

CONTENT OF THE EXAMINATIONS

EXAMINATION FOR CERTIFIED BIOMEDICAL EQUIPMENT TECHNICIAN (CBET)

- I. **Anatomy and Physiology** (Approx 13%)
 - A. Systems
 - 1. Respiratory
 - 2. Gastrointestinal
 - 3. Nervous
 - 4. Circulatory
 - 5. Musculoskeletal
 - 6. Endocrine
 - B. Organs
 - 1. Heart
 - 2. Lungs
 - 3. Liver
 - 4. Kidneys
 - 5. Brain
 - 6. Gallbladder
 - 7. Pancreas
 - 8. Other
 - C. Blood
 - 1. Components
 - 2. Metabolism
 - D. Terminology
- II. **Public (employee, patient, visitor) Safety In The Health Care Facility** (Approx 17%)
 - A. Electrical
 - 1. Microshock/Electrical Safety Testing
 - 2. Other
 - B. Chemical
 - 1. Material Safety Data Sheet
 - 2. Other
 - C. Radiation Hazards
 - 1. Light Spectrum
 - 2. Types of Rays
 - D. Biological
 - 1. Standard Precautions
 - 2. Other
 - E. Fire
 - 1. Class
 - 2. Fire Extinguishers
 - F. Codes and Standards
 - 1. Joint Commission Comprehensive Accreditation Manual
 - 2. AABB
 - 3. NFPA 99
 - a. Gas and Vacuum Systems
 - b. Electrical Systems
 - 4. FDA
 - 5. SMDA
 - 6. OSHA
 - 7. Other
- III. **Fundamentals of Electricity, Electronics, and Solid-State Devices** (Approx 17%)
 - A. Transducers
 - B. Calculations and Conversions
 - 1. Hex/Decimal/Binary
 - 2. Other
 - C. Devices
 - 1. Passive
 - 2. Active
 - 3. Digital
 - D. Circuits
 - 1. Operational Amplifier
 - 2. Power Supplies
 - 3. Common Base/Emitter/Collector Transistor Circuits
 - 4. AC Power
 - a. Transformer
 - b. Distribution
- E. Test Equipment
- F. Batteries
- G. Terminology
- IV. **Medical Equipment Function and Operation (Approx 26%)**
 - A. Monitoring Systems (i.e. ECG, EEG, Blood Pressure, Pulse Oximetry, Fetal Monitor)
 - B. Portable Equipment (i.e. Infusion Devices Syringe Pumps, PCA Pumps, Hypo Hyperthermia)
 - C. Life Support Equipment (i.e. Defibrillators, Hemodialysis, Anesthesia Machines, Critical Care Ventilators, Balloon Pumps)
 - D. Therapeutic Equipment (i.e. Infant Warmers, Ultrasound Therapy)
 - E. Laboratory Equipment (i.e. Centrifuges, Water Baths, Analyzers)
 - F. Diagnostic Imaging (i.e. Ultrasound, Radiographic/Fluoroscopy)
 - G. Operating Room (i.e. Electro Surgical Generators, Video Carts, Lasers, Tourniquets, Sterilizers, Warmers)
 - H. Information Systems (i.e. Computers, Networks, Topology)
 - I. Test Equipment (i.e. Electrical Safety, Defibrillator, Electro Surgical, Physiologic Simulators, Oscilloscopes, Meters)
 - J. Terminology
- V. **Medical Equipment Problem Solving (Approx 27%)**
 - A. Electronic Component Level, Block Level
 - B. Monitoring Systems (i.e. ECG, EEG, Blood Pressure, Pulse Oximetry, Fetal Monitor)
 - C. Portable Equipment (i.e. Infusion Devices Syringe Pumps, PCA Pumps, Hypo Hyperthermia)
 - D. Life Support Equipment (i.e. Defibrillators, Hemodialysis, Anesthesia Machines, Critical Care Ventilators, Balloon Pumps)
 - E. Therapeutic Equipment (i.e. Infant Warmers, Ultrasound Therapy)
 - F. Laboratory Equipment (i.e. Centrifuges, Water Baths, Analyzers)
 - G. Diagnostic Imaging (i.e. Ultrasound, Radiographic/Fluoroscopy)
 - H. Operating Room (i.e. Electro Surgical Generators, Video Carts, Lasers, Tourniquets, Sterilizers, Warmers)
 - I. Information Systems (i.e. Computers, Networks, Topology)
 - J. Situational (i.e. User error, user training, applications)

