UNIT 1: SOURCES OF ERRORS IN MEASUREMENT OF PHYSICAL QUANTITIES

1. ***U***94. If the measurement is 5.2 cm and the uncertainty is 0.1 cm.
(a) How much is the absolute value?
(b) Find the relative uncertainty.
(c) Find the percent error.
2.. Multiple choice : The number of significant digits in 0.0006032
(i) 8 *(ii)7* (iii) 4 (iv) 2
3. The velocity of a body is expressed as V=(X/t) + yt

.The dimensional formula for X is:

(a) $M L^0 T^0$ (b) $M^0 L T^0$ (c) $M^0 L^0 T$ (d) $M L T^0$

4. What is the absolute error if the central value is 120 s and the relative error is 5% ?

5. Explain if it is possible to add a vector quantity to a scalar quantity.

6. Give the difference between accuracy and precision.

UNIT 2: QUANTITATIVE ANALYSIS OF LINEAR MOTION

7.. A mini bus accelerates uniformly from rest to 30m/s in 10 s.

(a) Find the acceleration (b) Find the force applied to passengers of mass 60 Kg.

8.A bus changes its speed from 180m/s to rest in 10 s. Calculate the:

(a) Deceleration of the bus.

(b) Displacement of the bus.

9.The table below shows datas collected in order to study the motion of a car travelling from Musanze to Gitarama.

Velocity(m/s)	0	10	20	20	35	0
Time (s)	0	2	4	10	12	14

(a) Plot a graph of velocity (y-axis) against time(x-axis).
(b) Calculate acceleration in the first 4seconds.
(c) Explain why velocity didn't change between 4s and 10s.
(d) On graph represent the gradient in the first four seconds.
(e) Calculate the deceleration.
(f) Deduce the total distance travelled.

10 (a) Sketch the velocity-time graph of a moving body that starts with an initial velocity **u** different from zero and accelerates with a uniform acceleration "**a**" for time "**t**" seconds.

(b) Write the final velocity "**V**" in terms of **u, a,** and **t**.

(c) Show that the displacement of a body in a uniformly accelerated rectilinear motion is given by: $x_f = x_i + v_i \times t + \frac{1}{2} a \times t^2$.

11 (a). A stone is thrown upwards from the ground with an initial speed 50m/s.

(i) What will maximum height be? g = 10m/s^2,

(ii) When will its strike the ground?

(iii) Where will it be in 2seconds?

(a) Calculate the acceleration between OA,AB and BC. Write a brief description of the journey.

(b) Calculate the total distance moved by the body.

12.(a) Is an object accelerating if its speed is constant?
(b) Is an object accelerating if its velocity is constant?
9. (a) How long will it take a car to accelerate from 10m/s to 35m/s at a constant acceleration of 5m/s^2 in a straight line.

UNIT 3: FRICTIONAL FORCES

13. . Fill in the blanks.
(a) Friction opposes the……..between the surfaces in contact with each other.
(b) Friction depends on the……of surfaces.

(c) Sprinkling of powder on the carom board…….friction.
(d) Sliding friction is …….than the static friction.
14.(a)Explain why athletes use shoes with spikes.
(b) Explain why sliding friction is less than static friction.
(c) Give two examples to show that friction is both a friend and a foe.
15. Discuss 5 advantages of frictional forces
16. Discuss 5 disadvantages of frictional forces
17. Give three methods used t o reduce frictional forces.
18 Compare static friction and kinetic friction.

UNIT 4: DENSITY AND PRESSURE IN SOLIDS

19. Which of the following equations is not correct?

(a) Force=mass× acceleration

(b) Density=Volume/mass

(c) Pressure=density × acceleration×height

(d) Pressure=Force/area

20.The static fluid pressure at any given depth depends on:

(a) the total mass

(b) the surface area

(c) the distance below the surface

(d) All of the above.

21. Calculate the pressure on the surface when a force of 30N acts on area of $0.2m^{2.}$

.22 (a) A rightward force is applied to a 5 kg object to move it across a rough surface at a rate of $2m/s^2$. The coefficient of friction between the object and surface is 0.1. Use a diagram to determine:

(i) gravitational force, (ii) applied force (iii) frictional force and (iv) net force.

23. (a) What is atmosphere (atm)?

(b) If one of the windows in a plane flying at high altitude breaks, what do you think will happen?

(c) If the density of water is $1000kg/m^3$ and atmospheric pressure is 100,000Pa; how high will the column of water in a perfect water barometer be? (Take g on the Earth as 10N/kg).

