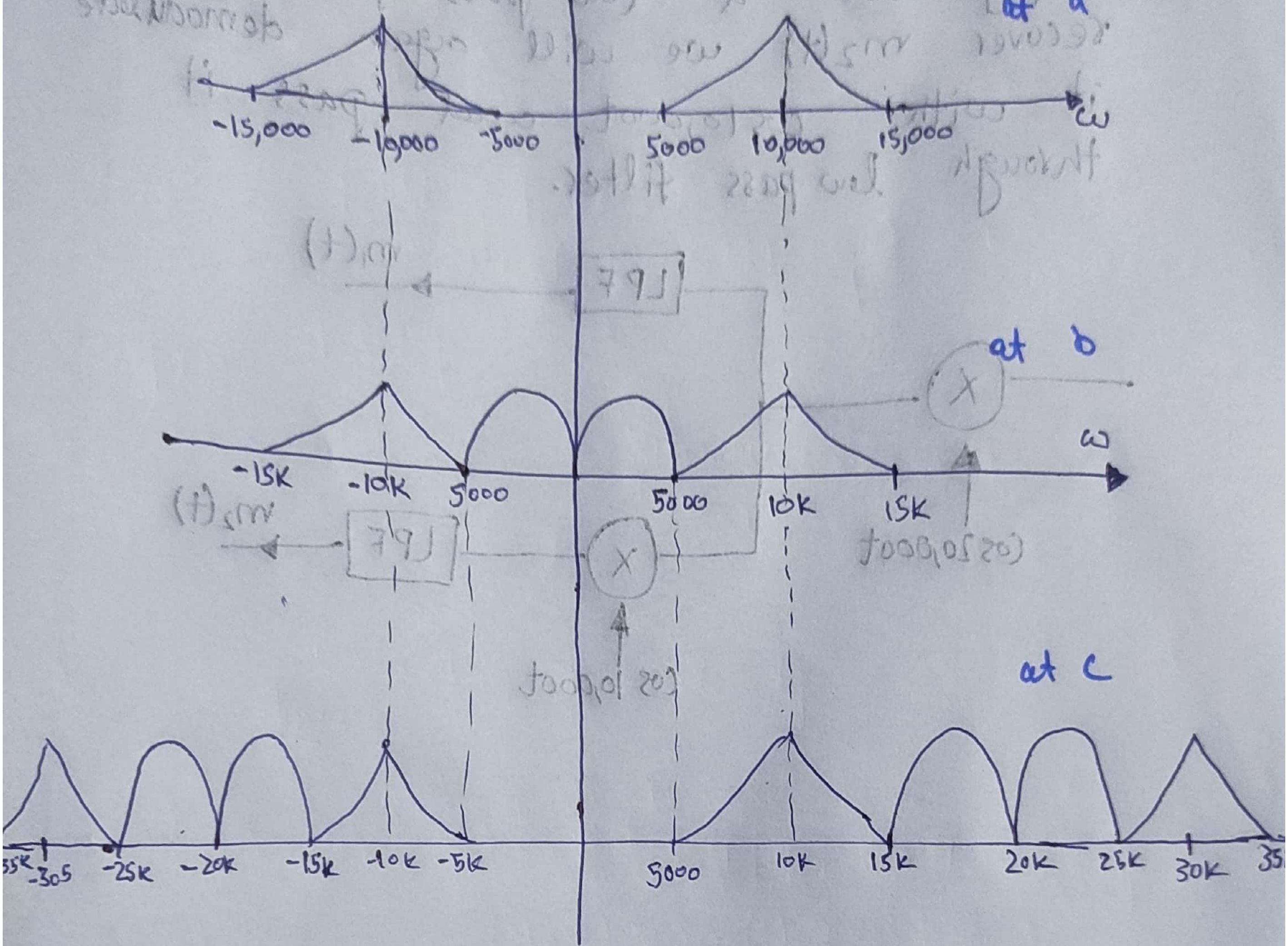
Assignment 2 Q2

Spectra at a, b and c.

