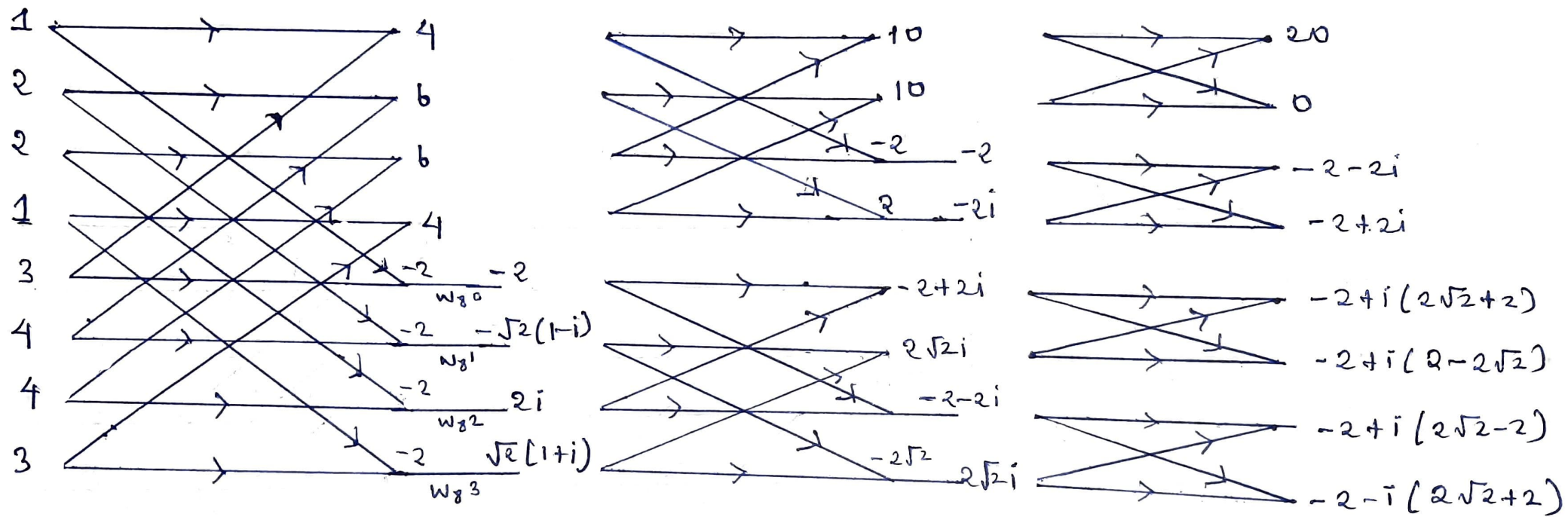


* Compute the DFT

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



Decimation process:

