higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

NOVEMBER EXAMINATION

ELECTRICAL TRADE THEORY N1

19 NOVEMBER 2015

This marking guideline consists of 6 pages.

QUESTION 1

1.1
- Petrol pumps
- Wine cellars
- Flammable liquid reservoirs
- Coal bunkers
- Spray paint cubicles
- Grain mills (Any 5 x 1) (5)

1.2
- Working areas and walkways must be kept clear.
- Floors must be skid-free.
- Spilled slippery substances must be wiped up at once.
- Equipment and materials must be stacked in an orderly manner.
- Guardrails must be installed on stairways et cetera.
- Roofs must be kept leak-free.
- Lighting must be adequate.
- Warning systems (e.g. siren) must be installed.
- Effective emergency procedure must be in place.
- Emergency lighting must be provided when necessary. (Any 5 x 1) (5)

1.3 False√ (1)

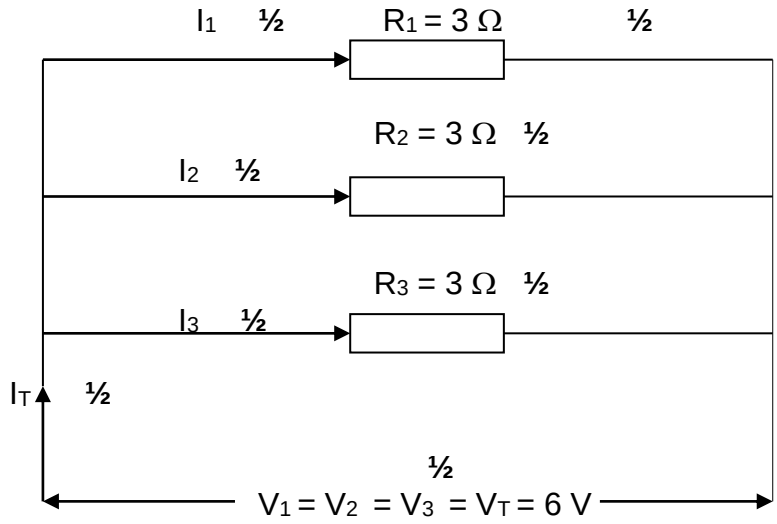
Hand tools must be:
- Well cared for
- Kept in good condition
- Used properly
- Used with due caution
- Kept rust-free
- Oiled if necessary
- Used only for the purpose for which they were made (3)

[13]

QUESTION 2

2.1 The current√ flowing in a direct-current circuit√ is directly proportional to the applied√ voltage and inversely proportional to the resistance of that circuit, at a constant temperature√. (4)

2.2 2.2.1



(4)

2.2.2 $1 \div R_T = 1 \div R_1 + 1 \div R_2 + 1 \div R_3$√
$= 1 \div 3 + 1 \div 3 + 1 \div 3$ √
$= (1 + 1 + 1) \div 3$
$= 1$ √
$\therefore R_T = 1\ \Omega$√ (4)

2.2.3 $I_1 = V_1 \div R_1$√ AND $I_2 = V_2 \div R_2$√ AND $I_3 = V_3 \div R_3$√
But $V_1 = V_2 = V_3 = V_T = 6$ V √
$\therefore$
$I_1 = 6 \div 3$ AND $I_2 = 6 \div 3$ AND $I_3 = 6 \div 3$
$= 2$ A √ $= 2$ A√ $= 2$ A√ (7)

2.2.4 $I_T = V_T \div R_T$ √ OR $I_T = I_1 + I_2 + I_3$
$= 6 \div 1$ $= 2 + 2 + 2$
$= 6$ A √ $= 6$ A (2)

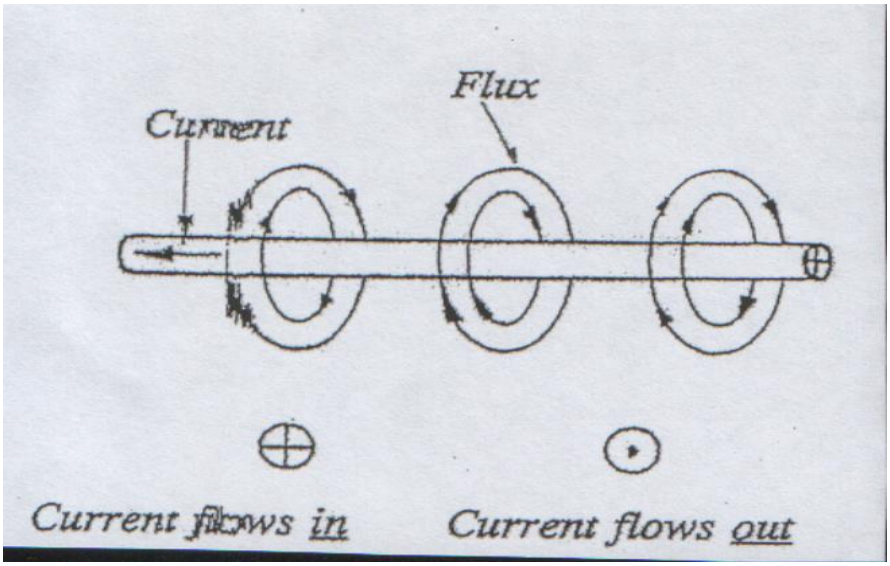
2.2.5 $P_T = I_T^2 R_T$√ OR $P_T = V_T I_T$ OR $P_T = V_T^2 \div R_T$
$= 6^2 \times 1$
$= 36$ W √ (2)

