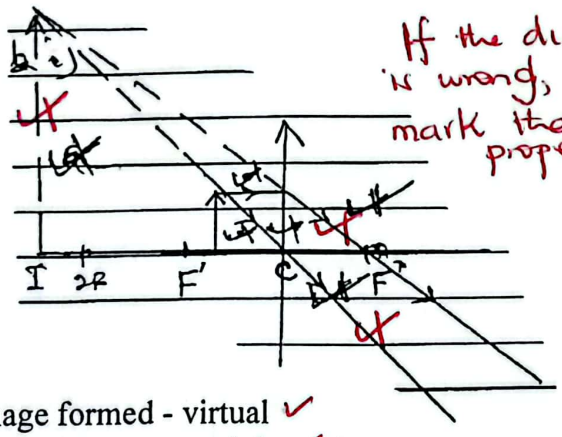
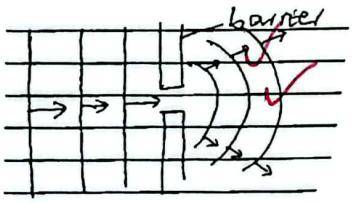
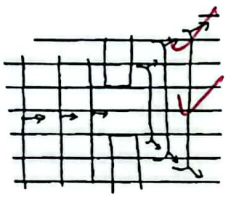
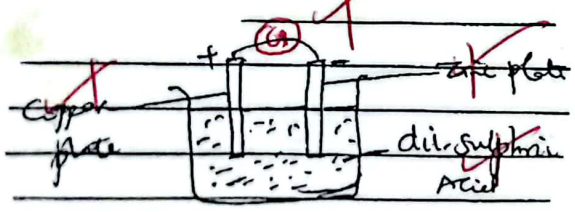
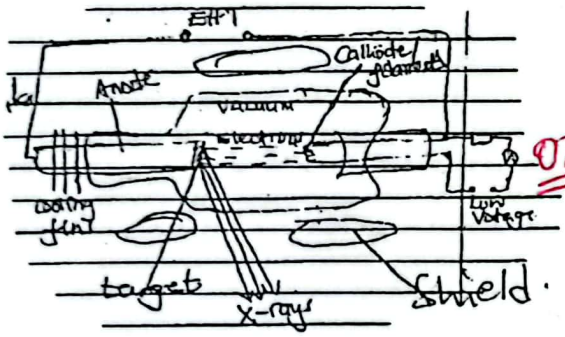
WAKISSHA JOINT MOCK EXAMINATIONS
MARKING GUIDE
Uganda Certificate of Education
PHYSICS 535/2
July/August 2023

Qn.	Scoring point	Notes	Mark
1(a)	Uniform velocity is the constant rate of change of displacement **While** Uniform acceleration is the constant rate of change of velocity	with/without word time you mark	01 01
b(i)	The motorist initially moves with a constant velocity of 40ms^{-1} for 5s. Then moves with a uniform acceleration to 80ms^{-1} for 10s. Then the motorist maintains a velocity of 80ms^{-1} for 15s. The motorist then decelerates uniformly to rest for 5s	- Identifying 4=4 marks * Velocity, time * type of motions should be catered for.	05
(ii)	Distance = LW + ½h (a+b) + LW + ½bh = 5 X 40 + ½ X 10 (40 + 80) + (15 X 80) + (½ X 5 X 80) = 200 + ½ X 10 X 1200 + 1200 + 200 = 2,200m	2200 m 1200 m X – wrong answer, correct units	04
(c)	The passenger in the car jerks forward. The passenger in the moving car is in a state of motion. When the car stops suddenly, the part of the body in contact with the seat comes to rest but the upper part of his body continues to move with the same velocity due to inertia and hence jerks forward.	- Jerks forward - Due to Inertia - Related content to inertia	03
(d)	- Rocket engine - Jet engine - Fireworks display - Lawn sprinkler - Explosion of a bomb - Firing a bullet from a gun - Boat rowing	any 2 (1st two)	02
2 (a) (i)	Pressure – force acting normally per unit area. - pascals (Pa), Nm^{-2}	Reject cross section area / surface area	
(ii)	Area of contact is small so pressure is greater at narrow section; area of contact is large at wide section so pressure is low hence flow is slower;		
(b)	$h_k \vartheta_k g = h_w \vartheta w g$ $w\vartheta_k \times 10 = 8 \times 1000 \times 10$ $\vartheta_k = \frac{80000}{100}$ $\vartheta_k = 800 kgm^{-3}$	If its given mark it.	03