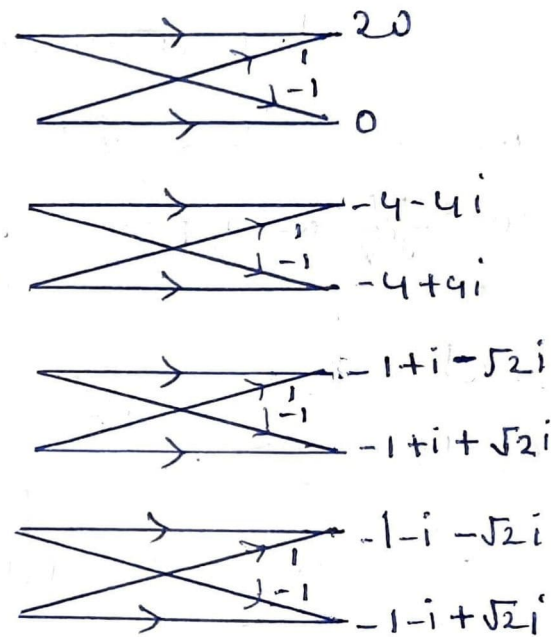
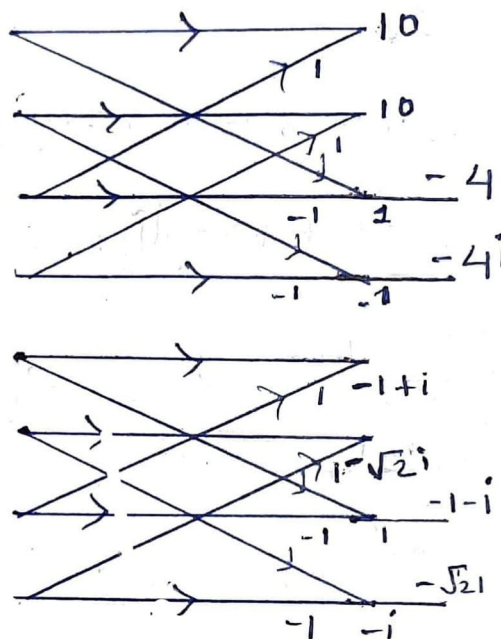
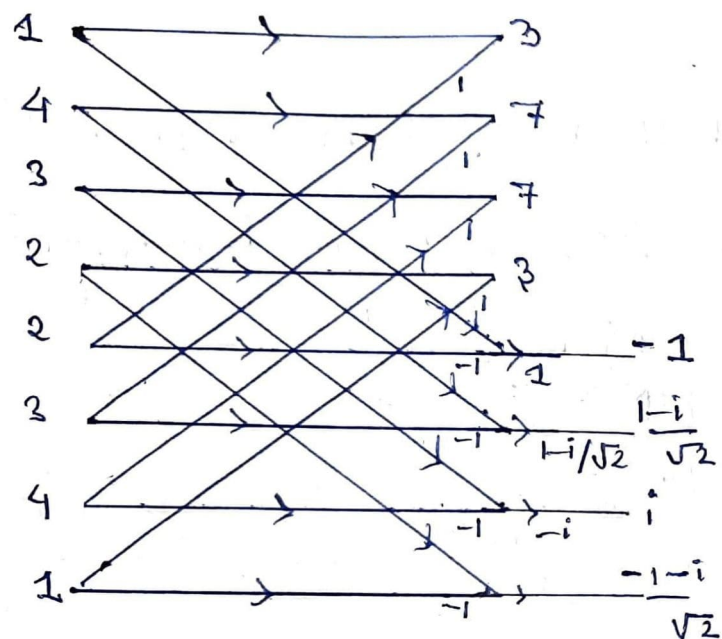
$$\{20, 0\} \quad \{-2, -2i, -2+2i\} \quad \{-2+i(2\sqrt{2}+2), -2+i(2-2\sqrt{2})\} \quad \{-2+i(2\sqrt{2}-2), -2-i(2\sqrt{2}+2)\}$$

$$\{20, -2-2i, 0, -2+2i\} \quad \{-2+i(2\sqrt{2}+2), -2+i(2\sqrt{2}-2), -2+i(2-2\sqrt{2}), -2-i(2\sqrt{2}+2)\}$$

