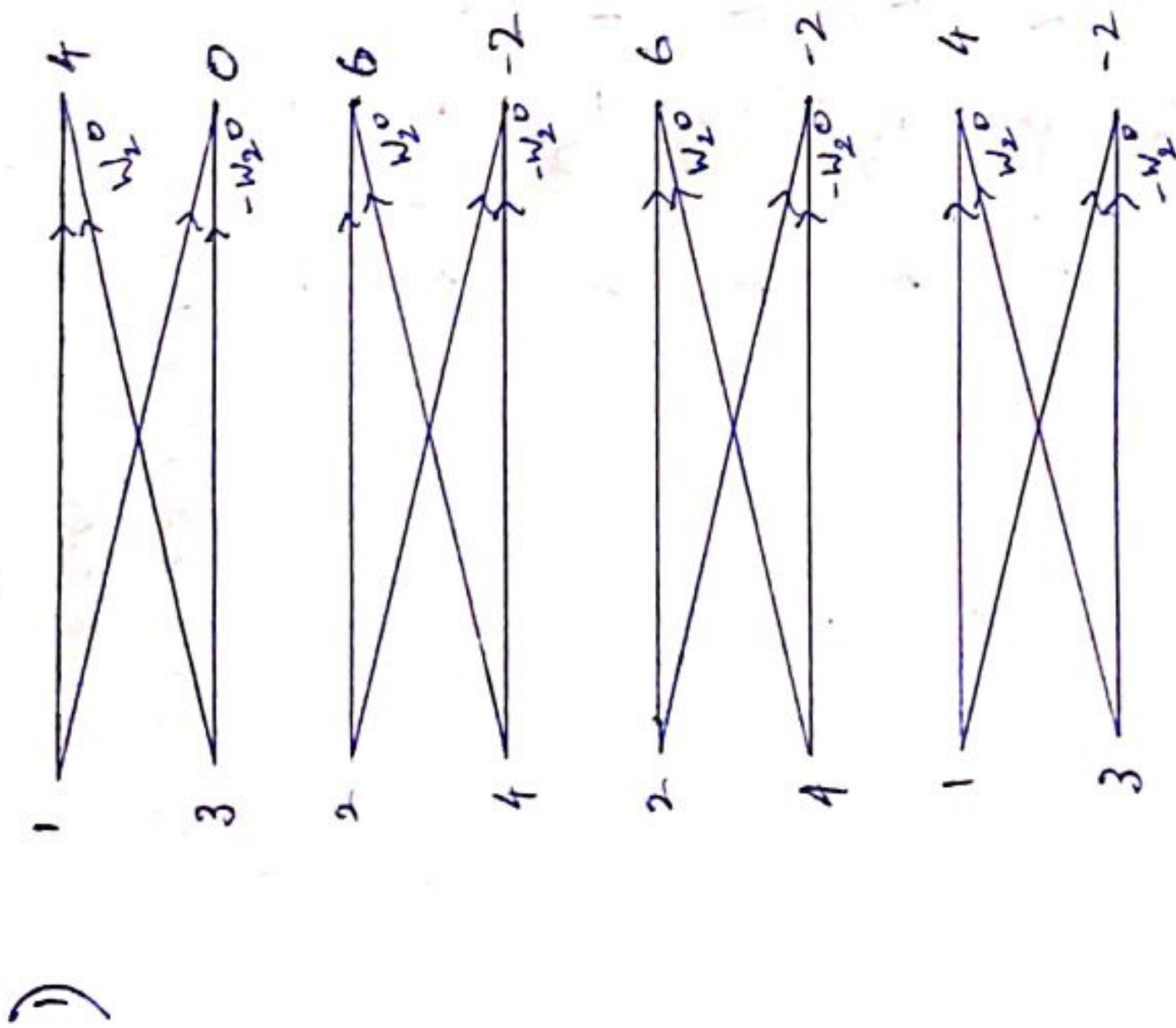


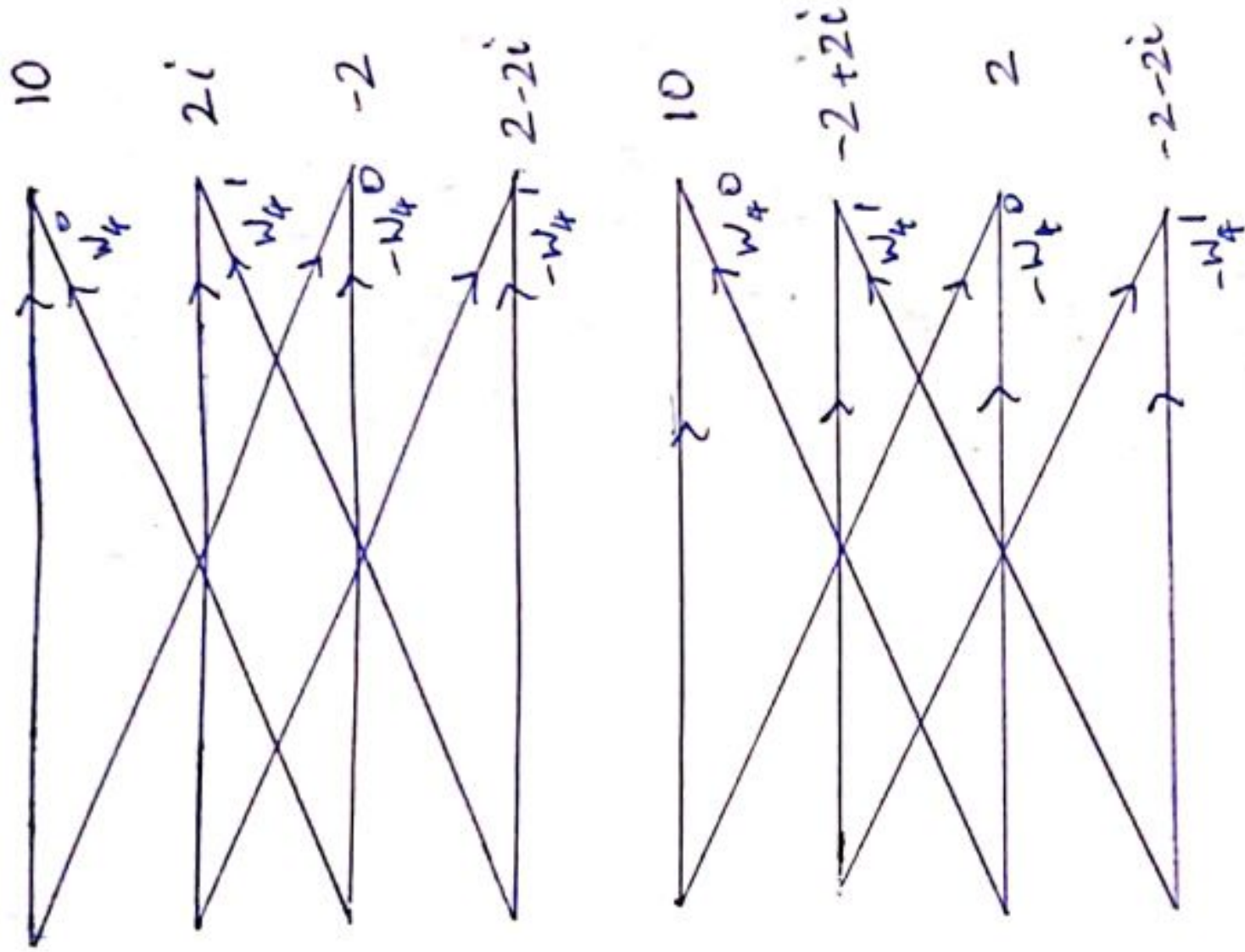
I DFT using DIT-FFT



$$x(n) = \{1, 2, 2, 1, 3, 4, 4, 3\}$$

$$\{1, 2, 3, 4\}$$

$$\{4, 1, 4, 3\}$$



