

Overview of Biomedical Engineering

Overview of the Biomedical Engineering Technician Role

(Designed as quick-reference study notes)

1. Core Definition

- **Biomedical Engineering Technician (BMET)** – a technical professional who installs, maintains, calibrates, repairs, and troubleshoots medical equipment and systems used in health-care facilities.
- Works under the guidance of biomedical engineers, clinical engineers, or facility managers.

2. Primary Responsibilities

Category	Typical Tasks	Key Skills / Tools
Equipment Installation & Setup	• Unpack, assemble, and install devices (e.g., imaging systems, patient monitors, infusion pumps). • Verify proper power, networking, and environmental requirements.	• Reading schematics & manuals • Use of hand/ power tools, torque wrenches
Preventive Maintenance (PM)	• Follow manufacturer-specified PM schedules. • Perform functional checks, cleaning, lubrication, firmware updates.	• Checklists, maintenance management software (CMMS)
Calibration & Performance Verification	• Run calibration routines (e.g., ECG, ventilator flow meters). • Document results and adjust settings to meet specifications.	• Calibration standards, reference devices, software tools
Repair & Troubleshooting	• Diagnose faults using symptom analysis, error codes, and test equipment. • Replace faulty components (PCBs, sensors, batteries).	• Multimeter, oscilloscope, signal generators, hot-swap techniques

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Safety & Compliance	• Conducted functional safety tests (ground fault, leakage current). • Ensure devices meet FDA, IEC 60601, and local regulatory standards.	• Safety analyzers, leak detectors, documentation of test results
Inventory & Asset Management	• Track equipment location, warranty status, and service history. • Order spare parts and consumables.	• CMMS, barcode/RFID scanning
User Support & Training	• Provide bedside assistance, answer user questions, and train clinical staff on proper operation.	• Clear communication, instructional materials
Documentation	• Write service reports, maintenance logs, and incident records. • Update equipment manuals with facility-specific notes.	• Electronic health record (EHR) integration, standardized forms

3. Typical Work Environment

Setting	Examples	Specific Considerations
Hospital / Clinical Facility	Operating rooms, ICU, radiology, labs	24/7 on-call rotations; sterile environment protocols
Manufacturing / OEM Service	Device manufacturers, field service teams	Travel to multiple sites; focus on warranty repairs
Research Institutions	Universities, biotech labs	Support experimental equipment, often custom-built
Outpatient Clinics & Long-Term Care	Dental offices, dialysis centers	Smaller equipment inventory, higher patient interaction frequency

4. Required Knowledge Base

1. **Electrical & Electronics Fundamentals** – Ohm's law, circuit analysis, digital logic.
2. **Medical Device Standards** – IEC 60601 series, ISO 14971 (risk management), FDA 21 CFR 820 (QSR).

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3. **Physiology Basics** – Understanding of cardiac, respiratory, and neurological signals to interpret device outputs.

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4. **Computer & Networking Basics** – Windows/Linux OS, TCP/IP, HL7, device drivers.

5. **Safety Regulations** – OSHA, NFPA 99 (Health Care Facilities Code).

5. Essential Tools & Software

Tool / Software	Purpose
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Multimeter / Clamp Meter	
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