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

rearranging

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



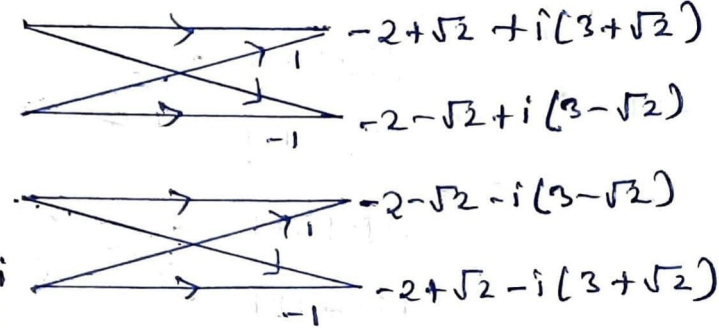
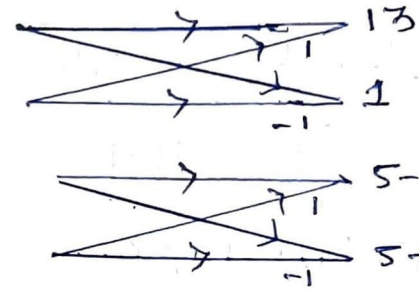
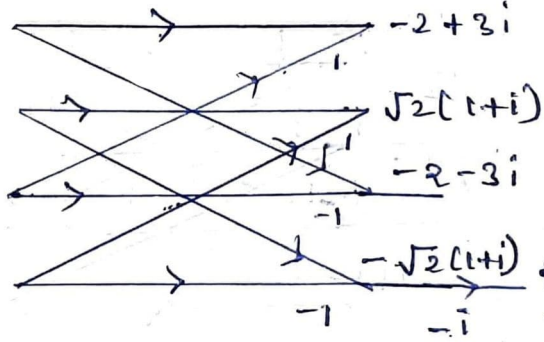
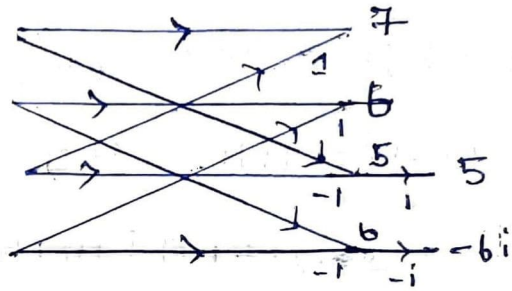
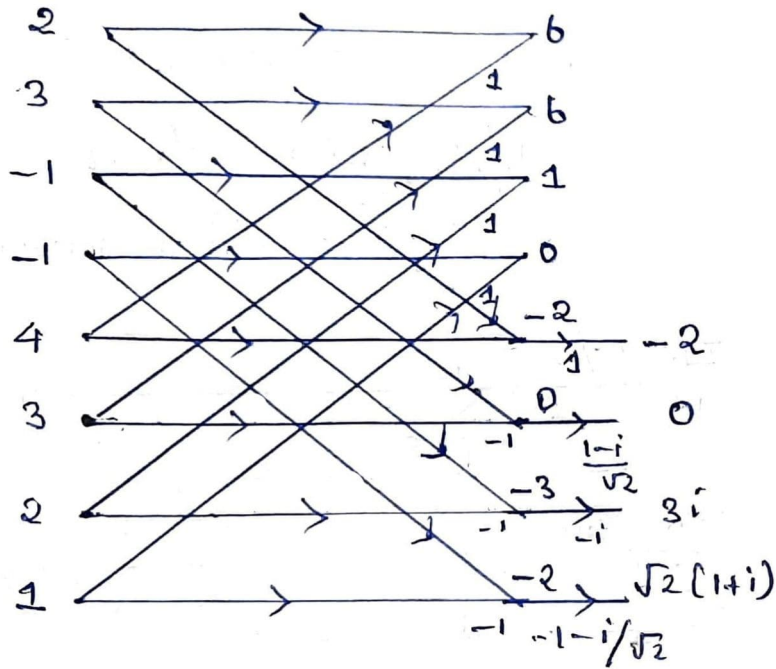
Decimation process: $\{20, 0\}$ $\{-4-4i, -4+4i\}$ $\{-1+i(1-\sqrt{2}), -1+i(1+\sqrt{2})\}$ $\{-1-i(1+\sqrt{2}), -1-i(1-\sqrt{2})\}$