**EXAMINATION FOR CERTIFIED
RADIOLOGY EQUIPMENT SPECIALIST (CRES)**

- I. Anatomy and Physiology**
(Approximately 13%)
- A. Systems
 - 1. Respiratory
 - 2. Gastrointestinal
 - 3. Nervous
 - 4. Circulatory
 - 5. Musculoskeletal
 - 6. Endocrine
 - B. Organs
 - 1. Heart
 - 2. Lungs
 - 3. Liver
 - 4. Kidneys
 - 5. Brain
 - 6. Gallbladder
 - 7. Pancreas
 - 8. Other
 - C. Blood
 - 1. Components
 - 2. Metabolism
 - D. Terminology
- II. Public (employee, patient, visitor) Safety In The Health Care Facility**
(Approximately 17%)
- A. Electrical
 - 1. Microshock/Electrical Safety Testing
 - 2. Other
 - B. Chemical
 - 1. Material Safety Data Sheet
 - 2. Other
 - C. Radiation Hazards
 - 1. Light Spectrum
 - 2. Types of Rays
 - D. Biological
 - 1. Standard Precautions
 - 2. Other
 - E. Fire
 - 1. Class
 - 2. Fire Extinguishers
 - F. Codes and Standards
 - 1. Joint Commission Comprehensive Accreditation Manual
 - 2. NFPA 99
 - a. Gas and Vacuum Systems
 - b. Electrical Systems
 - 3. FDA
 - a. MQSA
 - b. Title 21
 - 4. SMDA
 - 5. OSHA
 - 6. Other
- III. Fundamentals of Electricity, Electronics, and Solid-State Devices**
(Approximately 17%)
- A. Transducers
 - B. Calculations and Conversions
 - 1. Hex/Decimal/Binary
 - 2. Other
 - C. Devices
 - 1. Passive
 - 2. Active
 - 3. Digital
 - D. Circuits
 - 1. Operational Amplifier
 - 2. Power Supplies
 - 3. Common Base/Emitter/Collector Transistor Circuits
 - 4. AC Power
 - a. Transformer
 - b. Distribution
- IV. Medical Equipment Function and Operation**
(Approximately 26%)
- A. Equipment Types
 - 1. Test Equipment
 - 2. Film Processors
 - 3. X-Ray Tubes
 - 4. TV Camera
 - 5. Intensifying Screens
 - 6. Image Intensifier
 - 7. Other
 - B. Systems
 - 1. X-Ray Machines
 - a. Diagnostic
 - b. Therapy
 - c. Portable
 - d. Fluoroscopy
 - 2. Nuclear Medicine
 - 3. Magnetic Resonance Imaging
 - 4. Linear Tomography Systems
 - 5. Ultrasound - Diagnostics
 - 6. Mammography
 - 7. Digital Imaging
 - 8. CT
 - 9. PACS
 - 10. Other
 - C. Information Technology
 - 1. Computers
 - a. Hardware
 - b. Software
 - 2. Networks
 - a. Topologies
 - b. Operating Systems
 - D. Quality Control
 - E. Terminology
- V. Medical Equipment Problem Solving**
(Approximately 27%)
- A. Component Level (Electronic Circuit)
 - B. Equipment Types
 - 1. Film Processors
 - 2. X-Ray Tubes
 - 3. TV Camera/Displays
 - 4. Intensifying Screens
 - 5. Image Intensifier
 - 6. Digital Imaging
 - 7. CT
 - 8. PACS
 - 9. Other
 - C. Systems
 - 1. X-Ray Machines
 - a. Diagnostic
 - b. Therapy
 - c. Portable
 - d. Fluoroscopy
 - 2. Nuclear Medicine
 - 3. Magnetic Resonance Imaging
 - 4. Linear Tomography Systems
 - 5. Ultrasound - Diagnostic
 - 6. Mammography
 - 7. Other
 - D. Situational
 - 1. Prioritizing Work
 - 2. Operator vs. Equipment
 - 3. Applications
 - 4. Other

