higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

AUGUST EXAMINATION

ENGINEERING SCIENCE N1

28 JULY 2014

This marking guideline consists of 9 pages.

QUESTION

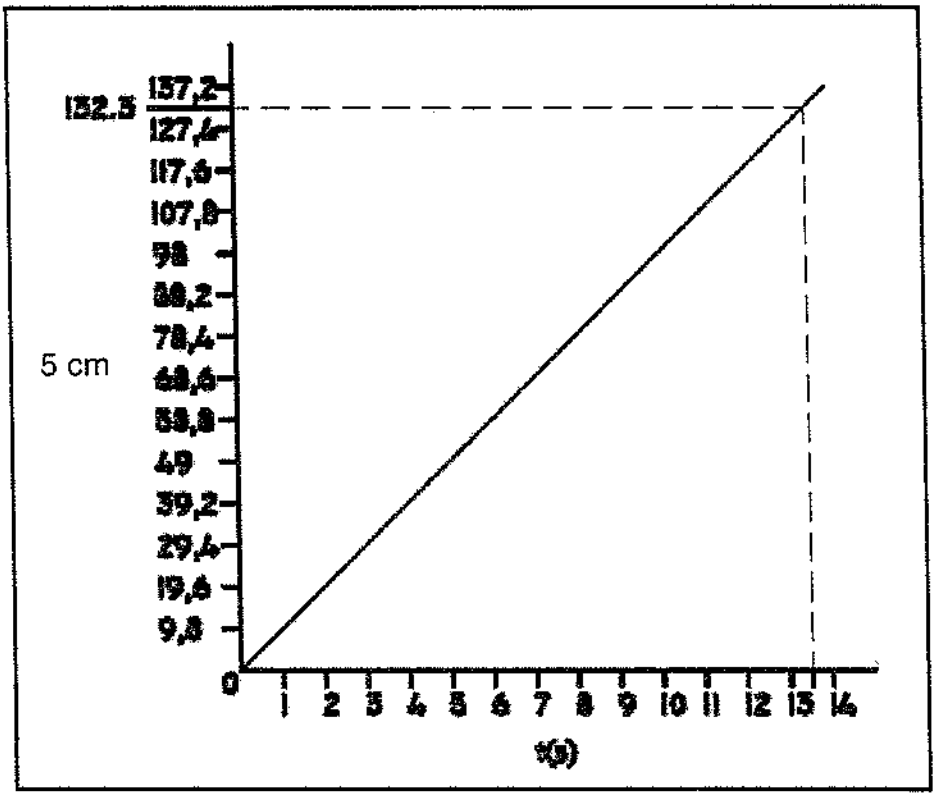
1.1 1.1.1 Scalar

1.1.2 Vector

1.1.3 Vector

1.1.4 Scalar (2)

1.2 1.2.1



(3)