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

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

Medhamitha

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

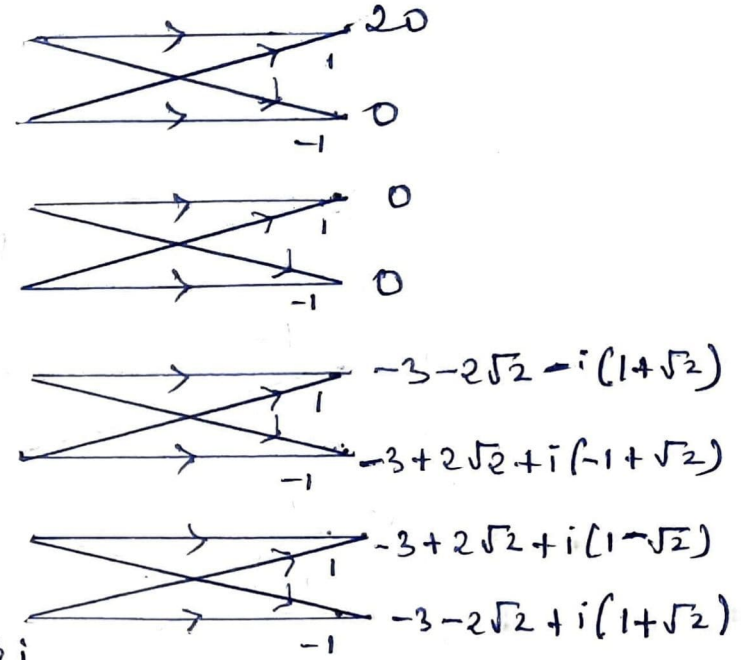
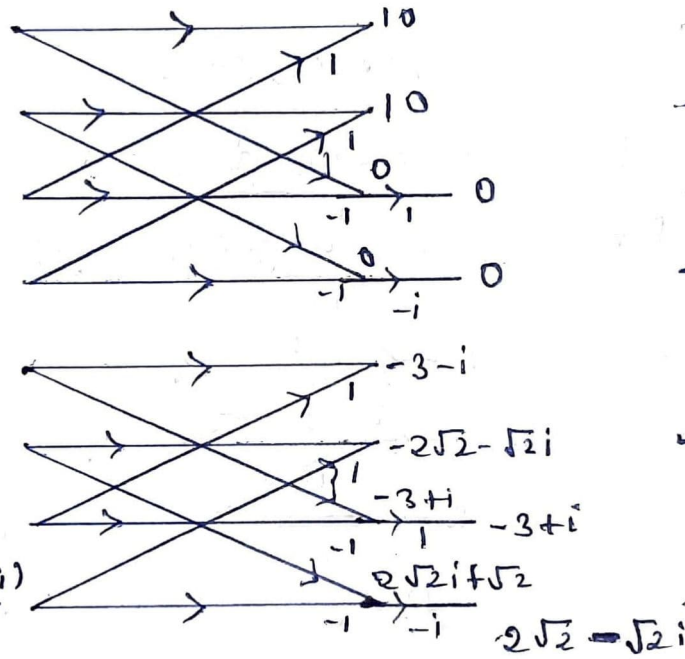
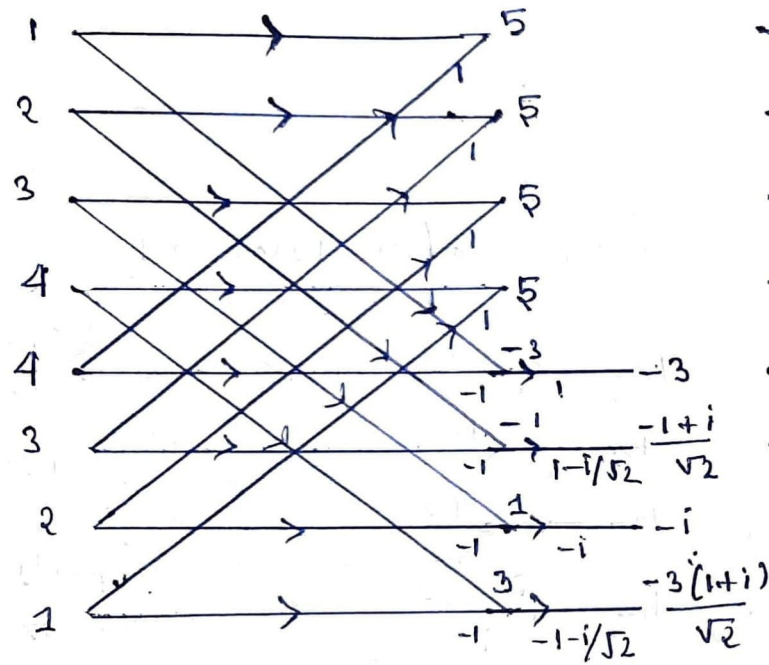


Decumination process : $\{13, 1\} \{5-6i, 5+6i\} \{-2+\sqrt{2}+i(3+\sqrt{2}), -2-\sqrt{2}+i(3-\sqrt{2})\} \{-2-\sqrt{2}-i(3-\sqrt{2}), -2+\sqrt{2}-i(3+\sqrt{2})\}$
 $\{13, 5-6i, 1, 5+6i\} \{-2+\sqrt{2}+i(3+\sqrt{2}), -2-\sqrt{2}-i(3-\sqrt{2}), -2-\sqrt{2}+i(3-\sqrt{2}), -2+\sqrt{2}-i(3+\sqrt{2})\}$

$$X(k) = \{ 43, -2 + \sqrt{2} + i(3 + \sqrt{2}), 5 - 6i, -2 - \sqrt{2} - i(3 - \sqrt{2}), 1, -2 - \sqrt{2} + i(3 - \sqrt{2}), 5 + 6i, -2 + \sqrt{2} - i(3 + \sqrt{2}) \}$$