(c)	A floating body displaces its own weight of fluid where it floats.	Key word is weight.	01
(d)	Mass of wood = mass of water displaced v x dw = vw x dw $0.01 \times d_w = \frac{3}{4} \times 0.01 \times 1000$ dwood = 0.75 x 1000 $= 750\ kgm^{-3}$ "Archimedes" $U = W_L$, $U = \rho V g$, $U = 1000 \times \frac{3}{4} \times 0.01 \times 10$, $U = 75N$ Law of flotation $U = mg$, $\frac{75}{10} = M_s$, $M_s = 7.5kg$, $\rho_s = \frac{m_s}{V_s} = \frac{7.5}{0.01} = 750 kg/m^3$		03
(f)	- Weigh solid in air and records its weight W_1 - Weigh the solid while in water and record of W_2. - Obtain the up thrust in water $W_1 - w_2$ - Obtain the density of solid from $\rho_s = \left(\frac{W_1}{W_1 - W_2}\right) \times \rho_w$ But $R_D = \frac{\rho_s}{\rho_w}$ where - ρ_w is density of water	- can measure - Mass / weight	04
3(a)(i)	Power of lens is the reciprocal of the focal length in metres;		01
(ii)	Focal length is the distance between the optical centre and principal focus:	Reject pole for optical centre.	01
(b)(i)	 Image formed - virtual - upright - magnified	If the diagram is wrong, dont mark the properties - here should be specified ⇒ If contradicting properties are given, dont mark any e.g virtual ∧ Real ∧	03
(ii)	Power of lens $= \frac{1}{f} = \frac{1}{-0.20} = -5D$		02
(c)	Sin I = ng Sin r ng Sin C = 1 $ng = \frac{1}{\sin 42^0} = 1.494$ $\therefore$ Sin i = 1.494 Sin 18^0 $i = 27.5^0$ $ng = \frac{1}{\sin C} = \frac{1}{\sin 42}$, $ng = 1.494$, Using $ng = \frac{\sin i}{\sin r}$, $1.494 = \frac{\sin i}{\sin 18^0}$	$i = \sin^{-1}(1.494 \sin 18)$ $i = 27.5^0$	05
(d)(i)	Black board is black which absorbs all light white chalk reflects all the light making the writings in white chalk background making it easy to read;		02
(ii)	Concave mirror forms inverted and upright images which are from a small field of view:		02

4(a) (i)	Period is the time taken by a wave to make a complete cycle ✓		01
(ii)	Wave length is the distance between two successive crests or troughs ✓		01
(b) (i)	$V = f\lambda$ ✓ $= 800 \times \frac{20}{100} \times 2$ ✓ $= 2 \times 160 ms^{-1}$ ✓ $= 320 ms^{-1}$ ✓ $\lambda = 2L$ $\lambda = 2(0.2) = 0.4$ $V = f\lambda$ ✓ 02 $= 800 \times 0.4$ ✓ $= 320 m/s$ ✓	Γ	02
(ii)	Temperature of air ✓ ✱ Humidity Density of air ✓ ✱ wind	✱First two	02
(c)	- An electric bell is placed in a bell jar connected to a vacuum pump. - When the bell is switched on, a loud sound is heard - When the air gradually removed from the jar loudness of sound reduces gradually ~~unit~~ until no sound is heard ~~through~~ though the hammer is seen hitting the gong. (05) - Sound requires a material medium for propagation	-If only diagram drawn, give (1 mk) correctly labelled	05
(d) (i)	Diffraction is the bending ~~and~~ or spreading of waves when they pass through an opening (1)		01
(ii)	Narrow shit  02	- Pattern (1)(2) - Direction (1)(2)	02
	Wide shit 23 12 35  02		02
5(a) (i)	Emf is the p.d across a cell in an open circuit (1) - Work done in Joules	- Ratio of power generated to the current it delivers	01
(ii)	-  	- Terminal pd of the cell when it is not supplying any current. Electron @ ½	02
(iii)	- Use of a depolarizer e.g ~~manganese dioxide or~~ potassium dichromate which oxidizes the hydrogen gas to form water and so removes hydrogen bubbles. - By brushing or clearing of the plate surface regularly to remove the hydrogen bubbles	- Depolarizer OR - Using $KClO_4$ ✓	02