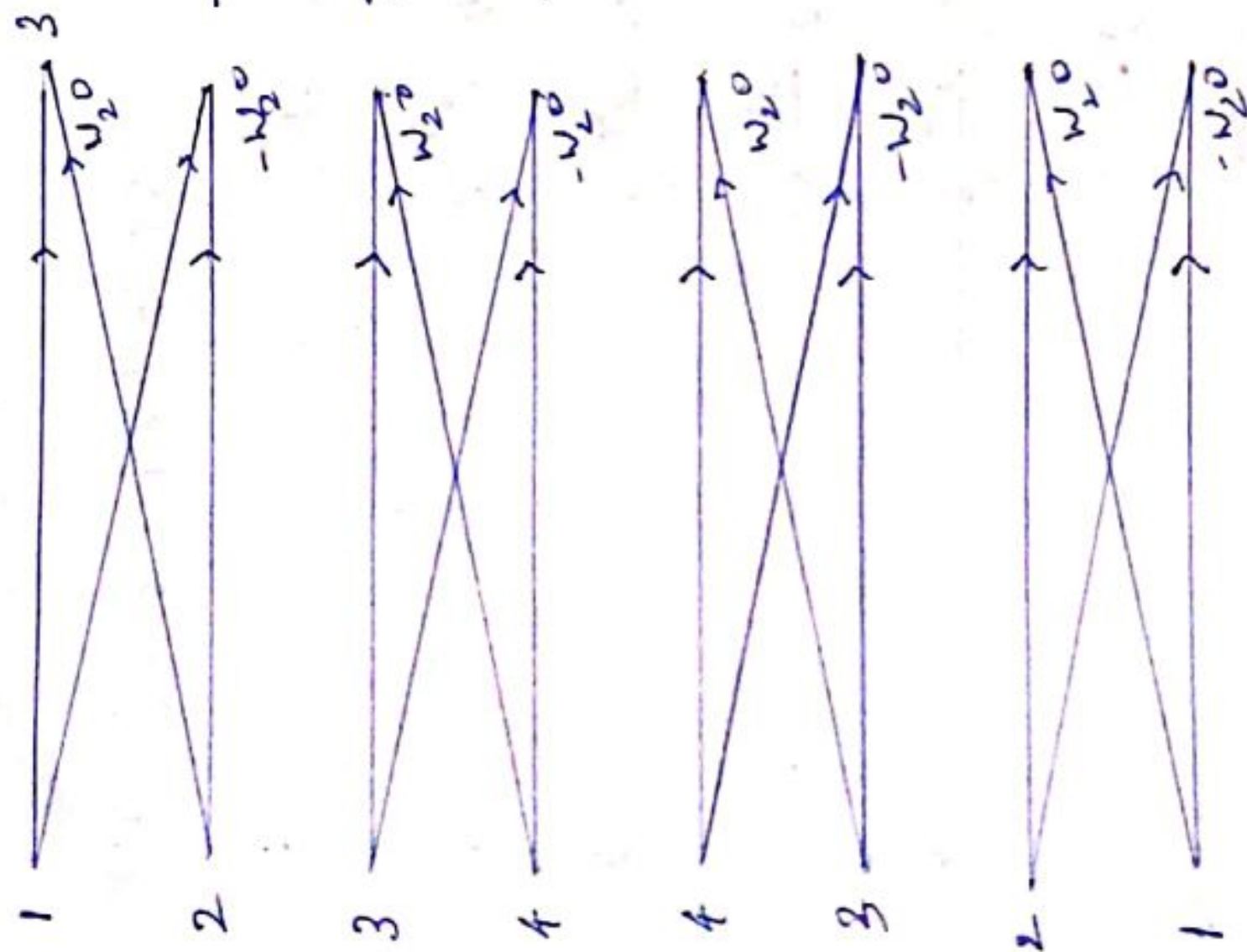
$$\{1, 3\} \{2, 4\} \{4, 4\} \{1, 3\}$$

$$FFT = \{20 - 2 + 82i + -2 - 2i, -2 + 0.8i, 0, -2 - 0.8i, -2 + 2i, -2 + 64.82i\}$$

K.P.B.

Y)