24.(a) What would happen to the mercury level in a mercury barometer if:

(i) The atmospheric pressure went down.

(ii) The atmospheric pressure went up.

(iii) A little air leaked into the tube above the mercury.

(iv) The barometer was taken up a high mountain.

(v) The temperature of the room the barometer was got higher

UNIT 6 : PASCAL'PRINCIPLE AND ITS APPLICATIONS

26.(a) State Pascal's principle.

(b) In our every day life, describe two applications of Pascal's principle.

(c) The figure below shows an hydraulic weight bridge which works on principle of Pascal' law.

(i) What is the pressure at B?

(ii) What is the pressure at A?

(iii) Find the weight of vegetable on the large piston A if the weight bridge is in equilibrium.

(d) Calculate the mechanical advantage.

27 State Pascal' principle.

28. Discuss 5 applications of Pascal' principle

29.What is the pressure due to water pressure 100 m below the surface of a lake?

30. The maximum gauge pressure in a hydraulic lift is 18 atm. What largest mass vehicle can it lift if the diameter of the output line is 22 cm?

31. .(a)By using a graph, show that the pressure in fluid depends on depth.

(b) Calculate the pressure at a depth of 150cm in swimming pool filled with water. Given that density of water is $1g/cm^3$.

UNIT 7: ARCHMEDES' PRINCIPLE AND ITS APPLICATIONS

32. State Archimedes' principle.

32. Describe three uses of Archimedes' principle in our every day life.

33. A body weighs 600g in air and 400g in water. Calculate:

(a) The loss in weight of the body.

(b) The up thrust on the body.

(c) The relative density of the solid.

(d) The volume of the body.

34.(a) Name and state the kind of principle is above illustrated?

(b) The up thrust on the body.

(c) The relative density of the solid.

(d) The volume of the body.

(e) Name and state the kind of principle is above illustrated?

35. .A body weighs 600g in air and 400g in water. Calculate:

(a) The loss in weight of the body.

(b) The upthrust on the body.

(c) The relative density of the solid.

(d) The volume of the body.

(e) Which kind of principle is above illustrated?

36.If A_1 and A_2 are the areas of the pistons of an hydraulic lift and if $\frac{A1}{A2} = 6$, given that the area of the small piston is $0.4m^2$, calculate:

(a) The area of the big piston.
(b) What force can lift the charge of 2000N placed on the big piston?
(c) Calculate the pressure at the big piston.
(d) What pressure is exerted at the other piston?
(e) Which principle is applied when solving the question above?

37.(a) A solid copper sphere will sink in water while a hollow copper sphere of the same mass sphere may float. Explain this observation.

(b) Describe any 2 uses of pressure in gases in our dairy life.

.(a) Describe an experiment to verify Archimedes principle using the following:

- An overflow can

38. A block(b) A block of wood weighing 2.0 N is held under water by a spring attached to the bottom of a container. The tension in the spring is 0.5 N. Determine the density of wood.

39 (a) State Archimedes principle.

(b) A piece of aluminium of volume200 cm^3 and density 2.7 g/ cm^{-3} is completely immersed in kerosene. (g=10N/Kg)

(i) Determine the up thrust exerted on the piece of aluminium.

(ii) Determine the weight of kerosene displaced.

40..A body weighs 600g in air and 400g in water. Calculate:

(a) The loss in weight of the body.

(b) The upthrust on the body.

(c) The relative density of the solid.

(d) The volume of the body.

(e) Which kind of principle is above illustrated?

41.If A_1 and A_2 are the areas of the pistons of an hydraulic lift and if $\frac{A1}{A2} = 6$, given that the area of the small piston is $0.4m^2$, calculate:

(a) The area of the big piston.
(b) What force can lift the charge of 2000N placed on the big piston?
(c) Calculate the pressure at the big piston.
(d) What pressure is exerted at the other piston?
(e) Which principle is applied when solving the question above?

42...(a) Describe an experiment to verify Archimedes principle using the following:

- An overflow can
- A spring balance
- A metal block
- Water

43.A block of wood weighing 2.0 N is held under water by a spring attached to the bottom of a container. The tension in the spring is 0.5 N. Determine the density of wood.

44.(a) A solid copper sphere will sink in water while a hollow copper sphere of the same mass sphere may float. Explain this observation.

(b) Describe any 2 uses of pressure in gases in our dairy life.

45 . (a) What is atmosphere (atm)?

