education

Department:
Education
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

SUBJECT GUIDELINES

ELECTRICAL WORKMANSHIP

NQF Level 3

September 2007

ELECTRICAL WORKMANSHIP – LEVEL 3

CONTENTS

INTRODUCTION

1 DURATION AND TUITION TIME

2 SUBJECT LEVEL FOCUS

3 ASSESSMENT REQUIREMENTS

3.1 Internal assessment

3.2 External assessment

4 WEIGHTED VALUES OF TOPICS

5 CALCULATION OF FINAL MARK

6 PASS REQUIREMENTS

7 SUBJECT OUTCOMES AND LEARNING OUTCOMES

7.1 Trade practices

7.2 Testing and measuring equipment

7.3 Fault-finding and testing

7.4 Repair and maintenance

7.5 Installations

8 RESOURCE NEEDS FOR THE TEACHING OF ELECTRICAL WORKMANSHIP - LEVEL 3

8.1 Physical resources

8.2 Human resources

8.3 Financial resources

INTRODUCTION

A. What is Workshop Practice and Electrical Workmanship?

Workshop Practice introduces students to technical fields. It will equip students with the necessary hand-skills for the construction industry. Workshop and fieldwork procedures that conform to safety regulations and safe working practices will also be learnt.

Electrical Workmanship introduces this field of learning to students. Students will have been introduced to the subject "Workshop Practice" at Level 2 and Electrical Workmanship continues to practically implement the learning material. Although some of the work is repeated, this gives students a solid foundation of knowledge.

B. Why are Workshop Practice and Electrical Workmanship important in the Electrical Infrastructure Construction programme?

Workshop Practice will equip students with the necessary hand-skills, safety consciousness and first aid knowledge and accustom students to technical environments.

Electrical Workmanship contains enough trade specific skills, knowledge, attitudes and values so that students can maintain, repair and construct basic electrical systems in practice.

C. The link between the Workshop Practice and Electrical Workmanship Learning Outcomes and the Critical and Developmental Outcomes

Students will be taught to:

- Identify and solve problems:
  - Recognise principles of electricity and react appropriately.
- Work effectively with others:
  - Solve electricity-related problems.
- Organise and manage their activities and themselves:
  - Apply planned procedures for using, storing and looking after equipment, tools, test equipment, drawings and parts.
- Collect, organise and evaluate information and take appropriate action:
  - Use media centres to collect information.
- Communicate effectively:
  - Use common names for electrical equipment, tools, test equipment, drawings and parts.
- Use science and technology:
  - Use and apply science and technology principles in both theory and practice.
- Demonstrate understanding of subject content through the application of acquired knowledge:
  - Solve problems by using subject contents.

D. Factors that contribute to achieving the Workshop Practice and Electrical Workmanship learning outcomes

- An understanding of technical (electro-mechanical) principles
- An analytical ability
- An ability to do mathematical calculations and manipulations
- Hand skills (practical skills)
- Practical improvisation abilities

1 DURATION AND TUITION TIME

This is a one year instructional programme comprising 200 teaching and learning hours. The subject may be offered on a part-time basis provided all of the assessment requirements set out hereunder are adhered to.

2 SUBJECT LEVEL FOCUS

- Gain skills required by electrical tradespersons
- Ability to fault-find electrical devices
- Ability to maintain and repair electrical devices
- Use instruments for the electrical field effectively

3 ASSESSMENT REQUIREMENTS

3.1 Internal assessment (constitutes 50 percent of the final mark)

An assessor with at least a certificate of competence must finalise all internal assessments.

3.1.1 Theoretical Component

The theoretical component will form 40 percent of the internal assessment.

3.1.2 Practical Component

All practical components must be indicated in a Portfolio of Evidence (PoE).

The practical component will form 60 percent of the internal assessment.

Please note that a mathematical calculation that makes use of the theoretical background of the student can be considered to be the practical component.