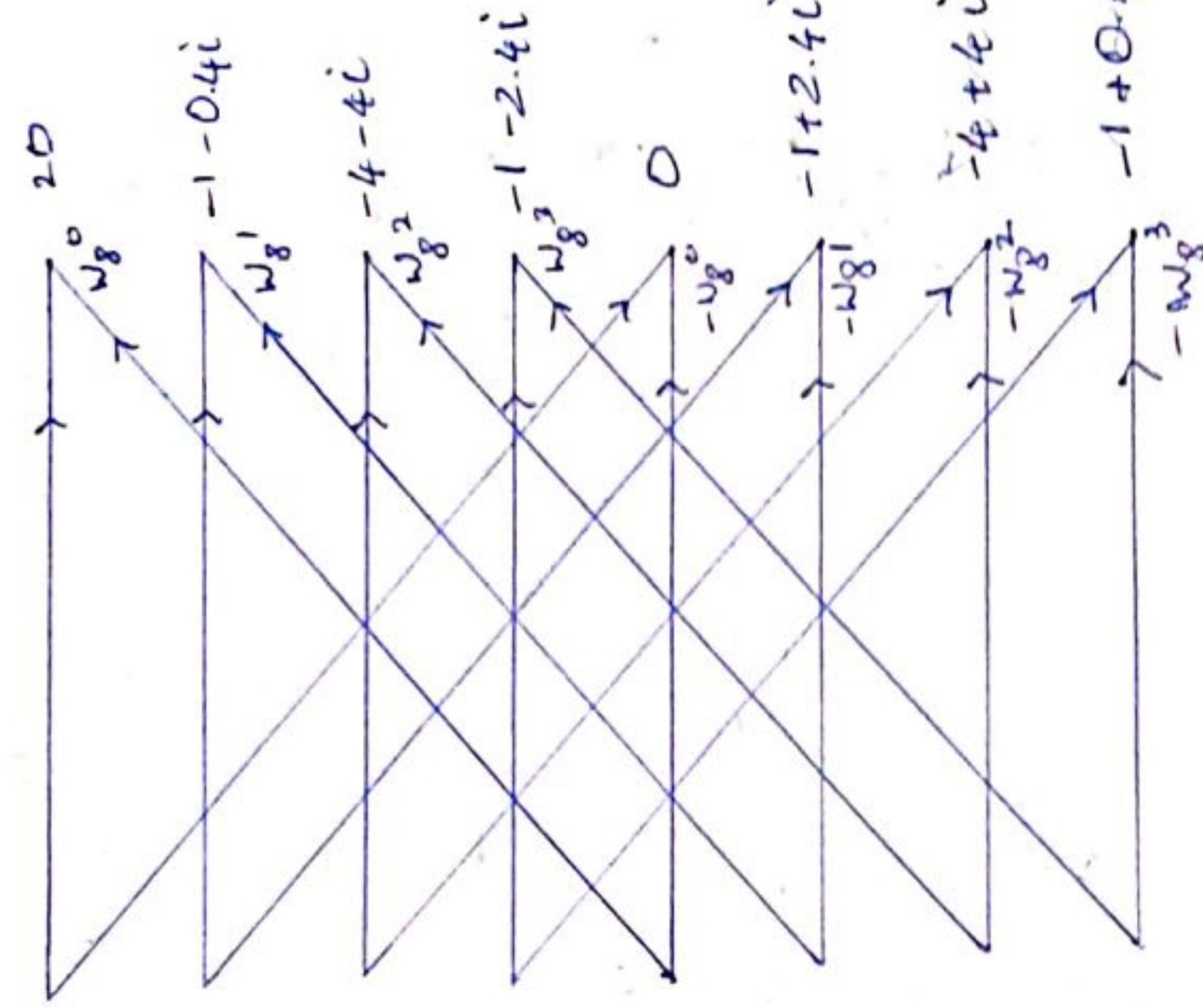
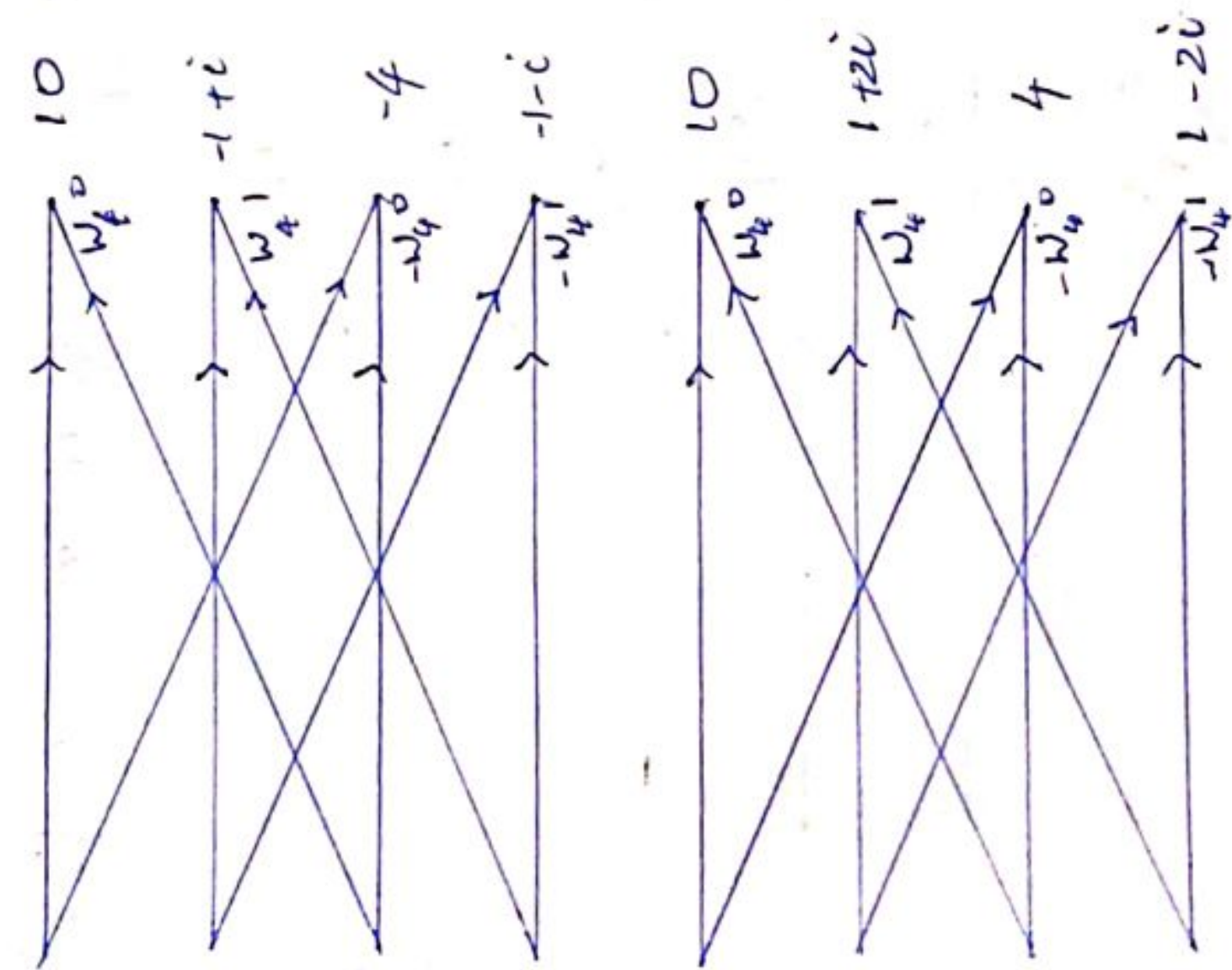
$$x(n) = \{1, 4, 3, 2, 2, 3, 4, 1\}$$



