Tugas 2 | FFT (Fast Fourier Transform)

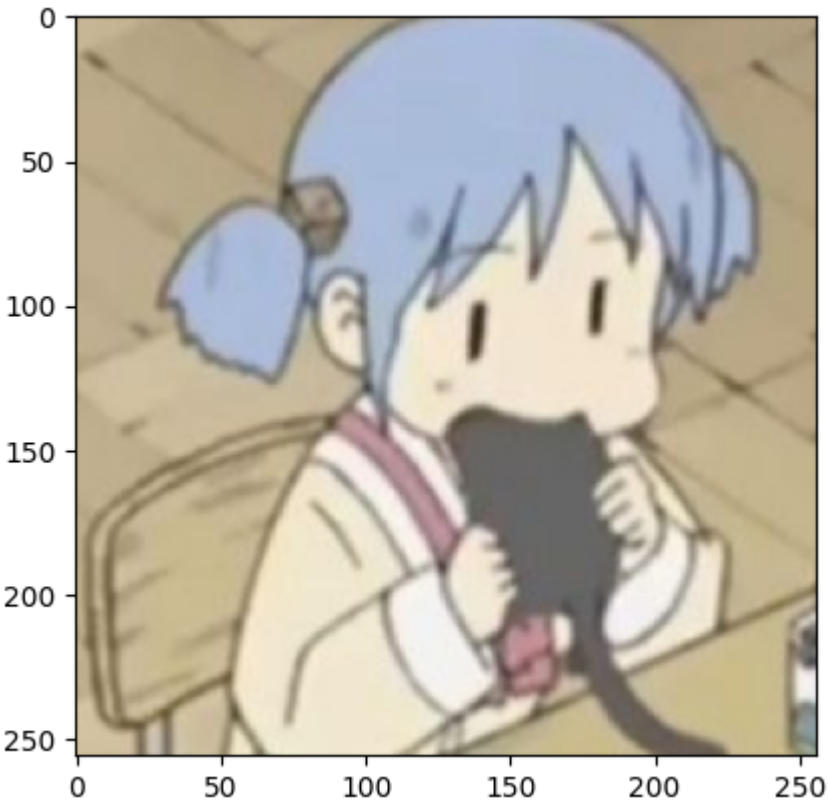
Nama: Ronggo Widjoyo
NIM: 220411100061
Kelas: PCD A

Import Tools

In [1]:
```
import cv2 as cv
import numpy as np
import matplotlib.pyplot as plt
```

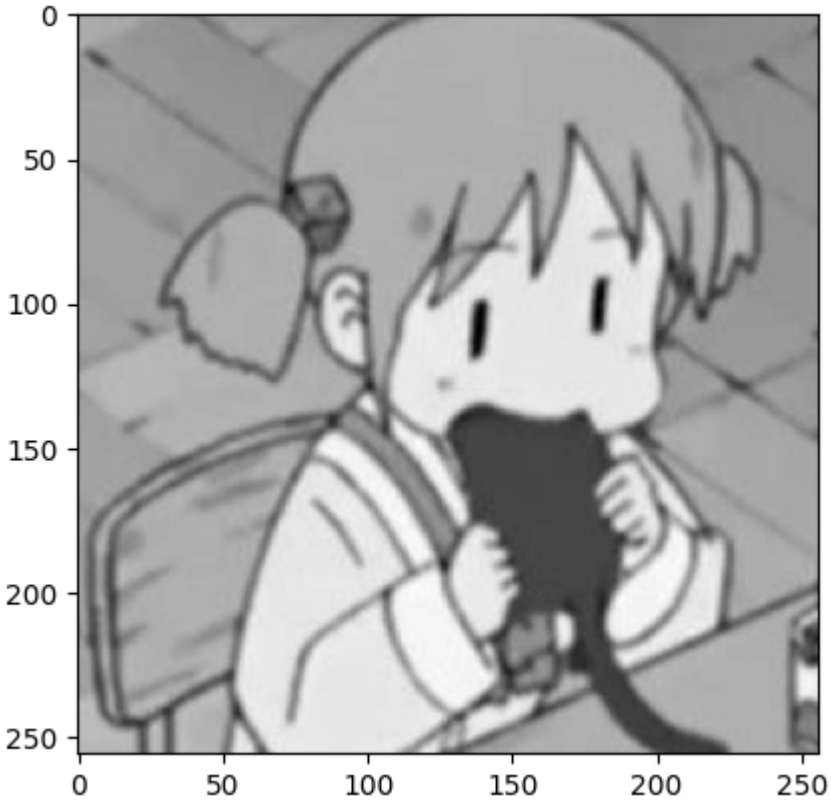
Load Image

In [14]:
```
img = cv.imread('test_cropped.jpg')
img = cv.cvtColor(img, cv.COLOR_BGR2RGB)
plt.imshow(img)
plt.show()
```



