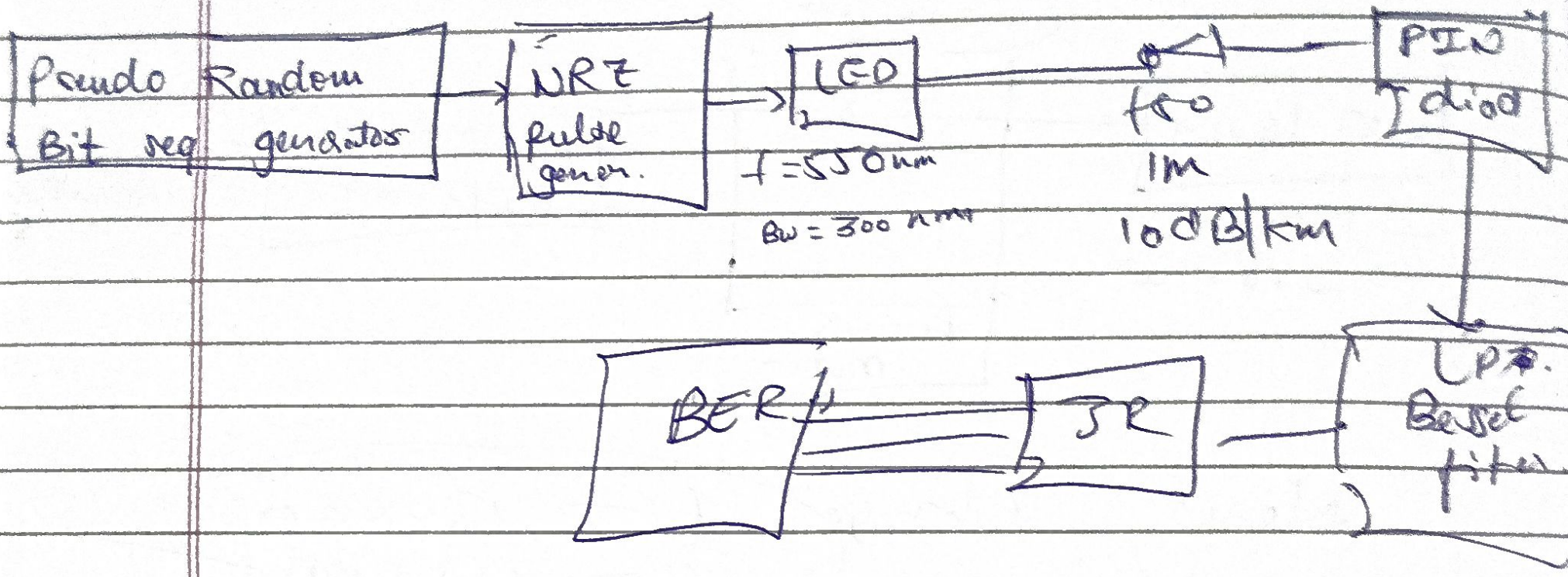
Exp ⑧ ~~simulate link budget~~ fso comm.