$$x(n) = \{1, 4, 3, 2, 2, 3, 4, 1\}$$

$$\{1, 3, 2, 4\} \{4, 2, 3, 1\}$$

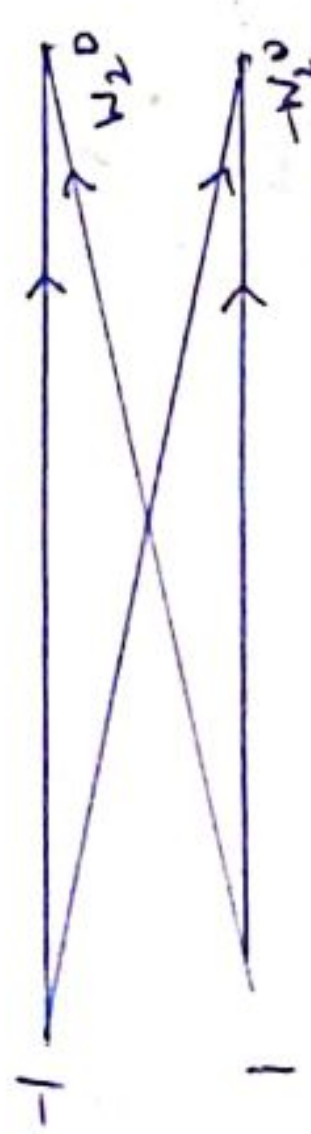
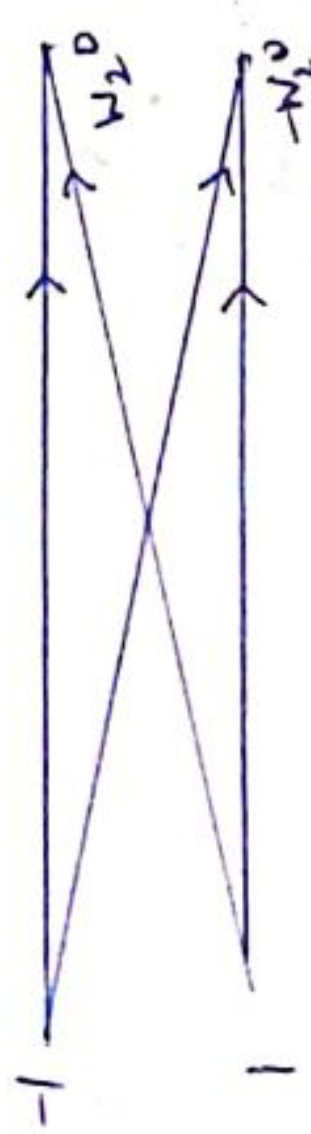
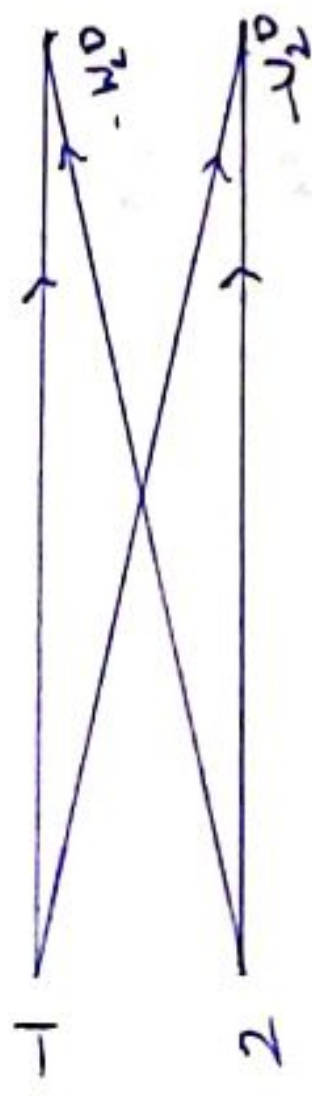
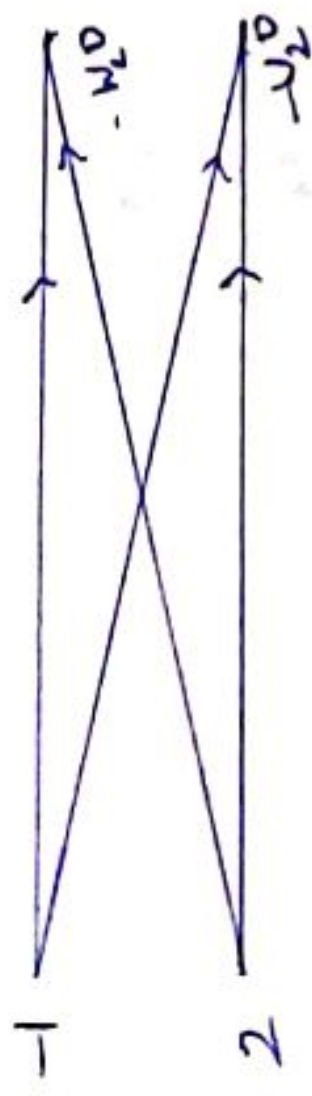
$$\{1, 2\} \{3, 4\} \{4, 3\} \{2, 1\}$$



$$FFT = \{20, -1-0.4i, -4-4i, -1-2.4i, 0, -1+2.4i, -4+4i, -1+0.4i\}$$

K.D.

