1. (a) Define the following as applied to motion;
   (i) **Uniform velocity.** (01 mark)
   (ii) **Length of the pendulum.** (01 mark)

(b) Figure 1 below shows the variation of velocity with time of the car.

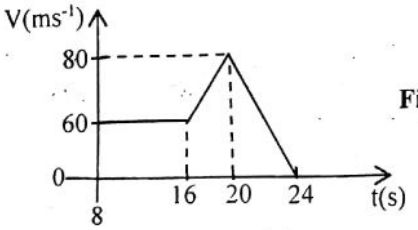


Fig. 1

(i) Describe the motion of the car. (03 marks)
(ii) Calculate the distance covered between 16th and 24th second. (03 marks)

(c) A body of known mass is acted upon by forces of; 3N, 8N and 4N as shown in figure 2(i).

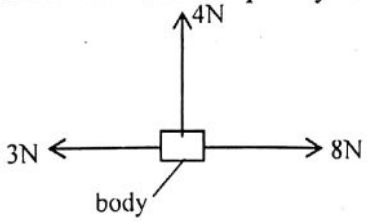


Fig. 2(i)

(i) Find the resultant force of the body. (03 marks)
(ii) Explain what happens when a balloon filled with air is released in space as shown in figure 2(ii). (02 marks)

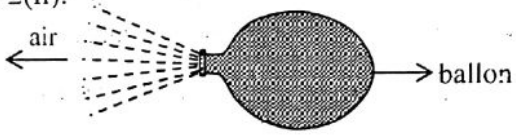


Fig. 2(ii)

(d) Explain how a person is able to draw a liquid from a glass using a straw. (03 marks)

2. (a) What is meant by the following?
   (i) Mechanical advantage. (01 mark)
   (ii) **Moment of force.** (01 mark)

(b) (i) State the **principle of moments.** (01 mark)

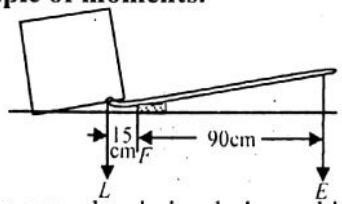


Fig. 3

(ii) Figure 3 shows a crow bar being balanced by the forces E,g the effort and L, the load and F being the fulcrum.
Determine the Mechanical advantage of the crow bar. (03 marks)

(c) (i) What is meant by **density of substance**? (01 mark)
(ii) Calculate the mass of air in a room of floor dimensions 10m x 12m and height 4m. (Density of air 1.26kgm^{-3}). (03 marks)

(d) (i) State **Archimede's principle.** (01 mark)
(ii) Describe an experiment to verify Archimede's principle. (04 marks)
(iii) Explain why water in the bottom of a floating boat cannot be siphoned over the side. (01 mark)

3. (a) What is meant by;
   (i) **Convection.** (01 mark)
   (ii) **Fixed temperature points.** (01 mark)

(b) The diagram below shows a refrigerator.

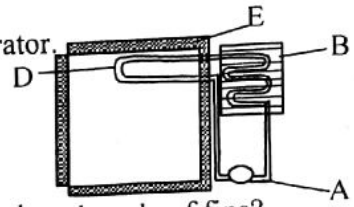


Fig. 4

(i) Name the part A. (01 mark)
(ii) Explain why B is painted black and made of fins? (02 marks)
(iii) Explain why D is on the upper side in the refrigerator and not in the lower side. (02 marks)

(c) (i) Describe how the scale of a new thermometer can be calibrated. (03 marks)
(ii) State **two** advantages and **two** disadvantages of using mercury as a thermometric liquid. (03 marks)

(d) Explain how the green house effects leads to global warming. (03 marks)

4. (a) (i) State any **two** different types of sources of electrical energy. (01 mark)
(ii) Explain why birds standing on electricity transmission wires do not get electrocuted. (02 marks)

(b) (i) Define **potential difference (p.d)**. (01 mark)
(ii) Use the definition in (b) (i) above, to show that the power produced across a conductor is P = IV where V is the p.d across conductor and I is the current in the conductor. (02 marks)
(iii) Explain the necessity of earthing some electrical appliance. (02 marks)

(c) Draw circuit diagrams to show;
(i) Voltmeter reading emf of a cell. (01 mark)
(ii) Voltmeter reading terminal p.d of a cell. (01 mark)

(d) On the same axis, sketch a graph of current against potential difference (p.d) for;
(i) a torch bulb. (01 mark)
(ii) a carbon resistor. (01 mark)