(b) If one of the windows in a plane flying at high altitude breaks, what do you think will happen?

(c) If the density of water is 1000kg/m^3 and atmospheric pressure is 100,000Pa; how high will the column of water in a perfect water barometer be? (Take g on the Earth as 10N/kg).

46 (a) What would happen to the mercury level in a mercury barometer if:

(i) The atmospheric pressure went down.

(ii) The atmospheric pressure went up.

(iii) A little air leaked into the tube above the mercury.

(iv) The barometer was taken up a high mountain.

47. The temperature of the room where the barometer was got higher. .The static fluid pressure at any given depth depends on:

(a) the total mass

(b) the surface area

(c) the distance below the surface

(d) All of the above.(a) What is gauge pressure?

(b) Calculate the pressure at a depth of 2m in swimming pool filled with water. Given that density of water is 1000kg/m^3.

48.(a) State Pascal' s principle and state its applications.

(b) Calculate the pressure due to water column of height 100m where $g=10m/s^2$ and density of water is $1000kg/m^3$ .What height of mercury column will exert the same pressure? Density of mercury $=13.6\times 10^3 kgm^{-3}$.

49..The maximum gauge pressure in a hydraulic lift is 18 atm.What largest mass vehicle can it lift the diameter of the output line is 22 cm?

45. What would happen to the mercury level in a mercury barometer if:

(a) The atmospheric pressure went down

(b) The atmospheric pressure went up

(c) The barometer was taken up a high mountain

(d) The temperature of the room where the barometer was got high.

50.(a)State Archimedes' s principle.

(b) Explain why boat can float on water but a person can not.

A body weighs 450g in air and 310 g when completely immersed in water.Find:

(a) the loss in weight of the body

(b) the upthrust on the body

(c) the volume of the body

(d) the relative density of the solid.

51.A . solid weighs 600g in air, 450g in water and 480g in a liquid . Find the:

(a) Volume of the solid

(b) R.D of the solid, and

(c) R.D . of the liquid .

52. A body weighs 20g in air,18.2g in liquid and 18.0g in water. Calculate:

(a) the relative density of the body

(b) the relative density of the liquid.

53.Discuss 5 applications of Archimedes principle that are in use today.

54. Which of the following quantities is not necessary to describe a gas?(Choose the correct answer):

(a) 760 cm Hg

(b) 760mm Hg

(c) 101325 mm Hg

(d) 8.314 mm Hg.

55. 125 cm^3 of gas are collected at 15℃ and 755 mm of mercury pressure. Calculate the volume of the gas at s.t.p (T=297 K, V=22.4 l/mol, P= 1 atm)

56. .A car of mass 1000Kg runs at a speed of $20m/s$ during 5 minutes.

(a) Calculate its kinetic energy.

(b) Find its work and power. G=10N/Kg

57. **UNIT 8: WORK, POWER AND ENERGY**

58. .A mini bus accelerates uniformly from rest to 30m/s in 10 s.
(a) Find the acceleration (b) Find the force applied to passengers of mass 60 Kg.
116. (a) Define the following terms:
(i) work (ii) power and (iii) energy
(a) How much work is done on a 100N stone when you lift it 5 m?
(b) What power is expended if you lift it this distance in 2 s?
59. (a)Differentiate kinetic energy and potential energy.
(b) An orange of 20 g falls from a tree of 8 m high to the ground. Calculate its potential energy.
(c) During competition, Agnes runs 600 m during 2 minutes, If her mass is 40 kg. Calculate her kinetic energy.
59.(a) What is mechanical energy of an object?
(b) The kinetic energy and potential energy of an object in motion is 1000J and 500J correspondingly. Find its mechanical energy.
60. .A girl whose mass is 60 kg can run up a flight of 35 steps each step is 10 cm high in 4 seconds. Find the power of the girl. **(Take g=10 N/kg)**

61. (a) State law of conservation of energy.
(b) Give five forms of energy in our every day life.
(c)Differentiate kinetic energy and potential energy.
62..(a) An orange of 20 g falls from a tree of 8 m high to the ground. Calculate its potential energy.
(b) During competition, Agnes runs 600 m during 2 minutes, If her mass is 40 kg. Calculate her kinetic energy.

63. a) How much work is done on a 100N stone when you lift it 5 m?

(b) What power is expended if you lift it this distance in 2 s?

64. .(a) Give the difference between work and power.

(b) A 5.2 Kg object speeds up from 3.1m/s to 4.2m/s. Calculate its change in kinetic energy.