11 columns

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



decimation process:

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

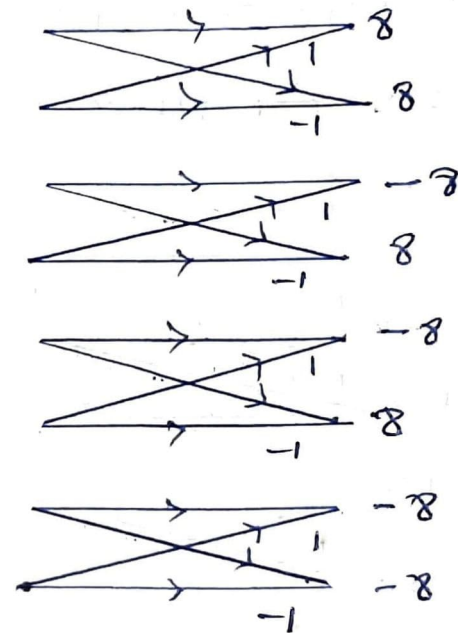
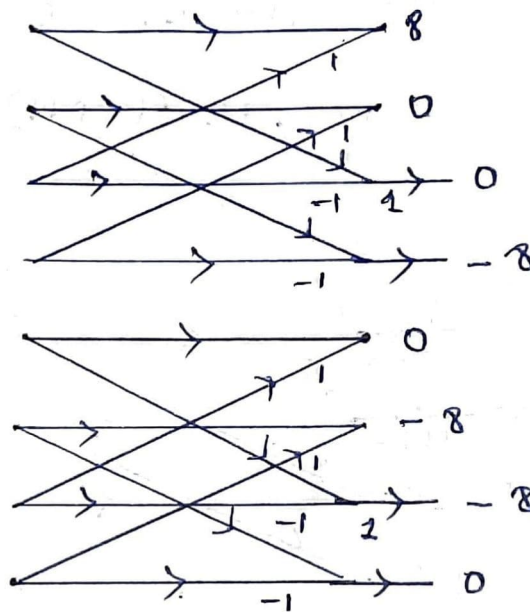
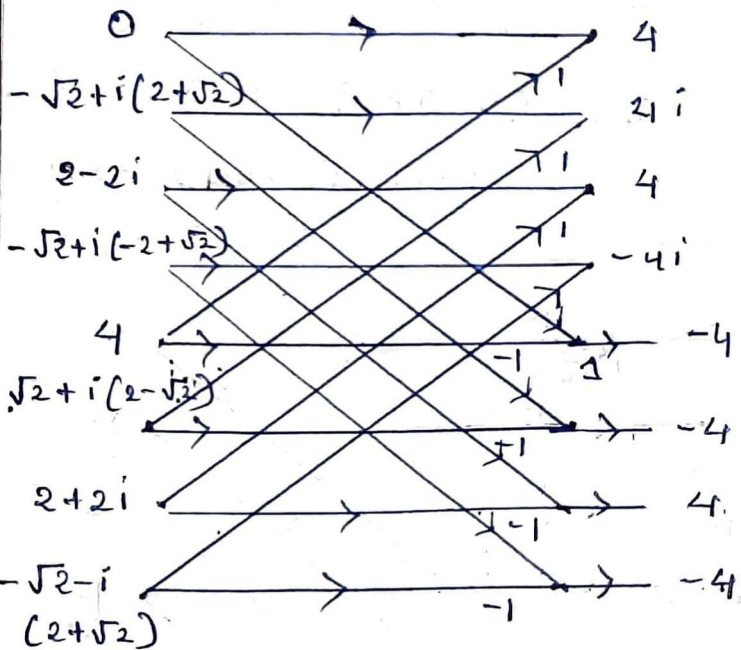
$$\{20, 0, 0, 0\} \{-3-2\sqrt{2}-i(1+\sqrt{2}), -3+2\sqrt{2}+i(1-\sqrt{2}), -3+2\sqrt{2}+i(-1+\sqrt{2}), -3-2\sqrt{2}+i(1+\sqrt{2})\}$$

