

ATHEENAPANDIAN'S

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# INTERNATIONAL CERTIFICATE COURSE

**Certificate Course on Troubleshooting of  
Medical Equipment**

COURSE

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Learn to  
troubleshoot and  
maintain critical  
medical devices

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# **CERTIFICATE COURSE ON TROUBLESHOOTING OF MEDICAL EQUIPMENT**

**Course Name:** Troubleshooting of Medical Devices

**Course Duration:** 30 Hours

## **Course Eligibility:**

□ This course is eligibility for Students, Faculty, Biomedical Professionals and Other Professional.

**Course Fee:** Rs 999/11.9 USD

## **Course Objectives:**

- Understand the basic concept of medical equipment's
- Learn about Electrical and Electronic Concept
- Ensure Electrical Safety in Medical Equipment
- Apply Troubleshooting Techniques in various department

## **Course Benefits:**

- Comprehensive Knowledge of Medical Devices
- Improved Troubleshooting Skills
- Improved Electrical Safety Awareness
- Expertise in Advanced Devices
- Multi-Departmental Equipment Management
- Regulatory Compliance and Reporting
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## **Course Coverage:**

### **1. Introduction to Medical Devices and Troubleshooting**

- Overview of Medical Devices: Types and categories (diagnostic, therapeutic, surgical)
- Common Problems in Medical Devices: Faults, failures, and malfunctions
- Introduction to Troubleshooting Techniques: Step-by-step diagnosis, root cause analysis

### **2. Basic Electrical & Electronic Principles**

- Electrical and Electronics Components in Medical Devices
- Circuit Diagrams and Schematics
- Troubleshooting Basic Electrical Circuit

- Electrical Safety in Medical Devices

### **3. Physiological effects of electricity**

- Sources of shocks, macro & micro shocks.
- Basic approaches to shock protection.
- Leakage Currents (Hazards, monitoring and interrupting the operation).
- Electrical safety analyzer.
- Testing of biomedical equipment.
- Electrical-safety codes and standards for medical equipment.

### **4. Troubleshooting methods of various department Equipment's Troubleshooting methods on Intensive Care Unit (ICU)**

#### **Equipment's**

- Patient Monitoring Systems
- Ventilators
- Infusion Pumps and Syringe pump

### **Troubleshooting methods on Cardiology Department Equipment's**

- Electrocardiogram (ECG/EKG) Machines
- Defibrillators (Automated External Defibrillators - AEDs and Manual Defibrillators)
- Heart Lung Machine
- Troubleshooting methods on Dialysis and Renal Care Equipment's
- Dialysis Machines
- Peritoneal Dialysis Devices

### **Troubleshooting methods on Physiotherapy Department Equipment's**

- Diathermy
- TENS (Transcutaneous Electrical Nerve Stimulation) Machines
- Electric Muscle Stimulators (EMS)

### **Troubleshooting methods on Diagnostic Imaging Department Equipment's**

- X-ray Machines
- CT Scanner

- Ultrasound Devices
- PET
- SPECT
- Radiation Therapy
- Proton Therapy
- Radiation safety standards

## **5. Troubleshooting Advanced Medical Devices**

- Wearable and Portable Devices: Troubleshooting IoT-based healthcare devices, portable diagnostic equipment, and fitness trackers
- Minimally Invasive Devices: Understanding and solving problems in endoscopes, laparoscopes, and robotic surgery systems

## **6. Documentation and Reporting for Device Repairs**

- Importance of Accurate Documentation: Keeping records of issues, repairs, and maintenance
- Creating Troubleshooting Reports: How to prepare detailed and clear reports for maintenance teams and regulatory bodies
- Compliance with Medical Device Regulations: Ensuring repairs meet industry standards (e.g., FDA, CE, ISO)

