}_{1,1}^{(c)}(E) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z250}} \quad \mathbb{Q}_{1,2}^{(c)}(E) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z251}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z252}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

- A : 'A' site-cluster
  - \* bra:  $\langle s, \uparrow |, \langle s, \downarrow |$
  - \* ket:  $|p_x, \uparrow \rangle, |p_x, \downarrow \rangle, |p_y, \uparrow \rangle, |p_y, \downarrow \rangle, |p_z, \uparrow \rangle, |p_z, \downarrow \rangle$
  - \* wyckoff: 6c

$$\boxed{\text{z2}} \quad \mathbb{Q}_0^{(c)}(A_1) = \frac{\sqrt{3}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{3} + \frac{\sqrt{3}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{3} + \frac{\sqrt{3}\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_1^{(s)}(A_2)}{3}$$

$$\boxed{\text{z3}} \quad \mathbb{Q}_2^{(c)}(A_1) = -\frac{\sqrt{6}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{6} - \frac{\sqrt{6}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{6} + \frac{\sqrt{6}\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_1^{(s)}(A_2)}{3}$$

$$\boxed{\text{z4}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_1) = -\frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{2} - \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z5}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_1) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z6}} \quad \mathbb{Q}_0^{(1,0;c)}(A_1) = \frac{\sqrt{3}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{3} + \frac{\sqrt{3}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{3} + \frac{\sqrt{3}\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_1^{(s)}(A_2)}{3}$$

$$\boxed{\text{z7}} \quad \mathbb{Q}_2^{(1,0;c)}(A_1) = -\frac{\sqrt{6}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{6} - \frac{\sqrt{6}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{6} + \frac{\sqrt{6}\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_1^{(s)}(A_2)}{3}$$

$$\boxed{\text{z8}} \quad \mathbb{G}_2^{(c)}(A_1) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{2,1}^{(s)}(E,1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{2,2}^{(s)}(E,1)}{2}$$

$$\boxed{\text{z9}} \quad \mathbb{G}_0^{(1,-1;c)}(A_1) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E,1)\mathbb{Q}_{2,1}^{(s)}(E,1)}{2} + \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E,1)\mathbb{Q}_{2,2}^{(s)}(E,1)}{2}$$

$$\boxed{\text{z10}} \quad \mathbb{G}_2^{(1,-1;c)}(A_1) = \mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z11}} \quad \mathbb{G}_3^{(1,-1;c)}(A_1) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,1}^{(s)}(E)}{2} + \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z12}} \quad \mathbb{G}_2^{(1,0;c)}(A_1) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(s)}(E,1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(s)}(E,1)}{2}$$

$$\boxed{\text{z13}} \quad \mathbb{G}_0^{(1,1;c)}(A_1) = \mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z130}} \quad \mathbb{Q}_1^{(c)}(A_2, a) = \mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z131}} \quad \mathbb{Q}_1^{(c)}(A_2, b) = -\frac{\sqrt{2}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{2,2}^{(s)}(E,1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{2,1}^{(s)}(E,1)}{2}$$

$$\boxed{\text{z132}} \quad \mathbb{Q}_1^{(1,-1;c)}(A_2) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E,1)\mathbb{Q}_{2,2}^{(s)}(E,1)}{2} - \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E,1)\mathbb{Q}_{2,1}^{(s)}(E,1)}{2}$$

$$\boxed{\text{z133}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_2, 2) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_{2,2}^{(s)}(E,1)}{2} - \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_{2,1}^{(s)}(E,1)}{2}$$

$$\boxed{\text{z134}} \quad \mathbb{Q}_1^{(1,0;c)}(A_2, a) = \mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z135}} \quad \mathbb{Q}_1^{(1,0;c)}(A_2, b) = -\frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(s)}(E,1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(s)}(E,1)}{2}$$

$$\boxed{\text{z136}} \quad \mathbb{G}_1^{(c)}(A_2) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z137}} \quad \mathbb{G}_1^{(1,-1;c)}(A_2) = \frac{\sqrt{30}\mathbb{G}_{2,1}^{(1,-1;a)}(E,1)\mathbb{Q}_{1,2}^{(s)}(E)}{10} - \frac{\sqrt{30}\mathbb{G}_{2,2}^{(1,-1;a)}(E,1)\mathbb{Q}_{1,1}^{(s)}(E)}{10} + \frac{\sqrt{10}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_1^{(s)}(A_2)}{5}$$

$$\boxed{\text{z138}} \quad \mathbb{G}_3^{(1,-1;c)}(A_2,1) = -\frac{\sqrt{5}\mathbb{G}_{2,1}^{(1,-1;a)}(E,1)\mathbb{Q}_{1,2}^{(s)}(E)}{5} + \frac{\sqrt{5}\mathbb{G}_{2,2}^{(1,-1;a)}(E,1)\mathbb{Q}_{1,1}^{(s)}(E)}{5} + \frac{\sqrt{15}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_1^{(s)}(A_2)}{5}$$

$$\boxed{\text{z139}} \quad \mathbb{G}_3^{(1,-1;c)}(A_2,2) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,2}^{(s)}(E)}{2} - \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z140}} \quad \mathbb{G}_1^{(1,0;c)}(A_2) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z141}} \quad \mathbb{G}_1^{(1,1;c)}(A_2) = \mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_1^{(s)}(A_2)$$

$$\boxed{\text{z253}} \quad \mathbb{Q}_{1,1}^{(c)}(E,a) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_0^{(s)}(A_1)}{2}$$

$$\boxed{\text{z254}} \quad \mathbb{Q}_{1,2}^{(c)}(E,a) = \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_0^{(s)}(A_1)}{2}$$

$$\boxed{\text{z255}} \quad \mathbb{Q}_{1,1}^{(c)}(E,b) = -\frac{\sqrt{2}\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_{2,2}^{(s)}(E,1)}{2}$$

$$\boxed{\text{z256}} \quad \mathbb{Q}_{1,2}^{(c)}(E,b) = \frac{\sqrt{2}\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_{2,1}^{(s)}(E,1)}{2}$$

$$\boxed{\text{z257}} \quad \mathbb{Q}_{2,1}^{(c)}(E,1) = \frac{\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_1^{(s)}(A_2)}{2} + \frac{\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z258}} \quad \mathbb{Q}_{2,2}^{(c)}(E,1) = -\frac{\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_1^{(s)}(A_2)}{2} - \frac{\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z259}} \quad \mathbb{Q}_{2,1}^{(c)}(E,2) = \frac{\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{2} - \frac{\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z260}} \quad \mathbb{Q}_{2,2}^{(c)}(E,2) = -\frac{\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{2} - \frac{\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z261}} \quad \mathbb{Q}_{3,1}^{(c)}(E,2) = \frac{\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{2,1}^{(s)}(E,1)}{2} - \frac{\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{2,2}^{(s)}(E,1)}{2}$$

$$\boxed{\text{z262}} \quad \mathbb{Q}_{3,2}^{(c)}(E, 2) = -\frac{\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2} - \frac{\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z263}} \quad \mathbb{Q}_{1,1}^{(1,-1;c)}(E) = -\frac{\sqrt{10}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{10} + \frac{\sqrt{10}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{10} - \frac{\sqrt{30}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{10}$$

$$\boxed{\text{z264}} \quad \mathbb{Q}_{1,2}^{(1,-1;c)}(E) = \frac{\sqrt{10}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{10} + \frac{\sqrt{10}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{10} - \frac{\sqrt{30}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{10}$$

$$\boxed{\text{z265}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 1) = \frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{6} + \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(s)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{6} + \frac{\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z266}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 1) = -\frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(s)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{6} - \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{6} + \frac{\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z267}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 2) = -\frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{6} + \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{6} - \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_1^{(s)}(A_2)}{3}$$

$$\boxed{\text{z268}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 2) = \frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{6} + \frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_1^{(s)}(A_2)}{3} + \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{6}$$

$$\boxed{\text{z269}} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E, 1) = \frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{10} - \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{5}$$

$$\boxed{\text{z270}} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(E, 1) = -\frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{10} - \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{5}$$

$$\boxed{\text{z271}} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(E, a) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_0^{(s)}(A_1)}{2}$$

$$\boxed{\text{z272}} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(E, a) = \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_0^{(s)}(A_1)}{2}$$

$$\boxed{\text{z273}} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(E, b) = -\frac{\sqrt{2}\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z274}} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(E, b) = \frac{\sqrt{2}\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z275}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 1) = \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_1^{(s)}(A_2)}{2} + \frac{\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z276}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 1) = -\frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_1^{(s)}(A_2)}{2} - \frac{\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z277}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 2) = \frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{2} - \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z278}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 2) = -\frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{2} - \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z279}} \quad \mathbb{Q}_{3,1}^{(1,0;c)}(E, 2) = \frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2} - \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z280}} \quad \mathbb{Q}_{3,2}^{(1,0;c)}(E, 2) = -\frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2} - \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z281}} \quad \mathbb{G}_{1,1}^{(c)}(E) = \frac{\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_1^{(s)}(A_2)}{2} - \frac{\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z282}} \quad \mathbb{G}_{1,2}^{(c)}(E) = -\frac{\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_1^{(s)}(A_2)}{2} + \frac{\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z283}} \quad \mathbb{G}_{1,1}^{(1,-1;c)}(E) = \frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(s)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{10} - \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(s)}(E)}{10}$$

$$\boxed{\text{z284}} \quad \mathbb{G}_{1,2}^{(1,-1;c)}(E) = \frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(s)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{10} - \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(s)}(E)}{10}$$

$$\boxed{\text{z285}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 1) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_0^{(s)}(A_1)}{2}$$

$$\boxed{\text{z286}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 1) = \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_0^{(s)}(A_1)}{2}$$

$$\boxed{\text{z287}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 2a) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_0^{(s)}(A_1)}{2}$$

$$\boxed{\text{z288}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 2a) = \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_0^{(s)}(A_1)}{2}$$

$$\boxed{\text{z289}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 2b) = -\frac{\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2} + \frac{\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z290}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 2b) = \frac{\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2} + \frac{\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z291}} \quad \mathbb{G}_{3,1}^{(1,-1;c)}(E, 1) = -\frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{30} - \frac{2\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(s)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{30} + \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(s)}(E)}{5}$$

$$\boxed{\text{z292}} \quad \mathbb{G}_{3,2}^{(1,-1;c)}(E, 1) = \frac{2\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(s)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{30} + \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{30} + \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(s)}(E)}{5}$$

$$\boxed{\text{z293}} \quad \mathbb{G}_{3,1}^{(1,-1;c)}(E, 2) = \frac{\sqrt{6}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{6} - \frac{\sqrt{6}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{6} - \frac{\sqrt{6}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_1^{(s)}(A_2)}{6}$$

$$\boxed{\text{z294}} \quad \mathbb{G}_{3,2}^{(1,-1;c)}(E, 2) = -\frac{\sqrt{6}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{6} + \frac{\sqrt{6}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_1^{(s)}(A_2)}{6} - \frac{\sqrt{6}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{6}$$

$$\boxed{\text{z295}} \quad \mathbb{G}_{1,1}^{(1,0;c)}(E) = \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_1^{(s)}(A_2)}{2} - \frac{\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z296}} \quad \mathbb{G}_{1,2}^{(1,0;c)}(E) = -\frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_1^{(s)}(A_2)}{2} + \frac{\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z297}} \quad \mathbb{G}_{1,1}^{(1,1;c)}(E) = \frac{\sqrt{2}\mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z298}} \quad \mathbb{G}_{1,2}^{(1,1;c)}(E) = \frac{\sqrt{2}\mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z299}} \quad \mathbb{G}_{2,1}^{(1,1;c)}(E, 1) = \frac{\sqrt{2}\mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z300}} \quad \mathbb{G}_{2,2}^{(1,1;c)}(E, 1) = \frac{\sqrt{2}\mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

• A : 'A' site-cluster

\* bra:  $\langle p_x, \uparrow |, \langle p_x, \downarrow |, \langle p_y, \uparrow |, \langle p_y, \downarrow |, \langle p_z, \uparrow |, \langle p_z, \downarrow |$

\* ket:  $|p_x, \uparrow \rangle, |p_x, \downarrow \rangle, |p_y, \uparrow \rangle, |p_y, \downarrow \rangle, |p_z, \uparrow \rangle, |p_z, \downarrow \rangle$

\* wyckoff: **6c**

$$\boxed{\text{z14}} \quad \mathbb{Q}_0^{(c)}(A_1, a) = \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z15}} \quad \mathbb{Q}_0^{(c)}(A_1, b) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z16}} \quad \mathbb{Q}_2^{(c)}(A_1) = \mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z17}} \quad \mathbb{Q}_3^{(c)}(A_1) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z18}} \quad \mathbb{Q}_4^{(c)}(A_1, 2) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z19}} \quad \mathbb{Q}_0^{(1,-1;c)}(A_1) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z20}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_1) = \mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z21}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_1) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z22}} \quad \mathbb{Q}_4^{(1,-1;c)}(A_1, 2) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z23}} \quad \mathbb{Q}_2^{(1,0;c)}(A_1) = \frac{\sqrt{2}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z24}} \quad \mathbb{Q}_0^{(1,1;c)}(A_1) = \mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z25}} \quad \mathbb{G}_2^{(c)}(A_1) = -\frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z26}} \quad \mathbb{G}_2^{(1,-1;c)}(A_1) = -\frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z27}} \quad \mathbb{G}_0^{(1,0;c)}(A_1) = \frac{\sqrt{3}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{3} + \frac{\sqrt{3}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{3} + \frac{\sqrt{3}\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_1^{(s)}(A_2)}{3}$$

$$\boxed{\text{z28}} \quad \mathbb{G}_2^{(1,0;c)}(A_1) = -\frac{\sqrt{6}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{6} - \frac{\sqrt{6}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{6} + \frac{\sqrt{6}\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_1^{(s)}(A_2)}{3}$$

$$\boxed{\text{z142}} \quad \mathbb{Q}_1^{(c)}(A_2, a) = \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_1^{(s)}(A_2)$$

$$\boxed{\text{z143}} \quad \mathbb{Q}_1^{(c)}(A_2, b) = \frac{\sqrt{30}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{10} - \frac{\sqrt{30}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{10} + \frac{\sqrt{10}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_1^{(s)}(A_2)}{5}$$

$$\boxed{\text{z144}} \quad \mathbb{Q}_3^{(c)}(A_2, 1) = -\frac{\sqrt{5}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{5} + \frac{\sqrt{5}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{5} + \frac{\sqrt{15}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_1^{(s)}(A_2)}{5}$$

$$\boxed{\text{z145}} \quad \mathbb{Q}_3^{(c)}(A_2, 2) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z146}} \quad \mathbb{Q}_4^{(c)}(A_2) = -\frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z147}} \quad \mathbb{Q}_1^{(1,-1;c)}(A_2) = \frac{\sqrt{30}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{10} - \frac{\sqrt{30}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{10} + \frac{\sqrt{10}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_1^{(s)}(A_2)}{5}$$

$$\boxed{\text{z148}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_2, 1) = -\frac{\sqrt{5}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{5} + \frac{\sqrt{5}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{5} + \frac{\sqrt{15}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_1^{(s)}(A_2)}{5}$$

$$\boxed{\text{z149}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_2, 2) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z150}} \quad \mathbb{Q}_4^{(1,-1;c)}(A_2) = -\frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z151}} \quad \mathbb{Q}_1^{(1,0;c)}(A_2) = \frac{\sqrt{2}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{2} - \frac{\sqrt{2}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z152}} \quad \mathbb{Q}_1^{(1,1;c)}(A_2) = \mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_1^{(s)}(A_2)$$

$$\boxed{\text{z153}} \quad \mathbb{G}_1^{(c)}(A_2) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z154}} \quad \mathbb{G}_1^{(1,-1;c)}(A_2) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z155}} \quad \mathbb{G}_1^{(1,0;c)}(A_2, a) = \mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z156}} \quad \mathbb{G}_1^{(1,0;c)}(A_2, b) = -\frac{\sqrt{2}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z301}} \quad \mathbb{Q}_{1,1}^{(c)}(E, a) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z302}} \quad \mathbb{Q}_{1,2}^{(c)}(E, a) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z303}} \quad \mathbb{Q}_{1,1}^{(c)}(E, b) = \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_1^{(s)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{10} - \frac{\sqrt{5}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,1}^{(s)}(E)}{10}$$

$$\boxed{\text{z304}} \quad \mathbb{Q}_{1,2}^{(c)}(E, b) = \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_1^{(s)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{10} - \frac{\sqrt{5}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,2}^{(s)}(E)}{10}$$

$$\boxed{\text{z305}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1a) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z306}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1a) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z307}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1b) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_0^{(s)}(A_1)}{2}$$

$$\boxed{\text{z308}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1b) = \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_0^{(s)}(A_1)}{2}$$

