SCIENCE SCHOLARS ACADEMY | SSA

S.5 PHYSICS EXAM

CONTENT CHECK

END OF TERM 1

2 hours, 45 minutes

INSTRUCTIONS:

- ***Attempt all flashcards!***

PART I: THERMOMETRY

1. *What is meant by a **thermometric property**?*
2. *State **four qualities** of a **good thermometric property**.*
3. *Name **five types of thermometers** and **their thermometric properties**.*
4. *Define a **fixed point** in thermometry.*
5. *Define **ice point**.*
6. *Define **steam point**.*
7. *At what **pressure** are **ice point** and **steam point** defined?*
8. *Define **triple point of water**.*
9. *State the **value** of the **triple point of water** in **Kelvin**.*
10. *Define **absolute zero**.*
11. *State the **value** of **absolute zero** in **Celsius** and **Kelvin.***
12. *What happens to **internal energy** at **absolute zero**?*
13. *Why is **absolute zero** considered **unattainable practically**?*
14. *Name **two common temperature scales**.*
15. *State the **fixed points** used in **Celsius scale**.*

16. *Explain how the **Celsius scale** is **constructed** using a **thermometric property**.*
17. *Write the **general formula** for **unknown temperature** in **Celsius scale**.*
18. *Write the **formula** for **unknown temperature** in **Celsius scale** of a **platinum-resistance thermometer**.*
19. *Write the **formula** for **unknown temperature** in **Celsius scale** of **liquid-in-glass thermometer.***
20. *Write the **formula** for **unknown temperature** in **Celsius scale** of **thermocouple**.*
21. *Write the **formula** for **unknown temperature** in **Celsius scale** of **constant volume gas thermometer**.*
22. *Write the **formula** for **unknown temperature** in **Celsius scale** of **constant pressure gas thermometer**.*
23. *What **fixed point** is used in **Kelvin scale**?*
24. *Why is **Kelvin scale** called **absolute scale**?*
25. *Outline **steps** used to establish **Kelvin scale**.*

MANIPULATION FLASHCARDS:

1]. *A particular* ***resistance thermometer*** *has* ***resistance*** *of* ***30***Ω *at* ***ice point****,* ***41. 58***Ω *at* ***steam point*** *and* ***34.58***Ω *when immersed in a boiling liquid. A* ***constant volume gas thermometer*** *gives readings,* $\boldsymbol{1.333x10^5}$***Pa,*** $\boldsymbol{1.821x10^5}$***Pa and*** $\boldsymbol{1.528x10^5}$***Pa*** *at the same temperatures. Calculate the temperature at which the liquid is boiling on scale of;*

(i) ***Resistance thermometer*** *(ii)* ***Gas thermometer***

2]. *The* ***resistance*** *of platinum wire at* ***triple point*** *of water is* ***5.16Ω****. What will be the* ***resistance*** *at* ***100***℃.

3]. *The* ***resistance*** *of the wire as measured by* ***gas thermometer*** *varies with temperature* $\boldsymbol{\theta}$ *according to the equation*

$$\boldsymbol{R_\theta = R_0(1 + 50\alpha\theta + 200\alpha\theta^2)}$$

Determine ***temperature*** *on* ***resistance thermometer*** *that corresponds to* ***40***℃ *on the* ***gas scale****.*

PART II: DIMENSIONS

MANIPULATION FLASHCARDS:

1. *In the formula;*

$$\boldsymbol{T = E^x P^y \rho^z},$$

E *is the energy,* ***T*** *is the period,* ***P*** *is the pressure,* $\boldsymbol{\rho}$ *is density and* ***k*** *is a dimensionless constant. Find* ***x, y*** *and* ***z***

2. *For streamline flow of a non-viscous, incompressible fluid, the pressure* ***P*** *at any point is related to the height,* ***h*** *and the velocity,* ***v*** *by the equation:*

$$\boldsymbol{(P - a) = \rho g(h - b) + \frac{1}{2}\rho(v^2 - d)},$$

where ***a, b*** *and* ***d*** *are constants,* $\boldsymbol{\rho}$ *is the* ***density of the fluid*** *and* ***g*** *is the* ***acceleration due to gravity****. Given that the equation is* ***dimensionally consistent****, find the dimensions of* ***a, b*** *and* ***d****; and hence their* ***units****.*

3. *Assuming that the **mass, m** of the largest stone that can be moved by a flowing river depends on the **velocity, v** of the water, its **density, ρ** and **acceleration due to gravity, g**. Show that:* $\boldsymbol{m = \frac{k\rho v^6}{g^3}}$ *where **k** is a **dimensionless constant**.*

END!!!

"SSA | CREATING COMPETENT SCIENCE SCHOLARS IN UGANDA"