BIOMEDICAL ENGINEERING TECHNICIAN SERIES

Code No.	Class Title	Occ. Area	Work Area	Prob. Period	Effective Date	Last Action
4549	Biomedical Engineering Technician I	02	032	6 mo.	07/15/11	Rev.
4550	Biomedical Engineering Technician II	02	032	6 mo.	07/15/11	Rev.
4551	Biomedical Engineering Technician III	02	032	6 mo.	07/15/11	Rev.

Promotional Line: 162

Series Narrative

This series includes positions that develop, construct, test, repair, calibrate, and maintain most types of biomedical/clinical equipment. Maintenance includes the inspection, installation, and preventative maintenance for general clinical equiptment, including appropriate documentation for all service activities. Higher level Biomedical Engineering Technicians may supervise lower level technicians.

DESCRIPTIONS OF LEVELS OF WORK

Level I: Biomedical Engineering Technician I 4549

Employees at this level, under direct supervision, assist in developing, constructing, repairing, and maintaining basic electromedical equipment.

A Biomedical Engineering Technician I typically –

1. constructs basic electronic circuitry, such as transistors, amplifiers, and integrated circuits
2. assists higher level technicians in repairing, installing, calibrating, or maintaining a range of general biomedical/ clinical equipment, e.g., replacing components, taking test readings, and wiring circuits in accordance with specific instructions
3. perform preventative maintenance and electrical safety testing of equipment
4. makes minor repairs on medical electronic equipment, such as isolating and repairing defects in motors, calibrating biomedical equipment, replacing blown fuses and worn motor brushes, and adjusting loose connections
5. conducts basic experiments to determine the characteristics of new semiconductor devices, such as tunnel diodes, and their potential for use in amplifiers, oscillators, and other electrical circuits
6. maintains appropriate records of repairs and preventative maintenance
7. responsible for equiptment inventory and supply needs to perform their job
8. may investigate and provide required action to address hazard alerts and recalls, or, risk management investigations
9. work with vendors as necessary to ensure that equipment is repaired
10. performs other related duties as assigned

Level II: Biomedical Engineering Technician II 4550

Employees at this level, under general supervision, repair, calibrate, and maintain medical equipment, instrumentation, and support connectivity of systems of moderate complexity used in healthcare delivery. They also inspect, install, and provide inventory assessments and preventative maintenance of medical equipment, including appropriate documentation for all service activities.

A Biomedical Engineering Technician II typically –

1. follows specific layout and schematic diagrams to construct devices and subunits of equipment, such as power supplies, oscillators, and amplifiers

2. constructs pieces of electronic equipment not available commercially

3. tests electrical circuits and components to locate shorts, faulty connections, and defective parts, using test meters; solders loose connections and replaces defective parts (such as tubes, transformers, resistors, condensers, and switches) using hand tools (such as soldering irons, drill press and punch press, pliers, and wrenches)

4. performs routine inspections and preventative maintenance on all new and repaired biomedical and electronic equipment (e.g., checks batteries and electrical circuits and cleans and lubricates equipment parts); maintains appropriate records of repair and maintenance schedules

5. provides continuous repair services to equipment located in intensive care units

6. evaluates new components, transducers, and techniques as they become available to determine their value and adaptability to the research needs of the health care facility

7. instructs staff in the mechanical aspects of electronic medical equipment

8. manges or monitors completion of preventative maintenance activities done by third party vendors

9. provides mentoring and training to Biomedical Engineering Technician Is

10. diagnose and correct system connectivity issues and equipment malfunction

11. review outcomes of preventative maintenance outcomes and make recommendations concerning improvements

12. may investigate and provide required action to address hazard alerts and recalls, or, risk management investigations

13. performs the duties of lower level in this series

14. performs other related duties as assigned

Level III: Biomedical Engineering Technician III 4551

Employees at this level, under minimal supervision, redesign, develop tests, evaluate, construct, install, repair, and maintain complex electronic measurement and control instruments, and adjust and repair both custom and commercial apparatus. They may also direct, coordinate, and evaluate the work of lower level technicians.

A Biomedical Engineering Technician III typically –

1. prepares detailed circuit diagrams for complex equipment, such as equipment that includes two or more circuits which pose problems because of the necessity for incorporating circuitry within limited space, e.g., firing units, safety switches, and connectors

2. completes the basic design of electromedical equipment circuitry initially conceptualized by a Biomedical Engineer, e.g., works from rough sketches and in some instances block diagrams, and uses precedent type or parallel methods that can be extended or modified in developing the electromedical equipment

3. lays out circuits to provide adequate mechanical mounting support for components; makes calculations to determine the value of basic components

4. develops and constructs sophisticated electronic equipment, such as counters, high and low voltage windows, and wide band amplifiers and nonstandard components, such as special high frequency coils, very low frequency chokes, and cavity resonators

5. devises means of arranging, mounting, and wiring components on a chassis to ensure that possible sources of electrical interference are physically isolated or shielded

6. constructs models of electromedical equipment, meeting the specific shape, space, and weight requirements suggested by a Biomedical Engineer

7. performs preventive maintenance on sophisticated electronic equipment by regular inspection of records and spot checks of devices and systems; provides for the appropriate follow-up of warranty and service agreements

8. races circuitry, diagnoses malfunctions, and adjusts controls of electromedical equipment to achieve peak performance

