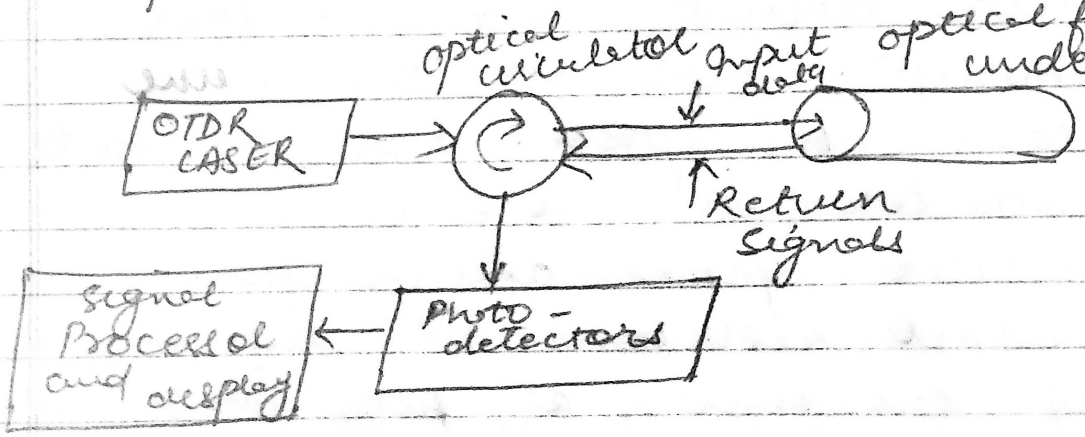
Optical Time Domain Reflectometer

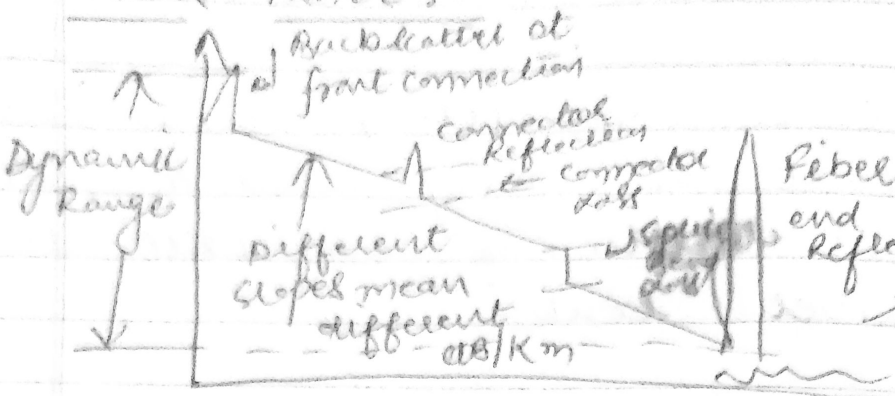
→ An OTDR is a versatile portable instrument that is widely used to evaluate the characteristic of an installed optical fiber link.

→ Also identifying and locating faults within a link, this instrument measures parameter such as fiber attenuation, length, optical connector and splice losses and right reflectance level.

→ An OTDR is fundamentally an optical radar. The OTDR operates by periodically launching narrow laser pulses into one end of a fiber under test by using either a directional coupler or a circulator



OTDR TRACES:-



Representation trace of backscattered & reflected optical power as displayed on an OTDR screen and the meaning of various trace features

The backscattered waveform has four distinct features:-

1. A large initial pulse ~~from~~ resulting from fresnel reflections at the input end of the fiber.
2. A long decaying tail resulting from Rayleigh scattering in the reverse direction as the input pulse travels along the fiber.
3. Abrupt shifts in the curve caused by optical loss at joints & connectors in the fiber line.
4. Positive spikes arising from fresnel reflections at the far end of the fiber, at fiber joints and fiber imperfections

Two important performance parameters are dynamic range and measurement range.

(i) Dynamic range:- Dynamic range is defined as the difference between the initial backscattered power level at the front connector and the noise level at the far end of the fiber. Dynamic

→ Dynamic range provides information on the max fiber loss that can be measured and denotes the time required to measure a given fiber loss

(ii) Measurement range:-

Measurement range deals with how far away an OTDR can identify events in the link such as splice points, connection points or fiber breaks.

→ The maximum Range Rmax depends on the fiber attenuation α and on the pulse width or the dynamic range.

$$R_{max} = D_{OTDR}/\alpha.$$

OTDR Dead Zone:-

→ Dead zone is the distance over which the photodetector in an OTDR is saturated momentarily after it measures a strong reflection.