3.1.3 Processing of internal assessment mark for the year

A year mark out of 100 is calculated by adding the marks of the theoretical component (40 percent) and the practical component (60 percent) of the internal continuous assessment.

3.1.4 Moderation of internal assessment mark

(Internal Assessment is subject to internal and external moderation procedures as set out in the *National Examinations Policy for Further Education and Training College Programmes.*

3.2 External assessment (constitutes 50 percent of the final mark)

A national examination is conducted in October or November by means of a paper/s set externally and marked and moderated internally.

External assessment details are set out in the *Assessment Guidelines: Electrical Workmanship* (Level 3).

4 WEIGHTED VALUES OF TOPICS

TOPICS	WEIGHTED VALUE
1. Trade practices	20%
2. Testing and measuring equipment	20%
3. Fault-finding and testing	20%
4. Repair and maintenance	20%
5. Installations	20%
TOTAL	**100**

5 CALCULATION OF FINAL MARK

Continuous assessment:	Student's mark/100 x 50/1 = a mark out of 50	(a)
examination mark:	Student's mark/100 x 50/1= a mark out of 50	(b)
Final mark:	**(a) + (b) = a mark out of 100**	

All marks are systematically processed and accurately recorded to be available as hard copy evidence for, amongst others, purposes of moderation and verification.

6 PASS REQUIREMENTS

Students must obtain at least fifty (50) percent in ICASS and fifty (50) percent in the examination.

7 SUBJECT OUTCOMES AND LEARNING OUTCOMES

On completion of Electrical Workmanship Level 3 the student should have covered the following topics:

Topic 1: Trade practices
Topic 2: Testing and measuring equipment
Topic 3: Fault-finding and testing
Topic 4: Repair and maintenance
Topic 5: Installations

7.1 Topic 1: Trade practices

7.1.1 Subject Outcome 1: Know and use standard and acceptable trade practices.

Range: Includes but is not limited to; Planning the work (task) effectively. Drawing up written plans and organizing a schedule for the effective and efficient completion of a task (ordering of equipment, permission to work on equipment, isolation of circuitry, notices and lock-out switches, order in the work area, etc.). Managing work time effectively. Demonstrating an understanding of safe working conditions and procedures at the work-site. Using hand- and power-tools correctly and effectively. Completing and administering required documentation,

Learning Outcomes

- List activities to be done by drawing up a tasks list.
- Draw up a day/week/month planner for the tasks at hand.
- Show in the planning how possible unexpected incidents will influence the work schedule.
- State safety, health and environmental requirements applicable to a work-site.
- Know about site-specific requirements.
- List safety precautions to be taken for identified hazardous working conditions.
- List the procedures in reporting an accident.
- Know about the Occupational Health and Safety Act of 1993, the Mine Health and Safety Act 29 of 1996, NOSA and NOSA ratings in factories and workshops, and the SHE program.
- Select, inspect and use hand tools (saws, files, clamps, screwdrivers, spanners, pliers, hammers, chisels, punches, scribers, rulers and measuring tapes, squares and jigs, electrically insulated tools, wire strippers and cable knife, side cutters, ferrule crimping tools, draw tapes, bending spring and ladders.
- Select, inspect and use power tools and power tool attachments (drill bits, hole saws, filing-, grinding-, and cutting-attachments, drilling machines, angle grinding machines, orbital sanders and jig-saws).
- Select, inspect and use safety equipment (protective clothing, eyewear, footwear, electrically insulated gloves, welding protection (hood, apron, spats, gloves, barriers), guards and emergency stop switches).
- Have basic knowledge of good housekeeping (worksite procedures, safety signs, colour coding of walkways, work-areas, no-go areas and fire-fighting equipment).
- Draw up a written plan and organise a schedule for the effective and efficient completion of a task (ordering of equipment, permission to work on equipment, isolation of circuitry, notices and lock-out switches, order in the work area, etc.).