1.2.2 $gradient = \frac{s}{t}$

$gradient = \frac{60}{3,5}$

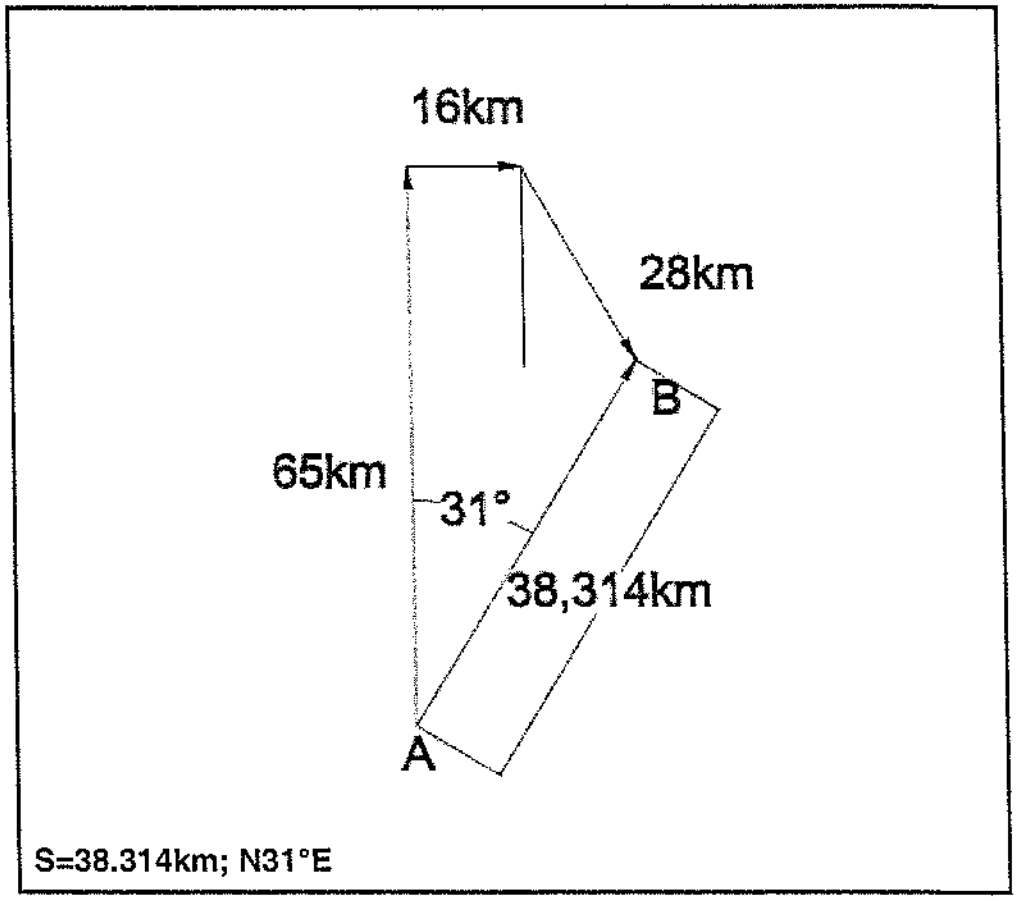
$gradient = 1,714\ m/s$ (1)

1.2.3 V = 1,714 m/s (1)

1.3 1.3.1 $s = 65 + 16 + 28$

$s = 109\ km$ (1)

1.3.2



(3)

1.4

(3)
[14]

QUESTION 2

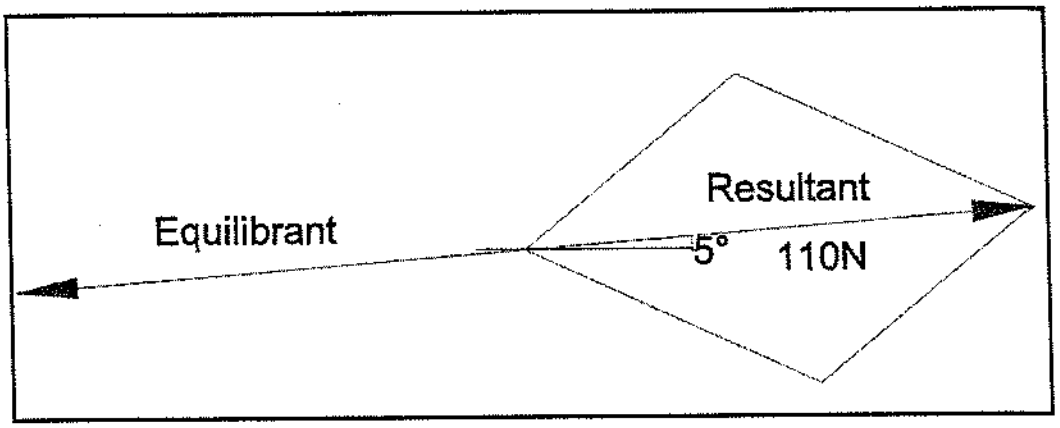
2.1 2.1.1 Mechanical advantage is the ratio of the load overcome as opposed to the corresponding effort applied.

2.1.2 A system of forces is in equilibrium when the sum of the clockwise moments is equal to the sum of the anticlockwise moments.