(c) A motor whose power is 5.5Kw is used to raise a curtain of 150 kg during 10 seconds. Find:

(i) Speed by which the curtain moved. (g=10 N/kg)

(ii) Acceleration of this raised curtain.

65. A 5 kg object falls from a height of 6m, by using a diagram illustrating its fall, fill in the potential, kinetic and total energy of this object at the given points.

UNIT 10. GAS LAWS' EXPERIMENTS

66. One atmosphere is equal to:

(a) 760 cm Hg

(b) 760 mm Hg

(c) 101325 mm Hg

(d) 8.314 mm Hg

67. Which of the following quantities is not necessary to describe a gas? (Choose the correct answer)

(a) Volume

(b) Temperature

(c) Amount

(d) Pressure density.

68.Determine the volume of 1 mol of any gas at S T P , assuming it behaves like an ideal gas.

69. State and describe Boyle's law

70. Describe Charles'law

71. Define ideal gas.

UNIT 11. MAGNETISM AND DEMAGNETISATION

72. . (a) What do you mean by ferromagnetic materials.

(b) The following figure represents a bar magnet,

Represent direction of magnetic field lines.

73. b) Give the physical change happens when a magnet is heated.

(c) Give two methods of magnetization and state the use of ***keeper***.

(d) What is the difference between temporary magnets and permanent magnets?

71.(a)Illustrate two properties of magnets.

(b) What is the term temporary magnet?

(c) Give any two methods of making a magnet.

74.(a)What is a cell? Use a symbol to represent a cell.

(b) Give two advantages of using secondary cells and give two examples 0f primary cells.

75. (a) By using diagrams, differentiate concave mirror and convex mirror.

(b) By using diagrams, differentiate regular from diffuse reflection.

UNIT 12: APPLICATIONS OF ELECTROSTATICS

76. True or False?

(a) An object which is positively charged contains all protons and no electrons.

(b) An object which is negatively charged could contain only electrons with no accompanying protons.

(c) An object which is electrically neutral contains only neutrons.

77.(a) State electrostatics law.

(b) State Coulomb' s law.

(c)At what distance from a negative charge of 5.536Nc would the electric field strength be $1.90\times 10^5 N/C$?.

76. Two polystyrene balls are hung side by side on the treads as shown below:

Sketch what you would expect to see:

(i)ifboth balls were given a positive charges and (ii) if one ball was positive and the other is negative.

(iii) Two balloons are charged with an identical quantity of charge of -6.25nC. They are held apart at a separation distance of 61.7cm.Determine the magnitude of the electrical force. Is it repulsive or attractive? Why?

K=9×10^9Nm^2C^{-2}.

78. .(a) The current of 10 A is throwing through a conductor during 2minutes. Find:
(i) The charges produced. (ii) If the charge of one electron 1e=$1.6\times 1o^{-19}$ C, deduce the number of electrons throwing.
(b) Considering a 3 plug electric socket, differentiate 3 types of electric wires.
(f) There are two kinds of electric circuits: Ring main and Lightning sub-circuits, describe these circuits referring to apparatuses within connected.
78. . (a) Determine the electrical force of attraction between two balloons that are charged with the same charge of 70$\boldsymbol{\mu c}$ each and separated by distance of 5ocm. K=9×10^9Nm$^2c^{-2}$

79. What is the strength and direction of the electric field 3.74 cm on the left hand side of a 9.1 nc?

UNIT 13: ARRANGEMENT OF RESISTORS IN AN ELECTRIC CIRUIT

80. .Consider the circuit represented by the figure below where the voltage of the source is 24 V.

(a) Calculate the equivalent resistance**.**
(b) Calculate the current which flows.
(c) Calculate the intensity which is crossing the resistance of 8Ω.
(d) Calculate the voltage of resistance 12 Ω.
(e) Deduce the power.

81..(a)A dry cell 0f 1.5V is connected to a 0.3 Ω bulb and the voltage becomes 1.2V. Deduce its internal resistance and current which is flowing.

(b)Deduce the power.

82. . (a) State Ohm's law.

(b) Describe three effects of electricity.

(c) Use a hand right rule to indicate the direction of magnetic field on the conductor below.

Current (I)

83. Consider the circuit below:

(i) Calculate the resultant resistance.

(ii) Deduce the current supplied.

(iii) Calculate the power of the power supply in Kilowatts.

84. . (a) A charge of 4C flows through an ammeter in 2seconds. What readings will the ammeter show?