(e) (i) Describe the faults of a simple primary cell. (02 marks)
(ii) What special precaution are taken in caring for a lead acid battery? (02 marks)

5. (a) (i) What is meant by the term light? (01 mark)
(ii) Describe an experiment to show that light travels in a straight line. (04 marks)

(b) Distinguish between primary and secondary colours giving an example in each case. (03 marks)

(c) (i) An object 2cm high is placed 5cm from optical center of the converging lens of fold length 10cm. By scale drawing, determine the position and size of the image formed. (04 marks)
(ii) State **two** uses of a converging lens. (01 mark)

(d) (i) What is **total internal reflection**? (01 mark)
(ii) Explain how sky radio waves travel from a transmitting station to a receiver. (02 marks)

6. (a) Draw a diagram to show how plane progressive wave are refracted as they travel from deep water to shallow water. (02 marks)

(b) (i) Distinguish between a **transverse** and a **longitudinal wave.** (02 marks)
(ii) The distance between 11 successive crests of a wave is 33m. Find the speed of the wave, if time taken to make one complete cycle is 0.01 second. (03 marks)

(c) (i) Describe an experiment to show that sound cannot travel through a vacuum. (04 marks)
(ii) State **two** applications of Ultrasonic sounds. (01 mark)

(d) A student standing between two high walls and 500m from the nearest wall shouted. He heard the first echo after 3s and second echo 2s later. Determine,
(i) the speed of sound in air. (02 marks)
(ii) The distance between walls. (02 marks)

Turn Over

7. (a) Define the terms as applied to magnetism: (01 mark)
(i) **Paramagnetic material.** (01 mark)
(ii) **Neutral point**

(b) (i) Using domain theory, explain why the strength of a magnet cannot be increased beyond a certain point. (02 marks)

(ii) Explain how magnetic keepers function to prevent stored bar magnets from self-demagnetization. (02 marks)

(c) Describe the function of the following parts of a moving coil galvanometer.
(i) The soft iron cylinder. (01 mark)
(ii) The return spring. (01 mark)

(d) (i) Predict the direction of force when current flows out of the plane between the poles of magnets in figure 5 below. (02 marks)

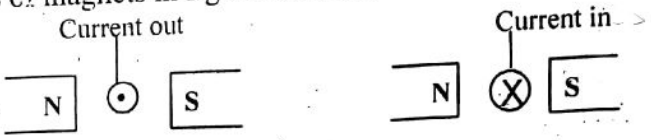


Fig. 5

(ii) Describe how the efficiency of a D.C motor may be increased. (02 marks)
(iii) State **four** examples in which a D.C motor is made use of. (02 marks)

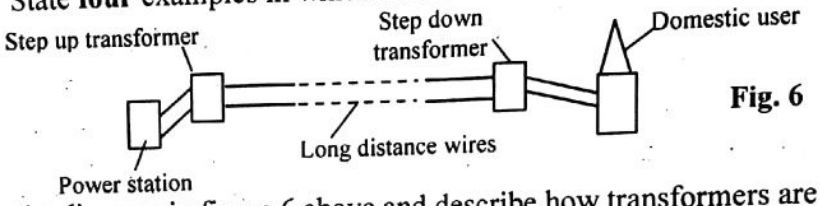


Fig. 6

(e) Study the diagram in figure 6 above and describe how transformers are used to transmit electric power from the hydroelectric power dam to a domestic house. (02 marks)

8. Define the following terms as applied to radio activity;
(a) (i) **Activity.** (01 mark)
(ii) **Half-life.** (01 mark)

(b) Below is the graph of activity against time for a radioactive sample.

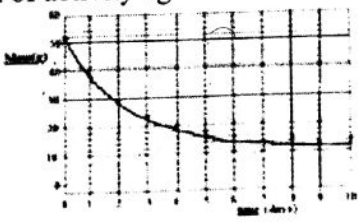


Fig. 7

Use the graph to;
(i) Find the half-life of the sample of the material. (01 mark)
(ii) Determine how much of the original sample of the material will have decayed in 9.6 days. (02 marks)

(c) Fig. 8 shows a technician locating the position of the leak of an underground water pipe which has cracked.

