APPENDIX

In Case V above, expressions corresponding to Q_j, $1 \le j \le 4$, in (3.12) for a general parameter value $c \in \mathbb{C} \setminus \{0, 1\}$, see the definition (3.6) of U, are needed. We offer these expressions as Mathematica printouts below. In these printouts, $t := w - c$, and qj stands for Q_j. Further, a, b, f and g stand for α, β, γe^z and δe^{2z}, respectively.

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Together[Expand[q1]]
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$$-\frac{1}{t^4}\,(2\,(2\,c^2 - 8\,c^3 + 12\,c^4 - 8\,c^5 + 2\,c^6 + 3\,c\,t - 14\,c^2\,t + 24\,c^3\,t - 18\,c^4\,t + 5\,c^5\,t + t^2 - 2\,b\,t^2 - 7\,c\,t^2 + 4\,b\,c\,t^2 + 15\,c^2\,t^2 + 2\,a\,c^2\,t^2 - 2\,b\,c^2\,t^2 - 13\,c^3\,t^2 - 4\,a\,c^3\,t^2 + 4\,c^4\,t^2 + 2\,a\,c^4\,t^2 + 2\,c\,f\,t^2 - 2\,c^2\,f\,t^2 - 2\,c^2\,g\,t^2 - t^3 + 2\,b\,t^3 + 3\,c\,t^3 + 2\,a\,c\,t^3 - 2\,b\,c\,t^3 - 3\,c^2\,t^3 - 6\,a\,c^2\,t^3 + c^3\,t^3 + 4\,a\,c^3\,t^3 + f\,t^3 - 2\,c\,f\,t^3 - 2\,c\,g\,t^3 - 2\,a\,c\,t^4 + 2\,a\,c^2\,t^4))$$

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Together[Expand[q2]]
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$$\frac{-2\,c + 4\,c^2 - 2\,c^3 - t + 4\,c\,t - 3\,c^2\,t + t^2 - c\,t^2}{t^2}$$