I 3) $x(n) = \{2, 3, -1, 4, 3, 2, 1\}$



$x(n) = \{2, 3, -1, -1, 4, 3, 2, 1\}$

$\{2, -1, 4, 2\} \{3, -1, 3, 1\}$

$\{2, 4\} \{-1, 2\} \{3, 3\} \{-1, 1\}$

FFu



7

$-2+3i$

5

$6-3i$

6

$2i$

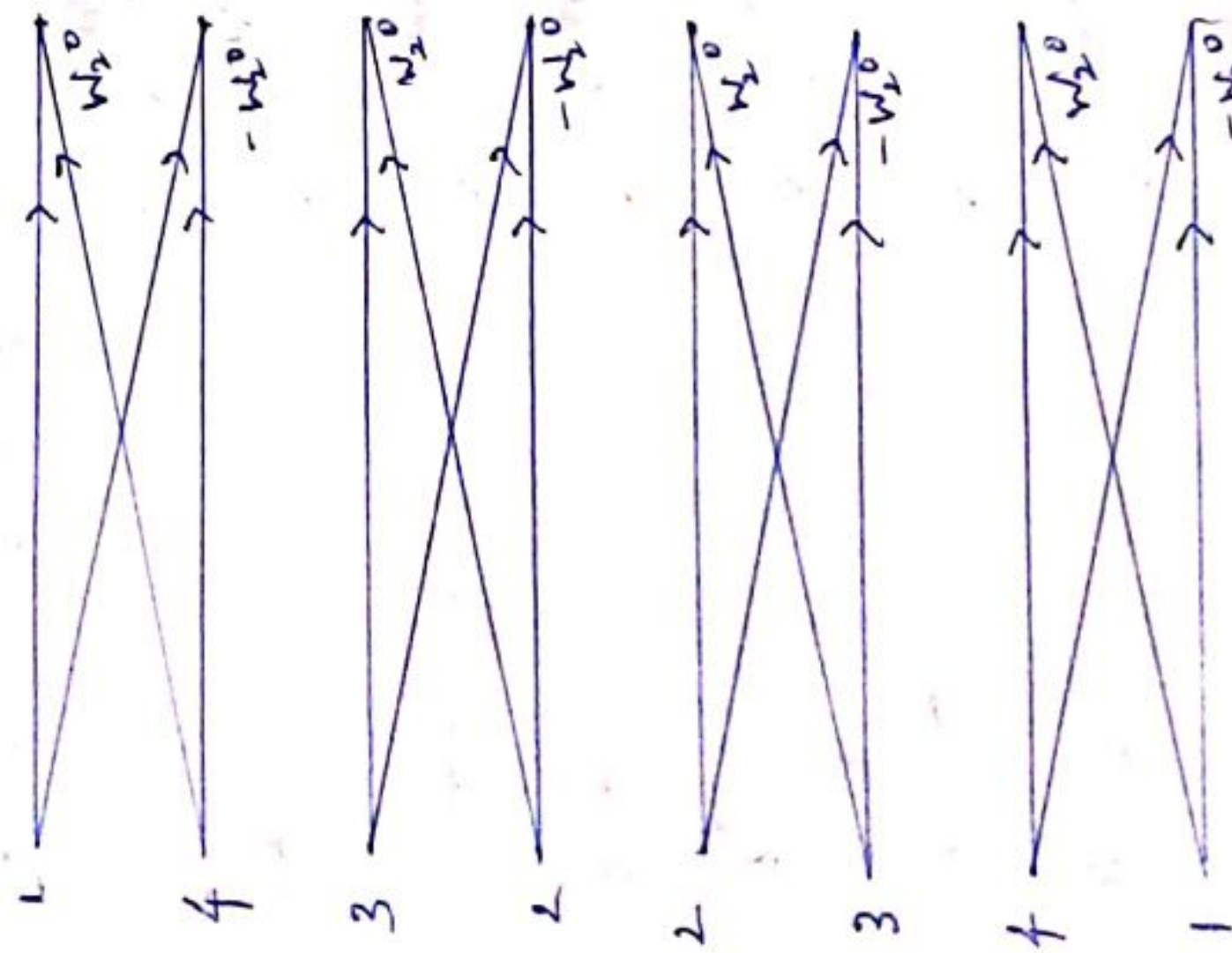
6

$-2i$

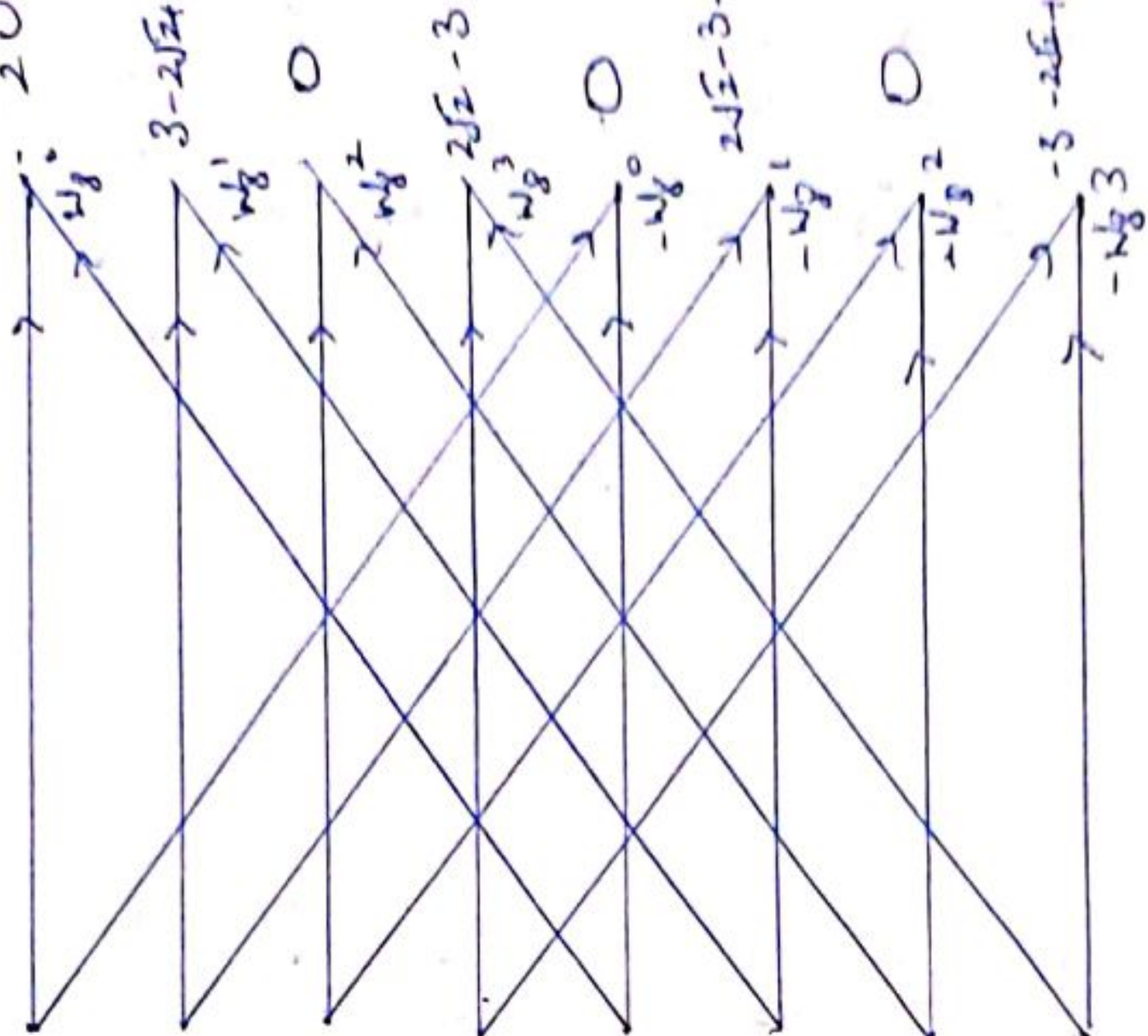
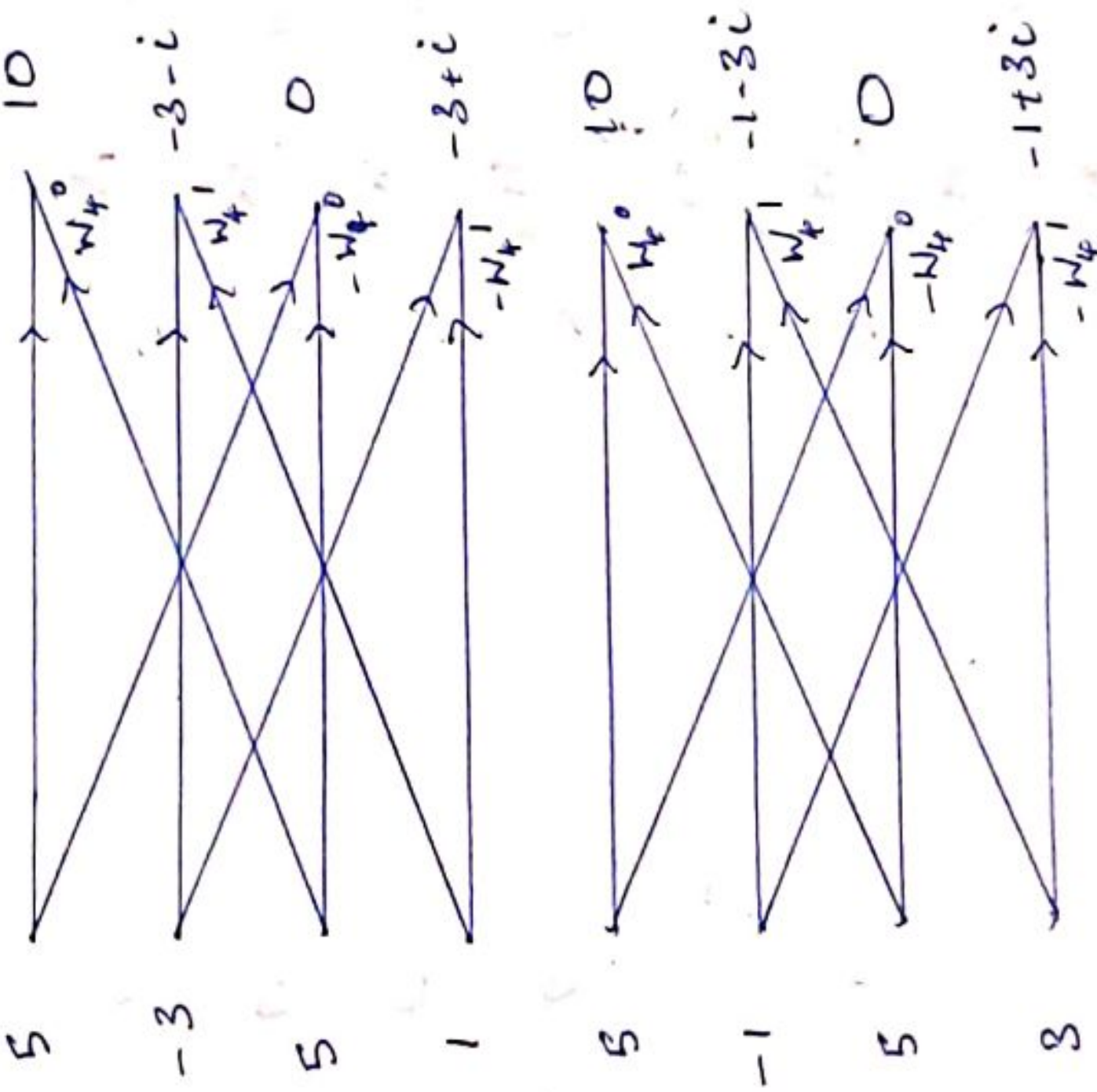