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

Madhumitha

* Compute IDFT using DIF-FFT

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



Decimation process: $\{0, 8\} \{-8, 8\} \{-8, 8\} \{-8, -8\}$

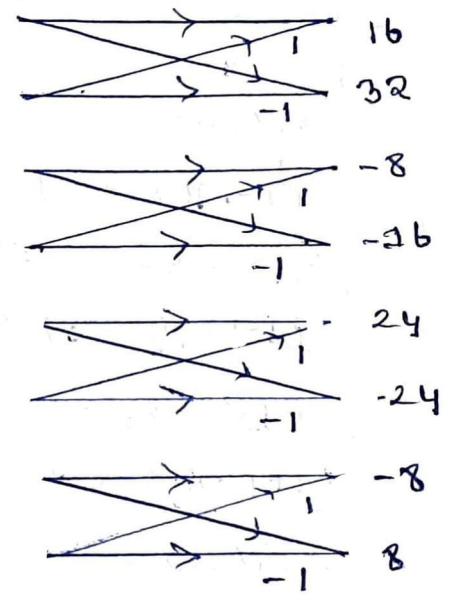
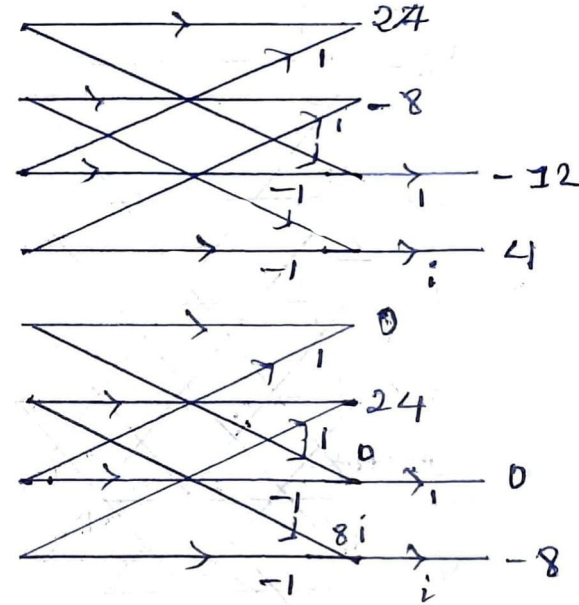
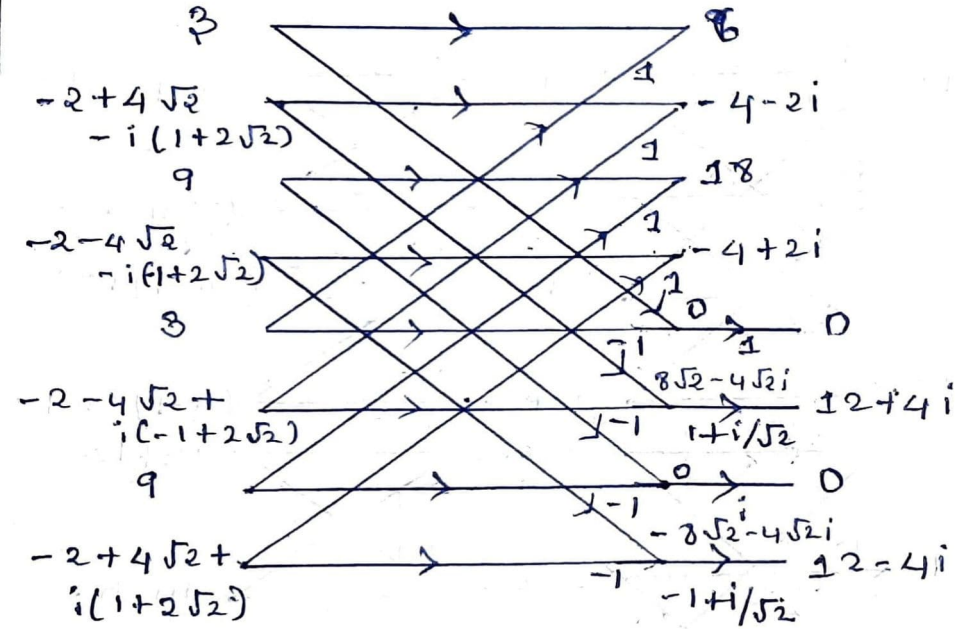
$\{8, -8, 8, 8\} \{-8, -8, 8, -8\}$