9. determines suitability of equipment in terms of objectives and recommends or redesigns circuits as necessary

10. furnishes instructions on standard test techniques to users of the equipment; uses and interprets standard, as well as complex, test equipment (such as Qmeter, signal generator, saartooth generator, and video amplifiers)

11. documents test results and generates reports as needed

12. maintains a daily log on progress and performance of equipment under development or maintenance

13. prepares schematics and wiring diagrams for completed equipment

14. assigns and directs the work of lower level Biomedical Engineering Technicians

15. assists with the analysis of equipment data compliance necessary to meet The Joint Commission or other applicable standards

16. collaborates with the IS department for any equipment connectivity needs

17. performs duties of a Biomedical Engineering Technician I or II as required

18. performs other related duties as assigned

Level I: Biomedical Engineering Technician I 4549

CREDENTIALS TO BE VERIFIED BY PLACEMENT OFFICER

1. Any one or any combination of the following, totaling **two (2) years (24 months),** from the categories below:

   a) graduation from an accredited biomedical engineering technical school, or equivalent technical/vocational certification/training (including a U.S. military biomedical equipment technology program)

   b) graduation from an accredited electronics technician school

   c) college credit in electrical or electronic engineering or related field

   - 60 semester hours equals 24 months

2. Six months of experience in the repair and maintenance of medical equipment

KNOWLEDGE, SKILLS AND ABILITIES (KSAs)

1. Knowledge of the construction, development, repair, and maintenance of electro-medical equipment, such as mini-computers, scintillation counters, electron microscopes, wide band amplifiers, and other electro-medical devices

2. Knowledge of simple electrical/electronic distribution and signal systems

3. Knowledge of medical terminology

4. Verbal and written communication skills

5. Ability to prepare circuit diagrams

6. Ability to make mathematical computations required in electronics

7. Ability to diagnose equipment malfunctions

8. Ability to occasionally lift up to 50 lbs of equipment, to push/pull equipment carts, and to kneel, stand, bend, and reach during equipment repairs

9. Manual dexterity, and eye-hand coordination

Level II: Biomedical Engineering Technician II 4550

CREDENTIALS TO BE VERIFIED BY PLACEMENT OFFICER

1. Any one or any combination of the following, totaling **two (2) years (24 months),** from the categories below:

   a) graduation from an accredited biomedical engineering technical school, or equivalent technical/vocational certification/training (including a U.S. military biomedical equipment technology program)

   b) graduation from an accredited electronics technician school

   c) college credit in electrical or electronic engineering or related field

   - 60 semester hours equals 24 months

2. Two (2) years (24 months) of biomedical equipment technician experience comparable to that performed at the **Biomedical Engineering Technician I** level of this series or in other positions of comparable responsibility

KNOWLEDGE, SKILLS AND ABILITIES (KSAs)

1. Knowledge of the construction, development, repair, and maintenance of electro-medical equipment, such as mini-computers, scintillation counters, electron microscopes, wide band amplifiers, and other electro-medical devices

2. Knowledge of simple alternating-current phenomena, including a.c. impedance and resonance

3. Knowledge of simple electrical/electronic distribution and signal systems

4. Knowledge of medical terminology

5. Verbal and written communication skills

6. Skill in repairing, constructing, and maintaining basic electronic and electro-medical equipment

7. Ability to prepare circuit diagrams

8. Ability to make mathematical computations required in electronics

9. Ability to diagnose equipment malfunctions

10. Ability to instruct hospital staff in basic maintenance of electro-medical equipment

11. Ability to occasionally lift up to 50 lbs of equipment, to push/pull equipment carts, and to kneel, stand, bend, and reach during equipment repairs

12. Manual dexterity, and eye-hand coordination

Level III: Biomedical Engineering Technician III 4551

CREDENTIALS TO BE VERIFIED BY PLACEMENT OFFICER

1. Any one or any combination of the following, totaling **two (2) years (24 months),** from the categories below:

   a) graduation from an accredited biomedical engineering technical school, or equivalent technical/vocational certification/training (including a U.S. military biomedical equipment technology program)

   b) graduation from an accredited electronics technician school

   c) college credit in electrical or electronic engineering or related field

   - 60 semester hours equals 24 months

2. Two (2) years (24 months) of biomedical equipment technician experience comparable to that performed at the **Biomedical Engineering Technician II** level of this series (repairing, constructing, and maintaining electro-medical equipment) or in other positions of comparable responsibility)

KNOWLEDGE, SKILLS AND ABILITIES (KSAs)

1. Knowledge of the construction, development, repair, and maintenance of electromedical equipment, such as mini-computers, scintillation counters, electron microscopes, wide band amplifiers, and other electromedical devices

2. Knowledge of complex electrical/electronic distribution and signal systems

3. Knowledge of medical terminology

4. Ability to prepare detailed circuit diagrams

5. Ability to develop, construct, and maintain complex electromedical equipment

6. Ability to make mathematical computations required in electronics

7. Ability to diagnose equipment malfunctions

8. Ability to supervise lower level Biomedical Engineering Technicians

9. Ability to occasionally lift up to 50 lbs of equipment, to push/pull equipment carts, and to kneel, stand, bend, and reach during equiptment repairs

10. Manual dexterity, and eye-hand coordination