$$\boxed{\text{z309}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1c) = -\frac{\sqrt{42}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{14} + \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{14} + \frac{\sqrt{14}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{14}$$

$$\boxed{\text{z310}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1c) = \frac{\sqrt{42}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{14} + \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{14} + \frac{\sqrt{14}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{14}$$

$$\boxed{\text{z311}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 2a) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_0^{(s)}(A_1)}{2}$$

$$\boxed{\text{z312}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 2a) = \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_0^{(s)}(A_1)}{2}$$

$$\boxed{\text{z313}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 2b) = -\frac{\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2} + \frac{\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z314}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 2b) = \frac{\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2} + \frac{\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z315}} \quad \mathbb{Q}_{3,1}^{(c)}(E, 1) = -\frac{\sqrt{15}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{30} - \frac{2\sqrt{15}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_1^{(s)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{30} + \frac{\sqrt{5}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,1}^{(s)}(E)}{5}$$

$$\boxed{\text{z316}} \quad \mathbb{Q}_{3,2}^{(c)}(E, 1) = \frac{2\sqrt{15}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_1^{(s)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{30} + \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{30} + \frac{\sqrt{5}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,2}^{(s)}(E)}{5}$$

$$\boxed{\text{z317}} \quad \mathbb{Q}_{3,1}^{(c)}(E, 2) = \frac{\sqrt{6}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_1^{(s)}(A_2)}{6}$$

$$\boxed{\text{z318}} \quad \mathbb{Q}_{3,2}^{(c)}(E, 2) = -\frac{\sqrt{6}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{6} + \frac{\sqrt{6}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_1^{(s)}(A_2)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{6}$$

$$\boxed{\text{z319}} \quad \mathbb{Q}_{4,1}^{(c)}(E, 1) = \frac{\sqrt{7}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{7}$$

$$\boxed{\text{z320}} \quad \mathbb{Q}_{4,2}^{(c)}(E, 1) = -\frac{\sqrt{7}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{7}$$

$$\boxed{\text{z321}} \quad \mathbb{Q}_{1,1}^{(1,-1;c)}(E) = \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(s)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{10} - \frac{\sqrt{5}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(s)}(E)}{10}$$

$$\boxed{\text{z322}} \quad \mathbb{Q}_{1,2}^{(1,-1;c)}(E) = \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(s)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{10} - \frac{\sqrt{5}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(s)}(E)}{10}$$

$$\boxed{\text{z323}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 1a) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_0^{(s)}(A_1)}{2}$$

$$\boxed{\text{z324}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 1a) = \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_0^{(s)}(A_1)}{2}$$

$$\boxed{\text{z325}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 1b) = -\frac{\sqrt{42}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{14} + \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{14} + \frac{\sqrt{14}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{14}$$

$$\boxed{\text{z326}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 1b) = \frac{\sqrt{42}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{14} + \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{14} + \frac{\sqrt{14}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{14}$$

$$\boxed{\text{z327}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 2a) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_0^{(s)}(A_1)}{2}$$

$$\boxed{\text{z328}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 2a) = \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_0^{(s)}(A_1)}{2}$$

$$\boxed{\text{z329}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 2b) = -\frac{\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2} + \frac{\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z330}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 2b) = \frac{\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2} + \frac{\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z331}} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E, 1) = -\frac{\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{30} - \frac{2\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(s)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{30} + \frac{\sqrt{5}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(s)}(E)}{5}$$

$$\boxed{\text{z332}} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(E, 1) = \frac{2\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(s)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{30} + \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{30} + \frac{\sqrt{5}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(s)}(E)}{5}$$

$$\boxed{\text{z333}} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E, 2) = \frac{\sqrt{6}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_1^{(s)}(A_2)}{6}$$

$$\boxed{\text{z334}} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(E, 2) = -\frac{\sqrt{6}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{6} + \frac{\sqrt{6}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_1^{(s)}(A_2)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{6}$$

$$\boxed{\text{z335}} \quad \mathbb{Q}_{4,1}^{(1,-1;c)}(E, 1) = \frac{\sqrt{7}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{7}$$

$$\boxed{\text{z336}} \quad \mathbb{Q}_{4,2}^{(1,-1;c)}(E, 1) = -\frac{\sqrt{7}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{7}$$

$$\boxed{\text{z337}} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(E) = \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_1^{(s)}(A_2)}{2} - \frac{\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z338}} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(E) = -\frac{\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_1^{(s)}(A_2)}{2} + \frac{\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z339}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 1) = -\frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z340}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 1) = \frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z341}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 2) = \frac{\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2} - \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z342}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 2) = -\frac{\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2} - \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z343}} \quad \mathbb{Q}_{1,1}^{(1,1;c)}(E) = \frac{\sqrt{2}\mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z344}} \quad \mathbb{Q}_{1,2}^{(1,1;c)}(E) = \frac{\sqrt{2}\mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z345}} \quad \mathbb{Q}_{2,1}^{(1,1;c)}(E, 1) = \frac{\sqrt{2}\mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_{2,1}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z346}} \quad \mathbb{Q}_{2,2}^{(1,1;c)}(E, 1) = \frac{\sqrt{2}\mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_{2,2}^{(s)}(E, 1)}{2}$$

$$\boxed{\text{z347}} \quad \mathbb{G}_{2,1}^{(c)}(E, 1) = \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_1^{(s)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{6} + \frac{\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z348}} \quad \mathbb{G}_{2,2}^{(c)}(E, 1) = -\frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_1^{(s)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{6} + \frac{\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z349}} \quad \mathbb{G}_{2,1}^{(c)}(E, 2) = -\frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_1^{(s)}(A_2)}{3}$$

$$\boxed{\text{z350}} \quad \mathbb{G}_{2,2}^{(c)}(E, 2) = \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_1^{(s)}(A_2)}{3} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{6}$$

$$\boxed{\text{z351}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 1) = \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(s)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{6} + \frac{\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z352}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 1) = -\frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(s)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(s)}(E)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(s)}(E)}{6} + \frac{\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z353}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 2) = -\frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_1^{(s)}(A_2)}{3}$$

$$\boxed{\text{z354}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 2) = \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(s)}(E)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_1^{(s)}(A_2)}{3} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(s)}(E)}{6}$$

$$\boxed{\text{z355}} \quad \mathbb{G}_{1,1}^{(1,0;c)}(E) = \frac{\sqrt{2}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_0^{(s)}(A_1)}{2}$$

$$\boxed{\text{z356}} \quad \mathbb{G}_{1,2}^{(1,0;c)}(E) = \frac{\sqrt{2}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_0^{(s)}(A_1)}{2}$$

$$\boxed{\text{z357}} \quad \mathbb{G}_{2,1}^{(1,0;c)}(E, 1) = \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_1^{(s)}(A_2)}{2} + \frac{\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z358}} \quad \mathbb{G}_{2,2}^{(1,0;c)}(E, 1) = -\frac{\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_1^{(s)}(A_2)}{2} - \frac{\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

$$\boxed{\text{z359}} \quad \mathbb{G}_{2,1}^{(1,0;c)}(E, 2) = \frac{\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{2} - \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{2}$$

$$\boxed{\text{z360}} \quad \mathbb{G}_{2,2}^{(1,0;c)}(E, 2) = -\frac{\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(s)}(E)}{2} - \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(s)}(E)}{2}$$

• A;A\_001\_1 : 'A'-'A' bond-cluster

- \* bra:  $\langle s, \uparrow |, \langle s, \downarrow |$
- \* ket:  $|s, \uparrow \rangle, |s, \downarrow \rangle$
- \* wyckoff: **6a@6c**

$$\boxed{\text{z29}} \quad \mathbb{Q}_0^{(c)}(A_1) = \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z30}} \quad \mathbb{Q}_0^{(1,-1;c)}(A_1) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z31}} \quad \mathbb{G}_0^{(1,-1;c)}(A_1) = \frac{\sqrt{3}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z32}} \quad \mathbb{G}_2^{(1,-1;c)}(A_1) = -\frac{\sqrt{6}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z157}} \quad \mathbb{Q}_1^{(c)}(A_2) = \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_1^{(b)}(A_2)$$

$$\boxed{\text{z158}} \quad \mathbb{Q}_1^{(1,-1;c)}(A_2) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z159}} \quad \mathbb{G}_1^{(1,-1;c)}(A_2, a) = \mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z160}} \quad \mathbb{G}_1^{(1,-1;c)}(A_2, b) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z361}} \quad \mathbb{Q}_{1,1}^{(c)}(E) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z362}} \quad \mathbb{Q}_{1,2}^{(c)}(E) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z363}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z364}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z365}} \quad \mathbb{Q}_{1,1}^{(1,-1;c)}(E) = \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z366}} \quad \mathbb{Q}_{1,2}^{(1,-1;c)}(E) = -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z367}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 1) = \frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z368}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 1) = -\frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z369}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 2) = \frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z370}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 2) = -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z371}} \quad \mathbb{G}_{1,1}^{(1,-1;c)}(E) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z372}} \quad \mathbb{G}_{1,2}^{(1,-1;c)}(E) = \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z373}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 1) = \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z374}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 1) = -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z375}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 2) = \frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z376}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 2) = -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

• A;A\_001\_1 : 'A-'A' bond-cluster

\* bra:  $\langle s, \uparrow |$ ,  $\langle s, \downarrow |$

\* ket:  $|p_x, \uparrow \rangle$ ,  $|p_x, \downarrow \rangle$ ,  $|p_y, \uparrow \rangle$ ,  $|p_y, \downarrow \rangle$ ,  $|p_z, \uparrow \rangle$ ,  $|p_z, \downarrow \rangle$

\* wyckoff: 6a@6c

$$\boxed{\text{z33}} \quad \mathbb{Q}_0^{(c)}(A_1, a) = \frac{\sqrt{3}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z34}} \quad \mathbb{Q}_0^{(c)}(A_1, b) = \frac{\sqrt{3}\mathbb{T}_{1,1}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{T}_{1,2}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{T}_1^{(a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z35}} \quad \mathbb{Q}_2^{(c)}(A_1, a) = -\frac{\sqrt{6}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z36}} \quad \mathbb{Q}_2^{(c)}(A_1, b) = -\frac{\sqrt{6}\mathbb{T}_{1,1}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{T}_{1,2}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{T}_1^{(a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z37}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_1, a) = -\frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z38}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_1, b) = -\frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z39}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_1, a) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z40}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_1, b) = \frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z41}} \quad \mathbb{Q}_0^{(1,0;c)}(A_1, a) = \frac{\sqrt{3}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z42}} \quad \mathbb{Q}_0^{(1,0;c)}(A_1, b) = \frac{\sqrt{3}\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z43}} \quad \mathbb{Q}_2^{(1,0;c)}(A_1, a) = -\frac{\sqrt{6}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z44}} \quad \mathbb{Q}_2^{(1,0;c)}(A_1, b) = -\frac{\sqrt{6}\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z45}} \quad \mathbb{G}_0^{(c)}(A_1) = \frac{\sqrt{2}\mathbb{T}_{1,1}^{(a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{T}_{1,2}^{(a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z46}} \quad \mathbb{G}_2^{(c)}(A_1) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z47}} \quad \mathbb{G}_0^{(1,-1;c)}(A_1) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z48}} \quad \mathbb{G}_2^{(1,-1;c)}(A_1, a) = \mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z49}} \quad \mathbb{G}_2^{(1,-1;c)}(A_1, b) = \mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z50}} \quad \mathbb{G}_2^{(1,-1;c)}(A_1, c) = -\frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,1}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z51}} \quad \mathbb{G}_3^{(1,-1;c)}(A_1, a) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z52}} \quad \mathbb{G}_3^{(1,-1;c)}(A_1, b) = \frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z53}} \quad \mathbb{G}_0^{(1,0;c)}(A_1) = \frac{\sqrt{2}\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z54}} \quad \mathbb{G}_2^{(1,0;c)}(A_1) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z55}} \quad \mathbb{G}_0^{(1,1;c)}(A_1, a) = \mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z56}} \quad \mathbb{G}_0^{(1,1;c)}(A_1, b) = \mathbb{M}_0^{(1,1;a)}(A_1)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z161}} \quad \mathbb{Q}_1^{(c)}(A_2, a) = \mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z162}} \quad \mathbb{Q}_1^{(c)}(A_2, b) = -\frac{\sqrt{2}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z163}} \quad \mathbb{Q}_1^{(c)}(A_2, c) = \mathbb{T}_1^{(a)}(A_2)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z164}} \quad \mathbb{Q}_1^{(c)}(A_2, d) = \frac{\sqrt{2}\mathbb{T}_{1,1}^{(a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{T}_{1,2}^{(a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z165}} \quad \mathbb{Q}_1^{(1,-1;c)}(A_2, a) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} - \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z166}} \quad \mathbb{Q}_1^{(1,-1;c)}(A_2, b) = \frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z167}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_2, 2a) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} - \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z168}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_2, 2b) = \frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z169}} \quad \mathbb{Q}_1^{(1,0;c)}(A_2, a) = \mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z170}} \quad \mathbb{Q}_1^{(1,0;c)}(A_2, b) = -\frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z171}} \quad \mathbb{Q}_1^{(1,0;c)}(A_2, c) = \mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z172}} \quad \mathbb{Q}_1^{(1,0;c)}(A_2, d) = \frac{\sqrt{2}\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z173}} \quad \mathbb{G}_1^{(c)}(A_2, a) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z174}} \quad \mathbb{G}_1^{(c)}(A_2, b) = \frac{\sqrt{2}\mathbb{T}_{1,1}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{T}_{1,2}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z175}} \quad \mathbb{G}_1^{(1,-1;c)}(A_2, a) = \frac{\sqrt{30}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{30}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{10} + \frac{\sqrt{10}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_1^{(b)}(A_2)}{5}$$

$$\boxed{\text{z176}} \quad \mathbb{G}_1^{(1,-1;c)}(A_2, b) = \frac{\sqrt{30}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{30}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{10} + \frac{\sqrt{10}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_1^{(b)}(A_2)}{5}$$

$$\boxed{\text{z177}} \quad \mathbb{G}_3^{(1,-1;c)}(A_2, 1a) = -\frac{\sqrt{5}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{5} + \frac{\sqrt{5}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{5} + \frac{\sqrt{15}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_1^{(b)}(A_2)}{5}$$

$$\boxed{\text{z178}} \quad \mathbb{G}_3^{(1,-1;c)}(A_2, 1b) = -\frac{\sqrt{5}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{5} + \frac{\sqrt{5}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{5} + \frac{\sqrt{15}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_1^{(b)}(A_2)}{5}$$

$$\boxed{\text{z179}} \quad \mathbb{G}_3^{(1,-1;c)}(A_2, 2a) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z180}} \quad \mathbb{G}_3^{(1,-1;c)}(A_2, 2b) = \frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z181}} \quad \mathbb{G}_1^{(1,0;c)}(A_2, a) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z182}} \quad \mathbb{G}_1^{(1,0;c)}(A_2, b) = \frac{\sqrt{2}\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z183}} \quad \mathbb{G}_1^{(1,1;c)}(A_2, a) = \mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_1^{(b)}(A_2)$$

$$\boxed{\text{z184}} \quad \mathbb{G}_1^{(1,1;c)}(A_2, b) = \mathbb{M}_0^{(1,1;a)}(A_1)\mathbb{T}_1^{(b)}(A_2)$$

$$\boxed{\text{z377}} \quad \mathbb{Q}_{1,1}^{(c)}(E, a) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z378}} \quad \mathbb{Q}_{1,2}^{(c)}(E, a) = \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z379}} \quad \mathbb{Q}_{1,1}^{(c)}(E, b) = -\frac{\sqrt{2}\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z380}} \quad \mathbb{Q}_{1,2}^{(c)}(E, b) = \frac{\sqrt{2}\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z381}} \quad \mathbb{Q}_{1,1}^{(c)}(E, c) = \frac{\sqrt{2}\mathbb{T}_{1,1}^{(a)}(E)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z382}} \quad \mathbb{Q}_{1,2}^{(c)}(E, c) = \frac{\sqrt{2}\mathbb{T}_{1,2}^{(a)}(E)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z383}} \quad \mathbb{Q}_{1,1}^{(c)}(E, d) = -\frac{\sqrt{2}\mathbb{T}_1^{(a)}(A_2)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z384}} \quad \mathbb{Q}_{1,2}^{(c)}(E, d) = \frac{\sqrt{2}\mathbb{T}_1^{(a)}(A_2)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z385}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1a) = \frac{\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_1^{(b)}(A_2)}{2} + \frac{\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z386}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1a) = -\frac{\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_1^{(b)}(A_2)}{2} - \frac{\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z387}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1b) = \frac{\mathbb{T}_{1,2}^{(a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{T}_1^{(a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z388}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1b) = -\frac{\mathbb{T}_{1,1}^{(a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{T}_1^{(a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z389}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 2a) = \frac{\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z390}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 2a) = -\frac{\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z391}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 2b) = \frac{\mathbb{T}_{1,1}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{T}_{1,2}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z392}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 2b) = -\frac{\mathbb{T}_{1,1}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{T}_{1,2}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z393}} \quad \mathbb{Q}_{3,1}^{(c)}(E, 2) = \frac{\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} - \frac{\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z394}} \quad \mathbb{Q}_{3,2}^{(c)}(E, 2) = -\frac{\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} - \frac{\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z395}} \quad \mathbb{Q}_{1,1}^{(1,-1;c)}(E, a) = -\frac{\sqrt{10}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{10} + \frac{\sqrt{10}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{10} - \frac{\sqrt{30}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{10}$$