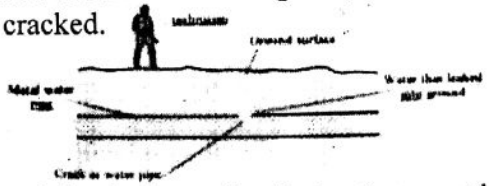


Fig. 8

State and explain, the type of radiation that must be emitted by the isotope introduced into water supply for the leak to be detected. (02 marks)

(d) (i) What are **x-rays**? (01 mark)
(ii) Describe how X-rays are produced in an X-ray tube. (04 marks)
(iii) Give **two** uses of X-rays. (02 marks)

(e) Give **two** precautions taken while handling radioactive substances. (02 marks)

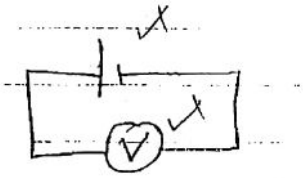
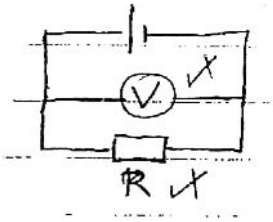
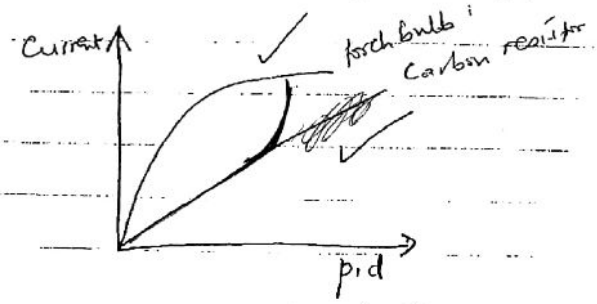
END

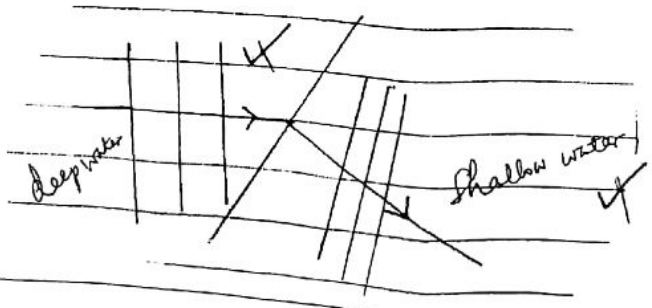
WAKISSHA JOINT MOCK EXAMINATIONS
MARKING GUIDE
Uganda Certificate of Education
PHYSICS 535/2

Qn	SCORING POINT	NOTES	MARKS
1(a)	(i) The rate of change of displacement is constant.		01
	(ii) The distance from the point of suspension to the center ~~of gravity~~ of the pendulum bob.		01
(b)	(i) The car started moving with a constant velocity of $60ms^{-1}$ for 8s, it then uniformly accelerated to $80ms^{-1}$ for 4s. Then finally decelerated uniformly to rest in 4s.		03
	(ii) Distance covered ½ bh + LxW +1/2 bh =1/2 x4x80+4x60+1/2 x4 x20 =160 + 240 +40 =440m ✓	Acc: $\frac{1}{2}$h(a+b) + ½ bh use of	03
(c)	(i) $\rightarrow 8 - 3 = 5N$ Resultant force = $\sqrt{4^2+5^2} = \sqrt{41}$ = 6.403N ✓	Acc	03
	(ii) Air begins to escape, ballon moves in opposite direction to escaping air with equal and opposite force (Newton's 3rd law). When all air has escaped, the balloon falls to the ground.	As air escapes from balloon at a high speed back ward, by law of conservation of momentum, a backward momentum due to air escaping sets up equal but opposite forward momentum on the balloon causing it to move forward	02
(d)	The person placed the mouth at one end of the straw with it other and dipping in the liquid. The person reduces pressure insert the straw by sucking. Atmospheric pressure is now greater than pressure inside the straw pushes liquid from glass to mouth.		03
			T = 16
2(a)	(i) Mechanical advantage is the ratio of load to effort.		01
	(ii) Moment of force is the product of force and perpendicular distance from the line of action of the force.		01
(b)	(i) When a body is in equilibrium, the sum of clockwise moments about a point is equal to the sum of anticlockwise moment about the same point.		01