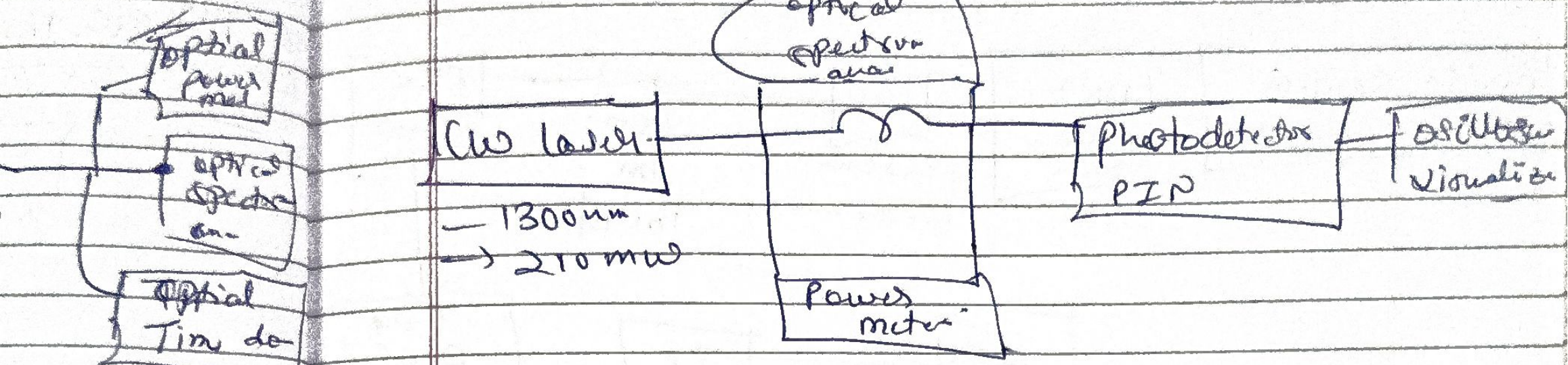
Setup ①




Design an fso comm. system and analyse the BER by varying optical param

Exp ①. Attenuation loss.

setup 1. ● effect ● length on attenuation.




Now Change $\begin{cases} f = 1300nm \\ f = 1550nm \end{cases}$ ←

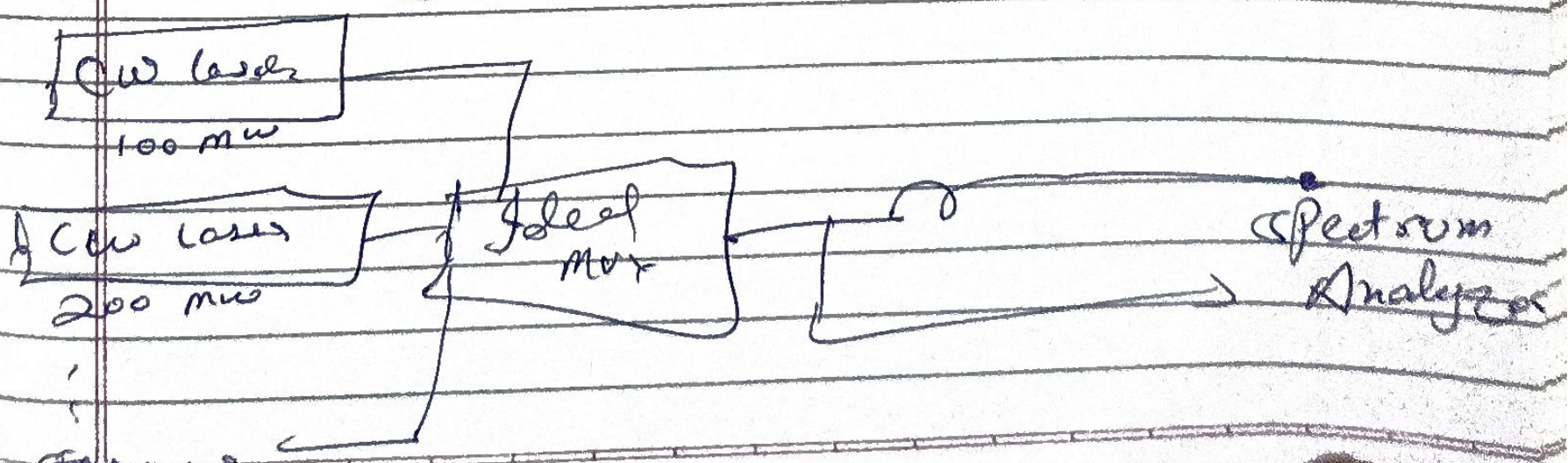
with Pin = 210mw

find o/p. power.

then $\alpha L = \frac{10}{L} \cdot \log_{10}\left(\frac{P_i}{P_o}\right)$

setup ② - SRS effect

smaller wavelength will scatter the most.



Exp (2) Measure N.A.

$$N.A = \sqrt{n_1^2 - n_2^2} = n_1\sqrt{2\Delta} = \sin\theta_a.$$

$$N.A. = \sin\left(\tan^{-1}\left(\frac{D}{2L}\right)\right)$$

d = 5, 10, 15, 20.