**EXAMINATION FOR CERTIFIED
LABORATORY EQUIPMENT SPECIALIST (CLES)**

- I. **Anatomy and Physiology**
(Approximately 13%)
 - A. Systems
 - 1. Respiratory
 - 2. Gastrointestinal
 - 3. Nervous
 - 4. Circulatory
 - 5. Musculoskeletal
 - 6. Endocrine
 - B. Organs
 - 1. Heart
 - 2. Lungs
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 - 5. Brain
 - 6. Gallbladder
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 - 8. Other
 - C. Blood
 - 1. Components
 - 2. Metabolism
 - D. Terminology
- II. **Public (employee, patient, visitor) Safety In The Health Care Facility**
(Approximately 17%)
 - A. Electrical
 - 1. Microshock/Electrical Safety Testing
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 - 1. Material Safety Data Sheet
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 - a. Gas and Vacuum Systems
 - b. Electrical Systems
 - 4. FDA
 - 5. SMDA
 - 6. OSHA
 - 7. CLIA
 - 8. Other
- III. **Fundamentals of Electricity, Electronics, and Solid-State Devices**
(Approximately 13%)
 - A. Transducers
 - B. Calculations and Conversions
 - 1. Hex/Decimal/Binary
 - 2. Other
 - C. Devices
 - 1. Passive
 - 2. Active
 - 3. Digital
 - D. Circuits
 - 1. Operational Amplifier
- IV. **Medical Equipment Function and Operation**
(Approximately 39%)
 - A. Equipment Types
 - 1. Test Equipment
 - 2. Common Lab Equipment
 - a. Centrifuges
 - b. Microscopes
 - c. Blood Gas Analyzers
 - d. Refrigerators
 - 3. Chemistry Equipment
 - 4. Hematology Equipment
 - 5. Microbiology Equipment
 - 6. Blood Bank Equipment
 - 7. Urinalysis Equipment
 - 8. Histology Equipment
 - 9. Other
 - B. Systems
 - 1. Lab Information
 - 2. Computer
 - a. Hardware
 - b. Software
 - 3. Networks
 - a. Topologies
 - b. Operating Systems
 - 4. Other
 - C. Quality Control
 - D. Terminology
- V. **Medical Equipment Problem Solving**
(Approximately 18%)
 - A. Component Level (Electronic Circuit)
 - B. Equipment Types
 - 1. Common Lab Equipment
 - a. Centrifuges
 - b. Microscopes
 - c. Blood Gas Analyzers
 - d. Refrigerators
 - 2. Chemistry Equipment
 - 3. Hematology Equipment
 - 4. Microbiology Equipment
 - 5. Blood Bank Equipment
 - 6. Urinalysis Equipment
 - 7. Histology Equipment
 - 8. Other
 - C. Systems
 - 1. Lab Information
 - 2. Computer
 - a. Hardware
 - b. Software
 - 3. Networks
 - a. Topologies
 - b. Operating Systems
 - 4. Other
 - D. Situational
 - 1. Prioritizing Work
 - 2. Operator vs. Equipment
 - 3. Applications
 - 4. Other

SAMPLE QUESTIONS

I. Anatomy & Physiology

The biomedical equipment technician must be able to communicate intelligently with physicians and hospital staff members. To fulfill the BMET's responsibilities in safety, calibration, and related areas, the BMET must have a reasonable knowledge of anatomy and physiology. The knowledge should include familiarity with terminology and body functions.

1. In fresh, normal human blood, the volume of cells is what percent of the total volume?
 1. 25%
 2. 45%
 3. 80%
 4. 90%

II. Public Safety in the Health Care Facility

This area includes all aspects of safety relating to the health care facility. Each specialist examination (Radiology & Laboratory) emphasizes safety in the specialty.

2. What are the three components of an ordinary fire?
 1. Gas, liquid, vapor
 2. Smoke, flame, heat
 3. Fuel, heat, oxygen
 4. Flames, sparks, explosions

III. Fundamentals of Electricity, Electronics, and Solid-State Devices

Fundamental to many functions of the BMET is knowledge of basic electricity and electronics. Test items in this area call for:

- a. An understanding of current and voltage relationships in AC and DC circuits.
 - b. The ability to apply fundamental mathematical formulae to circuitry.
 - c. An understanding of semiconductor theory and the principles of solid-state circuitry.
 - d. An understanding of electronic test and measuring equipment function.
3. In a single-stage amplifier with a transistor in common-emitter configuration featuring a purely resistive load, the emitter voltage and the collector voltage are
 1. in phase.
 2. not related.
 3. 90° out of phase.
 4. 180° out of phase.

IV. Medical Equipment Function and Operation

The BMET should possess a broad knowledge of equipment and instrumentation in the medical environment. The BMET's knowledge should include the theory of operation, clinical application, and unique safety requirements relating to items such as: (1) coronary and critical care equipment; (2) spectrophotometers, colometers, centrifuges, and other instruments in a clinical laboratory; (3) suction and pressure units; (4) anesthesia machines, ventilators, intra-aortic balloon pumps, and infusion devices; (5) diathermy and ultrasound units; (6) X-ray equipment; and (7) sterilizers.

4. A sphygmomanometer is used for
 1. measuring blood pressure.
 2. collecting urine for analysis.
 3. measuring respiration rate.
 4. high-speed counting of erythrocytes.

V. Medical Equipment Problem Solving

The BMET must be able to perform theoretical troubleshooting using schematics ranging from the simple, serologic water bath to one for an electrocardiograph.

5. A dampened waveform on an invasive blood pressure monitor is usually caused by
 1. a defective monitor.
 2. air bubbles in the fluid system.
 3. the transducer being above the patient.
 4. the transducer being below the patient.

CORRECT ANSWERS TO SAMPLE QUESTIONS:

1. 2 2. 3 3. 4 4. 1 5. 2