	(ii) By principle of moments: $L \times 15 = E \times 90$ $\frac{L}{E} = \frac{90}{15}$ M.A = 6	03	03
(c)	(i) Density is the mass per unit volume (ii) Volume = 10m x 12m x 4m $= 480m^3$ $= \frac{mass}{volume}$ Mass = 1.26 x 480 = 604.8kg	01 03	01 03
(d)	(i) When a body is wholly or partially immersed, it experience up thrust equals to the weight of fluid displaced.		
	(ii) A solid object (stone/metal) is suspended from a spring balance and its weight Wa noted. A displacement can is filled with water up to the spout. The body, still attached to the balance is carefully lowered into the can and its weight in water Ww noted. The displaced water caught in the weighed beaker is measured and record W. If the weight of empty beaker is Wb. Loss in weight = Wa – Ww Weight of displaced water = W –Wb Hence result shows that Wa – Ww = W-Wb thus verified.		01 04
	(iii) No atmospheric pressure on water inside the bottom.		01
			T = 16.
3.(a)	(i) Convection is the flow of heat from a region of high temperature to a region of low temperature by motion of the fluid in bulk.	01	01
(b)	(ii) Is a temperature that can be reproduced.		01
	– Temp at which pure water changes from one state to another.		01
	(i) A – Compressor pump	01	
	(ii) B – Painted black radiator of heat to radiate heat		02
	B – made of fins because fins have a larger surface area and more heat is radiated	02	02

	(iii)	D- on the upper sides that cooled air moves as warm air rises and is cooled in turn. A convection current is thus formed which uniformly cools the contents.	02	
(c)	(i)	Lower fixed point of thermometer is marked by placing bulb in pure melting ice and marking the level where the mercury thread stops. The upper fixed points is marked by placing the bulb in steam from boiling water at standard pressure and marking the level where mercury thread stops. The length between the two fixed points is marked off at equal intervals.	03	03
	(ii)	Advantages - Mercury does not wet glass - Does not vaporize easily. - Opaque and easily seen. - Better conductor of heat. - Has a regular expansion. Disadvantages - Has a high freezing point, cannot measure very low temps - Has a low expansivity	Any first 2 @ 1 mark 02 Any first two.	02 01
	(d)	Radiation from outer space is absorbed by the earth which produces radiation of shorter wave length. This radiation is absorbed by greenhouse gases (CO_2 and CO) and remains close to the earth's surface keeping the earth warm	Rad 03	03
				T = 16
4.(a)	(i)	Thermocouples - Photo – electric cells - Chemical cells (dry cells, batteries) - Thermal and hydro electric generators. - Nuclear electrical generators.	Any first 2 @ ½ mark	
	(ii)	Birds stand at one same p.d on the wire and do not make any complete circuit, therefore, current does not flow through them.	02	

(b)	(i) P.d is the work done per coulomb of electricity passing from one point to another.	01	01
	(ii) From $V = \frac{W}{Q}$ and $W = Qv$ but $Q = It$ $W = IVt$ $\frac{W}{t} = IV$ $P = \frac{W}{t} = IV$	02	02
	(iii) Earthing is installed such that incase of fault current flow through earth wire to earth hence preventing electric shocks to the user.	02	02
(c)	(i) 	01	01
	(ii) 	01	01
(d)		02	02
(e)	(i) Polarizotim – accumulation of hydrogen bubbles on copper plate reduces flow of current. Localation – production of hydrogen at zinc plate as a result of impurities.	02	02
	(ii) It should be charged using small current - Should not be kept in undis charged state for long. - No short – circuiting - When acid level is low, add distilled water. - Battery should not be dropped.	ANY 2 (2)	02
			T = 16

5.(a)	(i) Is a form of energy which enables us to see (ii) Mark holes in three cardboards such that they at the same level. - Pass a string through the holes and pull it taut to, makes sure that the holes are in a straight line. - Carefully remove the thread without disturbing the arrangement. - Place alight candle at one end and ~~took~~ look through ~~two their~~ the other end. - You should be able to see the candle flame through the hole. - If one cardboard is slightly displaced the flame will no longer be visible. - This shows that light travels in a straight line.	Diagram (1) 04	04
(b)	(i) Primary colours are ~~ones~~ which cannot be formed by combining any two other colour e.g. Red, blue, green While Secondary colours are colours which are formed by combining two primary colours e.g. yellow, cyan, magneta. (ii) Image position = 9.5 x 2cm = 19cm Image size = 4x1 = 4 cm (iii) Used in projectors In lens camera. In eye In lens microscope / magnifying glass.	03 Acc 20 + 1cm See the graph Any first 2	03 02 02 01
(d)	(i) Is a type of reflection where a ray of light travels from a denser medium to less dense when the angle of ~~reflection is 90°~~ angle of incidence exceeds critical angle. (ii) The ~~receiver~~ transmitter produces radio waves and send them in space. These waves meet ionosphere and under goes total internal reflection and they reflect back to other parts of the earth where the receiver (radio) receives them.	01 02	01 02
6 (a)		Direction Small spacing of refracted wave fronts	T = 16 02

