$$\mathbf{Y1(f)} = \frac{Am*B}{2} * \frac{\sin(N*Ts*\pi*(fk +/- f1))}{\sin(\pi*Ts*(fk +/- f1))} * \{\cos N*\pi*Ts*(fk +/- f1)) +/- j \sin(N*\pi*Ts*(fk +/- f1))\}$$

The equation above now has to be adjusted so that it suits our needs i.e. we are dealing with a baseband modulating signal and therefore does not have a carrier. However the equation above has been treated as though a carrier has been involved. Hence the following adjustments have to be made :

1. Take out the divide by 2 factor because we do not have a carrier and therefore have not multplied by B*cos2πf1t
2. For the same reason above, we will only require (fk - f1)

$$\mathbf{Y1(f)} = Am*B * \frac{\sin(N*Ts*\pi*(fk - f1))}{\sin(\pi*Ts*(fk - f1))} * \{\cos N*\pi*Ts*(fk - f1)) - j \sin(N*\pi*Ts*(fk - f1))\}$$

For Bandpass 2-FSK and for a simulation time of 3Tb :

$$\mathbf{Y1(f) = 1/N \left\{ \sum_{n=0}^{(N/3)-1} y(n) * e^{-J2\pi fn} + \sum_{N/3}^{(2*N/3)-1} y(n) * e^{-J2\pi fn} + \sum_{(2*N/3)}^{N} y(n) * e^{-J2\pi fn} \right\}} \qquad \mathbf{\sum_{N/3}^{(2*N/3)-1} y(n) * e^{-J2\pi fn} =} \; 0$$

$$\mathbf{\left\{ \sum_{n=0}^{(N/3)-1} y(n) * e^{-J2\pi fn} \right\} =} \; Am*B * \frac{\sin(((N/3) - 1)*Ts*\pi*(fk - f1))}{\sin(\pi*Ts*(fk - f1))} * \{\cos((N/3) - 1)*\pi*Ts*(fk - f1)) - j \sin(((N/3) - 1)*\pi*Ts*(fk - f1))\}$$

$$\mathbf{\sum_{(2*N/3)}^{N} y(n) * e^{-J2\pi fn} \} = \sum_{0}^{N/3} y(n) * e^{-J2\pi fn} \} \quad ?}$$

$$\mathbf{\sum_{0}^{N/3} y(n) * e^{-J2\pi fn} \} =} \; Am*B * \frac{\sin((N/3)*Ts*\pi*(fk - f1))}{\sin(\pi*Ts*(fk - f1))} * \{\cos(N/3)*\pi*Ts*(fk - f1)) - j \sin((N/3)*\pi*Ts*(fk - f1))\}$$

$$\mathbf{Y1(f) = 1/N \sum_{n=0}^{N-1} y(n) * e^{-J2\pi fn} =} \; \frac{Am*B}{N} \left\{ \frac{\sin(((N/3) - 1)*Ts*\pi*(fk - f1))}{\sin(\pi*Ts*(fk - f1))} * \{\cos((N/3) - 1)*\pi*Ts*(fk - f1)) - j \sin(((N/3) - 1)*\pi*Ts*(fk - f1))\} \; \mathbf{+} \right.$$

$$\left. \frac{\sin((N/3)*Ts*\pi*(fk - f1))}{\sin(\pi*Ts*(fk - f1))} * \{\cos(N/3)*\pi*Ts*(fk - f1)) - j \sin((N/3)*\pi*Ts*(fk - f1))\} \right\}$$