7.2 Topic 2: Testing and measuring equipment

Range: Includes but are not limited to; Hand-held instruments such as multimeters, stroboscopic tachometers, meggers and tong-testers. Panel instruments such as voltmeters, ammeters, power factor meters, frequency meters and recorders.

7.2.1 Subject Outcome 1: Using testing and measuring equipment.

Learning Outcomes

- Demonstrate knowledge of different types and applications of measurement.
- Select, inspect, calibrate and use measuring equipment.

7.2.2 Subject Outcome 2: Installing testing and measuring equipment.

Learning Outcomes

- Explain the requirements pertaining to the installation of electrical metering units.
- Plan, prepare, install and connect electrical metering units.
- Quality control the installation.
- Test the electrical metering unit.
- Understand how the electrical metering unit is referenced from circuit diagrams through labelling

7.3 Topic 3: Fault-finding and testing

7.3.1 Subject Outcome 1: Test and fault find electrical components and equipment.

Range includes but is not limited to: Domestic appliances such as kettles, steam irons, stoves, geysers, fridges and freezers, washing machines and tumble dryers. Electric power tools such as hand-drills, grinders, orbital sanders and jig-saws.

Learning Outcomes

- State safety precautions when working on live electrical equipment.
- Understand manufacturer's circuit diagrams and specifications.
- List the possible tests that can be carried out on the component or equipment.
- Testing and fault finding is done in accordance with recognized procedures and practices.

7.4 Topic 4: Repair and maintenance

7.4.1 Subject Outcome 1: Maintenance of domestic appliances and electric power tools.

Range includes but is not limited to: Domestic appliances such as kettles, steam irons, stoves, geysers, fridges and freezers, washing machines and tumble dryers. Electric power tools such as hand-drills, grinders, orbital sanders and jig-saws. Loosening, dismantling, replacing, assembling and tightening according to manufacturer's specifications.

Learning Outcomes

- List maintenance procedures that can be carried out on domestic appliances and electric power tools.
- State criteria for the maintenance in accordance with the manufacturer's manual and recognized procedures and practices.
- Maintenance is done in accordance with recognized procedures and practices.
- The domestic appliance or electric power tool is inspected, tested and quality assured after maintenance.

7.4.2 Subject Outcome 2: Repair of domestic appliances and electric power tools.

Range includes but is not limited to: Domestic appliances such as kettles, steam irons, stoves, geysers, fridges and freezers, washing machines and tumble dryers. Electric power tools such as hand-drills, grinders, orbital sanders and jig-saws. Loosening, dismantling, replacing, assembling and tightening according to manufacturer's specifications.

Learning Outcomes

- List repair procedures that can be carried out on domestic appliances and electric power tools.
- State criteria for the repair in accordance with the manufacturer's manual and recognized procedures and practices.
- Repair is done in accordance with recognized procedures and practices.
- The domestic appliance or electric power tool is inspected, tested and quality assured after repair.

7.5 Topic 5: Installations

7.5.1 Subject Outcome 1: Install and commission single phase A.C. machines and control gear.

Range: Includes but is not limited to; Induction and universal motors and alternators. Direct-on-line, sequenced, forward and reverse and auto-transformer control units.

Learning Outcomes

- Plan task and select equipment.
- Install single phase A.C. machines and control gear according to worksite procedures and statutory requirements.
- Connect single phase A.C. machines and control gear.
- Commission single phase A.C. machines and control gear according to statutory requirements.

8. RESOURCE NEEDS FOR THE TEACHING OF ELECTRICAL WORKMANSHIP NQF LEVEL 3

- **Physical resources**
  Well equipped classrooms and workshops are essential for this practical orientated subject. If possible, using the facilities of Employers in the electrical field, for training, is preferred.

- **Human resources**
  Registered post level 1 or higher Educators at FET Institutions.

- **Financial resources**
  The institution should make provision for
  (a) consumables during practicals,
  (b) maintenance of physical recourses and
  (c) purchasing of new equipment. `