$$\boxed{\text{z396}} \quad \mathbb{Q}_{1,2}^{(1,-1;c)}(E,a) = \frac{\sqrt{10}\mathbb{G}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_{2,2}^{(b)}(E,1)}{10} + \frac{\sqrt{10}\mathbb{G}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_{2,1}^{(b)}(E,1)}{10} - \frac{\sqrt{30}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,2}^{(b)}(E,1)}{10}$$

$$\boxed{\text{z397}} \quad \mathbb{Q}_{1,1}^{(1,-1;c)}(E,b) = \frac{\sqrt{42}\mathbb{M}_{2,1}^{(1,-1;a)}(E,2)\mathbb{M}_{1,1}^{(b)}(E)}{14} - \frac{\sqrt{42}\mathbb{M}_{2,2}^{(1,-1;a)}(E,2)\mathbb{M}_{1,2}^{(b)}(E)}{14} - \frac{\sqrt{14}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{M}_{1,1}^{(b)}(E)}{14}$$

$$\boxed{\text{z398}} \quad \mathbb{Q}_{1,2}^{(1,-1;c)}(E,b) = -\frac{\sqrt{42}\mathbb{M}_{2,1}^{(1,-1;a)}(E,2)\mathbb{M}_{1,2}^{(b)}(E)}{14} - \frac{\sqrt{42}\mathbb{M}_{2,2}^{(1,-1;a)}(E,2)\mathbb{M}_{1,1}^{(b)}(E)}{14} - \frac{\sqrt{14}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{M}_{1,2}^{(b)}(E)}{14}$$

$$\boxed{\text{z399}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E,1a) = \frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,1}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(E,1)\mathbb{Q}_1^{(b)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,2}^{(b)}(E)}{6} + \frac{\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z400}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E,1a) = -\frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(E,1)\mathbb{Q}_1^{(b)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_{1,1}^{(b)}(E)}{6} + \frac{\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z401}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E,1b) = \frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(E,2)\mathbb{T}_{1,1}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(E,1)\mathbb{T}_1^{(b)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(E,2)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z402}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E,1b) = -\frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(E,1)\mathbb{T}_1^{(b)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(E,2)\mathbb{T}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(E,2)\mathbb{T}_{1,1}^{(b)}(E)}{6} + \frac{\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z403}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E,2a) = -\frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(E,1)\mathbb{Q}_{1,1}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(E,1)\mathbb{Q}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z404}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E,2a) = \frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(E,1)\mathbb{Q}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{G}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_1^{(b)}(A_2)}{3} + \frac{\sqrt{3}\mathbb{G}_{2,2}^{(1,-1;a)}(E,1)\mathbb{Q}_{1,1}^{(b)}(E)}{6}$$

$$\boxed{\text{z405}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E,2b) = -\frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(E,1)\mathbb{T}_{1,1}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(E,1)\mathbb{T}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(E,2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z406}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E,2b) = \frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(E,1)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(E,2)\mathbb{T}_1^{(b)}(A_2)}{3} + \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(E,1)\mathbb{T}_{1,1}^{(b)}(E)}{6}$$

$$\boxed{\text{z407}} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E,1a) = \frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_{2,1}^{(b)}(E,1)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_{2,2}^{(b)}(E,1)}{10} - \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,1}^{(b)}(E,1)}{5}$$

$$\boxed{\text{z408}} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(E,1a) = -\frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E,2)\mathbb{Q}_{2,2}^{(b)}(E,1)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E,2)\mathbb{Q}_{2,1}^{(b)}(E,1)}{10} - \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,2}^{(b)}(E,1)}{5}$$

$$\boxed{\text{z409}} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E,1b) = \frac{\sqrt{7}\mathbb{M}_{2,1}^{(1,-1;a)}(E,2)\mathbb{M}_{1,1}^{(b)}(E)}{14} - \frac{\sqrt{7}\mathbb{M}_{2,2}^{(1,-1;a)}(E,2)\mathbb{M}_{1,2}^{(b)}(E)}{14} + \frac{\sqrt{21}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{M}_{1,1}^{(b)}(E)}{7}$$

$$\boxed{\text{z410}} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(E, 1b) = -\frac{\sqrt{7}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,2}^{(b)}(E)}{14} - \frac{\sqrt{7}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,1}^{(b)}(E)}{14} + \frac{\sqrt{21}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{M}_{1,2}^{(b)}(E)}{7}$$

$$\boxed{\text{z411}} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E, 2) = \frac{\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z412}} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(E, 2) = -\frac{\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z413}} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(E, a) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z414}} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(E, a) = \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z415}} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(E, b) = -\frac{\sqrt{2}\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z416}} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(E, b) = \frac{\sqrt{2}\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z417}} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(E, c) = \frac{\sqrt{2}\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z418}} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(E, c) = \frac{\sqrt{2}\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z419}} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(E, d) = -\frac{\sqrt{2}\mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z420}} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(E, d) = \frac{\sqrt{2}\mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z421}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 1a) = \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_1^{(b)}(A_2)}{2} + \frac{\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z422}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 1a) = -\frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_1^{(b)}(A_2)}{2} - \frac{\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z423}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 1b) = \frac{\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z424}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 1b) = -\frac{\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z425}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 2a) = \frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z426}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 2a) = -\frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z427}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 2b) = \frac{\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z428}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 2b) = -\frac{\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z429}} \quad \mathbb{Q}_{3,1}^{(1,0;c)}(E, 2) = \frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} - \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z430}} \quad \mathbb{Q}_{3,2}^{(1,0;c)}(E, 2) = -\frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} - \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z431}} \quad \mathbb{Q}_{1,1}^{(1,1;c)}(E) = \frac{\sqrt{2}\mathbb{M}_0^{(1,1;a)}(A_1)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z432}} \quad \mathbb{Q}_{1,2}^{(1,1;c)}(E) = \frac{\sqrt{2}\mathbb{M}_0^{(1,1;a)}(A_1)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z433}} \quad \mathbb{G}_{1,1}^{(c)}(E, a) = \frac{\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_1^{(b)}(A_2)}{2} - \frac{\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z434}} \quad \mathbb{G}_{1,2}^{(c)}(E, a) = -\frac{\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_1^{(b)}(A_2)}{2} + \frac{\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z435}} \quad \mathbb{G}_{1,1}^{(c)}(E, b) = \frac{\mathbb{T}_{1,2}^{(a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{T}_1^{(a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z436}} \quad \mathbb{G}_{1,2}^{(c)}(E, b) = -\frac{\mathbb{T}_{1,1}^{(a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{T}_1^{(a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z437}} \quad \mathbb{G}_{2,1}^{(c)}(E, 2) = \frac{\mathbb{T}_{1,1}^{(a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{T}_{1,2}^{(a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z438}} \quad \mathbb{G}_{2,2}^{(c)}(E, 2) = -\frac{\mathbb{T}_{1,1}^{(a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{T}_{1,2}^{(a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z439}} \quad \mathbb{G}_{1,1}^{(1,-1;c)}(E, a) = \frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{10}$$

$$\boxed{\text{z440}} \quad \mathbb{G}_{1,2}^{(1,-1;c)}(E, a) = \frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{10}$$

$$\boxed{\text{z441}} \quad \mathbb{G}_{1,1}^{(1,-1;c)}(E, b) = \frac{\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{10}$$

$$\boxed{\text{z442}} \quad \mathbb{G}_{1,2}^{(1,-1;c)}(E, b) = \frac{\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{10}$$

$$\boxed{\text{z443}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 1a) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z444}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 1a) = \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z445}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 1b) = \frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z446}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 1b) = \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z447}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 2a) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z448}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 2a) = \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z449}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 2b) = -\frac{\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} + \frac{\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z450}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 2b) = \frac{\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} + \frac{\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z451}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 2c) = \frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z452}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 2c) = \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z453}} \quad \mathbb{G}_{3,1}^{(1,-1;c)}(E, 1a) = -\frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{30} - \frac{2\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{30} + \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{5}$$

$$\boxed{\text{z454}} \quad \mathbb{G}_{3,2}^{(1,-1;c)}(E, 1a) = \frac{2\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{30} + \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{30} + \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{5}$$

$$\boxed{\text{z455}} \quad \mathbb{G}_{3,1}^{(1,-1;c)}(E, 1b) = -\frac{\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{30} - \frac{2\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{30} + \frac{\sqrt{5}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{5}$$

$$\boxed{\text{z456}} \quad \mathbb{G}_{3,2}^{(1,-1;c)}(E, 1b) = \frac{2\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{30} + \frac{\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{30} + \frac{\sqrt{5}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{5}$$

$$\boxed{\text{z457}} \quad \mathbb{G}_{3,1}^{(1,-1;c)}(E, 2a) = \frac{\sqrt{6}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_1^{(b)}(A_2)}{6}$$

$$\boxed{\text{z458}} \quad \mathbb{G}_{3,2}^{(1,-1;c)}(E, 2a) = -\frac{\sqrt{6}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_1^{(b)}(A_2)}{6} - \frac{\sqrt{6}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{6}$$

$$\boxed{\text{z459}} \quad \mathbb{G}_{3,1}^{(1,-1;c)}(E, 2b) = \frac{\sqrt{6}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{6}$$

$$\boxed{\text{z460}} \quad \mathbb{G}_{3,2}^{(1,-1;c)}(E, 2b) = -\frac{\sqrt{6}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{6} - \frac{\sqrt{6}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{6}$$

$$\boxed{\text{z461}} \quad \mathbb{G}_{1,1}^{(1,0;c)}(E, a) = \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_1^{(b)}(A_2)}{2} - \frac{\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z462}} \quad \mathbb{G}_{1,2}^{(1,0;c)}(E, a) = -\frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_1^{(b)}(A_2)}{2} + \frac{\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z463}} \quad \mathbb{G}_{1,1}^{(1,0;c)}(E, b) = \frac{\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z464}} \quad \mathbb{G}_{1,2}^{(1,0;c)}(E, b) = -\frac{\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z465}} \quad \mathbb{G}_{2,1}^{(1,0;c)}(E, 2) = \frac{\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z466}} \quad \mathbb{G}_{2,2}^{(1,0;c)}(E, 2) = -\frac{\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z467}} \quad \mathbb{G}_{1,1}^{(1,1;c)}(E, a) = \frac{\sqrt{2}\mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z468}} \quad \mathbb{G}_{1,2}^{(1,1;c)}(E, a) = \frac{\sqrt{2}\mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z469}} \quad \mathbb{G}_{1,1}^{(1,1;c)}(E, b) = \frac{\sqrt{2}\mathbb{M}_0^{(1,1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z470}} \quad \mathbb{G}_{1,2}^{(1,1;c)}(E, b) = \frac{\sqrt{2}\mathbb{M}_0^{(1,1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z471}} \quad \mathbb{G}_{2,1}^{(1,1;c)}(E, 1) = \frac{\sqrt{2}\mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z472}} \quad \mathbb{G}_{2,2}^{(1,1;c)}(E, 1) = \frac{\sqrt{2}\mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

• A;A\_001\_1 : 'A'-'A' bond-cluster

\* bra:  $\langle p_x, \uparrow |, \langle p_x, \downarrow |, \langle p_y, \uparrow |, \langle p_y, \downarrow |, \langle p_z, \uparrow |, \langle p_z, \downarrow |$

\* ket:  $|p_x, \uparrow \rangle, |p_x, \downarrow \rangle, |p_y, \uparrow \rangle, |p_y, \downarrow \rangle, |p_z, \uparrow \rangle, |p_z, \downarrow \rangle$

\* wyckoff: 6a@6c

$$\boxed{\text{z57}} \quad \mathbb{Q}_0^{(c)}(A_1, a) = \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z58}} \quad \mathbb{Q}_0^{(c)}(A_1, b) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z59}} \quad \mathbb{Q}_0^{(c)}(A_1, c) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{M}_{1,2}^{(a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z60}} \quad \mathbb{Q}_2^{(c)}(A_1) = \mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z61}} \quad \mathbb{Q}_3^{(c)}(A_1) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z62}} \quad \mathbb{Q}_4^{(c)}(A_1, 2) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z63}} \quad \mathbb{Q}_0^{(1,-1;c)}(A_1, a) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z64}} \quad \mathbb{Q}_0^{(1,-1;c)}(A_1, b) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z65}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_1, a) = \mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z66}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_1, b) = \frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z67}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_1, a) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z68}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_1, b) = -\frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{4} - \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{4} + \frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_1^{(b)}(A_2)}{2}$$

$$\boxed{\text{z69}} \quad \mathbb{Q}_4^{(1,-1;c)}(A_1, 2a) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z70}} \quad \mathbb{Q}_4^{(1,-1;c)}(A_1, 2b) = \frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z71}} \quad \mathbb{Q}_2^{(1,0;c)}(A_1, a) = \frac{\sqrt{2}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z72}} \quad \mathbb{Q}_2^{(1,0;c)}(A_1, b) = \mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z73}} \quad \mathbb{Q}_2^{(1,0;c)}(A_1, c) = -\frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{M}_{1,1}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z74}} \quad \mathbb{Q}_3^{(1,0;c)}(A_1) = \frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z75}} \quad \mathbb{Q}_0^{(1,1;c)}(A_1, a) = \mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{z76} \quad \mathbb{Q}_0^{(1,1;c)}(A_1, b) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{z77} \quad \mathbb{G}_0^{(c)}(A_1) = \frac{\sqrt{3}\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_1^{(a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{z78} \quad \mathbb{G}_2^{(c)}(A_1, a) = -\frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{z79} \quad \mathbb{G}_2^{(c)}(A_1, b) = -\frac{\sqrt{6}\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{M}_1^{(a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{z80} \quad \mathbb{G}_0^{(1,-1;c)}(A_1) = \frac{\sqrt{3}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{z81} \quad \mathbb{G}_2^{(1,-1;c)}(A_1, a) = -\frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{z82} \quad \mathbb{G}_2^{(1,-1;c)}(A_1, b) = \frac{\sqrt{14}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{7} + \frac{\sqrt{14}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{7} + \frac{\sqrt{21}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_1^{(b)}(A_2)}{7}$$

$$\boxed{z83} \quad \mathbb{G}_2^{(1,-1;c)}(A_1, c) = -\frac{\sqrt{6}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{z84} \quad \mathbb{G}_3^{(1,-1;c)}(A_1) = \mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{z85} \quad \mathbb{G}_4^{(1,-1;c)}(A_1, 1) = -\frac{\sqrt{42}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{14} - \frac{\sqrt{42}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{14} + \frac{2\sqrt{7}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_1^{(b)}(A_2)}{7}$$

$$\boxed{z86} \quad \mathbb{G}_4^{(1,-1;c)}(A_1, 2) = \frac{\sqrt{6}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{4} + \frac{\sqrt{6}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{4} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_1^{(b)}(A_2)}{2}$$

$$\boxed{z87} \quad \mathbb{G}_0^{(1,0;c)}(A_1) = \frac{\sqrt{3}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_1^{(b)}(A_2)}{3}$$

$$\boxed{z88} \quad \mathbb{G}_2^{(1,0;c)}(A_1, a) = -\frac{\sqrt{6}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_1^{(b)}(A_2)}{3}$$

$$\boxed{z89} \quad \mathbb{G}_2^{(1,0;c)}(A_1, b) = -\frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z90}} \quad \mathbb{G}_3^{(1,0;c)}(A_1) = \frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{M}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z91}} \quad \mathbb{G}_0^{(1,1;c)}(A_1) = \frac{\sqrt{3}\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z92}} \quad \mathbb{G}_2^{(1,1;c)}(A_1) = -\frac{\sqrt{6}\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z185}} \quad \mathbb{Q}_1^{(c)}(A_2, a) = \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_1^{(b)}(A_2)$$

$$\boxed{\text{z186}} \quad \mathbb{Q}_1^{(c)}(A_2, b) = \frac{\sqrt{30}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{30}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{10} + \frac{\sqrt{10}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_1^{(b)}(A_2)}{5}$$

$$\boxed{\text{z187}} \quad \mathbb{Q}_1^{(c)}(A_2, c) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z188}} \quad \mathbb{Q}_3^{(c)}(A_2, 1) = -\frac{\sqrt{5}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{5} + \frac{\sqrt{5}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{5} + \frac{\sqrt{15}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_1^{(b)}(A_2)}{5}$$