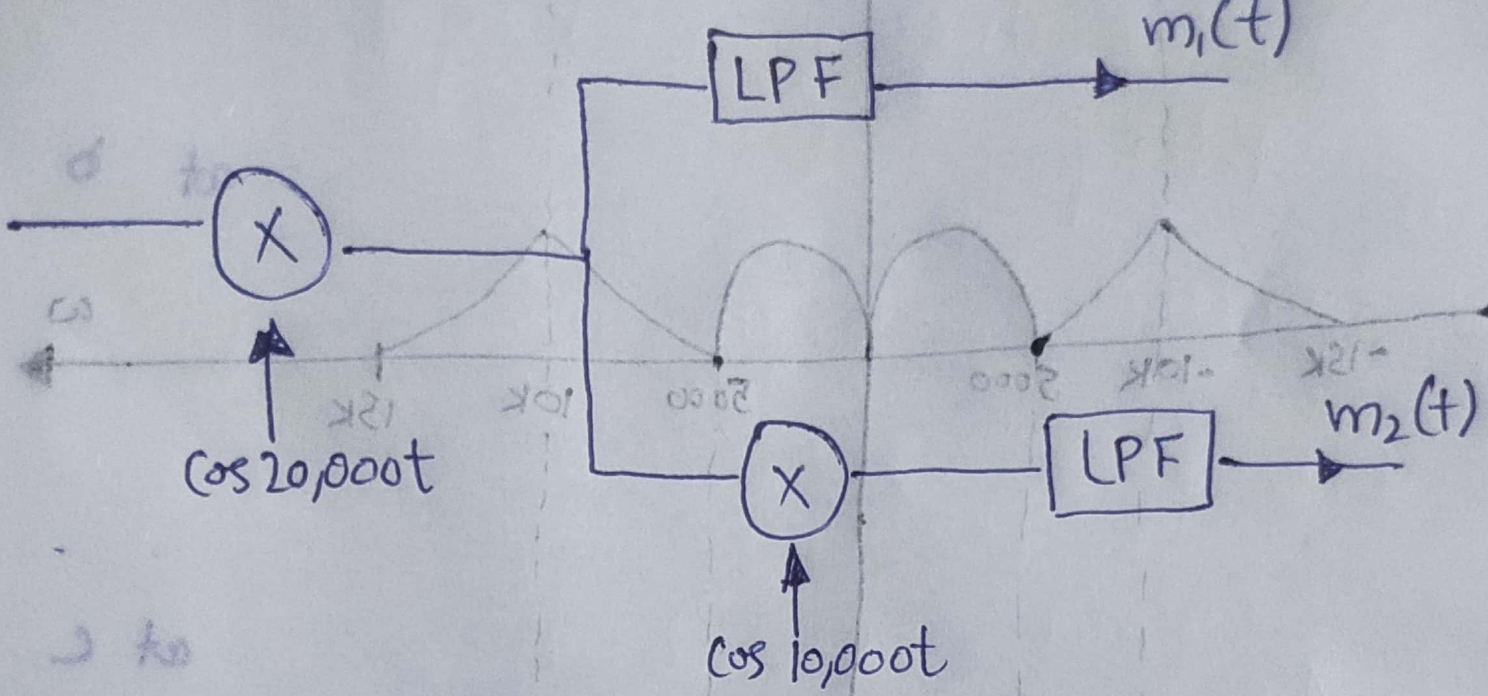


Part b:-

The bandwidth of channel must be at least 30,000 rad/s i-e from 5000 to 35,000 rad/s.

Part c:-

At receiver's end, we will perform the inverse operation of Modulation i-e Demodulation. So, first we will demodulate the output at c by cos20,000t then we will get the spectra of b and some high frequency


LPF
m1(t)
X
cos20,000t
X
LPF
m2(t)
cos 10,000t

Q2:- Ans:- $\omega_c = 2\pi \times 10^6$

For Q1, See Book and Notes

$$\varphi_{FM}(t) = 10\cos(\omega_c t + 0.1\sin 2000\pi t)$$

Assignment 3 Q2

$\omega_i(t)$

(a) Power:-

$$P_{EM} = \frac{10^2}{2} = 50 \text{ Watts}$$

(b) Δf :-

$$\omega_i(t) = \frac{d}{dt}\left[\omega_c t + 0.1\sin 2000\pi t\right)$$

$$\omega_i(t) = \omega_c + 200\pi \sin 2000\pi t$$

$$\Delta\omega = 200\pi \times \left(\text{Max value of } \sin 2000\pi t\right)$$

$$\Delta\omega = 200\pi \times 1$$

$$\Delta\omega = 200\pi$$

$$\Delta f = \frac{200\pi}{2\pi} = \boxed{100 \text{ Hz}}$$

(c) $\Delta\varphi$:-

$$\Delta\varphi = (0.1)\left(\text{Max value of } \sin 2000\pi t\right)$$

$$\boxed{\Delta\varphi = 0.1}$$

(d) B_{EM} :-

$$B_{EM} = 2(100 + 1000)$$

$$B_{EM} = 2(1100) = \boxed{2200 \text{ Hz}}$$