$\{8, -8, -8, -8, 8, 8, 8, -8\}$

Thus, $a(n) = \{1, -1, -1, -1, 1, 1, 1, -1\}$

Madhumitha

$$2) X[K] = \{3, -2+4\sqrt{2}-i(1+2\sqrt{2}), 9, -2-4\sqrt{2}-i(-1+2\sqrt{2}), 3, -2-4\sqrt{2}+i(-1+2\sqrt{2}), 9, -2+4\sqrt{2}+i(1+2\sqrt{2})\}$$



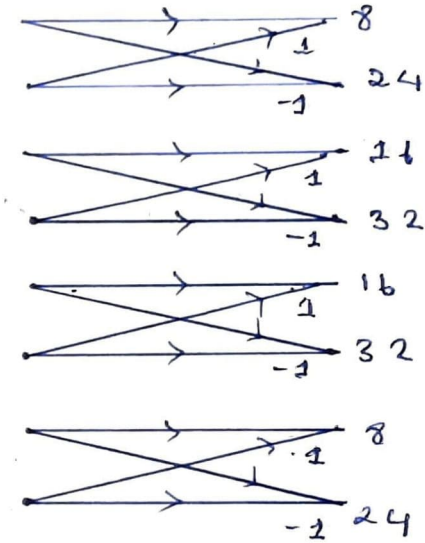
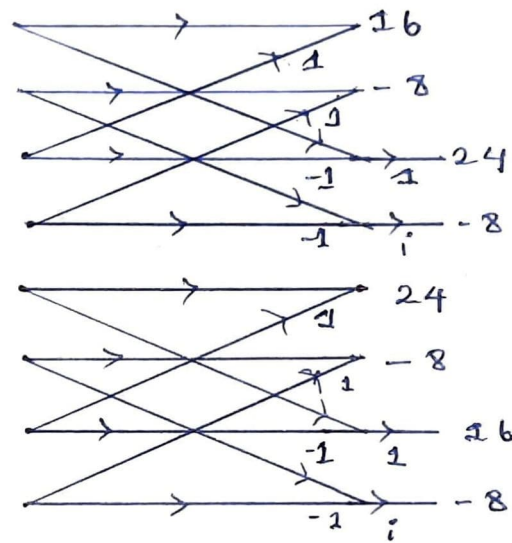
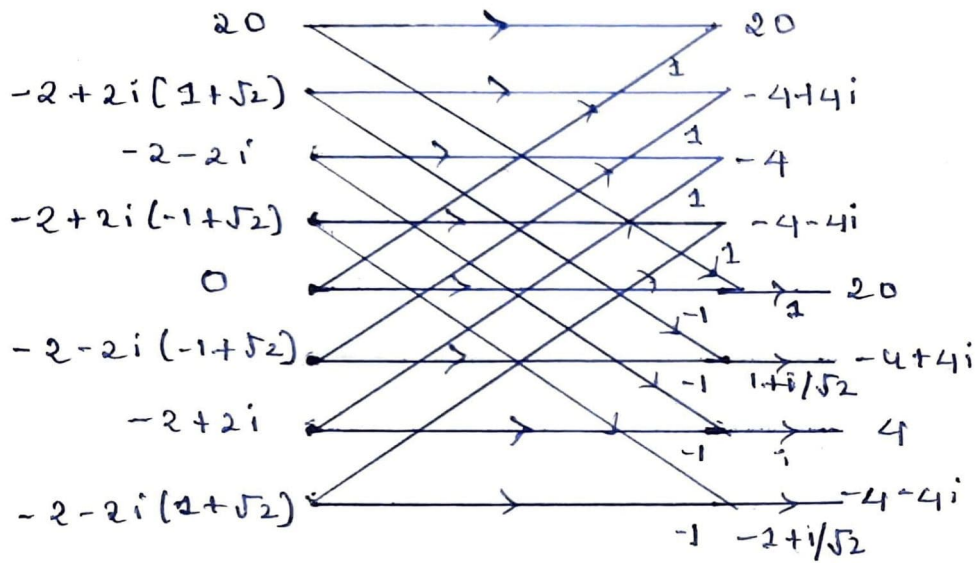
Decimation process: $\{16, 32\}$ $\{-8, -16\}$ $\{24, -24\}$ $\{-8, 8\}$