$$\boxed{\text{z189}} \quad \mathbb{Q}_3^{(c)}(A_2, 2) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z190}} \quad \mathbb{Q}_4^{(c)}(A_2) = -\frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z191}} \quad \mathbb{Q}_1^{(1,-1;c)}(A_2, a) = \frac{\sqrt{30}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{30}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{10} + \frac{\sqrt{10}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_1^{(b)}(A_2)}{5}$$

$$\boxed{\text{z192}} \quad \mathbb{Q}_1^{(1,-1;c)}(A_2, b) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z193}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_2, 1a) = -\frac{\sqrt{5}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{5} + \frac{\sqrt{5}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{5} + \frac{\sqrt{15}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_1^{(b)}(A_2)}{5}$$

$$\boxed{\text{z194}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_2, 1b) = \frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z195}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_2, 2a) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z196}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_2, 2b) = -\frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{4} + \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{4} - \frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_1^{(b)}(A_2)}{2}$$

$$\boxed{\text{z197}} \quad \mathbb{Q}_4^{(1,-1;c)}(A_2, a) = -\frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z198}} \quad \mathbb{Q}_4^{(1,-1;c)}(A_2, b) = -\frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,2}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z199}} \quad \mathbb{Q}_1^{(1,0;c)}(A_2, a) = \frac{\sqrt{2}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z200}} \quad \mathbb{Q}_1^{(1,0;c)}(A_2, b) = \frac{\sqrt{30}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{30}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{10} + \frac{\sqrt{10}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_1^{(b)}(A_2)}{5}$$

$$\boxed{\text{z201}} \quad \mathbb{Q}_3^{(1,0;c)}(A_2, 1) = -\frac{\sqrt{5}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{5} + \frac{\sqrt{5}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{5} + \frac{\sqrt{15}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_1^{(b)}(A_2)}{5}$$

$$\boxed{\text{z202}} \quad \mathbb{Q}_3^{(1,0;c)}(A_2, 2) = \frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z203}} \quad \mathbb{Q}_1^{(1,1;c)}(A_2, a) = \mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_1^{(b)}(A_2)$$

$$\boxed{\text{z204}} \quad \mathbb{Q}_1^{(1,1;c)}(A_2, b) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z205}} \quad \mathbb{G}_1^{(c)}(A_2, a) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z206}} \quad \mathbb{G}_1^{(c)}(A_2, b) = \mathbb{M}_1^{(a)}(A_2)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z207}} \quad \mathbb{G}_1^{(c)}(A_2, c) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z208}} \quad \mathbb{G}_1^{(1,-1;c)}(A_2, a) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z209}} \quad \mathbb{G}_1^{(1,-1;c)}(A_2, b) = \mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z210}} \quad \mathbb{G}_1^{(1,-1;c)}(A_2, c) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z211}} \quad \mathbb{G}_3^{(1,-1;c)}(A_2, 1a) = \mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z212}} \quad \mathbb{G}_3^{(1,-1;c)}(A_2, 1b) = \frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z213}} \quad \mathbb{G}_3^{(1,-1;c)}(A_2, 2) = \mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z214}} \quad \mathbb{G}_4^{(1,-1;c)}(A_2) = -\frac{\sqrt{6}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{4} + \frac{\sqrt{6}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{4} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_1^{(b)}(A_2)}{2}$$

$$\boxed{\text{z215}} \quad \mathbb{G}_1^{(1,0;c)}(A_2, a) = \mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z216}} \quad \mathbb{G}_1^{(1,0;c)}(A_2, b) = -\frac{\sqrt{2}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} + \frac{\sqrt{2}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z217}} \quad \mathbb{G}_1^{(1,0;c)}(A_2, c) = \frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z218}} \quad \mathbb{G}_3^{(1,0;c)}(A_2, 2) = \frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z219}} \quad \mathbb{G}_1^{(1,1;c)}(A_2, a) = \mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z220}} \quad \mathbb{G}_1^{(1,1;c)}(A_2, b) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z473}} \quad \mathbb{Q}_{1,1}^{(c)}(E, a) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z474}} \quad \mathbb{Q}_{1,2}^{(c)}(E, a) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z475}} \quad \mathbb{Q}_{1,1}^{(c)}(E, b) = \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{10}$$

$$\boxed{\text{z476}} \quad \mathbb{Q}_{1,2}^{(c)}(E, b) = \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{10}$$

$$\boxed{\text{z477}} \quad \mathbb{Q}_{1,1}^{(c)}(E, c) = \frac{\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z478}} \quad \mathbb{Q}_{1,2}^{(c)}(E, c) = -\frac{\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z479}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1a) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z480}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1a) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z481}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1b) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z482}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1b) = \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z483}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1c) = -\frac{\sqrt{42}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{14} + \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{14} + \frac{\sqrt{14}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{14}$$

$$\boxed{\text{z484}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1c) = \frac{\sqrt{42}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{14} + \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{14} + \frac{\sqrt{14}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{14}$$

$$\boxed{\text{z485}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1d) = \frac{\sqrt{2}\mathbb{M}_1^{(a)}(A_2)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z486}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1d) = -\frac{\sqrt{2}\mathbb{M}_1^{(a)}(A_2)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z487}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 2a) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z488}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 2a) = \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z489}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 2b) = -\frac{\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} + \frac{\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z490}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 2b) = \frac{\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} + \frac{\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z491}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 2c) = \frac{\mathbb{M}_{1,1}^{(a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z492}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 2c) = -\frac{\mathbb{M}_{1,1}^{(a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z493}} \quad \mathbb{Q}_{3,1}^{(c)}(E, 1) = -\frac{\sqrt{15}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{30} - \frac{2\sqrt{15}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{30} + \frac{\sqrt{5}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{5}$$

$$\boxed{\text{z494}} \quad \mathbb{Q}_{3,2}^{(c)}(E, 1) = \frac{2\sqrt{15}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{30} + \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{30} + \frac{\sqrt{5}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{5}$$

$$\boxed{\text{z495}} \quad \mathbb{Q}_{3,1}^{(c)}(E, 2) = \frac{\sqrt{6}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_1^{(b)}(A_2)}{6}$$

$$\boxed{\text{z496}} \quad \mathbb{Q}_{3,2}^{(c)}(E, 2) = -\frac{\sqrt{6}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_1^{(b)}(A_2)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{6}$$

$$\boxed{\text{z497}} \quad \mathbb{Q}_{4,1}^{(c)}(E, 1) = \frac{\sqrt{7}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{7}$$

$$\boxed{\text{z498}} \quad \mathbb{Q}_{4,2}^{(c)}(E, 1) = -\frac{\sqrt{7}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{7}$$

$$\boxed{\text{z499}} \quad \mathbb{Q}_{1,1}^{(1,-1;c)}(E, a) = \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{10}$$

$$\boxed{\text{z500}} \quad \mathbb{Q}_{1,2}^{(1,-1;c)}(E, a) = \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{10}$$

$$\boxed{\text{z501}} \quad \mathbb{Q}_{1,1}^{(1,-1;c)}(E, b) = \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z502}} \quad \mathbb{Q}_{1,2}^{(1,-1;c)}(E, b) = -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z503}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 1a) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z504}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 1a) = \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z505}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 1b) = -\frac{\sqrt{42}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{14} + \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{14} + \frac{\sqrt{14}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{14}$$

$$\boxed{\text{z506}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 1b) = \frac{\sqrt{42}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{14} + \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{14} + \frac{\sqrt{14}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{14}$$

$$\boxed{\text{z507}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 1c) = \frac{\sqrt{130}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,1}^{(b)}(E)}{26} - \frac{\sqrt{130}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,2}^{(b)}(E)}{26} - \frac{\sqrt{78}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{M}_{1,2}^{(b)}(E)}{26}$$

$$\boxed{\text{z508}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 1c) = -\frac{\sqrt{130}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,2}^{(b)}(E)}{26} - \frac{\sqrt{130}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,1}^{(b)}(E)}{26} + \frac{\sqrt{78}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{M}_{1,1}^{(b)}(E)}{26}$$

$$\boxed{\text{z509}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 1d) = \frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z510}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 1d) = -\frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z511}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 2a) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z512}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 2a) = \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z513}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 2b) = -\frac{\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2} + \frac{\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z514}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 2b) = \frac{\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2} + \frac{\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z515}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 2c) = -\frac{\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,1}^{(b)}(E)}{8} + \frac{\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,2}^{(b)}(E)}{8} + \frac{\sqrt{15}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{M}_{1,1}^{(b)}(E)}{8} + \frac{\sqrt{15}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{M}_{1,2}^{(b)}(E)}{8}$$

$$\boxed{\text{z516}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 2c) = \frac{\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,2}^{(b)}(E)}{8} + \frac{\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{M}_{1,1}^{(b)}(E)}{8} + \frac{\sqrt{15}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{M}_{1,2}^{(b)}(E)}{8} - \frac{\sqrt{15}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{M}_{1,1}^{(b)}(E)}{8}$$

$$\boxed{\text{z517}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 2d) = \frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z518}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 2d) = -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z519}} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E, 1a) = -\frac{\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{30} - \frac{2\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{30} + \frac{\sqrt{5}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{5}$$

$$\boxed{\text{z520}} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(E, 1a) = \frac{2\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{30} + \frac{\sqrt{15}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{30} + \frac{\sqrt{5}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{5}$$

$$\boxed{\text{z521}} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E, 1b) = -\frac{\sqrt{15}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{12} + \frac{\sqrt{6}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{12} + \frac{\sqrt{15}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{12} - \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z522}} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(E, 1b) = -\frac{\sqrt{6}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{12} + \frac{\sqrt{15}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{12} + \frac{\sqrt{15}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{12} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z523}} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E, 2a) = \frac{\sqrt{6}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_1^{(b)}(A_2)}{6}$$

$$\boxed{\text{z524}} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(E, 2a) = -\frac{\sqrt{6}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_1^{(b)}(A_2)}{6} - \frac{\sqrt{6}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{6}$$

$$\boxed{\text{z525}} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E, 2b) = \frac{\sqrt{15}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{12} - \frac{\sqrt{15}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{12} - \frac{\sqrt{6}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{6} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{4} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_{1,2}^{(b)}(E)}{4}$$

$$\boxed{\text{z526}} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(E, 2b) = -\frac{\sqrt{15}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{12} + \frac{\sqrt{6}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{6} - \frac{\sqrt{15}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{12} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{4} - \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_{1,1}^{(b)}(E)}{4}$$

$$\boxed{\text{z527}} \quad \mathbb{Q}_{4,1}^{(1,-1;c)}(E, 1a) = \frac{\sqrt{7}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{7}$$

$$\boxed{\text{z528}} \quad \mathbb{Q}_{4,2}^{(1,-1;c)}(E, 1a) = -\frac{\sqrt{7}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{7}$$

$$\boxed{\text{z529}} \quad \mathbb{Q}_{4,1}^{(1,-1;c)}(E, 1b) = \frac{\sqrt{39}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,1}^{(b)}(E)}{26} - \frac{\sqrt{39}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,2}^{(b)}(E)}{26} + \frac{\sqrt{65}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{M}_{1,2}^{(b)}(E)}{13}$$

$$\boxed{\text{z530}} \quad \mathbb{Q}_{4,2}^{(1,-1;c)}(E, 1b) = -\frac{\sqrt{39}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,2}^{(b)}(E)}{26} - \frac{\sqrt{39}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{M}_{1,1}^{(b)}(E)}{26} - \frac{\sqrt{65}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{M}_{1,1}^{(b)}(E)}{13}$$

$$\boxed{\text{z531}} \quad \mathbb{Q}_{4,1}^{(1,-1;c)}(E, 2) = \frac{\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{M}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z532}} \quad \mathbb{Q}_{4,2}^{(1,-1;c)}(E, 2) = \frac{\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{M}_{1,2}^{(b)}(E)}{2} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z533}} \quad \mathbb{Q}_{4,1}^{(1,-1;c)}(E,3) = \frac{\sqrt{15}\mathbb{M}_{3,1}^{(1,-1;a)}(E,1)\mathbb{M}_{1,1}^{(b)}(E)}{8} - \frac{\sqrt{15}\mathbb{M}_{3,2}^{(1,-1;a)}(E,1)\mathbb{M}_{1,2}^{(b)}(E)}{8} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{M}_{1,1}^{(b)}(E)}{8} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_2,2)\mathbb{M}_{1,2}^{(b)}(E)}{8}$$

$$\boxed{\text{z534}} \quad \mathbb{Q}_{4,2}^{(1,-1;c)}(E,3) = -\frac{\sqrt{15}\mathbb{M}_{3,1}^{(1,-1;a)}(E,1)\mathbb{M}_{1,2}^{(b)}(E)}{8} - \frac{\sqrt{15}\mathbb{M}_{3,2}^{(1,-1;a)}(E,1)\mathbb{M}_{1,1}^{(b)}(E)}{8} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{M}_{1,2}^{(b)}(E)}{8} - \frac{\mathbb{M}_3^{(1,-1;a)}(A_2,2)\mathbb{M}_{1,1}^{(b)}(E)}{8}$$

$$\boxed{\text{z535}} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(E,a) = \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_1^{(b)}(A_2)}{2} - \frac{\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z536}} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(E,a) = -\frac{\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_1^{(b)}(A_2)}{2} + \frac{\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z537}} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(E,b) = \frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E,2)\mathbb{T}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E,1)\mathbb{T}_1^{(b)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E,2)\mathbb{T}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{10}$$

$$\boxed{\text{z538}} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(E,b) = \frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E,1)\mathbb{T}_1^{(b)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E,2)\mathbb{T}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E,2)\mathbb{T}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{10}$$

$$\boxed{\text{z539}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E,1a) = -\frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_{2,2}^{(b)}(E,1)}{2}$$

$$\boxed{\text{z540}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E,1a) = \frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_{2,1}^{(b)}(E,1)}{2}$$

$$\boxed{\text{z541}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E,1b) = \frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E,1)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z542}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E,1b) = \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E,1)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z543}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E,1c) = \frac{\sqrt{10}\mathbb{T}_{2,1}^{(1,0;a)}(E,2)\mathbb{M}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{10}\mathbb{T}_{2,2}^{(1,0;a)}(E,2)\mathbb{M}_{1,2}^{(b)}(E)}{10} + \frac{\sqrt{30}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{M}_{1,1}^{(b)}(E)}{10}$$

$$\boxed{\text{z544}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E,1c) = -\frac{\sqrt{10}\mathbb{T}_{2,1}^{(1,0;a)}(E,2)\mathbb{M}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{10}\mathbb{T}_{2,2}^{(1,0;a)}(E,2)\mathbb{M}_{1,1}^{(b)}(E)}{10} + \frac{\sqrt{30}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{M}_{1,2}^{(b)}(E)}{10}$$

$$\boxed{\text{z545}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E,2a) = \frac{\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(b)}(E,1)}{2} - \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(b)}(E,1)}{2}$$

$$\boxed{\text{z546}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E,2a) = -\frac{\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{2,2}^{(b)}(E,1)}{2} - \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{2,1}^{(b)}(E,1)}{2}$$

$$\boxed{\text{z547}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 2b) = \frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z548}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 2b) = \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z549}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 2c) = -\frac{\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{M}_{1,1}^{(b)}(E)}{2} + \frac{\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z550}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 2c) = \frac{\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{M}_{1,2}^{(b)}(E)}{2} + \frac{\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z551}} \quad \mathbb{Q}_{3,1}^{(1,0;c)}(E, 1) = -\frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{30} - \frac{2\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{30} + \frac{\sqrt{5}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{5}$$

$$\boxed{\text{z552}} \quad \mathbb{Q}_{3,2}^{(1,0;c)}(E, 1) = \frac{2\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{30} + \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{30} + \frac{\sqrt{5}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{5}$$

$$\boxed{\text{z553}} \quad \mathbb{Q}_{3,1}^{(1,0;c)}(E, 2) = \frac{\sqrt{6}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{6}$$

$$\boxed{\text{z554}} \quad \mathbb{Q}_{3,2}^{(1,0;c)}(E, 2) = -\frac{\sqrt{6}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{6} - \frac{\sqrt{6}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{6}$$

$$\boxed{\text{z555}} \quad \mathbb{Q}_{1,1}^{(1,1;c)}(E, a) = \frac{\sqrt{2}\mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z556}} \quad \mathbb{Q}_{1,2}^{(1,1;c)}(E, a) = \frac{\sqrt{2}\mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z557}} \quad \mathbb{Q}_{1,1}^{(1,1;c)}(E, b) = \frac{\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z558}} \quad \mathbb{Q}_{1,2}^{(1,1;c)}(E, b) = -\frac{\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z559}} \quad \mathbb{Q}_{2,1}^{(1,1;c)}(E, 1a) = \frac{\sqrt{2}\mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_{2,1}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z560}} \quad \mathbb{Q}_{2,2}^{(1,1;c)}(E, 1a) = \frac{\sqrt{2}\mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_{2,2}^{(b)}(E, 1)}{2}$$

