higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

AUGUST EXAMINATION

ELECTRICAL TRADE THEORY N1

3 AUGUST 2015

This marking guideline consists of 6 pages.

QUESTION 1

1.1
- Warning notices indicating the supply voltage should be affixed in a prominent place.
- It should be stated whether the power supply is AC or DC.
- 'Danger' or 'Do not start' board should be placed on the 'start/stop' controls or switches.
- Switches should be labelled to indicate which equipment they control.
- The main switch should be prominently labelled so that there will be no confusion in an emergency. (5 x 1) (5)

1.2
- Clear guide to activity
- Workplace identification for quick recognition
- Ready warning of danger and industrial accidents
- Helps to reduce industrial accidents
- Useful method of promoting safety
- Means of universal communication
- Supplements machine guarding and other methods of eliminating hazardous conditions
- Triggers spontaneous reaction by workers in emergencies (Any 5 x 1) (5)

1.3
- Hacksaw
- Screwdriver (Flat/Phillips)
- Combination pliers
- Long-nose pliers
- Side cutter
- Crimping tool
- Cable knife
- Bending spring
- Draw tape
- Shifting spanner
- Vice-grip, etc. (Any 5 x 1) (5)

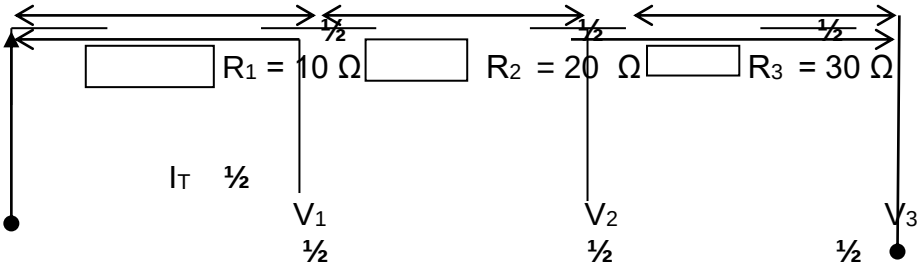
[15]

QUESTION 2

2.1
- Electromotive force is that force which maintains the potential difference while a current is flowing.
- Electromotive force is the voltage measured across the poles of a battery before an external resistance is connected across the poles. (Any 1 x 3) (3)

2.2
- Electric cell
- Electric battery
- Electric generator
- Photo-electric cell
- Thermocouple (Any 3 x 1) (3)

2.3



(2 marks for unlabelled sketch only) (4)

2.3.1 $R_T = R_1 + R_2 + R_3$✓
$= 10 + 20 + 30$
$= 60\ \Omega$✓ (2)

2.3.2 $I_T = V_T \div R_T$✓
$= 60 \div 60$
$= 1$ A✓ (2)

2.3.3 $I_1 = I_2 = I_3 = I_T$✓

$V_1 = I_T R_1$✓ $V_2 = I_T R_2$✓ $V_3 = I_T R_3$✓
$= 1 \times 10$ $= 1 \times 20$ $= 1 \times 30$
$= 10$ V✓ $= 20$ V✓ $= 30$ V✓ (7)

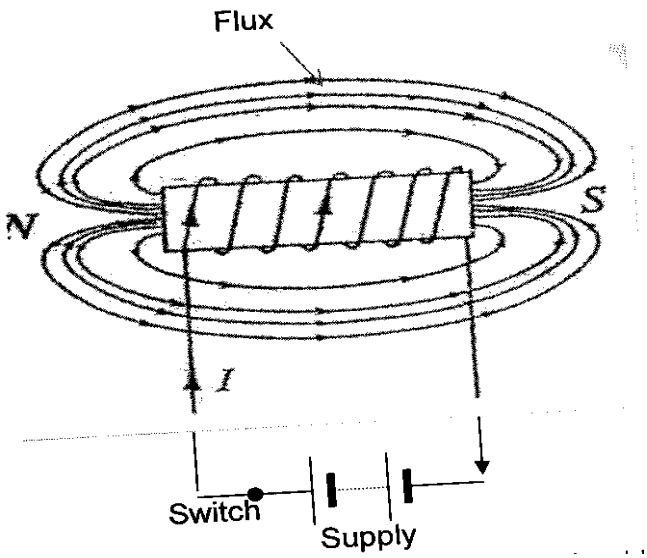
2.3.4 $P_T = I_T^2 R_T$✓ OR $P_T = I_T V_T$ OR $P_T = V_T^2 \div R_T$
$= I^2 \times 60$ $= 1 \times 60$ $= 60^2 \div 60$
$= 60$ W✓ $= 60$ W $= 60$ W (2)

2.3.5 $E = P_T \times t$✓
$= 60 \times 2 \times 60$✓
$= 7\ 200$ W✓
$= 7{,}2$ kW✓ (4)

[27]

QUESTION 3

3.1



(4 marks for unlabelled sketch only) (8)

3.2
- Simple construction
- High efficiency at full load, ± 97%
- Silent operation: no moving parts (3)

3.3 $V_1 : V_2$ = turns ratio✓
$\therefore V_2 = V_1 \div$ turns ratio)✓
$= 550 \div 55$
$= 10$ V✓ (3)

[14]

QUESTION 4

4.1
- Make sure that the air vents are open
- The room should be well ventilated
- Level of the electrolyte must be above the plates
- Do not smoke
- Do not use open lights
- Wear protective clothing
- Ensure correct polarity
- Cell temperature should not exceed 38 °C
- Have neutralising agent at hand; etc. (Any 6 x 1) (6)

4.2 The more plates a cell consists of
- the lower the resistance
- the higher the charging capacity (2)

4.3
- An AC generator (alternator) is fitted with two slip-rings.
- A DC generator is fitted with one ring that is split into two halves that are insulated from each other. (2 x 2) (4)

[12]

QUESTION 5

5.1 5.1.1 One complete series of values from 0° to 360° or one revolution of a coil through one pole pair**.** (2)

5.1.2 The average value of the wave over half a cycle
Average value = 0,637 x the maximum value (5)

5.2 Advantages
- Linear scale
- Very accurate
- Almost uniform scale
- Well shielded from stray magnetic fields
- Low power consumption (Any 3 x 1) (3)

Disadvantages
- Only measures DC
- Relatively expensive
- Easily damaged (Any 2 x 1) (2)

[12]

QUESTION 6

6.1 Conductor – any solid material that is capable of conducting electric current. (3)

6.2
- Gold
- Silver
- Copper
- Aluminium
- Carbon (Any 3 x 1) (3)

6.2 The purpose of an earth leakage unit is to detect an earth fault current and to automatically disconnect an installation or circuit from the supply when the fault current exceeds a specified or predetermined value. (5)

6.4
- Can be used as an isolator
- No replacement required
- Simply reset after a fault or overcurrent
- Can be used in case of overload and short-circuit conditions. (Any 2 x 1) (2)

[13]

QUESTION 7

7.1
- If a test voltage is available, a voltmeter or a lamp tester can be used.
- If no supply voltage is available, a bell tester or a low reading ohmmeter can be used. (4)

7.2 $C_T = C_1 + C_2 + C_3$ ✓
$= 30 + 25 + 345$✓
$= 400$ pF✓ (3)
[7]

TOTAL: 100