MR = ——— , PN = ———

$$r = \frac{MR + PN}{4}$$

$$N.A. = \frac{r}{\sqrt{r^2 + d^2}} = \sin\theta_a.$$

Step (i) d = 5, 10, 15, 20 mm.

Step (ii) $r = \frac{MR + PN}{4}$

Step (iii) $NA = \sin\theta_a = \frac{r}{\sqrt{r^2 + d^2}}$.

Step (iv) find Avg NA, & $\theta_a$, $\theta_{avg}$.

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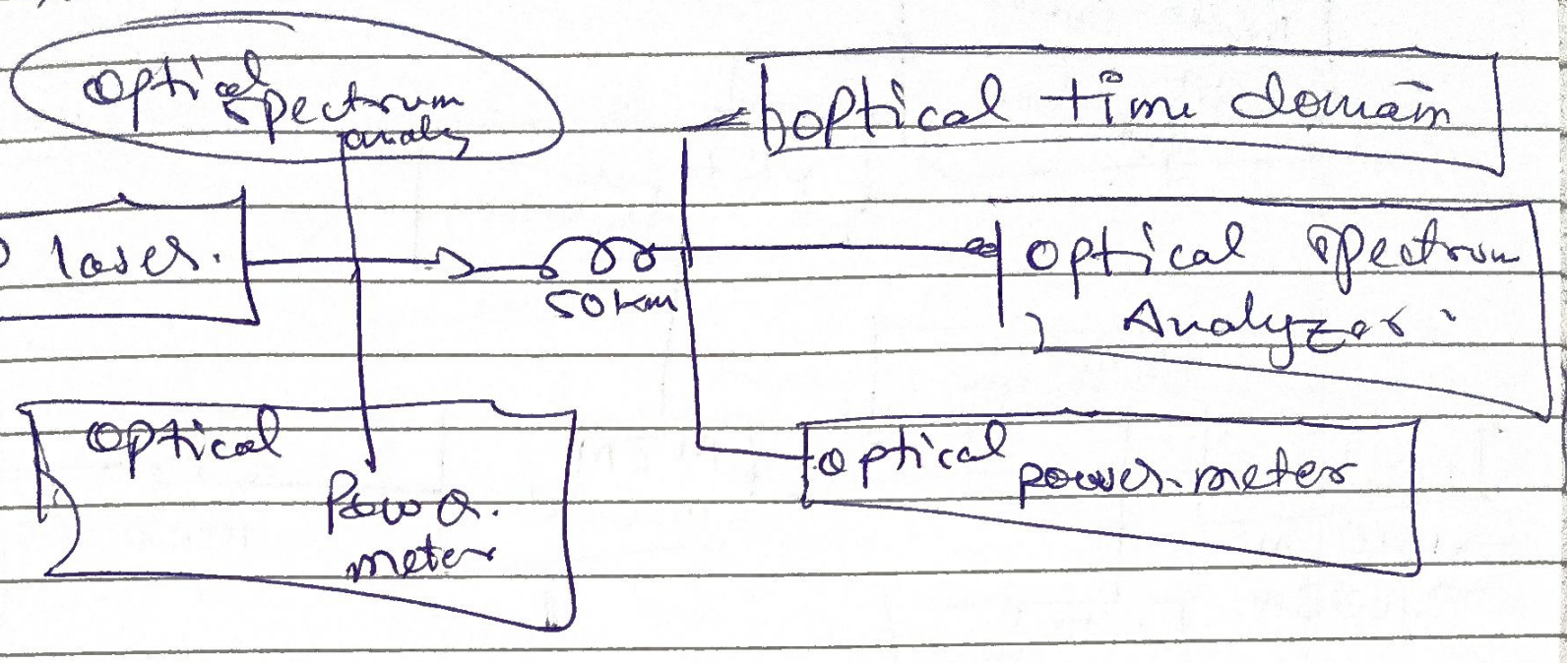
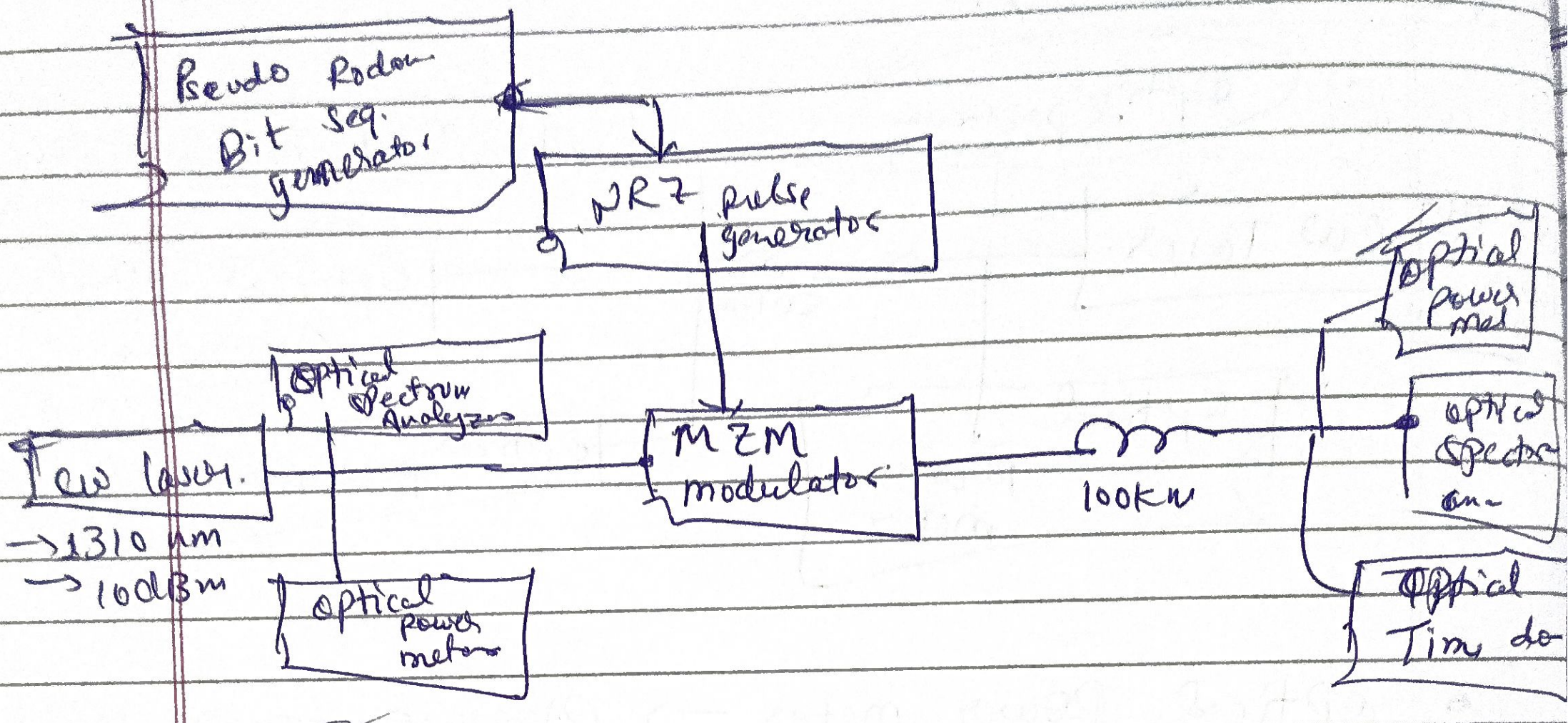
Exp (3) Tx & Rx.




- optical power meter → Measure power levels at different points.
- Spectral Analyzer (optical spectrum analyzer) → Examine optical spectrum to identify signal quality, Noise & distortions.
- Time domain analyzer (optical time domain) → observe signal behavior over time to find distortion & impairments.

Setup1 — 50km (optical fiber) with 0dBm power

Setup 2 → 100km with 10dBm power.




$$dL = 10 \log_{10}\left(\frac{P_i}{P_o}\right)$$