FFT = $\{13, -0.5+4.4i, 5-6i, -3.4-1.5i, 1, -3.4+1.5i, 5+6i, -0.58-4.4i\}$

IV) $x(n) = \{1, 2, 3, 4, 1, 3, 2, 1\}$



$x(n) = \{1, 2, 3, 4, 1, 3, 2, 1\}$
 $\{1, 3, 4, 2\}$
 $\{1, 4\}$



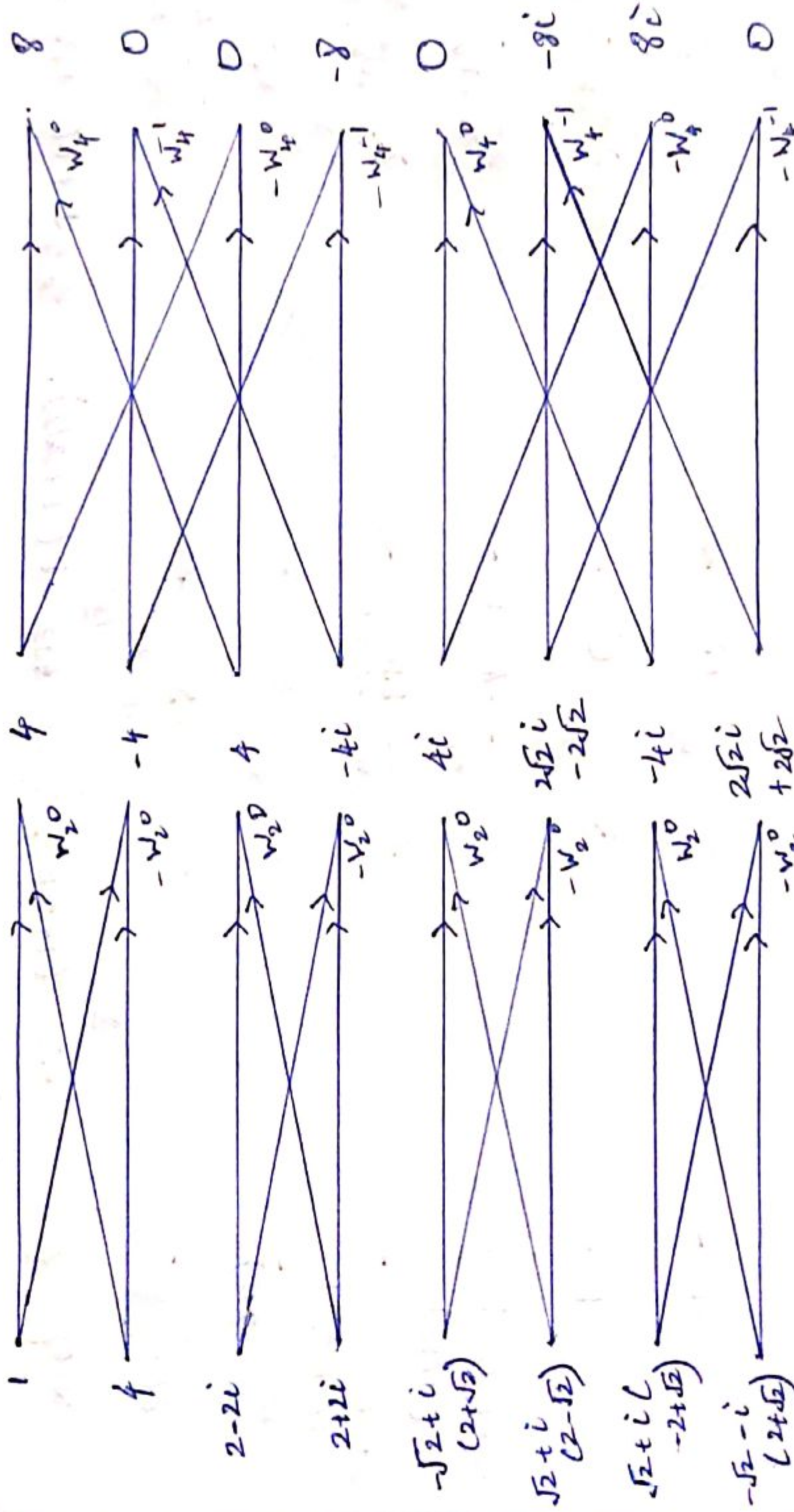
FFT = $\{20, 3-2\sqrt{2}+i(\sqrt{2}-1), 0, 2\sqrt{2}-3+i(1-\sqrt{2}), 0, -3-2\sqrt{2}+i(1+\sqrt{2}), 0, -3-2\sqrt{2}-i(1+\sqrt{2})\}$