2.2.6 $E_T = P_T \times t$√
$= 36 \times (1 \times 60 \times 60)$√
$= 129\ 600$ W√
$= 129{,}6$ kW√ (4)

[27]

QUESTION 3

3.1



(2 marks only for unlabelled sketch) (6)

3.2
- Increase in the current flow
- Placing an iron core inside the solenoid (coil)
- Increase in the number of turns of the coil (3 x 1) (3)

3.3 3.3.1 Turns ratio = current ratio

Turns ratio = $I_2:I_1$

i.e. $N_1:N_2 = I_2:I_1$

$\therefore I_2$ = (turns ratio) x I_1 √

= (25 ÷ 1)(5)

= 125 A√ (2)

3.3.2 $N_1:N_2$ = turns ratio

N_1 = (turns ratio)(N_2) √

= (25 ÷ 1)(110)

= 2 750 turns√ (2)

[13]

QUESTION 4

4.1

PRIMARY CELLS	SECONDARY CELLS
• Not rechargeable • Low output • Short life expectancy • Low internal resistance • Low EMF per cell • Small and easy to handle • Reasonably cheap • Voltage drop due to polarisation • Ampere-hours are very low (Any FIVE)	• Rechargeable • High output for its size • Reasonably long life if well maintained • High internal resistance • High EMF per cell • Heavy compared with energy it stores • Relatively more expensive • Polarisation is minimal • High discharge current for short period (Any FIVE)

(10)

4.2 Carbon (1)

4.3 Hydrometer (1)
[12]

QUESTION 5

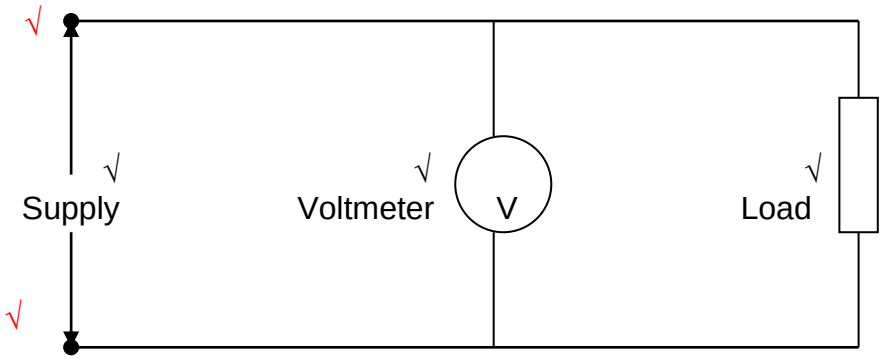
5.1 Maximum EMF is induced. (1)

5.2 5.2.1 The time taken to complete one cycle. (1)

5.2.2 That value of current or voltage that will produce the same heating effect as an equivalent direct current.

RMS value = 0,707 x the maximum value (6)

5.3



(2 marks only for unlabelled diagram) (5)
[13]

QUESTION 6

6.1 Any solid material preventing flow of electric current. (3)

6.2
- Vulcanised rubber
- Porcelain
- Silicon rubber
- Bakelite
- Polyvinyl chloride (PVC)
- Asbestos
- Micanite
- Glass
- Moulded resins and plastics
- Oil-impregnated paper (Any 5 x 1) (5)

6.3 Earthed means connected to the general mass of earth in such a manner as to ensure, at all times, an immediate discharge of electrical energy without danger. (5)

[13]

QUESTION 7

7.1
- Insulation resistance between live and neutral
- Insulation resistance between live, neutral and earth
- Polarity of switches
- Earth continuity (4)

7.2 $(1 \div C_T) = (1 \div C_1) + (1 \div C_2) + (1 \div C_3)$ √

$= (1 \div 240) + (1 \div 240) + (1 \div 240)$ √

$= (1 + 1 + 1) \div (240)$ √

$= \frac{1 + 1 + 1}{240}$ √

$\therefore C_T = (240 \div 3)$

$C_T = 80\ \mu F$ √ (5)

[9]

TOTAL: 100