$\{16, -8, 32, -16\}$ $\{24, -8, -24, 8\}$

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

resham

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



Decimation process: $\{8, 24\} \{16, 32\} \{16, 32\} \{8, 24\}$

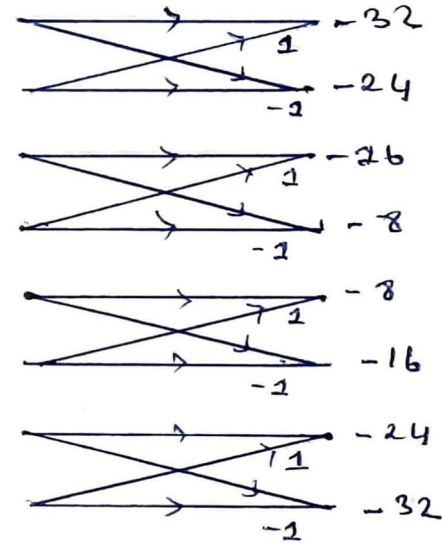
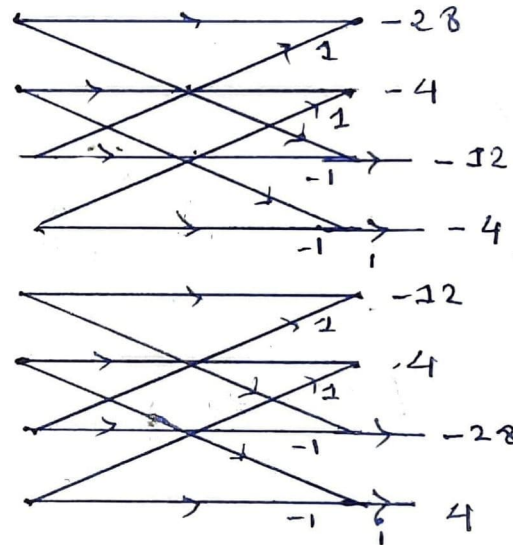
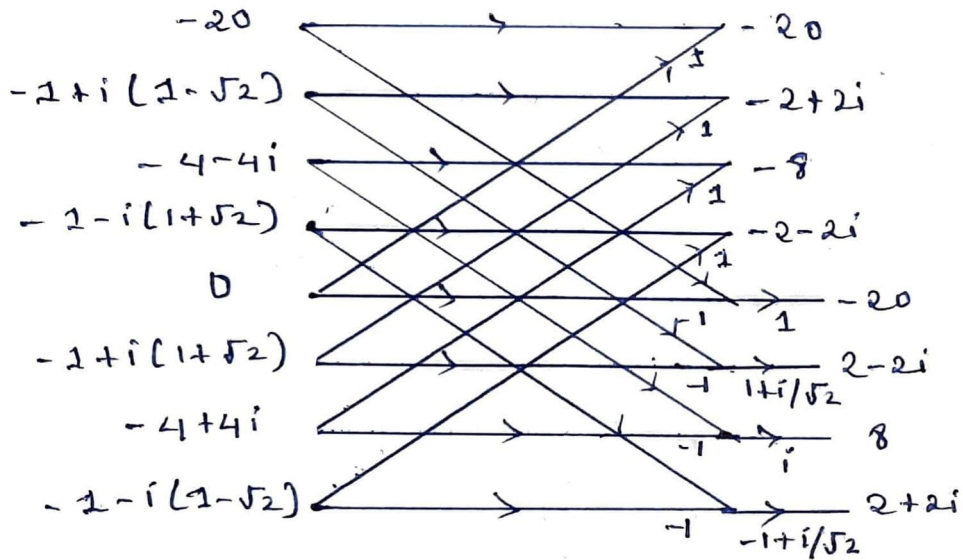
$$\{8, 16, 24, 32\} \{16, 8, 32, 24\} \Rightarrow \{8, 16, 24, 32, 32, 24, 16, 8\}$$

$$\{8, 16, 16, 8, 24, 32, 32, 24\}$$

$$\text{Thus, } \alpha(n) = \{1, 2, 2, 1, 3, 4, 4, 3\}$$

Adhithan

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



decimation process: $\{-32, -24\}$ $\{-16, -8\}$ $\{-8, -24\}$ $\{-24, -32\}$

$\{-32, -24, -24, -8\}$ $\{-8, -24, -16, -32\}$

$\{-32, -8, -24, -24, -24, -24, -8, -32\}$

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

Madhushree