Unit-5
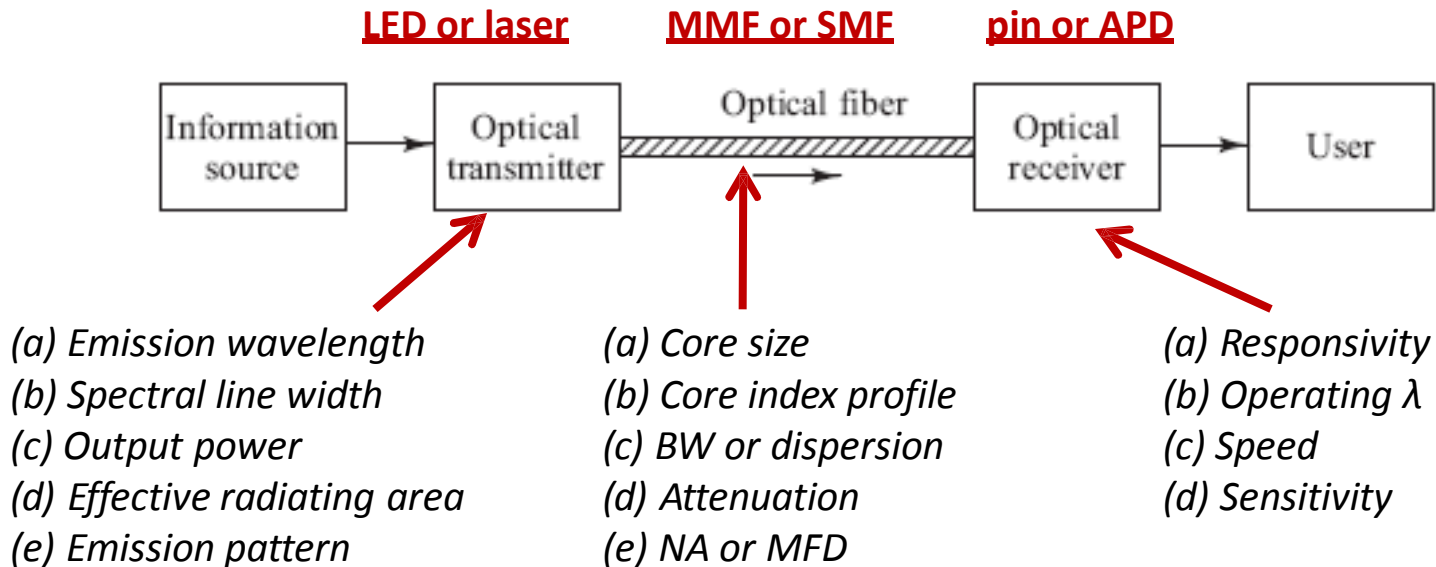
Lecture -1

Point to point links, Fiber Selection

Point-to-Point Links

Key system requirements needed to analyze optical fiber links:

1. The desired (or possible) transmission distance

2. The data rate or channel bandwidth

3. The bit-error rate (BER)

LED or laser   **MMF or SMF**   **pin or APD**

| Information source | Optical transmitter | Optical fiber | Optical receiver | User |

(a) Emission wavelength
(b) Spectral line width
(c) Output power
(d) Effective radiating area
(e) Emission pattern

(a) Core size
(b) Core index profile
(c) BW or dispersion
(d) Attenuation
(e) NA or MFD

(a) Responsivity
(b) Operating λ
(c) Speed
(d) Sensitivity

Selecting the Fiber

Bit rate and distance are the major factors

Other factors to consider: attenuation (depends on?) and distance-bandwidth product (depends on?) cost of the connectors, splicing etc.

Then decide

- Multimode or single mode

- Step or graded index fiber

Selecting the Optical Source

- Emission wavelength depends on acceptable attenuation and dispersion

- Spectral line width depends on acceptable ………… dispersion (LED → wide, LASER → narrow)

- Output power in to the fiber (LED → low, LASER → high)

- Stability, reliability and cost

- Driving circuit considerations

Selecting the detector

- Type of detector
  - **APD**: High sensitivity but complex, high bias voltage (40V or more) and expensive
  - **PIN:** Simpler, thermally stable, low bias voltage (5V or less) and less expensive
- Responsivity (that depends on the avalanche gain & quantum efficiency)
- Operating wavelength and spectral selectivity
- Speed (capacitance) and photosensitive area
- Sensitivity (depends on noise and gain)