(b)(i)	Bulb R		01
(ii)	$A_3 = 1.5 + 2.0 = 3.5A$ Effective current in a parallel combination is the total of currents in different branches of the circuit		02
(c)(i)	Resistance Rpq = 2 +3 = 5Ω Resisitance in parallel = $\frac{5\times5}{5+5}$ = 2.5Ω Total resistance 12 = 2.5 + 10 = 12.5Ω	$R = \frac{(2+3)7.5}{(2+3)+5} + 10$ $= \frac{25}{10} + 10$ $R = 12.5\Omega$	03
(ii)	Power $P = I^2R = 3.5^2 \times 12.5 = 153.125W$		03
(d)	So that the effective resistance is low and a failure of current flow in one branch will not affect the other branches. – Appliances receive same main P.d from the supply	– Appliances can work independently.	02

6(a)	Cathode rays	Gamma rays		
(i)	- Negatively charged - Fast moving electrons - Less penetrative - More ionizing - Massive "Have mass"	- carries no charge - electromagnetic in nature - more penetrative - Less ionizing - Have no mass	Any two	02
(ii)	$^{160}_{170}Co \rightarrow {}^{4}_{2}He + 2\,{}^{0}_{-1}e + {}^{156}_{70}Y + \gamma$ -rays		– 15k – 70 – Eqn	02
b) (i)	 - Cathode is heated using low voltage supply. - Cathode emits electrons by thermionic emission. - Electons are accelerated towards anode by high voltage. - When cathode rays strike the target, much of K.e is converted into heat and the rest into X-rays		– Well labeled diagram (any 4 lebbeled parts) – working diagram	05
(ii)	Mechanical use - Sterilizing medical equipment - Photography of broken bone - Detection of T.B. - Treatment of cancer Industrial Use: - Defecting hidden flaws - Crystallography - Detection of forgery in art pieces		Dont mark – Treatment of TB, Xrays detect.	01 01

In a magnetic field, beta particles are deflected towards Fleming's left hand rule showing that they carry a -ve charge while alpha particles are deflected in opposite direction

(c)	Alpha particle is deflected as per Fleming's rule in magnetic field faster than beta particles	- Different nature - Diffent mass	01
(d)	- Focuses and accelerates electrons - Deflects electrons vertically or horizontally - Forms electrons on screen or bright spot on screen	- electron gun - deflecting system	03
7(a)(i)	Is a region around a magnet where its magnetic is experienced.		01
(ii)	- A thin cardboard is put on a magnet whose magnetic field is required - Iron fillings are then gently sprinkled over the board. - On tapping the board. The fillings arrange themselves along the field lines		04
(b)(i)	Current magnetizes the core which induces magnetism in the tape		02
(ii)	Iron is a soft magnetic material - easily magnetized/ demagnetized - strongly magnetized can allow iron oxide as a soft magnetic material		02
(c)(i)	Output power = 20 x 10 x 200w Power input – IpVp = 1 x 240 = 240W Efficiency = $\frac{\text{power output}}{\text{power in put}}$ x 100 = $\frac{200}{240}$ x 100% = 83.3%		05
(ii)	Causes of power loses - Hysterisis (magnetic reversals) - Resistance of windings - Eddy currents - Flux leakage		02
8(a)(i)	A notch is a crack or weak point in a material		01
(ii)	- Helps in tearing pieces of clothes of clothes, papers - Helps in breaking glass, firewood	Eases contraction & expansions	01
(iii).	- Nature of the material - Thickness of the material	Length, shape size, diameter	02
(b)(i)	Temperature is a number that expresses the degree of hotness or coldness of an object on a chosen scale	key words - hotness / coldness	01
(ii)	Specific heat capacity is the quantity of heat required to raise the temperature of 1kg mass of a substance by 1 kelvin.		01
(c)(i)	Flask A which is black absorbs more heat than flask B The length of ether column in flask A lowers whereas that of flask B rises		01
(ii)	This is because air in flask A expands more than air in B hence the other on the left lowers and that on the right rises		03

(d)(i)	- As temperature reduces, kinetic energy of particles reduce and slowdown - Particles come closer and volume reduces - As temperature reduces further, appoint is reached when the particles have a theoretical zero volume is observed. Hence absolute temperature 03		
(ii)	$10 \times (70 - \theta) \times 450 = 20 \times 4200 \times (\theta + 10)$ $45 (70 - \theta) = 840 (\theta - 10)$ $\theta = 13.05^0$c 03		

END

Fraction = $\frac{\text{Volume of solid in liquid}}{\text{Total volume of solid.}}$

$= \frac{M_s}{\rho_L} \div \frac{M_s}{\rho_s}$

$\frac{3}{4} = \frac{\rho_s}{\rho_L}$

$\frac{3}{4} = \frac{\rho_s}{1000}$

$\rho_s = \frac{3}{4} \times 1000 = 750 \text{ kg/m}^3$.

* Both are oppositely charged and hence the direction of magnetic force exerted according to flemings left hand rule.