$$\boxed{\text{z561}} \quad \mathbb{Q}_{2,1}^{(1,1;c)}(E, 1b) = \frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z562}} \quad \mathbb{Q}_{2,2}^{(1,1;c)}(E, 1b) = -\frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z563}} \quad \mathbb{Q}_{2,1}^{(1,1;c)}(E, 2) = \frac{\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z564}} \quad \mathbb{Q}_{2,2}^{(1,1;c)}(E, 2) = -\frac{\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{M}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{M}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z565}} \quad \mathbb{G}_{1,1}^{(c)}(E) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z566}} \quad \mathbb{G}_{1,2}^{(c)}(E) = \frac{\sqrt{2}\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z567}} \quad \mathbb{G}_{2,1}^{(c)}(E, 1a) = \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{6} + \frac{\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z568}} \quad \mathbb{G}_{2,2}^{(c)}(E, 1a) = -\frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{6} + \frac{\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z569}} \quad \mathbb{G}_{2,1}^{(c)}(E, 1b) = \frac{\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z570}} \quad \mathbb{G}_{2,2}^{(c)}(E, 1b) = -\frac{\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z571}} \quad \mathbb{G}_{2,1}^{(c)}(E, 2a) = -\frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z572}} \quad \mathbb{G}_{2,2}^{(c)}(E, 2a) = \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_1^{(b)}(A_2)}{3} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{6}$$

$$\boxed{\text{z573}} \quad \mathbb{G}_{2,1}^{(c)}(E, 2b) = \frac{\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z574}} \quad \mathbb{G}_{2,2}^{(c)}(E, 2b) = -\frac{\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z575}} \quad \mathbb{G}_{1,1}^{(1,-1;c)}(E) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z576}} \quad \mathbb{G}_{1,2}^{(1,-1;c)}(E) = \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z577}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 1a) = \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{6} + \frac{\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z578}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 1a) = -\frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_1^{(b)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{6} + \frac{\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z579}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 1b) = \frac{\sqrt{210}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{42} + \frac{2\sqrt{21}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{21} - \frac{\sqrt{210}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{42} - \frac{\sqrt{14}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_{1,2}^{(b)}(E)}{14}$$

$$\boxed{\text{z580}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 1b) = -\frac{2\sqrt{21}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{21} - \frac{\sqrt{210}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{42} - \frac{\sqrt{210}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{42} + \frac{\sqrt{14}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_{1,1}^{(b)}(E)}{14}$$

$$\boxed{\text{z581}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 1c) = \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z582}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 1c) = -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z583}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 2a) = -\frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z584}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 2a) = \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_1^{(b)}(A_2)}{3} + \frac{\sqrt{3}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{6}$$

$$\boxed{\text{z585}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 2b) = -\frac{\sqrt{21}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{42} + \frac{\sqrt{21}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{42} + \frac{\sqrt{210}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{42} + \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{14} + \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_{1,2}^{(b)}(E)}{14}$$

$$\boxed{\text{z586}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 2b) = \frac{\sqrt{21}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{42} - \frac{\sqrt{210}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{42} + \frac{\sqrt{21}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{42} + \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{14} - \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_{1,1}^{(b)}(E)}{14}$$

$$\boxed{\text{z587}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 2c) = \frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z588}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 2c) = -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z589}} \quad \mathbb{G}_{3,1}^{(1,-1;c)}(E,1) = \frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E,1)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z590}} \quad \mathbb{G}_{3,2}^{(1,-1;c)}(E,1) = \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E,1)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z591}} \quad \mathbb{G}_{3,1}^{(1,-1;c)}(E,2) = \frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E,2)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z592}} \quad \mathbb{G}_{3,2}^{(1,-1;c)}(E,2) = \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E,2)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z593}} \quad \mathbb{G}_{4,1}^{(1,-1;c)}(E,1) = -\frac{\sqrt{21}\mathbb{M}_{3,1}^{(1,-1;a)}(E,2)\mathbb{T}_{1,1}^{(b)}(E)}{28} + \frac{\sqrt{210}\mathbb{M}_{3,2}^{(1,-1;a)}(E,1)\mathbb{T}_1^{(b)}(A_2)}{28} + \frac{\sqrt{21}\mathbb{M}_{3,2}^{(1,-1;a)}(E,2)\mathbb{T}_{1,2}^{(b)}(E)}{28} + \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_2,1)\mathbb{T}_{1,2}^{(b)}(E)}{14}$$

$$\boxed{\text{z594}} \quad \mathbb{G}_{4,2}^{(1,-1;c)}(E,1) = -\frac{\sqrt{210}\mathbb{M}_{3,1}^{(1,-1;a)}(E,1)\mathbb{T}_1^{(b)}(A_2)}{28} + \frac{\sqrt{21}\mathbb{M}_{3,1}^{(1,-1;a)}(E,2)\mathbb{T}_{1,2}^{(b)}(E)}{28} + \frac{\sqrt{21}\mathbb{M}_{3,2}^{(1,-1;a)}(E,2)\mathbb{T}_{1,1}^{(b)}(E)}{28} - \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_2,1)\mathbb{T}_{1,1}^{(b)}(E)}{14}$$

$$\boxed{\text{z595}} \quad \mathbb{G}_{4,1}^{(1,-1;c)}(E,2) = \frac{\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_3^{(1,-1;a)}(A_2,2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z596}} \quad \mathbb{G}_{4,2}^{(1,-1;c)}(E,2) = \frac{\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{2} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_2,2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z597}} \quad \mathbb{G}_{4,1}^{(1,-1;c)}(E,3) = \frac{\sqrt{105}\mathbb{M}_{3,1}^{(1,-1;a)}(E,1)\mathbb{T}_{1,1}^{(b)}(E)}{28} - \frac{\sqrt{105}\mathbb{M}_{3,2}^{(1,-1;a)}(E,1)\mathbb{T}_{1,2}^{(b)}(E)}{28} + \frac{\sqrt{42}\mathbb{M}_{3,2}^{(1,-1;a)}(E,2)\mathbb{T}_1^{(b)}(A_2)}{14} - \frac{\sqrt{7}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{28} - \frac{\sqrt{7}\mathbb{M}_3^{(1,-1;a)}(A_2,2)\mathbb{T}_{1,2}^{(b)}(E)}{28}$$

$$\boxed{\text{z598}} \quad \mathbb{G}_{4,2}^{(1,-1;c)}(E,3) = -\frac{\sqrt{105}\mathbb{M}_{3,1}^{(1,-1;a)}(E,1)\mathbb{T}_{1,2}^{(b)}(E)}{28} - \frac{\sqrt{42}\mathbb{M}_{3,1}^{(1,-1;a)}(E,2)\mathbb{T}_1^{(b)}(A_2)}{14} - \frac{\sqrt{105}\mathbb{M}_{3,2}^{(1,-1;a)}(E,1)\mathbb{T}_{1,1}^{(b)}(E)}{28} - \frac{\sqrt{7}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{28} + \frac{\sqrt{7}\mathbb{M}_3^{(1,-1;a)}(A_2,2)\mathbb{T}_{1,1}^{(b)}(E)}{28}$$

$$\boxed{\text{z599}} \quad \mathbb{G}_{1,1}^{(1,0;c)}(E,a) = \frac{\sqrt{2}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z600}} \quad \mathbb{G}_{1,2}^{(1,0;c)}(E,a) = \frac{\sqrt{2}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z601}} \quad \mathbb{G}_{1,1}^{(1,0;c)}(E,b) = \frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E,2)\mathbb{M}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E,2)\mathbb{M}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{M}_{1,1}^{(b)}(E)}{5}$$

$$\boxed{\text{z602}} \quad \mathbb{G}_{1,2}^{(1,0;c)}(E,b) = -\frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E,2)\mathbb{M}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E,2)\mathbb{M}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{M}_{1,2}^{(b)}(E)}{5}$$

$$\boxed{\text{z603}} \quad \mathbb{G}_{2,1}^{(1,0;c)}(E, 1a) = \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_1^{(b)}(A_2)}{2} + \frac{\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z604}} \quad \mathbb{G}_{2,2}^{(1,0;c)}(E, 1a) = -\frac{\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_1^{(b)}(A_2)}{2} - \frac{\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z605}} \quad \mathbb{G}_{2,1}^{(1,0;c)}(E, 1b) = \frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z606}} \quad \mathbb{G}_{2,2}^{(1,0;c)}(E, 1b) = -\frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{6} + \frac{\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z607}} \quad \mathbb{G}_{2,1}^{(1,0;c)}(E, 2a) = \frac{\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z608}} \quad \mathbb{G}_{2,2}^{(1,0;c)}(E, 2a) = -\frac{\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z609}} \quad \mathbb{G}_{2,1}^{(1,0;c)}(E, 2b) = -\frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z610}} \quad \mathbb{G}_{2,2}^{(1,0;c)}(E, 2b) = \frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{3} + \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{6}$$

$$\boxed{\text{z611}} \quad \mathbb{G}_{1,1}^{(1,1;c)}(E) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z612}} \quad \mathbb{G}_{1,2}^{(1,1;c)}(E) = \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z613}} \quad \mathbb{G}_{2,1}^{(1,1;c)}(E, 1) = \frac{\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z614}} \quad \mathbb{G}_{2,2}^{(1,1;c)}(E, 1) = -\frac{\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z615}} \quad \mathbb{G}_{2,1}^{(1,1;c)}(E, 2) = \frac{\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z616}} \quad \mathbb{G}_{2,2}^{(1,1;c)}(E, 2) = -\frac{\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

- A;A\_002\_1 : 'A-'A' bond-cluster

\* bra:  $\langle s, \uparrow |$ ,  $\langle s, \downarrow |$   
 \* ket:  $|s, \uparrow \rangle$ ,  $|s, \downarrow \rangle$   
 \* wyckoff: 3a@3b

$$\boxed{\text{z93}} \quad \mathbb{Q}_0^{(c)}(A_1) = \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z94}} \quad \mathbb{G}_0^{(1,-1;c)}(A_1) = \frac{\sqrt{3}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z95}} \quad \mathbb{G}_2^{(1,-1;c)}(A_1) = -\frac{\sqrt{6}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z221}} \quad \mathbb{Q}_1^{(1,-1;c)}(A_2) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z617}} \quad \mathbb{Q}_{1,1}^{(c)}(E) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z618}} \quad \mathbb{Q}_{1,2}^{(c)}(E) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z619}} \quad \mathbb{Q}_{1,1}^{(1,-1;c)}(E) = \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z620}} \quad \mathbb{Q}_{1,2}^{(1,-1;c)}(E) = -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z621}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 1) = \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z622}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 1) = -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z623}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 2) = \frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z624}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 2) = -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

- A;A\_002\_1 : 'A'-'A' bond-cluster

\* bra:  $\langle s, \uparrow |, \langle s, \downarrow |$

\* ket:  $|p_x, \uparrow \rangle, |p_x, \downarrow \rangle, |p_y, \uparrow \rangle, |p_y, \downarrow \rangle, |p_z, \uparrow \rangle, |p_z, \downarrow \rangle$

\* wyckoff: 3a@3b

$$\boxed{\text{z96}} \quad \mathbb{Q}_0^{(c)}(A_1, a) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z97}} \quad \mathbb{Q}_0^{(c)}(A_1, b) = \frac{\sqrt{3}\mathbb{T}_{1,1}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{T}_{1,2}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{T}_1^{(a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z98}} \quad \mathbb{Q}_2^{(c)}(A_1) = -\frac{\sqrt{6}\mathbb{T}_{1,1}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{T}_{1,2}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{T}_1^{(a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z99}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_1, a) = -\frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z100}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_1, b) = -\frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z101}} \quad \mathbb{Q}_0^{(1,0;c)}(A_1, a) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z102}} \quad \mathbb{Q}_0^{(1,0;c)}(A_1, b) = \frac{\sqrt{3}\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z103}} \quad \mathbb{Q}_2^{(1,0;c)}(A_1) = -\frac{\sqrt{6}\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z104}} \quad \mathbb{G}_2^{(1,-1;c)}(A_1) = \mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z105}} \quad \mathbb{G}_3^{(1,-1;c)}(A_1, a) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z106}} \quad \mathbb{G}_3^{(1,-1;c)}(A_1, b) = \frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z107}} \quad \mathbb{G}_0^{(1,1;c)}(A_1) = \mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z222}} \quad \mathbb{Q}_1^{(c)}(A_2) = \mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z223}} \quad \mathbb{Q}_1^{(1,0;c)}(A_2) = \mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z224}} \quad \mathbb{G}_1^{(c)}(A_2, a) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z225}} \quad \mathbb{G}_1^{(c)}(A_2, b) = \frac{\sqrt{2}\mathbb{T}_{1,1}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{T}_{1,2}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z226}} \quad \mathbb{G}_1^{(1,-1;c)}(A_2, a) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z227}} \quad \mathbb{G}_1^{(1,-1;c)}(A_2, b) = \frac{\sqrt{30}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{30}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{10} + \frac{\sqrt{10}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_1^{(b)}(A_2)}{5}$$

$$\boxed{\text{z228}} \quad \mathbb{G}_3^{(1,-1;c)}(A_2, 1) = -\frac{\sqrt{5}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{5} + \frac{\sqrt{5}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{5} + \frac{\sqrt{15}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_1^{(b)}(A_2)}{5}$$

$$\boxed{\text{z229}} \quad \mathbb{G}_3^{(1,-1;c)}(A_2, 2a) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z230}} \quad \mathbb{G}_3^{(1,-1;c)}(A_2, 2b) = \frac{\sqrt{2}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z231}} \quad \mathbb{G}_1^{(1,0;c)}(A_2, a) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z232}} \quad \mathbb{G}_1^{(1,0;c)}(A_2, b) = \frac{\sqrt{2}\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z233}} \quad \mathbb{G}_1^{(1,1;c)}(A_2) = \mathbb{M}_0^{(1,1;a)}(A_1)\mathbb{T}_1^{(b)}(A_2)$$

$$\boxed{\text{z625}} \quad \mathbb{Q}_{1,1}^{(c)}(E) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z626}} \quad \mathbb{Q}_{1,2}^{(c)}(E) = \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z627}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1a) = \frac{\sqrt{2}\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z628}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1a) = -\frac{\sqrt{2}\mathbb{Q}_1^{(a)}(A_2)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z629}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1b) = \frac{\mathbb{T}_{1,2}^{(a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{T}_1^{(a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z630}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1b) = -\frac{\mathbb{T}_{1,1}^{(a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{T}_1^{(a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z631}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 2a) = \frac{\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z632}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 2a) = -\frac{\mathbb{Q}_{1,1}^{(a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{Q}_{1,2}^{(a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z633}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 2b) = \frac{\mathbb{T}_{1,1}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{T}_{1,2}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z634}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 2b) = -\frac{\mathbb{T}_{1,1}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{T}_{1,2}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z635}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 1a) = \frac{\sqrt{10}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{10}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{10} + \frac{\sqrt{30}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{10}$$

$$\boxed{\text{z636}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 1a) = -\frac{\sqrt{10}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{10}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{10} + \frac{\sqrt{30}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{10}$$

$$\boxed{\text{z637}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 1b) = \frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z638}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 1b) = -\frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{6} + \frac{\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z639}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 2a) = -\frac{\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{2} + \frac{\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z640}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 2a) = \frac{\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{2} + \frac{\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z641}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 2b) = -\frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z642}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 2b) = \frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{3} + \frac{\sqrt{3}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{6}$$

$$\boxed{\text{z643}} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(E) = \frac{\sqrt{2}\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z644}} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(E) = \frac{\sqrt{2}\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z645}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 1a) = \frac{\sqrt{2}\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z646}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 1a) = -\frac{\sqrt{2}\mathbb{Q}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z647}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 1b) = \frac{\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z648}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 1b) = -\frac{\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z649}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 2a) = \frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z650}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 2a) = -\frac{\mathbb{Q}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{Q}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z651}} \quad \mathbb{Q}_{2,1}^{(1,0;c)}(E, 2b) = \frac{\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z652}} \quad \mathbb{Q}_{2,2}^{(1,0;c)}(E, 2b) = -\frac{\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z653}} \quad \mathbb{G}_{1,1}^{(c)}(E) = \frac{\mathbb{T}_{1,2}^{(a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{T}_1^{(a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z654}} \quad \mathbb{G}_{1,2}^{(c)}(E) = -\frac{\mathbb{T}_{1,1}^{(a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{T}_1^{(a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z655}} \quad \mathbb{G}_{1,1}^{(1,-1;c)}(E, a) = \frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{5}$$

$$\boxed{\text{z656}} \quad \mathbb{G}_{1,2}^{(1,-1;c)}(E, a) = -\frac{\sqrt{15}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{G}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{5}$$

$$\boxed{\text{z657}} \quad \mathbb{G}_{1,1}^{(1,-1;c)}(E, b) = \frac{\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{10}$$

$$\boxed{\text{z658}} \quad \mathbb{G}_{1,2}^{(1,-1;c)}(E, b) = \frac{\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{10}$$

$$\boxed{\text{z659}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 1) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z660}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 1) = \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z661}} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 2) = \frac{\sqrt{2}\mathbb{G}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z662}} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 2) = \frac{\sqrt{2}\mathbb{G}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z663}} \quad \mathbb{G}_{3,1}^{(1,-1;c)}(E, 1) = -\frac{\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{30} - \frac{2\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{30} + \frac{\sqrt{5}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{5}$$

$$\boxed{\text{z664}} \quad \mathbb{G}_{3,2}^{(1,-1;c)}(E, 1) = \frac{2\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{30} + \frac{\sqrt{15}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{30} + \frac{\sqrt{5}\mathbb{M}_2^{(1,-1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{5}$$

$$\boxed{\text{z665}} \quad \mathbb{G}_{3,1}^{(1,-1;c)}(E, 2) = \frac{\sqrt{6}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{6}$$

$$\boxed{\text{z666}} \quad \mathbb{G}_{3,2}^{(1,-1;c)}(E, 2) = -\frac{\sqrt{6}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{M}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{6} - \frac{\sqrt{6}\mathbb{M}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{6}$$

$$\boxed{\text{z667}} \quad \mathbb{G}_{1,1}^{(1,0;c)}(E) = \frac{\mathbb{T}_{1,2}^{(1,0;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z668}} \quad \mathbb{G}_{1,2}^{(1,0;c)}(E) = -\frac{\mathbb{T}_{1,1}^{(1,0;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{T}_1^{(1,0;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z669}} \quad \mathbb{G}_{1,1}^{(1,1;c)}(E, a) = \frac{\sqrt{2}\mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z670}} \quad \mathbb{G}_{1,2}^{(1,1;c)}(E, a) = \frac{\sqrt{2}\mathbb{G}_0^{(1,1;a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z671}} \quad \mathbb{G}_{1,1}^{(1,1;c)}(E, b) = \frac{\sqrt{2}\mathbb{M}_0^{(1,1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z672}} \quad \mathbb{G}_{1,2}^{(1,1;c)}(E, b) = \frac{\sqrt{2}\mathbb{M}_0^{(1,1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