2.1.3 The ratio of the distance moved by the effort as opposed to the distance the load has moved.

2.1.4 The single force which that brings a system of forces in equilibrium.
(4 × 1) (4)

2.2



2.2.1 110N; E 5°N R = 5,5 cm = 110 N (2)

2.2.2 110N; W 5°S E = 5,5 cm = 110 N (1)

2.3 2.3.1 Rest

2.3.2 Resultant

2.3.3 Effort

2.3.4 Load

2.3.5 Clockwise/Anti-clockwise

2.3.6 Anti-clockwise/Clockwise (3)

2.4 2.4.1

$$MA = \frac{L}{E}$$

$$MA = \frac{360 \times 9.8}{450}$$

$$\underline{MA = 7,84} \quad (1)$$

2.4.2

$$VR = \frac{E_{dist}}{L_{dist}}$$

$$VR = \frac{1,12}{0,32}$$

$$\underline{VR = 3.5} \quad (1)$$

2.5

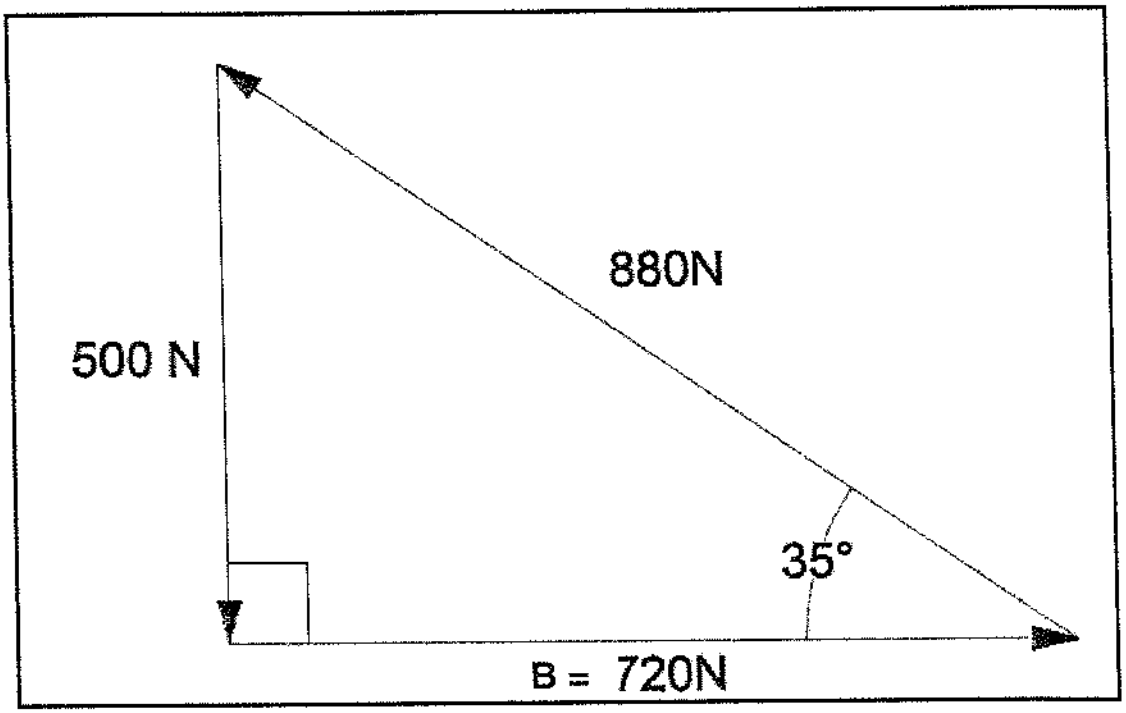
$$CWM = ACWM$$

$$125 \times 61 = F \times 51$$

$$F = \frac{7625}{51}$$

$$\underline{F = 149,51N} \quad (3)$$

2.6



(3)
[18]

QUESTION 3

3.1 3.1.1 E
3.1.2 G
3.1.3 C
3.1.4 F
3.1.5 B

(5 × ½) (2½)

3.2 $m = 38\ kg$ $F = 38 \times 9{,}8 = 372{,}4\ N$
$s = 11\ m$
$t = 2\ \text{min}$ 120 sec

3.2.1 A graph of force/distance must be supplied (3½)

3.2.2 $W = L \times B$
$W = 372{,}4 \times 11$ √ Subt. one mark // answer one mark
$W = 4096{,}4\ J\ //\ 4{,}096\ kJ$ (2)

