

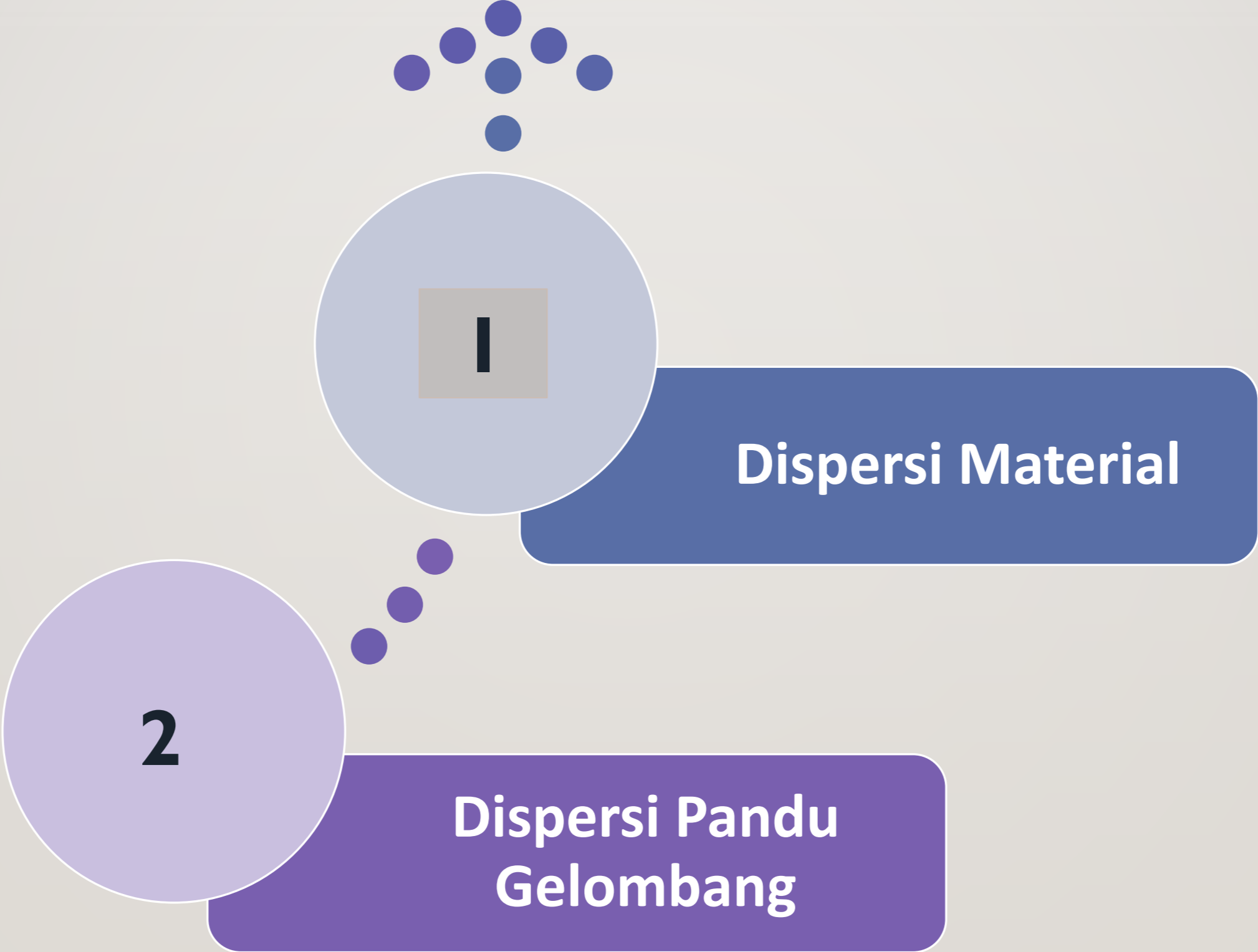
# SISTEM KOMUNIKASI OPTIK

- **MATERI 5**
- **DISPERSI MATERIAL**

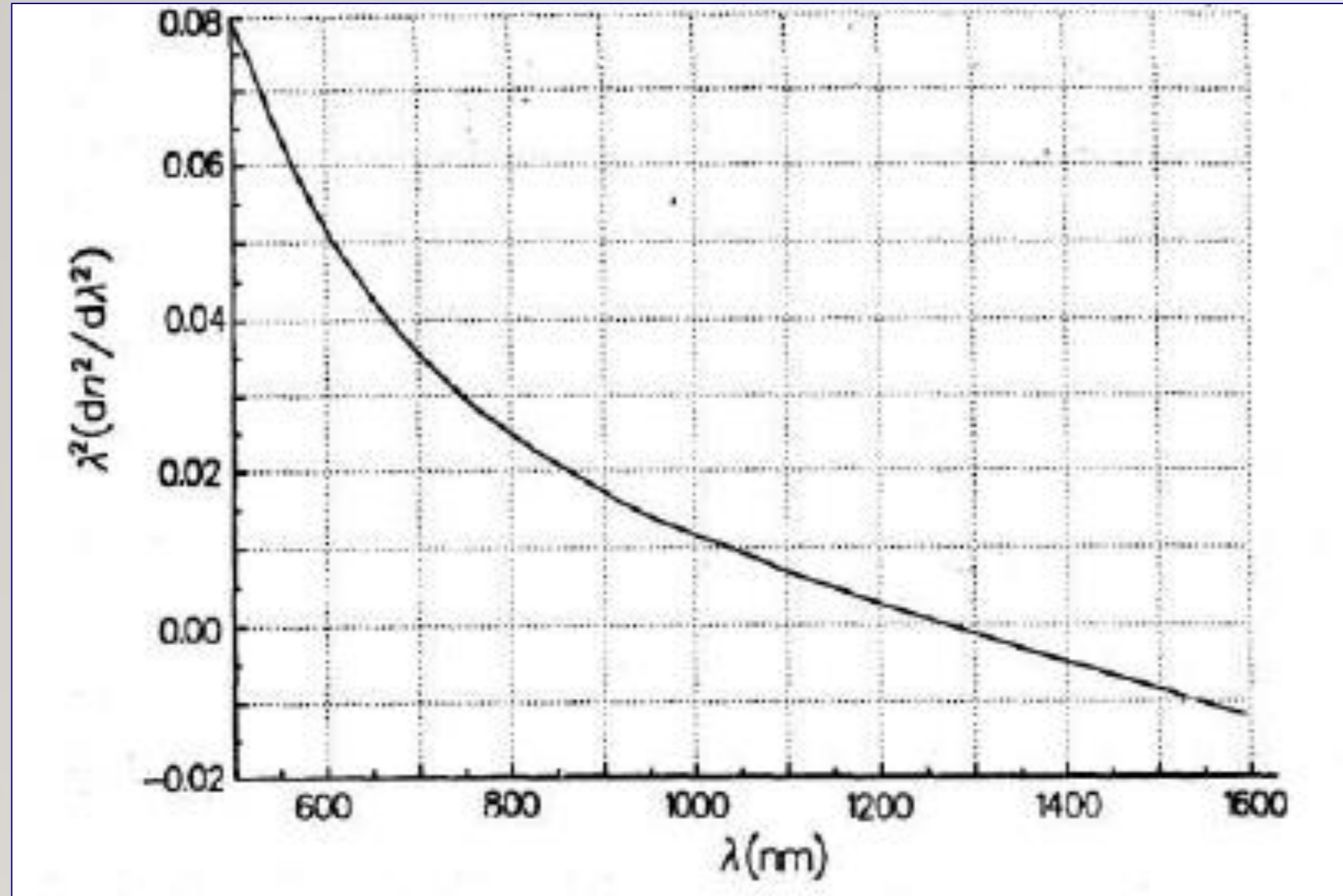
- D3 Teknologi Telekomunikasi – Fakultas Ilmu Terapan



# TYPE DISPERSI INTRAMODUS



# DISPERSI MATERIAL



Gambar 1. Grafik  $\lambda^2 d^2 n_1 / d\lambda^2$  terhadap Panjang Gelombang

$$\tau_m = \frac{1}{V_s} \dots\dots\dots(\text{Pers 1})$$

$$\tau_m = \frac{d\beta}{d\omega} = \frac{1}{c} \left( n_1 - \lambda \frac{dn_1}{d\lambda} \right) \dots\dots\dots(\text{Pers 2})$$

$$\sigma_m = \sigma_\lambda \, d\tau_m/d\lambda \dots\dots\dots(\text{ Pers 3})$$

$$\sigma_m = \sigma_\lambda \frac{\lambda}{c} \left| \frac{d^2 n_1}{d\lambda^2} \right| \dots\dots\dots(\text{ Pers 4})$$

**Parameter Dispersi Material  $D_m$  di Definiskan sebagai :**

$$D_m = \frac{d\tau_m}{d\lambda} = \frac{\lambda}{c} \left| \frac{d^2 n_1}{d\lambda^2} \right| \text{ dalam (ps/nm.km)} \dots\dots\dots(\text{ Pers 5})$$

$$\sigma_m = \sigma_\lambda \, D_m \cdot L \dots\dots\dots(\text{ Pers 6})$$

## CONTOH SOAL

- ▶ Diketahui suatu transmisi data menggunakan pengkodean NRZ dengan Jarak transmisi 10 Km. Sumber cahaya yang digunakan memiliki lebar spectral sebesar 1 nm dengan panjang gelombang 800 – 900 nm dimana parameter Dispersi Materialnya adalah sebesar 0.07 ns/nm.km Berapakah besarnya Dispersi Material?

**Jawab :**

$$\begin{aligned}\sigma_m &= \sigma_\lambda D_m .L = 1 \text{ nm} \times 0.07 \frac{\text{ns}}{\text{nm.km}} \times 10 \text{ km} \\ &= 0.7 \text{ ns}\end{aligned}$$



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