• A;A\_002\_1 : 'A-'A' bond-cluster

- \* bra:  $\langle p_x, \uparrow |, \langle p_x, \downarrow |, \langle p_y, \uparrow |, \langle p_y, \downarrow |, \langle p_z, \uparrow |, \langle p_z, \downarrow |$
- \* ket:  $|p_x, \uparrow \rangle, |p_x, \downarrow \rangle, |p_y, \uparrow \rangle, |p_y, \downarrow \rangle, |p_z, \uparrow \rangle, |p_z, \downarrow \rangle$
- \* wyckoff: 3a@3b

$$\boxed{\text{z108}} \quad \mathbb{Q}_0^{(c)}(A_1) = \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z109}} \quad \mathbb{Q}_2^{(c)}(A_1) = \mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z110}} \quad \mathbb{Q}_3^{(c)}(A_1) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z111}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_1) = \mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z112}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_1, a) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z113}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_1, b) = -\frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{4} - \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{4} + \frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_1^{(b)}(A_2)}{2}$$

$$\boxed{\text{z114}} \quad \mathbb{Q}_3^{(1,0;c)}(A_1) = \frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z115}} \quad \mathbb{Q}_0^{(1,1;c)}(A_1) = \mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z116}} \quad \mathbb{G}_0^{(c)}(A_1) = \frac{\sqrt{3}\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_1^{(a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z117}} \quad \mathbb{G}_2^{(c)}(A_1, a) = -\frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z118}} \quad \mathbb{G}_2^{(c)}(A_1, b) = -\frac{\sqrt{6}\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{M}_1^{(a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z119}} \quad \mathbb{G}_0^{(1,-1;c)}(A_1) = \frac{\sqrt{3}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z120}} \quad \mathbb{G}_2^{(1,-1;c)}(A_1, a) = -\frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z121}} \quad \mathbb{G}_2^{(1,-1;c)}(A_1, b) = \frac{\sqrt{14}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{7} + \frac{\sqrt{14}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{7} + \frac{\sqrt{21}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_1^{(b)}(A_2)}{7}$$

$$\boxed{\text{z122}} \quad \mathbb{G}_2^{(1,-1;c)}(A_1, c) = -\frac{\sqrt{6}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z123}} \quad \mathbb{G}_4^{(1,-1;c)}(A_1, 1) = -\frac{\sqrt{42}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{14} - \frac{\sqrt{42}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{14} + \frac{2\sqrt{7}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_1^{(b)}(A_2)}{7}$$

$$\boxed{\text{z124}} \quad \mathbb{G}_4^{(1,-1;c)}(A_1, 2) = \frac{\sqrt{6}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{4} + \frac{\sqrt{6}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{4} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_1^{(b)}(A_2)}{2}$$

$$\boxed{\text{z125}} \quad \mathbb{G}_0^{(1,0;c)}(A_1) = \frac{\sqrt{2}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2} + \frac{\sqrt{2}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z126}} \quad \mathbb{G}_2^{(1,0;c)}(A_1) = -\frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z127}} \quad \mathbb{G}_0^{(1,1;c)}(A_1) = \frac{\sqrt{3}\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{3} + \frac{\sqrt{3}\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z128}} \quad \mathbb{G}_2^{(1,1;c)}(A_1) = -\frac{\sqrt{6}\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_1^{(b)}(A_2)}{3}$$

$$\boxed{\text{z234}} \quad \mathbb{Q}_1^{(c)}(A_2, a) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z235}} \quad \mathbb{Q}_1^{(c)}(A_2, b) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z236}} \quad \mathbb{Q}_3^{(c)}(A_2, 2) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z237}} \quad \mathbb{Q}_1^{(1,-1;c)}(A_2, a) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z238}} \quad \mathbb{Q}_1^{(1,-1;c)}(A_2, b) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z239}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_2, 1) = \frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z240}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_2, 2a) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z241}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_2, 2b) = -\frac{\sqrt{2}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{4} + \frac{\sqrt{2}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{4} - \frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_1^{(b)}(A_2)}{2}$$

$$\boxed{\text{z242}} \quad \mathbb{Q}_1^{(1,0;c)}(A_2, a) = \frac{\sqrt{2}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z243}} \quad \mathbb{Q}_1^{(1,0;c)}(A_2, b) = \frac{\sqrt{30}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{30}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{10} + \frac{\sqrt{10}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_1^{(b)}(A_2)}{5}$$

$$\boxed{\text{z244}} \quad \mathbb{Q}_3^{(1,0;c)}(A_2, 1) = -\frac{\sqrt{5}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{5} + \frac{\sqrt{5}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{5} + \frac{\sqrt{15}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_1^{(b)}(A_2)}{5}$$

$$\boxed{\text{z245}} \quad \mathbb{Q}_3^{(1,0;c)}(A_2, 2) = \frac{\sqrt{2}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z246}} \quad \mathbb{Q}_1^{(1,1;c)}(A_2) = \frac{\sqrt{2}\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\sqrt{2}\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z247}} \quad \mathbb{G}_4^{(1,-1;c)}(A_2) = -\frac{\sqrt{6}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{4} + \frac{\sqrt{6}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{4} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_1^{(b)}(A_2)}{2}$$

$$\boxed{\text{z248}} \quad \mathbb{G}_1^{(1,0;c)}(A_2) = \mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z673}} \quad \mathbb{Q}_{1,1}^{(c)}(E, a) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z674}} \quad \mathbb{Q}_{1,2}^{(c)}(E, a) = \frac{\sqrt{2}\mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z675}} \quad \mathbb{Q}_{1,1}^{(c)}(E, b) = \frac{\sqrt{42}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{14} - \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{14} - \frac{\sqrt{14}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{14}$$

$$\boxed{\text{z676}} \quad \mathbb{Q}_{1,2}^{(c)}(E, b) = -\frac{\sqrt{42}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{14} - \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{14} - \frac{\sqrt{14}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{14}$$

$$\boxed{\text{z677}} \quad \mathbb{Q}_{1,1}^{(c)}(E, c) = \frac{\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z678}} \quad \mathbb{Q}_{1,2}^{(c)}(E, c) = -\frac{\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z679}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 1) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z680}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 1) = \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z681}} \quad \mathbb{Q}_{2,1}^{(c)}(E, 2) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z682}} \quad \mathbb{Q}_{2,2}^{(c)}(E, 2) = \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z683}} \quad \mathbb{Q}_{3,1}^{(c)}(E, 1) = \frac{\sqrt{7}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{7}$$

$$\boxed{\text{z684}} \quad \mathbb{Q}_{3,2}^{(c)}(E, 1) = -\frac{\sqrt{7}\mathbb{Q}_{2,1}^{(a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{7}$$

$$\boxed{\text{z685}} \quad \mathbb{Q}_{3,1}^{(c)}(E, 2) = \frac{\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z686}} \quad \mathbb{Q}_{3,2}^{(c)}(E, 2) = -\frac{\mathbb{Q}_{2,1}^{(a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{Q}_{2,2}^{(a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z687}} \quad \mathbb{Q}_{1,1}^{(1,-1;c)}(E, a) = \frac{\sqrt{42}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{14} - \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{14} - \frac{\sqrt{14}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{14}$$

$$\boxed{\text{z688}} \quad \mathbb{Q}_{1,2}^{(1,-1;c)}(E, a) = -\frac{\sqrt{42}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{14} - \frac{\sqrt{42}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{14} - \frac{\sqrt{14}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{14}$$

$$\boxed{\text{z689}} \quad \mathbb{Q}_{1,1}^{(1,-1;c)}(E, b) = \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z690}} \quad \mathbb{Q}_{1,2}^{(1,-1;c)}(E, b) = -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z691}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 1) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z692}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 1) = \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z693}} \quad \mathbb{Q}_{2,1}^{(1,-1;c)}(E, 2) = \frac{\sqrt{2}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z694}} \quad \mathbb{Q}_{2,2}^{(1,-1;c)}(E, 2) = \frac{\sqrt{2}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_0^{(b)}(A_1)}{2}$$

$$\boxed{\text{z695}} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E, 1a) = \frac{\sqrt{7}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{7}$$

$$\boxed{\text{z696}} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(E, 1a) = -\frac{\sqrt{7}\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,2}^{(b)}(E)}{14} - \frac{\sqrt{7}\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2)\mathbb{Q}_{1,1}^{(b)}(E)}{14} + \frac{\sqrt{21}\mathbb{Q}_2^{(1,-1;a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{7}$$

$$\boxed{\text{z697}} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E, 1b) = -\frac{\sqrt{15}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{12} + \frac{\sqrt{6}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{12} + \frac{\sqrt{15}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{12} - \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z698}} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(E, 1b) = -\frac{\sqrt{6}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{12} + \frac{\sqrt{15}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{12} + \frac{\sqrt{15}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{12} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z699}} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E, 2a) = \frac{\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{\text{z700}} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(E, 2a) = -\frac{\mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{\text{z701}} \quad \mathbb{Q}_{3,1}^{(1,-1;c)}(E, 2b) = \frac{\sqrt{15}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{12} - \frac{\sqrt{15}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{12} - \frac{\sqrt{6}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{6} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{4} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_{1,2}^{(b)}(E)}{4}$$

$$\boxed{\text{z702}} \quad \mathbb{Q}_{3,2}^{(1,-1;c)}(E, 2b) = -\frac{\sqrt{15}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{12} + \frac{\sqrt{6}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{6} - \frac{\sqrt{15}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{12} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{4} - \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_{1,1}^{(b)}(E)}{4}$$

$$\boxed{z703} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(E, a) = -\frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{z704} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(E, a) = \frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{z705} \quad \mathbb{Q}_{1,1}^{(1,0;c)}(E, b) = \frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{10}$$

$$\boxed{z706} \quad \mathbb{Q}_{1,2}^{(1,0;c)}(E, b) = \frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{10} - \frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{10} - \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{10} - \frac{\sqrt{5}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{10}$$

$$\boxed{z707} \quad \mathbb{Q}_{3,1}^{(1,0;c)}(E, 1) = -\frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{30} - \frac{2\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{30} + \frac{\sqrt{5}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{5}$$

$$\boxed{z708} \quad \mathbb{Q}_{3,2}^{(1,0;c)}(E, 1) = \frac{2\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{15} + \frac{\sqrt{15}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{30} + \frac{\sqrt{15}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{30} + \frac{\sqrt{5}\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{5}$$

$$\boxed{z709} \quad \mathbb{Q}_{3,1}^{(1,0;c)}(E, 2) = \frac{\sqrt{6}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{6}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{6}$$

$$\boxed{z710} \quad \mathbb{Q}_{3,2}^{(1,0;c)}(E, 2) = -\frac{\sqrt{6}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{6}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{6} - \frac{\sqrt{6}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{6}$$

$$\boxed{z711} \quad \mathbb{Q}_{1,1}^{(1,1;c)}(E, a) = \frac{\sqrt{2}\mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{z712} \quad \mathbb{Q}_{1,2}^{(1,1;c)}(E, a) = \frac{\sqrt{2}\mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{z713} \quad \mathbb{Q}_{1,1}^{(1,1;c)}(E, b) = \frac{\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{z714} \quad \mathbb{Q}_{1,2}^{(1,1;c)}(E, b) = -\frac{\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{z715} \quad \mathbb{G}_{2,1}^{(c)}(E, 1) = \frac{\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{z716} \quad \mathbb{G}_{2,2}^{(c)}(E, 1) = -\frac{\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{z717} \quad \mathbb{G}_{2,1}^{(c)}(E, 2) = \frac{\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{z718} \quad \mathbb{G}_{2,2}^{(c)}(E, 2) = -\frac{\mathbb{M}_{1,1}^{(a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{z719} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 1a) = \frac{\sqrt{210}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{42} + \frac{2\sqrt{21}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{21} - \frac{\sqrt{210}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{42} - \frac{\sqrt{14}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_{1,2}^{(b)}(E)}{14}$$

$$\boxed{z720} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 1a) = -\frac{2\sqrt{21}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{21} - \frac{\sqrt{210}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{42} - \frac{\sqrt{210}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{42} + \frac{\sqrt{14}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_{1,1}^{(b)}(E)}{14}$$

$$\boxed{z721} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 1b) = \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{z722} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 1b) = -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{z723} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 2a) = -\frac{\sqrt{21}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{42} + \frac{\sqrt{21}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{42} + \frac{\sqrt{210}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{42} + \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{14} + \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_{1,2}^{(b)}(E)}{14}$$

$$\boxed{z724} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 2a) = \frac{\sqrt{21}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{42} - \frac{\sqrt{210}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{42} + \frac{\sqrt{21}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{42} + \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{14} - \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_{1,1}^{(b)}(E)}{14}$$

$$\boxed{z725} \quad \mathbb{G}_{2,1}^{(1,-1;c)}(E, 2b) = \frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{z726} \quad \mathbb{G}_{2,2}^{(1,-1;c)}(E, 2b) = -\frac{\mathbb{M}_{1,1}^{(1,-1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,-1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

$$\boxed{z727} \quad \mathbb{G}_{4,1}^{(1,-1;c)}(E, 1) = -\frac{\sqrt{21}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{28} + \frac{\sqrt{210}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{28} + \frac{\sqrt{21}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{28} + \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_{1,2}^{(b)}(E)}{14}$$

$$\boxed{z728} \quad \mathbb{G}_{4,2}^{(1,-1;c)}(E, 1) = -\frac{\sqrt{210}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{28} + \frac{\sqrt{21}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{28} + \frac{\sqrt{21}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{28} - \frac{\sqrt{35}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_{1,1}^{(b)}(E)}{14}$$

$$\boxed{z729} \quad \mathbb{G}_{4,1}^{(1,-1;c)}(E, 2) = \frac{\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$$

$$\boxed{z730} \quad \mathbb{G}_{4,2}^{(1,-1;c)}(E, 2) = \frac{\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{2} + \frac{\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$$

