PHYSICS FORM ONE
TERM 2 2022 OPENER EXAM FORM 1
MARKING SCHEME:

1. List 3 branches of physics. (3mks)
   - ***Mechanics***
   - ***Electricity and magnetism***
   - ***Thermodynamics***
   - ***Geometrical optics.***
   - ***Waves.***
   - ***Atomic physics***

2. Explain the relationship between physics and Geography.
   i) . (2mks)
   Establishment of weather patterns relies on the accurate use of instruments like thermometer windvane and hygrometer which are concepts in physics.

3. Explain how you would estimate the circumference of a curved object using a thread and a ruler. (4mks)
   Wind the thread round the curved surface √ ***and note the number of complete turns.*** √
   Measure the length of the thread √
   Divide the length with the number of turns √ ***to get the circumference.***

4. (a) The mass of a density bottle of 50cm³ is 10.0g when empty. Aluminium turning are poured into the bottle and the total mass is 60.0g. Water is then added into the turnings till the bottle is full. If the total mass of the bottle and its contents is 90g, calculate the density of Aluminium. (4mks)
   Empty density bottle – 10g
   Density bottle + Aluminium – 60g
   Density of bottle + Aluminium + water – 90g
   Alum = 60 – 10 = 50g
   Water = 90 – 60 = 30g
   ∫ of water = 1g/cm³
   V. of water = 30g – 30cm³
   V of all = 50 – 30 = 20cm³
   $\int = \frac{m}{v} = \frac{50}{20} = 2.5g/cm^3$
   b) –should not dissolve in water
   -should be denser than water
   -should not react with water
   -should not absorb the wter

5. (a) Name the three different types of forces that act on a block of wood when placed on a table. (3mks)

Gravitational force(weight)
Action force
Reaction force

(b) State and explain the factors that affect surface tension. (2 mks)
Temperature – with rise in temperature the kinetic energy of the molecules of a liquid is increased, the intermolecular distance increases and the force of cohesion is decreased therefore surface tension is lowered.
Impurities – impurities reduce surface tension of a liquid since they weaken cohesive forces.

6. (a) Give five differences between mass and weight. (5mks)

Mass	**Weight**
It's the measure of quantity of matter in a body	***It's the measure of pull of gravity.***
It is measured in kilograms	***It is measured in newtons***
It does not change it's the same everywhere	***Changes from place to place.***
Measured using a beam balance	***Measured using a spring balance***
Has magnitude only	***Has both magnitude and direction***

(b) A mass of 7.5 kg has weight of 30N on a certain planet. Calculate the acceleration due to gravity on this planet. (2mks)
Weight of objects on planet = mass of object X planets gravity
$\frac{30}{7.5} = \frac{7.5}{7.5}$
$x = 4N/kg$

7. (a) Define the term pressure and state its SI unit. (2mks)
this is the force acting √normally perpendicularly per unit area SI N/m^2 √

(b) Explain why a camel is able to walk on deserts and cannot sink in sand. (2mks)
Camels have broad feet which are in contact with the ground which reduces the pressure exerted on the ground by the camel.

(c) A brick 30cm long 20cm and 5cm thick has a mass of 500g. Determine the;

i. Greatest pressure that can be exerted by the brick on the flat surface. (2mks)

$Min\ area = \frac{20}{100} \times \frac{5}{100} = 0.001m$
$Weight = \frac{500}{1000} \times 10$

$= 5N$

$P = {}^{F}/_{A} = {}^{5}/_{0.001} = 500N/m^2$

ii. Least pressure exerted by the brick. (2mks)

$Max\ area = \frac{20}{100} \times \frac{30}{100} = 0.06m$

$P = {}^{F}/_{A} = {}^{5}/_{0.06} = 83.33N/m^2$

8. Calculate the weight of the following masses

a) 2kg 1mk

W=mg=2x10=20N

b) 300000mg 2 mk

3**00000mg=300g=0.3kg**

W=mg=0.3x10=3 N

9. (a) State the Pascal's principle. (1mk)

Pressure applied at one point in an enclosed liquid is transmitted equally to all other parts of the liquid.

(ii) Calculate the pressure at the bottom of a jar 30cm tall and filled with kerosene of density 0.8g/cm^3. 3mks

P=hρg
=0.3x800x10
=2400 N/m²

(b) Explain how a Hydraulic brake system works. (5mks)

- ***Force applied on the brake pedal exerts pressure on the master cylinder.***
- ***It is transmitted by the brake fluid to the slave cylinder.***
- ***This causes the slave cylinder pistons to open the brake shoe and hence the brake lining presses on the drum. The rotation of the wheel thus resisted.***

(c) A small force of 100N is applied on a small piston of area 0.25m^2 produces a bigger force on a larger piston of 10m^2. Calculate F_2. (2mks)

$$\frac{F_2}{F_1} = \frac{A_2}{A_1}$$

$$F_2 = \frac{A_2}{A_1} \times F_1$$

$$\frac{10}{0.25} \times 100$$

$$= 4000N$$

(d) Explain why water storage tanks in houses are elected as high as possible. (2mks)

- ***This is to increase the pressure of water as it is flowing from the roof once the taps are opened.***

10. (a) Differentiate between cohesion forces and adhesive forces. (2mks)

Cohesion force is force of attraction between molecules of kind while adhesion is force of attraction between molecules of kind.

(b) A body weighs 200N in air and 170N when submerged in water. Calculate the upthrust acting on the body. (2mks)

Upthrust = 200 – 170
= 30N

(c) When a glass window is wiped with a dry cloth on a dry day dust particles tend to stick on the window, identify the force responsible for this. (1 mk)

Electrostatic force

11. Water level in a burette is 30cm^3. If 55 drops of water fall from the burette and the average volume of drop is 0.12cm^3, what is the final water level in the burette? (3mks)

0.12 X 55 = 6.6cm^3
Final reading
30 + 6.6
= 36.6cm^3

12. A block of glass of mass 187.5g is 5.0cm long, 2.0cm thick and 7.5cm high. Calculate the density of the glass kg/m^3. (3mks)

Density of the block = $\frac{mass}{volume}$

Mass = $\frac{187.5}{1000}$

V = $\frac{5\times2\times7.5}{1000000}$

Density = $\frac{187.5\times1000000}{5\times2\times7.5\times1000}$

$\frac{187500}{75} = 2500kg/m^3$

13. Express the following volumes in the units in brackets in:

(a) 9000 cm^3 to (m^3) 2mks

$1m^3=1000000cm^3$

$9000cm^3$

$=9000/1000000=0.009\ m^3$

(b) 27mm^3 to (cm^3)

$1cm^3=1000mm^3$ **2mks**

$= 27mm^3$

$=27/1000=0.027cm^3$

14. State two effects of a force on a moving object 2mks

-stop the object
-increase the speed of the object
-change its direction
-change its shape