SPB

II IDFT using DIT - FFT

1) $X(k) = \{0, -\sqrt{2} + i(2 + \sqrt{2}), 2 - 2i, \sqrt{2} + i(-2 + \sqrt{2}), 4, \sqrt{2} + i(2 - \sqrt{2}), 4\sqrt{2} + i(2 - \sqrt{2}), 2 + 2i, -\sqrt{2} - i(2 + \sqrt{2})\}$

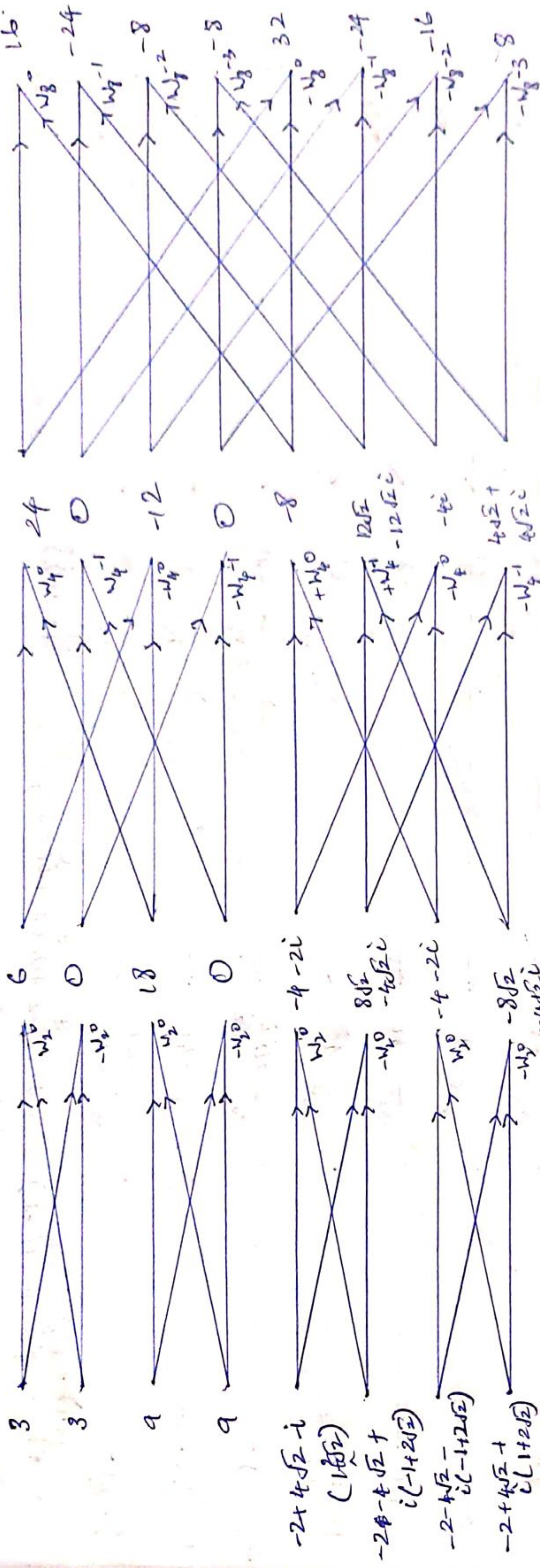
R.P. 44



$x(n) = \{1, 2, 3, 4, 2, 4, 2, 4\}$
 $X(k) = \{0, -\sqrt{2} + i(2 + \sqrt{2}), 2 - 2i, \sqrt{2} + i(-2 + \sqrt{2}), 4, \sqrt{2} + i(2 - \sqrt{2}), 4\sqrt{2} + i(2 - \sqrt{2}), 2 + 2i, -\sqrt{2} - i(2 + \sqrt{2})\}$

- {0, 3, 6, 7}, {2, 4, 5, 8}
- {1, 5}, {3, 7}, {2, 6}, {4, 8}

II) 2) $x(k) = \{3, -2+4\sqrt{2}-i(1+2\sqrt{2}), 9, -2-4\sqrt{2}-i(-1+2\sqrt{2}), 3, -2-4\sqrt{2}+i(-1+2\sqrt{2}), 9, -2+4\sqrt{2}+i(1+2\sqrt{2})\}$