- [z731]**  $\mathbb{G}_{4,1}^{(1,-1;c)}(E, 3) = \frac{\sqrt{105}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{28} - \frac{\sqrt{105}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{28} + \frac{\sqrt{42}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{14} - \frac{\sqrt{7}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{28} - \frac{\sqrt{7}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_{1,2}^{(b)}(E)}{28}$
- [z732]**  $\mathbb{G}_{4,2}^{(1,-1;c)}(E, 3) = -\frac{\sqrt{105}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{28} - \frac{\sqrt{42}\mathbb{M}_{3,1}^{(1,-1;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{14} - \frac{\sqrt{105}\mathbb{M}_{3,2}^{(1,-1;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{28} - \frac{\sqrt{7}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{28} + \frac{\sqrt{7}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_{1,1}^{(b)}(E)}{28}$
- [z733]**  $\mathbb{G}_{1,1}^{(1,0;c)}(E) = \frac{\sqrt{2}\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_0^{(b)}(A_1)}{2}$
- [z734]**  $\mathbb{G}_{1,2}^{(1,0;c)}(E) = \frac{\sqrt{2}\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_0^{(b)}(A_1)}{2}$
- [z735]**  $\mathbb{G}_{2,1}^{(1,0;c)}(E, 1) = \frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_{1,1}^{(b)}(E)}{2}$
- [z736]**  $\mathbb{G}_{2,2}^{(1,0;c)}(E, 1) = -\frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_1^{(b)}(A_2)}{6} - \frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_{1,1}^{(b)}(E)}{6} + \frac{\mathbb{T}_2^{(1,0;a)}(A_1)\mathbb{T}_{1,2}^{(b)}(E)}{2}$
- [z737]**  $\mathbb{G}_{2,1}^{(1,0;c)}(E, 2a) = \frac{\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2}$
- [z738]**  $\mathbb{G}_{2,2}^{(1,0;c)}(E, 2a) = -\frac{\mathbb{G}_{1,1}^{(1,0;a)}(E)\mathbb{Q}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{G}_{1,2}^{(1,0;a)}(E)\mathbb{Q}_{1,1}^{(b)}(E)}{2}$
- [z739]**  $\mathbb{G}_{2,1}^{(1,0;c)}(E, 2b) = -\frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{6} - \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{3}$
- [z740]**  $\mathbb{G}_{2,2}^{(1,0;c)}(E, 2b) = \frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E, 1)\mathbb{T}_{1,2}^{(b)}(E)}{6} + \frac{\sqrt{3}\mathbb{T}_{2,1}^{(1,0;a)}(E, 2)\mathbb{T}_1^{(b)}(A_2)}{3} + \frac{\sqrt{3}\mathbb{T}_{2,2}^{(1,0;a)}(E, 1)\mathbb{T}_{1,1}^{(b)}(E)}{6}$
- [z741]**  $\mathbb{G}_{2,1}^{(1,1;c)}(E, 1) = \frac{\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} + \frac{\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_{1,2}^{(b)}(E)}{2}$
- [z742]**  $\mathbb{G}_{2,2}^{(1,1;c)}(E, 1) = -\frac{\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_1^{(b)}(A_2)}{2} - \frac{\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_{1,1}^{(b)}(E)}{2}$
- [z743]**  $\mathbb{G}_{2,1}^{(1,1;c)}(E, 2) = \frac{\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2}$
- [z744]**  $\mathbb{G}_{2,2}^{(1,1;c)}(E, 2) = -\frac{\mathbb{M}_{1,1}^{(1,1;a)}(E)\mathbb{T}_{1,2}^{(b)}(E)}{2} - \frac{\mathbb{M}_{1,2}^{(1,1;a)}(E)\mathbb{T}_{1,1}^{(b)}(E)}{2}$

- bra:  $\langle s, \uparrow |, \langle s, \downarrow |$
- ket:  $|s, \uparrow \rangle, |s, \downarrow \rangle$

$$\boxed{x1} \quad \mathbb{Q}_0^{(a)}(A_1) = \begin{bmatrix} \frac{\sqrt{2}}{2} & 0 \\ 0 & \frac{\sqrt{2}}{2} \end{bmatrix}$$

$$\boxed{x2} \quad \mathbb{M}_1^{(1,-1;a)}(A_2) = \begin{bmatrix} \frac{\sqrt{2}}{2} & 0 \\ 0 & -\frac{\sqrt{2}}{2} \end{bmatrix}$$

$$\boxed{x3} \quad \mathbb{M}_{1,1}^{(1,-1;a)}(E) = \begin{bmatrix} 0 & \frac{\sqrt{2}}{2} \\ \frac{\sqrt{2}}{2} & 0 \end{bmatrix}$$

$$\boxed{x4} \quad \mathbb{M}_{1,2}^{(1,-1;a)}(E) = \begin{bmatrix} 0 & -\frac{\sqrt{2}i}{2} \\ \frac{\sqrt{2}i}{2} & 0 \end{bmatrix}$$

- bra:  $\langle s, \uparrow |, \langle s, \downarrow |$
- ket:  $|p_x, \uparrow \rangle, |p_x, \downarrow \rangle, |p_y, \uparrow \rangle, |p_y, \downarrow \rangle, |p_z, \uparrow \rangle, |p_z, \downarrow \rangle$

$$\boxed{x5} \quad \mathbb{Q}_1^{(a)}(A_2) = \begin{bmatrix} 0 & 0 & 0 & 0 & \frac{1}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{1}{2} \end{bmatrix}$$

$$\boxed{x6} \quad \mathbb{Q}_{1,1}^{(a)}(E) = \begin{bmatrix} \frac{1}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{2} & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{x7} \quad \mathbb{Q}_{1,2}^{(a)}(E) = \begin{bmatrix} 0 & 0 & \frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{1}{2} & 0 & 0 \end{bmatrix}$$

$$\boxed{x8} \quad \mathbb{Q}_1^{(1,0;a)}(A_2) = \begin{bmatrix} 0 & -\frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ \frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{x9} \quad \mathbb{Q}_{1,1}^{(1,0;a)}(E) = \begin{bmatrix} 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & \frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & -\frac{\sqrt{2}}{4} & 0 \end{bmatrix}$$

$$\boxed{x10} \quad \mathbb{Q}_{1,2}^{(1,0;a)}(E) = \begin{bmatrix} \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \end{bmatrix}$$

$$\boxed{x11} \quad \mathbb{G}_2^{(1,-1;a)}(A_1) = \begin{bmatrix} 0 & -\frac{\sqrt{6}i}{12} & 0 & -\frac{\sqrt{6}}{12} & \frac{\sqrt{6}i}{6} & 0 \\ -\frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & -\frac{\sqrt{6}i}{6} \end{bmatrix}$$

$$\boxed{x12} \quad \mathbb{G}_{2,1}^{(1,-1;a)}(E, 1) = \begin{bmatrix} 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & \frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & -\frac{\sqrt{2}}{4} & 0 \end{bmatrix}$$

$$\boxed{x13} \quad \mathbb{G}_{2,2}^{(1,-1;a)}(E, 1) = \begin{bmatrix} -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \end{bmatrix}$$

$$\boxed{x14} \quad \mathbb{G}_{2,1}^{(1,-1;a)}(E, 2) = \begin{bmatrix} 0 & \frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 \\ \frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{x15} \quad \mathbb{G}_{2,2}^{(1,-1;a)}(E, 2) = \begin{bmatrix} 0 & -\frac{\sqrt{2}}{4} & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 \\ \frac{\sqrt{2}}{4} & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{x16} \quad \mathbb{G}_0^{(1,1;a)}(A_1) = \begin{bmatrix} 0 & \frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{3}}{6} & \frac{\sqrt{3}i}{6} & 0 \\ \frac{\sqrt{3}i}{6} & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & -\frac{\sqrt{3}i}{6} \end{bmatrix}$$

$$\boxed{x17} \quad \mathbb{M}_2^{(1,-1;a)}(A_1) = \begin{bmatrix} 0 & -\frac{\sqrt{6}}{12} & 0 & \frac{\sqrt{6}i}{12} & \frac{\sqrt{6}}{6} & 0 \\ -\frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & -\frac{\sqrt{6}}{6} \end{bmatrix}$$

$$\boxed{x18} \quad \mathbb{M}_{2,1}^{(1,-1;a)}(E, 1) = \begin{bmatrix} 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & \frac{\sqrt{2}i}{4} & 0 \end{bmatrix}$$

$$\boxed{x19} \quad \mathbb{M}_{2,2}^{(1,-1;a)}(E, 1) = \begin{bmatrix} -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} \\ 0 & \frac{\sqrt{2}}{4} & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 \end{bmatrix}$$

$$\boxed{\text{x20}} \quad \mathbb{M}_{2,1}^{(1,-1;a)}(E, 2) = \begin{bmatrix} 0 & \frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ \frac{\sqrt{2}}{4} & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x21}} \quad \mathbb{M}_{2,2}^{(1,-1;a)}(E, 2) = \begin{bmatrix} 0 & \frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x22}} \quad \mathbb{M}_0^{(1,1;a)}(A_1) = \begin{bmatrix} 0 & \frac{\sqrt{3}}{6} & 0 & -\frac{\sqrt{3}i}{6} & \frac{\sqrt{3}}{6} & 0 \\ \frac{\sqrt{3}}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & -\frac{\sqrt{3}}{6} \end{bmatrix}$$

$$\boxed{\text{x23}} \quad \mathbb{T}_1^{(a)}(A_2) = \begin{bmatrix} 0 & 0 & 0 & 0 & \frac{i}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{i}{2} \end{bmatrix}$$

$$\boxed{\text{x24}} \quad \mathbb{T}_{1,1}^{(a)}(E) = \begin{bmatrix} \frac{i}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{i}{2} & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x25}} \quad \mathbb{T}_{1,2}^{(a)}(E) = \begin{bmatrix} 0 & 0 & \frac{i}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{i}{2} & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x26}} \quad \mathbb{T}_1^{(1,0;a)}(A_2) = \begin{bmatrix} 0 & \frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x27}} \quad \mathbb{T}_{1,1}^{(1,0;a)}(E) = \begin{bmatrix} 0 & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & \frac{\sqrt{2}}{4} & \frac{\sqrt{2}i}{4} & 0 \end{bmatrix}$$

$$\boxed{\text{x28}} \quad \mathbb{T}_{1,2}^{(1,0;a)}(E) = \begin{bmatrix} \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} \\ 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 \end{bmatrix}$$

- bra:  $\langle p_x, \uparrow |, \langle p_x, \downarrow |, \langle p_y, \uparrow |, \langle p_y, \downarrow |, \langle p_z, \uparrow |, \langle p_z, \downarrow |$
- ket:  $|p_x, \uparrow\rangle, |p_x, \downarrow\rangle, |p_y, \uparrow\rangle, |p_y, \downarrow\rangle, |p_z, \uparrow\rangle, |p_z, \downarrow\rangle$

$$\boxed{x29} \quad \mathbb{Q}_0^{(a)}(A_1) = \begin{bmatrix} \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} \end{bmatrix}$$

$$\boxed{x30} \quad \mathbb{Q}_2^{(a)}(A_1) = \begin{bmatrix} -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{3} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{3} \end{bmatrix}$$

$$\boxed{x31} \quad \mathbb{Q}_{2,1}^{(a)}(E, 1) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{1}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & \frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{1}{2} & 0 & 0 \end{bmatrix}$$

$$\boxed{x32} \quad \mathbb{Q}_{2,2}^{(a)}(E, 1) = \begin{bmatrix} 0 & 0 & 0 & 0 & -\frac{1}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{1}{2} \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{1}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{1}{2} & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x33}} \quad \mathbb{Q}_{2,1}^{(a)}(E, 2) = \begin{bmatrix} \frac{1}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{1}{2} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x34}} \quad \mathbb{Q}_{2,2}^{(a)}(E, 2) = \begin{bmatrix} 0 & 0 & -\frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{1}{2} & 0 & 0 \\ -\frac{1}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{1}{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x35}} \quad \mathbb{Q}_2^{(1,-1;a)}(A_1) = \begin{bmatrix} 0 & 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 & -\frac{\sqrt{6}}{12} \\ 0 & 0 & 0 & \frac{\sqrt{6}i}{6} & \frac{\sqrt{6}}{12} & 0 \\ \frac{\sqrt{6}i}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{12} \\ 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 & \frac{\sqrt{6}i}{12} & 0 \\ 0 & \frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 \\ -\frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x36}} \quad \mathbb{Q}_{2,1}^{(1,-1;a)}(E, 1) = \begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & \frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{x37} \quad \mathbb{Q}_{2,2}^{(1,-1;a)}(E, 1) = \begin{bmatrix} 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \end{bmatrix}$$

$$\boxed{x38} \quad \mathbb{Q}_{2,1}^{(1,-1;a)}(E, 2) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \\ 0 & \frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ -\frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{x39} \quad \mathbb{Q}_{2,2}^{(1,-1;a)}(E, 2) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 \\ 0 & \frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 \\ \frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{x40} \quad \mathbb{Q}_0^{(1,1;a)}(A_1) = \begin{bmatrix} 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & \frac{\sqrt{3}}{6} \\ 0 & 0 & 0 & \frac{\sqrt{3}i}{6} & -\frac{\sqrt{3}}{6} & 0 \\ \frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} \\ 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 \\ 0 & -\frac{\sqrt{3}}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 \\ \frac{\sqrt{3}}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{x41} \quad \mathbb{G}_1^{(1,0;a)}(A_2) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{x42} \quad \mathbb{G}_{1,1}^{(1,0;a)}(E) = \begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & -\frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{x43} \quad \mathbb{G}_{1,2}^{(1,0;a)}(E) = \begin{bmatrix} 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 \end{bmatrix}$$

$$\boxed{x44} \quad \mathbb{M}_1^{(a)}(A_2) = \begin{bmatrix} 0 & 0 & -\frac{i}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{i}{2} & 0 & 0 \\ \frac{i}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{i}{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{x45} \quad \mathbb{M}_{1,1}^{(a)}(E) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{i}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{i}{2} \\ 0 & 0 & \frac{i}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{i}{2} & 0 & 0 \end{bmatrix}$$

$$\boxed{x46} \quad \mathbb{M}_{1,2}^{(a)}(E) = \begin{bmatrix} 0 & 0 & 0 & 0 & \frac{i}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{i}{2} \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{i}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{i}{2} & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{x47} \quad \mathbb{M}_3^{(1,-1;a)}(A_1) = \begin{bmatrix} 0 & \frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ \frac{\sqrt{2}}{4} & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{x48} \quad \mathbb{M}_1^{(1,-1;a)}(A_2) = \begin{bmatrix} \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{6}}{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{6} \end{bmatrix}$$

$$\boxed{x49} \quad \mathbb{M}_3^{(1,-1;a)}(A_2, 1) = \begin{bmatrix} -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} \\ 0 & \frac{\sqrt{5}}{10} & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 \\ 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & \frac{\sqrt{5}i}{10} \\ 0 & 0 & 0 & \frac{\sqrt{5}}{10} & -\frac{\sqrt{5}i}{10} & 0 \\ 0 & -\frac{\sqrt{5}}{10} & 0 & \frac{\sqrt{5}i}{10} & \frac{\sqrt{5}}{5} & 0 \\ -\frac{\sqrt{5}}{10} & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & -\frac{\sqrt{5}}{5} \end{bmatrix}$$

$$\boxed{x50} \quad \mathbb{M}_3^{(1,-1;a)}(A_2, 2) = \begin{bmatrix} 0 & -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 \\ \frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ \frac{\sqrt{2}}{4} & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{x51} \quad \mathbb{M}_{1,1}^{(1,-1;a)}(E) = \begin{bmatrix} 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 \end{bmatrix}$$

$$\boxed{x52} \quad \mathbb{M}_{1,2}^{(1,-1;a)}(E) = \begin{bmatrix} 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{6}i}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}i}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{6} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{6} & 0 \end{bmatrix}$$

$$\boxed{x53} \quad \mathbb{M}_{3,1}^{(1,-1;a)}(E, 1) = \begin{bmatrix} 0 & -\frac{\sqrt{30}}{20} & 0 & \frac{\sqrt{30}i}{60} & \frac{\sqrt{30}}{15} & 0 \\ -\frac{\sqrt{30}}{20} & 0 & -\frac{\sqrt{30}i}{60} & 0 & 0 & -\frac{\sqrt{30}}{15} \\ 0 & \frac{\sqrt{30}i}{60} & 0 & -\frac{\sqrt{30}}{60} & 0 & 0 \\ -\frac{\sqrt{30}i}{60} & 0 & -\frac{\sqrt{30}}{60} & 0 & 0 & 0 \\ \frac{\sqrt{30}}{15} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{15} \\ 0 & -\frac{\sqrt{30}}{15} & 0 & 0 & \frac{\sqrt{30}}{15} & 0 \end{bmatrix}$$

$$\boxed{x54} \quad \mathbb{M}_{3,2}^{(1,-1;a)}(E, 1) = \begin{bmatrix} 0 & \frac{\sqrt{30}i}{60} & 0 & -\frac{\sqrt{30}}{60} & 0 & 0 \\ -\frac{\sqrt{30}i}{60} & 0 & -\frac{\sqrt{30}}{60} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{30}}{60} & 0 & \frac{\sqrt{30}i}{20} & \frac{\sqrt{30}}{15} & 0 \\ -\frac{\sqrt{30}}{60} & 0 & -\frac{\sqrt{30}i}{20} & 0 & 0 & -\frac{\sqrt{30}}{15} \\ 0 & 0 & \frac{\sqrt{30}}{15} & 0 & 0 & -\frac{\sqrt{30}i}{15} \\ 0 & 0 & 0 & -\frac{\sqrt{30}}{15} & \frac{\sqrt{30}i}{15} & 0 \end{bmatrix}$$

