

Q 4)

$$F(u, v) = \sum_{n=0}^{N-1} \sum_{y=0}^{N-1} f(n, y) e^{-j2\pi (un/N + vy/N)}$$

(2D-DFT)

$$\hookrightarrow F(u, v) = \sum_{y=0}^{201-1} f(101, y) e^{-j2\pi (un/201 + vy/201)}$$

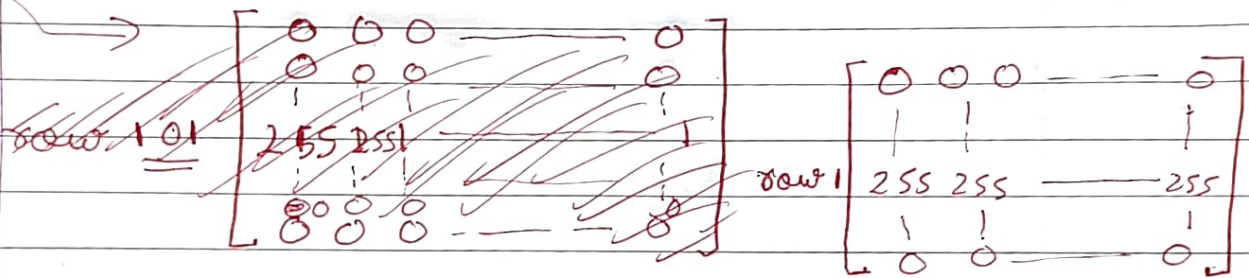
$n = 101$

rest all
zero.

(here we consider $n = 101$ rest
all zero).

$f(101, y)$ is 255 only, when y is in
the range $[0, 200]$ and 0 otherwise, the
Sum will be :-

$$F(u, v) = \sum_{y=0}^{200} 255 e^{-j2\pi (un/201 + vy/201)}$$



here, we can also do it like first perform

FT in x -direction Since in x -direction 101 row

is equal (255) we will get a constant in FT.

→ And when we apply in y direction the

Image will come like a vertical line in
middle of the Image.

So, simplifying the above Eq. :-

$$F(u, v) = 255 e^{-j \frac{(200)}{201} \pi u} \sum_{y=0}^{200} e^{-j \frac{2\pi v y}{201}}$$

→ Constant term,
got from
 x -direction.

* The value is max at $u = 0$

Logarithm of Fourier Magnitude