(b)	(i) A transverse wave is one in which the particles of the medium vibrate perpendicular to the direction of wave motion While A longitudinal wave is one in which the particles of the medium vibrate parallel to the direction of wave motion.		01 01
	(ii) 11 λ = 33 λ = 3m Period T = 0.01s From V = fλ = $\frac{\lambda}{T}$ $= \frac{3}{0.01}$ V = 300ms^{-1}		03
(c)	(i) An electric bell is placed in a bell jar. - When switched on, the bell is heard ringing. - The air in the ball jar is gradually pumped out using a vacuum pump, the sound of the bell continues to decrease. - When air is completely removed, no sound is heard, even though the hammer is still seen striking the gong.	Acc ticking clock for electric bell.	04
	(ii) To design whistles for dogs. - Designing spectacles for blind. - To kill bacterial in water. - Breaking kidney stones - Ultra scanning - Ultra sound drilling. - Cleaning delicate materials. - ~~Used by bats to overcome obstacles.~~	- Echo sounder in determining depth of sea bed - Medical surgical and diagnosis - To reveal flaws in welded joints and holes. ~~Determining the age of fish.~~	01
(d)	(i) $V = \frac{2d}{t} = \frac{2x500}{3}$ $= 333.33ms^{-1}$	02	02
	(ii) $d = \frac{Vt}{2} = \frac{333.333x5}{2} = 833.33m$ Total distance = 833.333+500 = 1333.33m	02	02
			T= 16

7(a)	(i) Paramagnetic material is one that gets slightly magnetized in the direction of a strong magnetic field.	01	01
	(ii) Neutral point is a point in a magnetic field where the resultant magnetic force is zero.	01	
(b)	(i) During magnetisatism; more and more of the domain are made to face one direction. When all dipoles in all the domains face the same direction then magnetic cannot be made any stronger.	02	02
	(ii) Keepers retain alignment of magnetic domain in the magnets themselves without the opposition or upset in.They form closed loop of its domain hence retain alignment.	02	02
(c)	(i) It's fixed between poles of a magnet to concentrate the magnetic field and make it uniform.	01	01
	(ii) Current flows in and out of the coil through the terminals connected.	01	01
(d)	(i) Force is upward, when current flows out force is down ward when current flows in.	02	
	(ii) Using a stronger magnet to increase the strength of magnetic field. - Increasing the number of turns in a coil. - Increasing the area of the coil. - Using their copper wires of low resistance. - Winding the coil on a soft iron armature to concentrate the magnetic flux.	Any 4 @ ½ mark 02	02
	(iii) In Fans CD player. Electric drills Electric vehicles Water pump printers	02 Any first 4 @ ½ mark	02
(e)	Power is transmitted over long distances, the voltage is first stepped up to reduce the current and this reduces power loss/energy loss along the way. When power reaches near the user, the voltage is then stepped down to a value that is safe for the user	02	02
			T= 16

8.(a)	(i) Activity is the number of disintegration made per second (ii) Half-life is the time taken for half the original sample of radioactive material to decay	07 07	01
(b)	(i) Half-life = 2.6 days. (ii) Decayed mass = 52 – 14 = 38g	01 02	02 02
(c)	Gamma rays A radioactive solute is dissolved in the liquid at some point. The isotope makes an activity with the soil at the leaking point, which can be detected.	02	T = 16
(d)	(i) X-rays are electromagnetic radiations produced when fast moving electrons are suddenly stopped by matter (ii) Cathode is heated using low voltage supply Cathrode emis electrons by thermimic emission Electrons are accelerated towards a anode by the high voltage. When cathode rays strike the target, much of their K.e is converted into heat or small loss of K.e is converted into x-rays and the rest into x-rays (iii) Detection of broken bones - Detection of T.B - Detection of foreign object in the body. - Killing malqmant growth. - Cancerous cells/detection of cancer /kidney stone. - Head injuries - Study crystal - Checking language at air port - Detection of hidden flaws in metal castings. - Detection of craks in welded joint	01 04 Radiograph 02 Radiotherapy Industrial uses Any first 2	01 04 02
(e)	- Avoid direct body contact - Sources to be transported in thick lead - Wear protective gears. - Handle sources with long tongs - Wearing of monitoring gadgets	02 Any first 2	02

(To be fastened together with other answers to paper)

UACE

Candidate's Name .....

Signature .....

Subject Name ..... Paper code ...../.....

Random No.				
Personal Number