$$\boxed{x55} \quad \mathbb{M}_{3,1}^{(1,-1;a)}(E, 2) = \begin{bmatrix} 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & -\frac{\sqrt{3}i}{6} \\ 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & \frac{\sqrt{3}i}{6} & 0 \\ \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} \\ 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{3}}{6} & 0 \\ 0 & -\frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{3}}{6} & 0 & 0 \\ \frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{x56} \quad \mathbb{M}_{3,2}^{(1,-1;a)}(E, 2) = \begin{bmatrix} \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} \\ 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{3}}{6} & 0 \\ 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{3}i}{6} \\ 0 & 0 & 0 & \frac{\sqrt{3}}{6} & -\frac{\sqrt{3}i}{6} & 0 \\ 0 & \frac{\sqrt{3}}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 \\ \frac{\sqrt{3}}{6} & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{x57} \quad M_1^{(1,1;a)}(A_2) = \begin{bmatrix} -\frac{\sqrt{30}}{30} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} \\ 0 & \frac{\sqrt{30}}{30} & 0 & 0 & \frac{\sqrt{30}}{20} & 0 \\ 0 & 0 & -\frac{\sqrt{30}}{30} & 0 & 0 & -\frac{\sqrt{30}i}{20} \\ 0 & 0 & 0 & \frac{\sqrt{30}}{30} & \frac{\sqrt{30}i}{20} & 0 \\ 0 & \frac{\sqrt{30}}{20} & 0 & -\frac{\sqrt{30}i}{20} & \frac{\sqrt{30}}{15} & 0 \\ \frac{\sqrt{30}}{20} & 0 & \frac{\sqrt{30}i}{20} & 0 & 0 & -\frac{\sqrt{30}}{15} \end{bmatrix}$$

$$\boxed{x58} \quad M_{1,1}^{(1,1;a)}(E) = \begin{bmatrix} 0 & \frac{\sqrt{30}}{15} & 0 & -\frac{\sqrt{30}i}{20} & \frac{\sqrt{30}}{20} & 0 \\ \frac{\sqrt{30}}{15} & 0 & \frac{\sqrt{30}i}{20} & 0 & 0 & -\frac{\sqrt{30}}{20} \\ 0 & -\frac{\sqrt{30}i}{20} & 0 & -\frac{\sqrt{30}}{30} & 0 & 0 \\ \frac{\sqrt{30}i}{20} & 0 & -\frac{\sqrt{30}}{30} & 0 & 0 & 0 \\ \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{30} \\ 0 & -\frac{\sqrt{30}}{20} & 0 & 0 & -\frac{\sqrt{30}}{30} & 0 \end{bmatrix}$$

$$\boxed{x59} \quad M_{1,2}^{(1,1;a)}(E) = \begin{bmatrix} 0 & \frac{\sqrt{30}i}{30} & 0 & \frac{\sqrt{30}}{20} & 0 & 0 \\ -\frac{\sqrt{30}i}{30} & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{30}}{20} & 0 & -\frac{\sqrt{30}i}{15} & \frac{\sqrt{30}}{20} & 0 \\ \frac{\sqrt{30}}{20} & 0 & \frac{\sqrt{30}i}{15} & 0 & 0 & -\frac{\sqrt{30}}{20} \\ 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & \frac{\sqrt{30}i}{30} \\ 0 & 0 & 0 & -\frac{\sqrt{30}}{20} & -\frac{\sqrt{30}i}{30} & 0 \end{bmatrix}$$

$$\boxed{x60} \quad T_2^{(1,0;a)}(A_1) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 \\ 0 & \frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{x61} \quad \mathbb{T}_{2,1}^{(1,0;a)}(E, 1) = \begin{bmatrix} 0 & 0 & 0 & \frac{\sqrt{6}i}{12} & \frac{\sqrt{6}}{12} & 0 \\ 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & -\frac{\sqrt{6}}{12} \\ 0 & \frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{6} & 0 & 0 \\ -\frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ \frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{6} \\ 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & -\frac{\sqrt{6}}{6} & 0 \end{bmatrix}$$

$$\boxed{x62} \quad \mathbb{T}_{2,2}^{(1,0;a)}(E, 1) = \begin{bmatrix} 0 & -\frac{\sqrt{6}i}{6} & 0 & -\frac{\sqrt{6}}{12} & 0 & 0 \\ \frac{\sqrt{6}i}{6} & 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & \frac{\sqrt{6}}{12} & 0 \\ -\frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{12} \\ 0 & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & \frac{\sqrt{6}i}{6} \\ 0 & 0 & 0 & -\frac{\sqrt{6}}{12} & -\frac{\sqrt{6}i}{6} & 0 \end{bmatrix}$$

$$\boxed{x63} \quad \mathbb{T}_{2,1}^{(1,0;a)}(E, 2) = \begin{bmatrix} 0 & 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & -\frac{\sqrt{6}i}{12} \\ 0 & 0 & 0 & \frac{\sqrt{6}}{6} & \frac{\sqrt{6}i}{12} & 0 \\ -\frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} \\ 0 & \frac{\sqrt{6}}{6} & 0 & 0 & \frac{\sqrt{6}}{12} & 0 \\ 0 & -\frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 \\ \frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{x64} \quad \mathbb{T}_{2,2}^{(1,0;a)}(E, 2) = \begin{bmatrix} -\frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} \\ 0 & \frac{\sqrt{6}}{6} & 0 & 0 & \frac{\sqrt{6}}{12} & 0 \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & \frac{\sqrt{6}i}{12} \\ 0 & 0 & 0 & -\frac{\sqrt{6}}{6} & -\frac{\sqrt{6}i}{12} & 0 \\ 0 & \frac{\sqrt{6}}{12} & 0 & \frac{\sqrt{6}i}{12} & 0 & 0 \\ \frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & 0 \end{bmatrix}$$

- Site cluster

\*\* Wyckoff: 6c

$$\boxed{y1} \quad \mathbb{Q}_0^{(s)}(A_1) = \left[ \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6} \right]$$

$$\boxed{y2} \quad \mathbb{Q}_1^{(s)}(A_2) = \left[ \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, -\frac{\sqrt{6}}{6}, -\frac{\sqrt{6}}{6}, -\frac{\sqrt{6}}{6} \right]$$

$$\boxed{y3} \quad \mathbb{Q}_{1,1}^{(s)}(E) = \left[ \frac{5\sqrt{21}}{42}, -\frac{2\sqrt{21}}{21}, -\frac{\sqrt{21}}{42}, -\frac{\sqrt{21}}{42}, \frac{5\sqrt{21}}{42}, -\frac{2\sqrt{21}}{21} \right]$$

$$\boxed{y4} \quad \mathbb{Q}_{1,2}^{(s)}(E) = \left[ \frac{\sqrt{7}}{14}, \frac{\sqrt{7}}{7}, -\frac{3\sqrt{7}}{14}, \frac{3\sqrt{7}}{14}, -\frac{\sqrt{7}}{14}, -\frac{\sqrt{7}}{7} \right]$$

$$\boxed{y5} \quad \mathbb{Q}_{2,1}^{(s)}(E, 1) = \left[ \frac{\sqrt{7}}{14}, \frac{\sqrt{7}}{7}, -\frac{3\sqrt{7}}{14}, -\frac{3\sqrt{7}}{14}, \frac{\sqrt{7}}{14}, \frac{\sqrt{7}}{7} \right]$$

$$\boxed{y6} \quad \mathbb{Q}_{2,2}^{(s)}(E, 1) = \left[ -\frac{5\sqrt{21}}{42}, \frac{2\sqrt{21}}{21}, \frac{\sqrt{21}}{42}, -\frac{\sqrt{21}}{42}, \frac{5\sqrt{21}}{42}, -\frac{2\sqrt{21}}{21} \right]$$

- Bond cluster

\*\* Wyckoff: 3a@3b

$$\boxed{y7} \quad \mathbb{Q}_0^{(s)}(A_1) = \left[ \frac{\sqrt{3}}{3}, \frac{\sqrt{3}}{3}, \frac{\sqrt{3}}{3} \right]$$

$$\boxed{y8} \quad \mathbb{T}_1^{(s)}(A_2) = \left[ \frac{\sqrt{3}i}{3}, \frac{\sqrt{3}i}{3}, \frac{\sqrt{3}i}{3} \right]$$

$$\boxed{y9} \quad \mathbb{Q}_{1,1}^{(s)}(E) = \left[ \frac{\sqrt{6}}{3}, -\frac{\sqrt{6}}{6}, -\frac{\sqrt{6}}{6} \right]$$

$$\boxed{y10} \quad \mathbb{Q}_{1,2}^{(s)}(E) = \left[ 0, \frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2} \right]$$

$$\boxed{y11} \quad \mathbb{T}_{1,1}^{(s)}(E) = \left[ 0, -\frac{\sqrt{2}i}{2}, \frac{\sqrt{2}i}{2} \right]$$

$$\boxed{y12} \quad \mathbb{T}_{1,2}^{(s)}(E) = \left[ \frac{\sqrt{6}i}{3}, -\frac{\sqrt{6}i}{6}, -\frac{\sqrt{6}i}{6} \right]$$

\*\* Wyckoff: **6a@6c**

$$\boxed{y13} \quad \mathbb{Q}_0^{(s)}(A_1) = \left[ \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6} \right]$$

$$\boxed{y14} \quad \mathbb{T}_0^{(s)}(A_1) = \left[ \frac{\sqrt{6}i}{6}, \frac{\sqrt{6}i}{6}, \frac{\sqrt{6}i}{6}, \frac{\sqrt{6}i}{6}, \frac{\sqrt{6}i}{6}, \frac{\sqrt{6}i}{6} \right]$$

$$\boxed{y15} \quad \mathbb{Q}_1^{(s)}(A_2) = \left[ \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}, -\frac{\sqrt{6}}{6}, -\frac{\sqrt{6}}{6}, -\frac{\sqrt{6}}{6} \right]$$

$$\boxed{y16} \quad \mathbb{T}_1^{(s)}(A_2) = \left[ \frac{\sqrt{6}i}{6}, \frac{\sqrt{6}i}{6}, \frac{\sqrt{6}i}{6}, -\frac{\sqrt{6}i}{6}, -\frac{\sqrt{6}i}{6}, -\frac{\sqrt{6}i}{6} \right]$$

$$\boxed{y17} \quad \mathbb{Q}_{1,1}^{(s)}(E) = \left[ \frac{5\sqrt{21}}{42}, -\frac{2\sqrt{21}}{21}, -\frac{\sqrt{21}}{42}, -\frac{\sqrt{21}}{42}, \frac{5\sqrt{21}}{42}, -\frac{2\sqrt{21}}{21} \right]$$

$$\boxed{y18} \quad \mathbb{Q}_{1,2}^{(s)}(E) = \left[ \frac{\sqrt{7}}{14}, \frac{\sqrt{7}}{7}, -\frac{3\sqrt{7}}{14}, \frac{3\sqrt{7}}{14}, -\frac{\sqrt{7}}{14}, -\frac{\sqrt{7}}{7} \right]$$

$$\boxed{y19} \quad \mathbb{T}_{1,1}^{(s)}(E) = \left[ \frac{5\sqrt{21}i}{42}, -\frac{2\sqrt{21}i}{21}, -\frac{\sqrt{21}i}{42}, -\frac{\sqrt{21}i}{42}, \frac{5\sqrt{21}i}{42}, -\frac{2\sqrt{21}i}{21} \right]$$

$$\boxed{y20} \quad \mathbb{T}_{1,2}^{(s)}(E) = \left[ \frac{\sqrt{7}i}{14}, \frac{\sqrt{7}i}{7}, -\frac{3\sqrt{7}i}{14}, \frac{3\sqrt{7}i}{14}, -\frac{\sqrt{7}i}{14}, -\frac{\sqrt{7}i}{7} \right]$$

$$\boxed{y21} \quad \mathbb{M}_{1,1}^{(s)}(E) = \left[ \frac{\sqrt{7}i}{14}, \frac{\sqrt{7}i}{7}, -\frac{3\sqrt{7}i}{14}, -\frac{3\sqrt{7}i}{14}, \frac{\sqrt{7}i}{14}, \frac{\sqrt{7}i}{7} \right]$$

$$\boxed{y22} \quad \mathbb{M}_{1,2}^{(s)}(E) = \left[ -\frac{5\sqrt{21}i}{42}, \frac{2\sqrt{21}i}{21}, \frac{\sqrt{21}i}{42}, -\frac{\sqrt{21}i}{42}, \frac{5\sqrt{21}i}{42}, -\frac{2\sqrt{21}i}{21} \right]$$

$$\boxed{y23} \quad \mathbb{Q}_{2,1}^{(s)}(E, 1) = \left[ \frac{\sqrt{7}}{14}, \frac{\sqrt{7}}{7}, -\frac{3\sqrt{7}}{14}, -\frac{3\sqrt{7}}{14}, \frac{\sqrt{7}}{14}, \frac{\sqrt{7}}{7} \right]$$

$$\boxed{y24} \quad \mathbb{Q}_{2,2}^{(s)}(E, 1) = \left[ -\frac{5\sqrt{21}}{42}, \frac{2\sqrt{21}}{21}, \frac{\sqrt{21}}{42}, -\frac{\sqrt{21}}{42}, \frac{5\sqrt{21}}{42}, -\frac{2\sqrt{21}}{21} \right]$$

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— Site and Bond —

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Table 5: Orbital of each site

#	site	orbital
1	A	$ s, \uparrow\rangle,  s, \downarrow\rangle,  p_x, \uparrow\rangle,  p_x, \downarrow\rangle,  p_y, \uparrow\rangle,  p_y, \downarrow\rangle,  p_z, \uparrow\rangle,  p_z, \downarrow\rangle$

Table 6: Neighbor and bra-ket of each bond

#	head	tail	neighbor	head (bra)	tail (ket)
1	A	A	[1, 2]	[s, p]	[s, p]

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— Site in Unit Cell —

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Sites in (conventional) cell (no plus set), SL = sublattice

Table 7: 'A' (#1) site cluster (6c), 1

SL	position ( $s$ )	mapping
1	[ 1.00000, 0.00000, 1.00000]	[1]
2	[ 0.00000, 1.00000, 1.00000]	[2]
3	[-1.00000,-1.00000, 1.00000]	[3]
4	[ 0.00000, 1.00000,-1.00000]	[4]
5	[ 1.00000, 0.00000,-1.00000]	[5]
6	[-1.00000,-1.00000,-1.00000]	[6]

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#### Bond in Unit Cell

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Bonds in (conventional) cell (no plus set): tail, head = (SL, plus set), (N)D = (non)directional (listed up to 5th neighbor at most)

Table 8: 1-th 'A'-'A' [1] (#1) bond cluster (6a@6c), D,  $|\mathbf{v}|=1.73205$  (cartesian)

SL	vector ( $\mathbf{v}$ )	center ( $\mathbf{c}$ )	mapping	head	tail	$\mathbf{R}$ (primitive)
1	[-1.00000, 1.00000, 0.00000]	[ 0.50000, 0.50000, 1.00000]	[1]	(2,1)	(1,1)	[0,0,0]
2	[-1.00000,-2.00000, 0.00000]	[-0.50000, 0.00000, 1.00000]	[2]	(3,1)	(2,1)	[0,0,0]
3	[ 2.00000, 1.00000, 0.00000]	[ 0.00000,-0.50000, 1.00000]	[3]	(1,1)	(3,1)	[0,0,0]
4	[ 1.00000,-1.00000, 0.00000]	[ 0.50000, 0.50000,-1.00000]	[4]	(5,1)	(4,1)	[0,0,0]
5	[-2.00000,-1.00000, 0.00000]	[ 0.00000,-0.50000,-1.00000]	[5]	(6,1)	(5,1)	[0,0,0]
6	[ 1.00000, 2.00000, 0.00000]	[-0.50000, 0.00000,-1.00000]	[6]	(4,1)	(6,1)	[0,0,0]

Table 9: 2-th 'A'-'A' [1] (#2) bond cluster (3a@3b), ND,  $|v|=2.0$  (cartesian)

SL	vector ( $v$ )	center ( $c$ )	mapping	head	tail	$R$ (primitive)
1	[ 0.00000, 0.00000,-2.00000]	[ 1.00000, 0.00000, 0.00000]	[1,-5]	(5,1)	(1,1)	[0,0,0]
2	[ 0.00000, 0.00000,-2.00000]	[ 0.00000, 1.00000, 0.00000]	[2,-4]	(4,1)	(2,1)	[0,0,0]
3	[ 0.00000, 0.00000,-2.00000]	[-1.00000,-1.00000, 0.00000]	[3,-6]	(6,1)	(3,1)	[0,0,0]