3.2.3 $W = L \times B$
$W = 372{,}4 \times 5$ √ Subt. one mark // answer one mark
$W = 1\,862\ J\ //\ 1{,}862\ kJ$ (2)

3.2.4 $P = \frac{W}{t}$
$P = \frac{4096{,}4}{120}$ √ Subt. one mark // answer one mark
$p = 34{,}137\ W$ √ (2)
[12]

QUESTION 5

5.1 Atom√ (1)

5.2 Positively or negatively charge substance√ (1)

5.3 Solid√
Liquid√
Gases√ (3)

5.4 Water√
Solid: Ice√
Liquid: Water√
Gases: Steam√ (4)

5.5 Solids:
The particles are close to one another. √
Movement very slow.

Liquids:
The particles are a little further apart. √
Movement within liquid is fast.

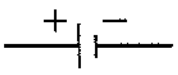
Gases:
The particles are much further apart. √
Movement is very fast. (3)
[12]

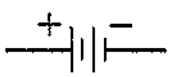
QUESTION 6

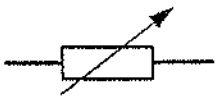
6.1

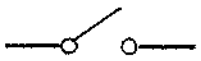
CONDUCTORS	INSULATORS
Carbon	PVC
Iron	Plastic
Aluminium	Bakelite

(3)

6.2 6.2.1 

6.2.2 

6.2.3  or 

6.2.4 

(4 × 1) (4)

6.3
$$I = \frac{V}{R}$$
$$I = \frac{220}{120}$$
$$\underline{I = 1{,}833\ A}$$
(2)

6.4 6.4.1
$$R_T = R_1 + R_2 + R_3$$
$$R_T = 7 + 11 + 21$$
$$\underline{R_T = 39\ \Omega}$$

6.4.2 $$I_T = \frac{V}{R}$$

$$I_T = \frac{12}{39}$$

$$\underline{I_T = 0{,}307\ A}$$

6.4.3 $$E = I^2Rt \text{ or } E = VIT \text{ or } E = \frac{V^2}{R'}$$

$$E = 0{,}307^2 \times 39 \times (5 \times 60)$$

$$\underline{E = 1102{,}713\ J}$$

(3 × 1) (3)

6.5 6.5.1 Stays the same

6.5.2 Lower

6.5.3 Rises

(3 × 1) (3)

6.6 6.6.1 Resistivity is the resisting effect of specific type of materials.

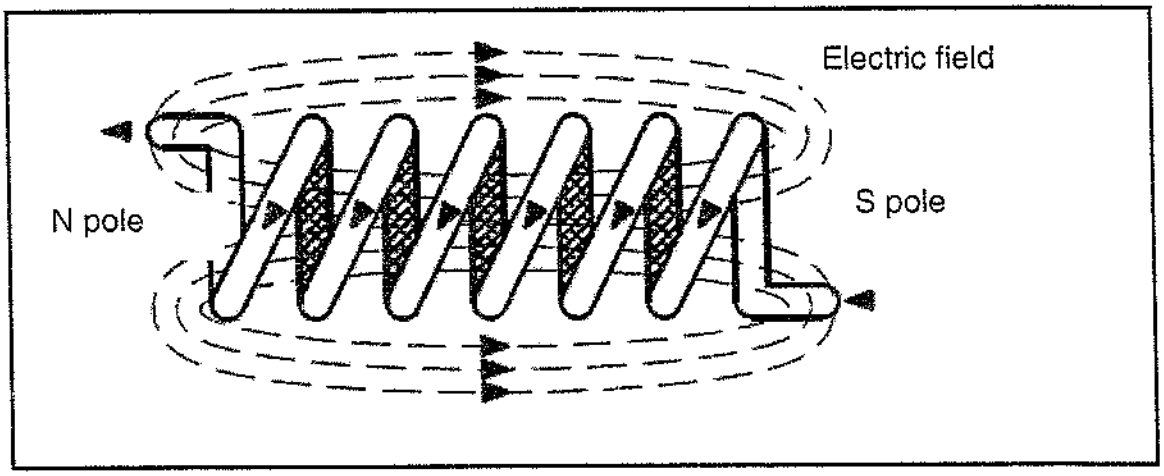
6.6.2

6.6.3 The current flowing in a circuit is proportional to the voltage and inversely proportional to the resistance.

6.6.4 Current that reverses polarity continuously.

(4 × 1) (4)

