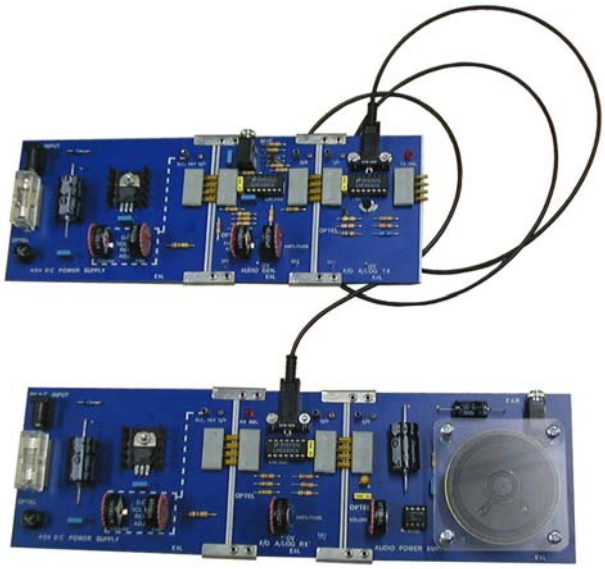
Fibre Optics Telecommunications Training for Today

OPTEL - 1



Items Available:

- **Practical Experiments Kit with components and parts required for the experiments, consisting of:**
  - 11 different custom designed modular boards for systems learning (12 boards in total)
  - Practical Experiments Book consisting of 14 experiments
  - 2 lengths of Fibre Optic Cable with connectors
  - 2 Power Supply Units
  - Microphone
  - Connecting wires
  - All Housed in a sturdy storage case

- **Course Text. Fully structured covering:**
  - History of Communication
  - The Electromagnetic Spectrum
  - Modulation and Multiplexing
  - The Behaviour of Light
  - Fibre Optics
  - Light Sources
  - Light Detectors
  - Fibre Optic Systems
  - Future Developments in Fibre Optic Technology

- **Audio-Visual Tutorial Package consisting of:**
  - 80 Colour 35mm Slides
  - A Synchronised Commentary Audio Cassette
  - Printed Teacher Notes

- **CD ROM Version of the Audio-Visual Package**

- **Instructor's Guide containing solutions to all experiments in the Practical Experiments Book.**

E & L Instruments

"TOTAL SOLUTIONS FOR ELECTRONICS TRAINING"

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Fibre Optics and Telecommunications Training

The OPTEL course provides an in-depth systems approach to Digital Communication & Fibre Optic Communication requirements at all levels of Education and for Vocational Training.

SKILLS INVENTORY

The following list indicates the level of competence attainable by students completing the programme.

History of Communication

- Definition of Communication & Telecommunication
- Parameters of Communication
- Demands for Communication including Audio, Visual and Electronic

The Electromagnetic Spectrum

- The basic concepts of Wave Theory
- Properties of Electromagnetic Radiation
- Allocation of the Electromagnetic Spectrum

Modulation and Multiplexing

- To define and explain the difference between analogue and digital signals
- To be familiar with important definitions used in telecommunication
- Appreciate the importance of bandwidth and its meaning
- Understand the reason for modulation and its different forms
- Understand the principles of time division multiplexing and of frequency multiplexing, sampling and the different kinds of pulse modulation

The Behaviour of Light

- Understand the behaviour of light when it strikes reflective or transparent materials
- Be familiar with terminology used to describe behaviour of light rays
- Know how to calculate angles of refraction and reflection
- Be familiar with some optical components and their use

Fibre Optics

- Understand how light propagates in fibre optics
- Be able to distinguish between step index fibres and gradual index fibres
- Understand the concept of mode and its influence on communication rate
- Know how the fibre optic cables are constructed

Light Sources

- Understand the principal energy levels of an atom
- Explain the generation of light at various wavelengths
- Understand what a pn junction is and what it does
- Understand function and properties of an LED
- Understand function and properties of an ILD

Light Detectors

- Understand how photodiodes work and the difference between three major varieties
- Be aware of the advantage of various photodiode geometries which can be employed
- Understand spectral characteristics of different materials used in photodiode fabrication
- Understand the significance of the various detection characteristics
- Appreciate the basic differences between analogue and digital receivers

Fibre Optic Systems

- Be able to identify the common types of networks used in data communications
- Be able to calculate the overall rise time for a fibre optic system
- Be able to calculate the overall losses for a fibre optic system

Future Developments

- Familiarisation with current developments in fibre optics technology and possible uses
- Have some idea of the research being conducted in the field of integrated optics and its influence on future developments

Practical Experiments

- Transmission of a signal through fibre optics
- Transmission of analogue DC signals over fibre optics
- Operation of the Fibre Optic Pulse Transmitter
- Determination of the parameters of the pulse transmitter
- Determination of the parameters of the pulse receiver
- Transmission of audio-frequency over a fibre optic link
- Transmission of sound over a fibre optic link
- Modulation of a pulse carrier by a DC level
- Modulation of waves
- Pulse Amplitude Modulation: its transmission via fibre optics
- Parallel to Serial Conversion
- Investigating the Clock in Digital Communications
- Analogue to Digital Conversion
- Mini Project - Digital Fibre Optics Communication System

AUDIO VISUAL TUTORIAL PACKAGE

The A-V Tutorial package provides an excellent awareness of telecommunication technology and its applications for Information Technology courses or as a foundation course at Vocational and Higher Education levels. Topics covered are:

- Telecommunications history
- The telecommunications explosion
- Communications links
- Cable versus Satellite
- Imperfect transmission
- A digital signal
- Binary numbers and bits of information
- Digitisation
- Conversion of Digital to Analogue
- Analogue versus Digital
- Multiplexing
- Information carrying capacity
- Fibre optics versus copper cables
- Fibre optics as light pipes
- Light sources and detectors
- Constraints on performance
- Improved fibre optics
- Making fibre optics
- Practical aspects
- Summary

The content of the A-V package is also available on CD-ROM.

ORDERING INFORMATION	Part N°
OPTEL-1 Practical Experiments Kit	325-2030
OPTEL-1 Instructor's Guide	345-0032
OPTEL-1 Course Text	345-0030
OPTEL-1 A-V Tutorial Package	325-0031
OPTEL-1 CD-ROM	370-9001
Fibre Optic Cable 1m with connectors	014-1115
Fibre Optic Cable 5m with connectors	014-1117

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