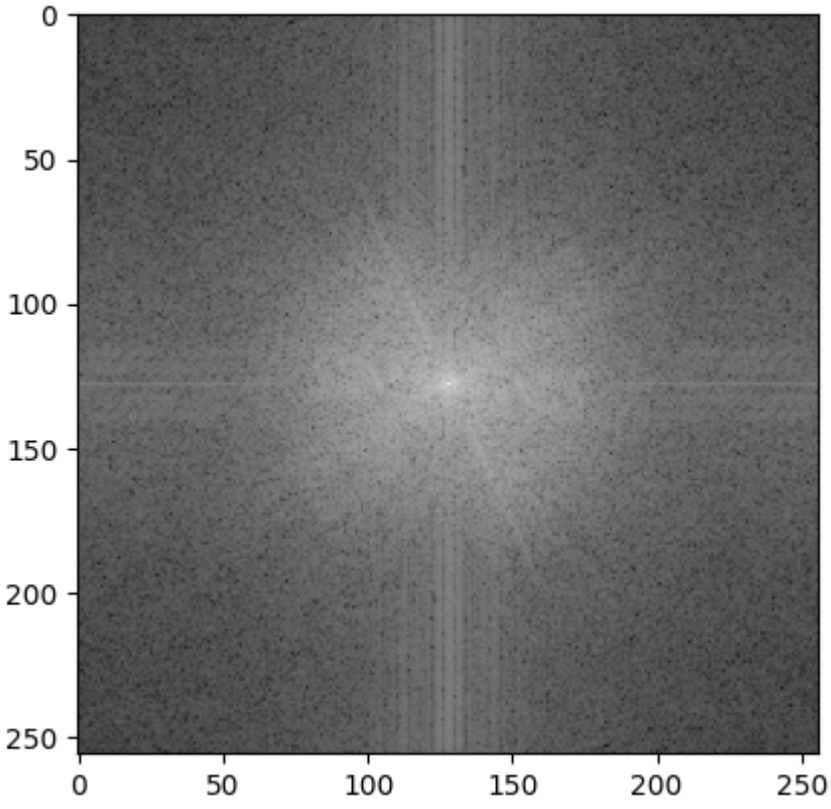
Convert Image

In [17]:
```
grey_img = cv.cvtColor(img, cv.COLOR_RGB2GRAY)
plt.imshow(grey_img, cmap='gray')
plt.show()
```



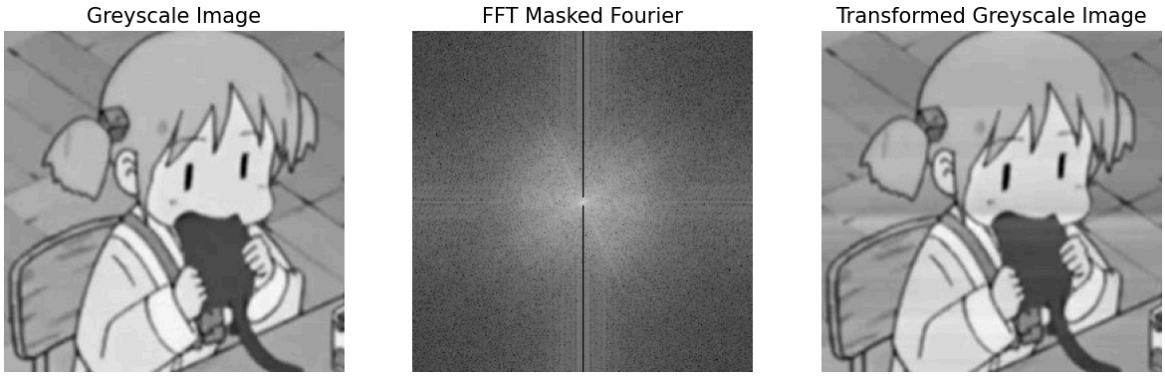
Fast Fourier Transform

In [22]:
```
grey_img = cv.cvtColor(img, cv.COLOR_RGB2GRAY)
grey_img_fourier = np.fft.fftshift(np.fft.fft2(grey_img))
plt.imshow(np.log(abs(grey_img_fourier)), cmap='grey')
plt.show()
```



Fast Fourier Transform vertikal menggunakan gambar greyscale

In [79]:
```
img = cv.imread('test_cropped.jpg', 1)
grey_img = cv.cvtColor(img, cv.COLOR_RGB2GRAY)

def fourier_masker_ver(image, i):
        f_size = 15
        grey_img_fourier = np.fft.fftshift(np.fft.fft2(image))

        grey_img_fourier[:125, image.shape[1]//2] = i
        grey_img_fourier[-125:, image.shape[1]//2] = i

        fig, ax = plt.subplots(1,3, figsize=(15,15))
        ax[0].imshow(image, cmap = 'gray')
        ax[0].set_title('Greyscale Image', fontsize = f_size)
        ax[0].set_axis_off()

        ax[1].imshow(np.log(abs(grey_img_fourier)), cmap='gray')
        ax[1].set_title('FFT Masked Fourier', fontsize = f_size)
        ax[1].set_axis_off()

        ax[2].imshow(abs(np.fft.ifft2(grey_img_fourier)), cmap='gray')
        ax[2].set_title('Transformed Greyscale Image', fontsize = f_size)
        ax[2].set_axis_off()

fourier_masker_ver(grey_img, 1)
```



Fast Fourier Transform vertikal menggunakan gambar RGB

In [87]:
```
def fourier_transform_rgb(image):
    f_size = 25
    transformed_channels = []
    for i in range(3):
        rgb_fft = np.fft.fftshift(np.fft.fft2((image[:, :, i])))
        rgb_fft[:125, 235:237] = 1
        rgb_fft[-125:,235:237] = 1
        transformed_channels.append(abs(np.fft.ifft2(rgb_fft)))

    final_image = np.dstack([transformed_channels[0].astype(int),
                             transformed_channels[1].astype(int),
                             transformed_channels[2].astype(int)])
```

```
    fig, ax = plt.subplots(1, 2, figsize=(17,12))
    ax[0].imshow(image)
    ax[0].set_title('Original Image', fontsize = f_size)
    ax[0].set_axis_off()

    ax[1].imshow(final_image)
    ax[1].set_title('Transformed Image', fontsize = f_size)
    ax[1].set_axis_off()

    fig.tight_layout()

img = cv.imread('test_cropped.jpg')
img = cv.cvtColor(img, cv.COLOR_BGR2RGB)
fourier_transform_rgb(img)
```