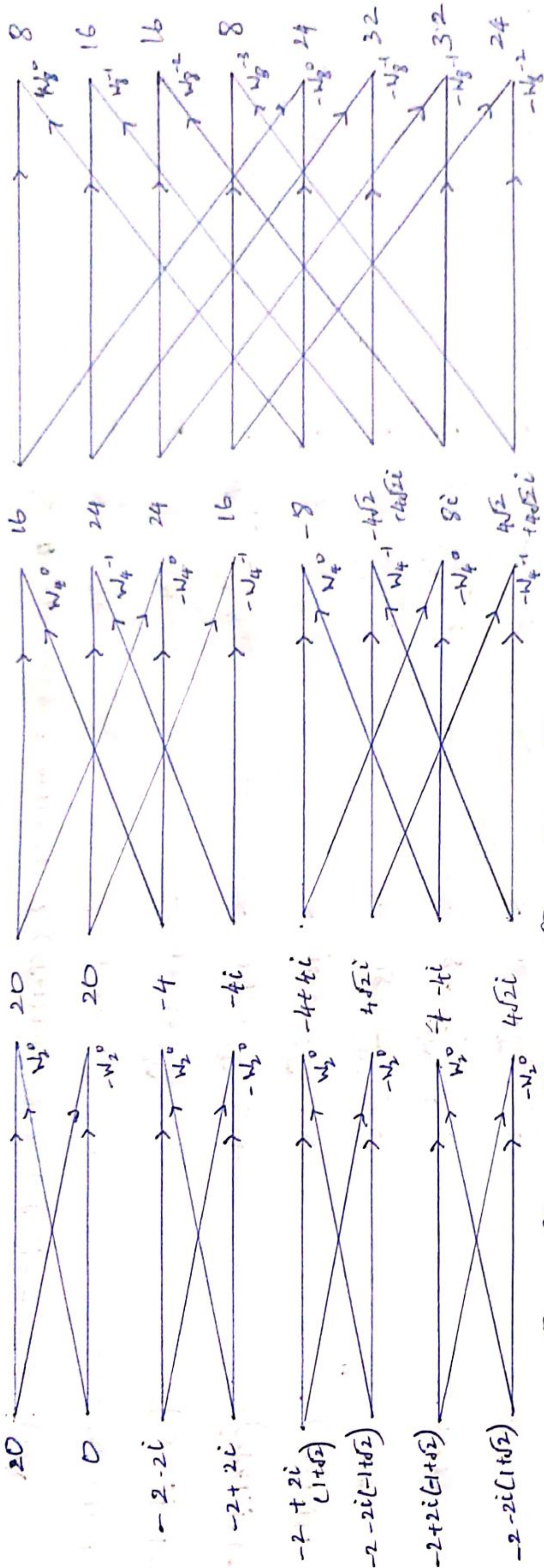


$x(k) = \{$ ① $3, -2+4\sqrt{2}-i(1+2\sqrt{2}), 9, -2-4\sqrt{2}-i(-1+2\sqrt{2}), 3, -2-4\sqrt{2}+i(-1+2\sqrt{2}), 9, -2+4\sqrt{2}+i(1+2\sqrt{2})\}$ ②
 $\{10, 3, 9, 7\}$ ③ $\{20, 20, 6, 8\}$ ④
 $\{10, 6\}$ ⑤ $\{3, 7\}$ ⑥ $\{2, 6\}$ ⑦ $\{4, 8\}$ ⑧
 $g(k) = \{2, -3, -1, -1, 4, -3, -4\}$

II

$$3) X(k) = \{20, -2 + 2i(1 + \sqrt{2}), -2 - 2i, -2 + 2i(-1 + \sqrt{2}), 0, -2 - 2i(1 + \sqrt{2}), -2 + 2i, -2 - 2i(-1 + \sqrt{2})\}$$

K. B. B.



$$X(k) = \{20, -2 + 2i(1 + \sqrt{2}), -2 - 2i, -2 + 2i(-1 + \sqrt{2}), 0, -2 - 2i(1 + \sqrt{2}), -2 + 2i, -2 - 2i(-1 + \sqrt{2})\}$$

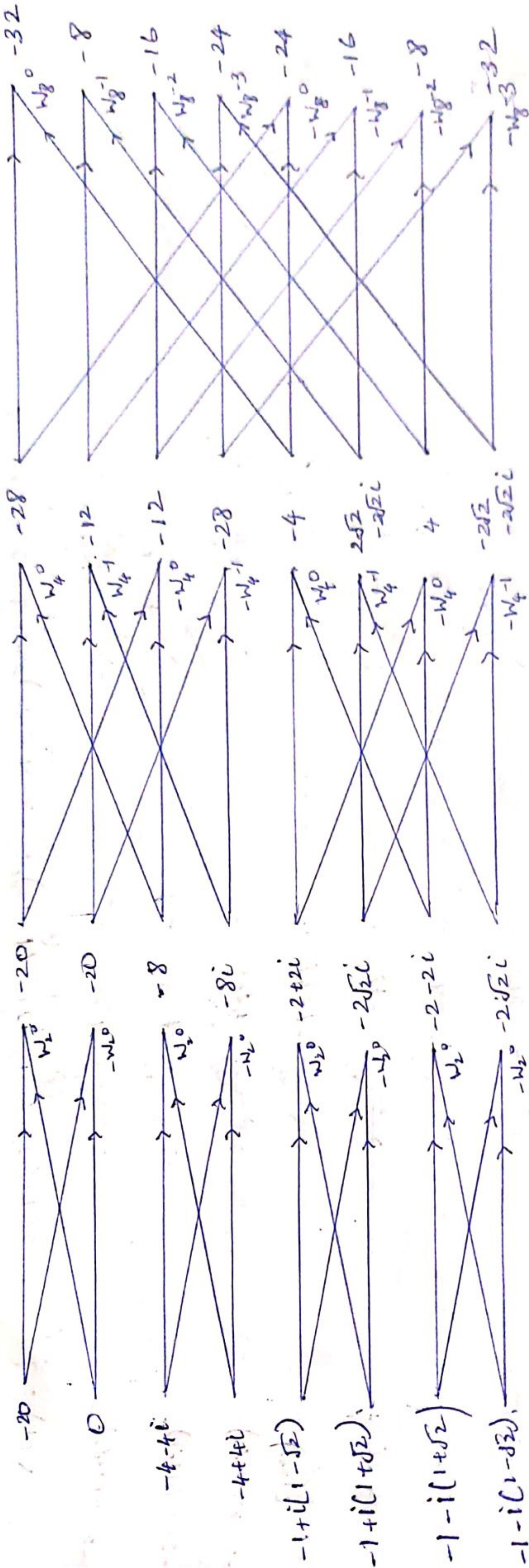
$$\{1, 3, 5, 7\} \{2, 4, 6, 8\}$$

$$\{1, 5\} \{3, 7\} \{2, 6\} \{4, 8\}$$

$$X(k) = \{1, 2, 2, 1, 3, 4, 4, 3\}$$

II

4) $x(k) = \{-20, -1+i(1-\sqrt{2}), -4-4i, -1-i(1+\sqrt{2}), 0, -1+i(1+\sqrt{2}), -4+4i, -1-i(1-\sqrt{2})\}$



$x(k) = \{-20, -1+i(1-\sqrt{2}), -4-4i, -1-i(1+\sqrt{2}), 0, -1+i(1+\sqrt{2}), -4+4i, -1-i(1-\sqrt{2})\}$

$\{0, 0, 0, 0, 0, 0, 0, 0\}$

$\{0, 0, 0, 0, 0, 0, 0, 0\}$

$x(k) = \{-4, -3, -3, -3, -3, -3, -3, -3\}$