6.7



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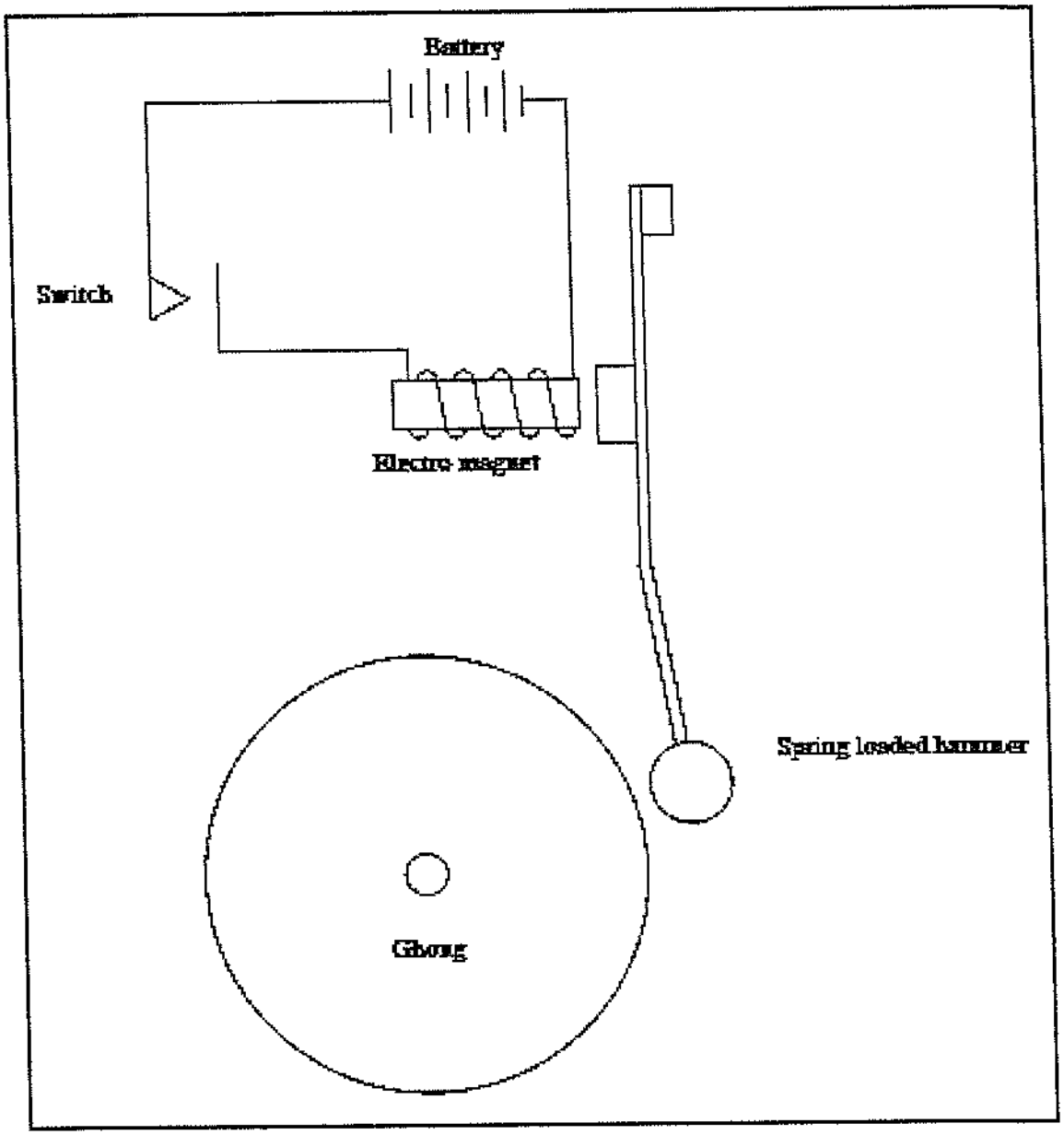
6.8



(3)
[25]

TOTAL: 100