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Together[Expand[q3]]
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$$\frac{1}{t^8}\,(4\,(4\,c^4 - 32\,c^5 + 112\,c^6 - 224\,c^7 + 280\,c^8 - 224\,c^9 + 112\,c^{10} - 32\,c^{11} + 4\,c^{12} + 12\,c^3\,t - 104\,c^4\,t + 392\,c^5\,t - 840\,c^6\,t + 1120\,c^7\,t - 952\,c^8\,t + 504\,c^9\,t - 152\,c^{10}\,t + 20\,c^{11}\,t + 13\,c^2\,t^2 - 8\,b\,c^2\,t^2 - 128\,c^3\,t^2 + 48\,b\,c^3\,t^2 + 536\,c^4\,t^2 + 8\,a\,c^4\,t^2 - 120\,b\,c^4\,t^2 - 1256\,c^5\,t^2 - 48\,a\,c^5\,t^2 + 160\,b\,c^5\,t^2 + 1810\,c^6\,t^2 + 120\,a\,c^6\,t^2 - 120\,b\,c^6\,t^2 - 1648\,c^7\,t^2 - 160\,a\,c^7\,t^2 + 48\,b\,c^7\,t^2 + 928\,c^8\,t^2 + 120\,a\,c^8\,t^2 - 8\,b\,c^8\,t^2 - 296\,c^9\,t^2 - 48\,a\,c^9\,t^2 + 41\,c^{10}\,t^2 + 8\,a\,c^{10}\,t^2 + 8\,c^3\,f\,t^2 - 40\,c^4\,f\,t^2 + 80\,c^5\,f\,t^2 - 80\,c^6\,f\,t^2 + 40\,c^7\,f\,t^2 - 8\,c^8\,f\,t^2 - 8\,c^4\,g\,t^2 + 32\,c^5\,g\,t^2 - 48\,c^6\,g\,t^2 + 32\,c^7\,g\,t^2 - 8\,c^8\,g\,t^2 + 6\,c\,t^3 - 8\,b\,c\,t^3 - 74\,c^2\,t^3 + 64\,b\,c^2\,t^3 + 362\,c^3\,t^3 + 24\,a\,c^3\,t^3 - 200\,b\,c^3\,t^3 - 954\,c^4\,t^3 - 160\,a\,c^4\,t^3 + 320\,b\,c^4\,t^3 + 1510\,c^5\,t^3 + 440\,a\,c^5\,t^3 - 280\,b\,c^5\,t^3 - 1486\,c^6\,t^3 - 640\,a\,c^6\,t^3 + 128\,b\,c^6\,t^3 + 894\,c^7\,t^3 + 520\,a\,c^7\,t^3 - 24\,b\,c^7\,t^3 - 302\,c^8\,t^3 - 224\,a\,c^8\,t^3 + 44\,c^9\,t^3 + 40\,a\,c^9\,t^3 + 16\,c^2\,f\,t^3 - 88\,c^3\,f\,t^3 + 192\,c^4\,f\,t^3 - 208\,c^5\,f\,t^3 + 112\,c^6\,f\,t^3 - 24\,c^7\,f\,t^3 - 24\,c^3\,g\,t^3 + 96\,c^4\,g\,t^3 - 144\,c^5\,g\,t^3 + 96\,c^6\,g\,t^3 - 24\,c^7\,g\,t^3 + t^4 - 2\,b\,t^4 - 20\,c\,t^4 + 28\,b\,c\,t^4 + 125\,c^2\,t^4 + 26\,a\,c^2\,t^4 - 118\,b\,c^2\,t^4 - 386\,c^3\,t^4 - 204\,a\,c^3\,t^4 + 232\,b\,c^3\,t^4 + 685\,c^4\,t^4 + 638\,a\,c^4\,t^4 - 238\,b\,c^4\,t^4 - 736\,c^5\,t^4 - 1032\,a\,c^5\,t^4 + 124\,b\,c^5\,t^4 + 475\,c^6\,t^4 + 918\,a\,c^6\,t^4 - 26\,b\,c^6\,t^4 - 170\,c^7\,t^4 - 428\,a\,c^7\,t^4 + 26\,c^8\,t^4 + 82\,a\,c^8\,t^4 + 10\,c\,f\,t^4 - 66\,c^2\,f\,t^4 + 164\,c^3\,f\,t^4 - 196\,c^4\,f\,t^4 + 114\,c^5\,f\,t^4 - 26\,c^6\,f\,t^4 - 26\,c^2\,g\,t^4 + 104\,c^3\,g\,t^4 - 156\,c^4\,g\,t^4 + 104\,c^5\,g\,t^4 - 26\,c^6\,g\,t^4 - 2\,t^5 + 4\,b\,t^5 + 20\,c\,t^5 + 12\,a\,c\,t^5 - 28\,b\,c\,t^5 - 78\,c^2\,t^5 - 124\,a\,c^2\,t^5 + 72\,b\,c^2\,t^5 + 160\,c^3\,t^5 + 464\,a\,c^3\,t^5 - 88\,b\,c^3\,t^5 - 190\,c^4\,t^5 - 856\,a\,c^4\,t^5 + 52\,b\,c^4\,t^5 + 132\,c^5\,t^5 + 844\,a\,c^5\,t^5 - 12\,b\,c^5\,t^5 - 50\,c^6\,t^5 - 428\,a\,c^6\,t^5 + 8\,c^7\,t^5 + 88\,a\,c^7\,t^5 + 2\,f\,t^5 - 20\,c\,f\,t^5 + 60\,c^2\,f\,t^5 - 80\,c^3\,f\,t^5 + 50\,c^4\,f\,t^5 - 12\,c^5\,f\,t^5 - 12\,c\,g\,t^5 + 48\,c^2\,g\,t^5 - 72\,c^3\,g\,t^5 + 48\,c^4\,g\,t^5 - 12\,c^5\,g\,t^5 + t^6 + 2\,a\,t^6 - 2\,b\,t^6 - 6\,c\,t^6 - 36\,a\,c\,t^6 + 8\,b\,c\,t^6 + 15\,c^2\,t^6 + 176\,a\,c^2\,t^6 - 12\,b\,c^2\,t^6 - 20\,c^3\,t^6 - 384\,a\,c^3\,t^6 + 8\,b\,c^3\,t^6 + 15\,c^4\,t^6 + 426\,a\,c^4\,t^6 - 2\,b\,c^4\,t^6 - 6\,c^5\,t^6 - 236\,a\,c^5\,t^6 + c^6\,t^6 + 52\,a\,c^6\,t^6 - 2\,f\,t^6 + 8\,c\,f\,t^6 - 12\,c^2\,f\,t^6 + 8\,c^3\,f\,t^6 - 2\,c^4\,f\,t^6 - 2\,g\,t^6 + 8\,c\,g\,t^6 - 12\,c^2\,g\,t^6 + 8\,c^3\,g\,t^6 - 2\,c^4\,g\,t^6 - 4\,a\,t^7 + 32\,a\,c\,t^7 - 88\,a\,c^2\,t^7 + 112\,a\,c^3\,t^7 - 68\,a\,c^4\,t^7 + 16\,a\,c^5\,t^7 + 2\,a\,t^8 - 8\,a\,c\,t^8 + 12\,a\,c^2\,t^8 - 8\,a\,c^3\,t^8 + 2\,a\,c^4\,t^8))$$

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Together[Expand[q4]]
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$$\frac{1}{t^6}\,(4\,(4\,c^3 - 24\,c^4 + 60\,c^5 - 80\,c^6 + 60\,c^7 - 24\,c^8 + 4\,c^9 + 8\,c^2\,t - 56\,c^3\,t + 160\,c^4\,t - 240\,c^5\,t + 200\,c^6\,t - 88\,c^7\,t + 16\,c^8\,t + 5\,c\,t^2 - 46\,c^2\,t^2 + 159\,c^3\,t^2 - 276\,c^4\,t^2 + 259\,c^5\,t^2 - 126\,c^6\,t^2 + 25\,c^7\,t^2 + t^3 - 16\,c\,t^3 + 73\,c^2\,t^3 - 152\,c^3\,t^3 + 163\,c^4\,t^3 - 88\,c^5\,t^3 + 19\,c^6\,t^3 - 2\,t^4 + 15\,c\,t^4 - 40\,c^2\,t^4 + 50\,c^3\,t^4 - 30\,c^4\,t^4 + 7\,c^5\,t^4 + t^5 - 4\,c\,t^5 + 6\,c^2\,t^5 - 4\,c^3\,t^5 + c^4\,t^5))$$