(b) the diagram below shows an electric circuit with five ammeters. Two (A_1 and A_3) show their readings. What are the readings on the other three ammeters?

(c) How many sources of voltages are here connected?

85. .These sources of voltage are identical cells, if each cell supplies 1.5 V, find the equivalent voltage.

86. . A battery whose e.m.f is 20V and internal resistance of 1Ω is connected to three resistors according to the diagram in the figure below.

Determine: (a) The potential difference to the battery terminals;

(b) The current through each resistor and voltage across each resistor.

(c) The power supplied by the battery.

(d) The power dissipated in each resistor.

87. (a)By using a diagram, describe the use of clinical thermometer. (b) Give the difference between good conductor of electricity and good conductor of heat.

(c) Give one example for each conductor.

89. A charge of 6×10^{-8} C exerts an electrostatic force of 60N.

(a) Calculate the electric field strength (E).

(b) If this charge is moved along 10cm, deduce the electric potential needed to move this charge. (k=$9.010^{9} N.m^{2}/C^{2}$).

90. .(a) Consider the electric circuit below,

If $R_1 = R_2 = R_3 = 12\Omega$,

(a) Calculate the total resistance between A and B.
(b) If the potential difference across terminals A and B, $V_{AB} = 48V$ .Find the values of the current through each of the resistorsR_1 ,$R_2 and\ R_3$.
(c) Define electromotive force (e. m .f) of a battery .
91.(a) The current of 10 A is throwing through a conductor during 2minutes. Find:

(i) The charges produced. (ii) If the charge of one electron 1e=1.6$\times 1o^{-19}$ C, deduce the number of electrons throwing.
(b) Considering a 3 plug electric socket, differentiate 3 types of electric wires.
(f) There are two kinds of electric circuits: Ring main and Lightning sub-circuits, describe these circuits referring to apparatuses within connected.
92. (a) Give the difference between fuse and circuit breaker.
(b) State Ohm's law for conductors.

(c)

From the electric circuit above, calculate the current recorded by ammeters **A_1, A_2** and **A_3**.

(d)A battery of electromotive-force (e.m.f) 1.5V and internal resistance, r, is connected in series with a 4 Ω resistor. The current in the circuit is 0.3A. draw a diagram to show this connection and calculate the internal resistance, r, of the battery.

UNIT 14. REFLECTION OF LIGHT IN CURVED MIRRORS

93. .(a) Give the difference between real from virtual image.

(b) Complete the figure bellow,

(C) If incident angle is 45°, find reflected angle.
(d) State three properties of image formed by using a plane mirror.

(e) A plane mirror has been rotated 60°, How many images formed ?

94. (a) Copy the diagram below and complete it the angle of deviation.

triangular glass prism

(b) An incident sunlight ray to a triangular glass prism is separated into different colours that form a rain bow.

(i) What is this process?

(ii) What causes the separation of colours?

(iii) Which colour is most deviated?

(iv) Which colour is least deviated?

(c) Name two processes occurred when white light is incidented on a rectangular glass prism.

95. (a) Copy and complete the diagram below showing clearly; incident ray, the normal, angle of incident and angle of reflection.

(b) State the relation between the angle of incidence and angle of reflection.

96. .(a) Redraw the following diagram and complete the path of incident ray until its emergence from the rectangular glass block.

(b) What can you conclude about the directions of incident ray and emergent ray?

*97.(a) Ph*ysically, what do you mean by accommodation of an human eye.

(b) During studying, a learners claims to teacher that she is not observing well the nearer written letters, what is her vision defect?
(c) Use a diagram to illustrate her vision defect
(d) By using a diagram, how can this defect can be corrected?
(e) Explain the use of magnifying glass.

98.(a) What do you mean by lateral inversion on plane mirrors?

(b) Find the angle of reflection on the figure below?

(c) A plane mirror is rotated about 60°. How many images are formed?

UNIT 15. BASIC ELECTRONIC COMPONENTS

97. A semi conductor is formed by …….bonds.

(a) Covalent

(b) Electrovalent

(c) Co-ordinate

(d) None of the above

98. A semi conductor has ……. Temperature coefficient of resistance.

(a) Positive

(b) Zero

(c) Negative

(d) None of the above

99.Differenciate semi-conductor, conductors and insulators on the basis of band gap.

100.When a pure semi-conductor is heated, its resistance…….

(a) Goes up

(b) Goes down

(c) Remains the same

(d) Can’t say.