Fiber Optics

Catalogue Number	3021-0000
Category	Electronics and Electrical Control
Duration	15 Hours

Activity 1: Introduction to Fiber Optics

- What is Fiber Optics?
- Fiber Optic Transmitting System
- Older Forms of Optical Communication Systems
- History of Fiber Optics
- Fiber Optic Systems in Modern Industry
- Task: Arranging the Components of the Fiber Optic Transmitting System

Activity 2: Laws of Light Propagation Used in Fiber Optics

- Important Facts About Light
- Reflection
- Refraction
- Snell's Law
- Total Internal Reflection and Refraction
- Industrial Applications
- Light Propagation and Optical Fibers
- Task: Using the Law of Reflection

Activity 3: Digitizing Analog Data

- Introducing Light Waves
- Electromagnetic Spectrum
- Transferring Information Over Optical Fibers
- Conversion of Analog Data
- Task: Arranging the Components of the Phone System

Activity 4: Basic Problems of Fiber Optic System Design

- Designing a Fiber Optic System
- Types of Fiber Optic Cable
- Encoding Information Technology
- Attenuation
- Attenuation in Optical Fibers
- Polarization
- Dispersion
- Types of Dispersion
- Task: Reducing Transmission Loss

Activity 5: Fiber Optics Manufacturing

- Introduction
- Material for Optical Fiber
- Comparison of Fiber Optic Types
- The Optical Fiber Manufacturing Process
- Making the Preform Cylinder
- Drawing Fibers from the Preform Blank
- Testing the Finished Optical Fiber
- Task: Arranging the Stages of Optical Fiber Manufacturing

Activity 6: Fiber Optic Cable versus Metal Wire Cable

- Comparing Metal Wire and Optical Fiber
- Advantages of the Optical Fiber
- Disadvantages of the Optical Fiber
- Task: Identifying Disadvantages of Copper and Optical Cable

Activity 7: Semiconductors and Diodes

- Atomic Structure
- Conductors and Insulators
- Semiconductors
- Diodes
- Light Emitting Diodes

Activity 8: Lasers

- Introduction to Lasers
- Physics of Lasers
- Laser Light
- Ordinary Light vs. Laser Light
- Task: Comparing Laser Light to Ordinary Light
- How Lasers Work
- Types of Lasers

Activity 9: Laser Applications

- Laser Applications
- Industrial Applications
- Medical Applications
- Military Applications
- Scientific Applications
- Communications
- Daily Applications
- Laser Shows
- Task: Measuring Ranges with a Laser Range Finder

Activity 10: Photovoltaic Cells and Photodiodes

- Optic Detectors
- Photodiodes in Fiber Optic Systems
- Photodiode Construction
- Photodiode Parameters
- Photovoltaic Cells
- The Photovoltaic Reaction
- Photovoltaic Applications
- Task: Toy Solar Panel Powered Car - Effect of the Angle of the Solar Panel
- Task: Toy Solar Panel Powered Car - Effect of the Time of Day
- Task: Toy Solar Panel Powered Car - Effect of Solar Panel Cover

Activity 11: Signal Amplification

- Role of Amplifiers in the Fiber Optic Transmitting
- Types of Amplifiers
- Optical Amplifiers
- Erbium Doped Fiber Amplifiers
- Semiconductor Optical Amplifiers
- Task: Constructing a Fiber Optic System

Activity 12: DWDM and TDM

- Limitations of Modern Fiber Optic Technology
- Dense Wavelength Division Multiplexing
- Time Division Multiplexing
- Meeting Future Communication Needs
- Task: Arrange the Components of the Fiber Optic MUX-DEMUX System

Activity 13: Fiber Optics in Medical Applications

- Endoscopy
- Types of Endoscopes
- Common Applications of Endoscopes
- Endoscope Characteristics
- Transmitting Images
- Other Medical Applications of Fiber Optics
- Task: Viewing Objects with an Optic Fiber Bundle

Activity 14: Various Applications of Fiber Optics

- Medical Applications of Fiber Optics
- Applications of Fiber Optics in Communications
- Industrial & Commercial Applications

Comprehensive Post-Test