Troubleshooting of Medical Devices			
Sl.No	Date	Day	Topic
1	04.11.2024	MONDAY	Overview of Medical Devices (2hours)
			Objective: Understand different types and categories of medical devices.
			Topics:
			Overview of Medical Devices
			Diagnostic Devices: Imaging systems, patient monitors
			Therapeutic Devices: Infusion pumps, ventilators
			Surgical Devices: Endoscopes, electrosurgical units
			Activity: Case studies on different device categories.
			Assessment: Class discussion on device categories.
2	05.11.2024	TUESDAY	Common Problems and Troubleshooting Techniques (2hours)
			Objective: Identify common issues in medical devices and basic troubleshooting strategies.
			Topics:
			Faults, Failures, and Malfunctions in Medical Devices
			Step-by-Step Troubleshooting Techniques
			Root Cause Analysis Methods
			Activity: Group discussion on troubleshooting common faults.
Assessment: Problem-solving exercises			
3	06.11.2024	WEDNESDAY	Electrical and Electronics Components in Medical Devices (2hours)
			Objective: Learn about electrical and electronic principles related to medical devices.
			Topics:
			Components: Resistors, capacitors, transistors, diodes
			Circuit Diagrams and Schematics
			Activity: Building and analyzing simple circuits.
Assessment: Circuit diagram analysis			
4	07.11.2024	THURSDAY	Troubleshooting Electrical Circuits and Safety (2hours)
			Objective: Apply troubleshooting techniques and electrical safety principles.
			Topics:
			Electrical Safety in Medical Devices
			Circuit troubleshooting techniques
			Activity: Troubleshoot a faulty medical device circuit.
Assessment: Hands-on practice with basic circuit troubleshooting.			
5	08.11.2024	FRIDAY	Macro and Micro Shocks, Shock Protection (2hours)
			Objective: Understand the physiological effects of electricity on the human body.
			Topics:
			Macro vs. Micro Shocks
			Basic Shock Protection Approaches
			Activity: Demonstration on electrical shock simulations.
Assessment: Discussion on patient safety measures.			
6	11.11.2024	MONDAY	Electrical Safety Testing (2hours)
			Objective: Learn about leakage currents, safety analyzers, and testing biomedical equipment.
			Topics:
			Leakage Currents: Hazards and Interruptions
			Electrical Safety Analyzer
			Testing Standards and Codes (FDA, CE, ISO)
			Testing Standards and Codes (FDA, CE, ISO)
Assessment: Quiz on electrical safety standards			
7	12.11.2024	TUESDAY	ICU Equipment Troubleshooting (2hours)
			Objective: Develop skills to troubleshoot ICU equipment.
			Topics:
			Patient Monitoring Systems, Ventilators, Infusion Pumps
			Activity: Troubleshoot a patient monitor failure.
			Assessment: Equipment troubleshooting simulation.



8	13.11.2024	WEDNESDAY	Cardiology Department Equipment Troubleshooting(2hours)
			Objective:Understand troubleshooting for cardiology equipment.
			Topics:
			ECGMachines,Defibrillators,Heart Lung Machine
			Activity:Simulated ECG malfunction troubleshooting.
			Assessment:Troubleshooting scenario.
9	14.11.2024	THURSDAY	Dialysis & Renal Care Equipment Troubleshooting(2hours)
			Objective:Learn troubleshooting methods for dialysis and renal care devices.
			Topics:
			Dialysis Machines,Peritoneal Dialysis Devices
			Activity:Diagnosing common dialysis machine issues.
			Assessment:Equipment case study.
10	15.11.2024	FRIDAY	Physiotherapy & Diagnostic Imaging Equipment Troubleshooting(2hours)
			Objective:Troubleshoot physiotherapy and imaging equipment.
			Topics:
			Diathermy,TENS,EMS,X-ray,CT,Ultrasound,PET,SPECT,ProtonTherapy
			Activity:Troubleshoot a malfunctioning ultrasound machine.
			Assessment:Imaging equipment quiz.
11	18.11.2024	MONDAY	Wearable & Portable Devices(2hours)
			Objective:Troubleshoot advanced,portable medicaldevices.
			Topics:
			IoT Healthcare Devices,Fitness Trackers
			PortableDiagnosticEquipment
			Activity:Troubleshoot a malfunctioning fitness tracker.
Assessment:Report preparation based on troubleshooting			
12	19.11.2024	TUESDAY	Minimally Invasive Devices (2hours)
			Objective:Troubleshoot devices used in minimally invasive surgery.
			Topics:
			Endoscopes,Laparoscopes,Robotic Surgery Systems
			Activity:Simulated troubleshooting of an endoscope system.
			Assessment:Device troubleshooting report.
13	20.11.2024	WEDNESDAY	Importance of Accurate Documentation (2hours)
			Objective:Understand the need for detailed records in medical device repairs.
			Topics:
			Keeping Logs:Issue records,maintenance reports
			Compliance with Industry Standards
			Activity:Analyze sample repair documentation.
Assessment:Create a mock maintenance report.			
14	21.11.2024	THURSDAY	Troubleshooting Reports and Compliance(2hours)
			Objective:Learn how to prepare clear and compliant troubleshooting reports.
			Topics:
			Preparing Troubleshooting Reports
			Compliance with Medical Device Regulations(FDA,CE,ISO)
			Activity:Draft a troubleshooting report for a simulated scenario.
Assessment:Peer review of troubleshooting reports			
15	22.11.2024	FRIDAY	Review and Final Assessment(2hours)
			Objective:Assess overall understanding of troubleshooting medical devices.
			Activity:
			Review key concepts from all modules.
			Final troubleshooting practical session.
			Assessment:
			Written assessment covering electrical principles,physiological effects,and troubleshooting methods.
Practical test:Troubleshoot and document a simulated device issue.			