**MATHIOYA JOINT EVALUATION TEST Dec 2021**

**Kenya Certificate of Secondary Education**

***Physics Paper 2 232/2 MARKING SCHEME***

|  |  |
| --- | --- |
| 1. *0.48A*
 | *√ 1mark* |
| 1. *Metal cans discharge the static charges while plastic cans accumulate static charges hence can create explosion*
 | *√ 1mark* |
| 1. *This means that the bulb is designed to function at maximum voltage of 240V and its energy consumption is 9W.*
 | *√ 1mark* |
| 1. *(a) X is connected to a forward biased diode which makes the junction to become smaller while Y is connected to a Reverse biased diode. Diodes conduct only in forward bias.*

 *(b) T= North* *R= South both correct;* | *√ 1mark**√ 1mark* |
| 1. *It has Low melting point i.e it is made of a material with low melting point e.g thin copper wire.*
 | *√ 1mark* |
| 1. *.*

 *(b) Image is:** + 1. *Real*
		2. *Inverted*
		3. *Magnified*
		4. *Formed beyond C*
 | *√ 1mark Correct ray**√ 1mark Object**Any one √ 1mark* |
| 1. *The magnet is repelled/the magnet moves away from the solenoid since south and North poles are formed at ends A and B respectively*
 | *√ 1mark* |
|  | *Correct subst. √ 1mark**Correct ans. With unit* *√ 1mark* |
| *b)* * *Sound waves requires material medium (is a mechanical wave) while electromagnetic waves don’t*
* *Sound waves are longitudinal while electromagnetic waves are transverse in nature*
 | *√ 1mark both rays (incident and reflected)* *√ 1mark Object position**Any one √ 1mark* |
| 1. *.*
* *Connecting the 30A fuse along the neutral line of the heating element.*

*(b) .* * *There is a risk of fire to nearby structures or vegetation when the cables get too low.*
* *There is a risk of electric shock in case the poles collapse or hang too low.*
* *Harmful effects of electric field.*
 | *√ 1mark**Any one √ 1mark* |
| *226=206+4x**4x=226-206 4x=20 X=5* *86=84+2x-y 86=84+10-y y=94-86 y=8**5-alpha particles and 8- beta particles are emitted* |  *√ 1mark No. of α-Particles**√ 1mark No. of β-Particles**(Marks independent)*  |
| 1. *..i. For even distribution of charges*

*ii) Upwards*  | *√ 1mark**√ 1mark**(Allow Upwards along earth wire)* |
| 1. *P = V²/R. P = 240²/950*

 *= 60.63W* | *√ 1mark Correct subst.* *√ 1mark Correct ans. With unit*  |
| 1. *.(a)*
* *The intensity of the sound gradually decreases/sound becomes faint*

*(The temperature of the air inside decreases, energy of the molecules decrease hence the rate of vibration decreases)**(b)**-Ultrasound penetrates the deepest and* *-can be easily reflected by tiny grains.*  | *√ 1mark**(Deny-No sound is heard)**Any one √ 1mark* |
| 1. *(a)*

 *(b)*  | *a) √ 1mark( Refraction tied to smaller-wavelength, uniform wave fronts)**b) √ 1mark- formula &/or**√ 1mark -Correct subst.* *√ 1mark- Correct ans. with unit* |
| *15 (c)* * *Prisms do not absorb energy from incident radiation*
* *Prism do not produce multiple images*
* *Prism do not tarnish or peel off like mirrors*
 | *√ 1mark- any one* |
|  *(d) 1.5 λ is proportional to 27.0cm*  *1λ= x* *= 18 cm*  | *√ 1mark- proportionality**√ 1mark -Correct subst.* *√ 1mark- Correct ans. with unit* |
|  *e)(i) f=1/T T = 0.32/4 = 0.08 f = 1/0.08 = 12.5 Hz* | *√ 1mark –T**√ 1mark - Correct ans.* |
|  *e)(ii) c=λf*  *λ= c/f* *= 50/12.5**=4m* | *√ 1mark -Correct subst.* *√ 1mark- Correct ans.* |
| 1. *. (a)*
* *Large currents can be drawn from them over a short period of time.*
* *They require very little attention to maintain.*
* *They are lighter (more portable) than the Lead – acid accumulators.*
* *They can be kept in a discharged condition for a very long time before the cells are ruined*
 | *√ 1mark- any one* |
| *b)*  | *√ 1mark –Total resistance**√ 1mark-Subst. for I=V/R**√ 1mark- Correct ans.* |
| *c(i)****1.65V*** | *√ 1mark- correct value of e.m.f* *(Allow value indicated on the extrapolated graph)* |
| ***ii) E = V + Ir******V= -Ir +E******-r = slope******-r=******Internal resistance =***  | *√ √ 2marks-slope**√ 1mark- relating slope with r and correct value* |
| ***ii***  | *√ 1mark- formula &/or**√ 1mark -Correct subst.* *√ 1mark- Correct ans. with unit* |
| *17. a)(i) Cathode rays are streams of electrons emitted from the surface of a metal by thermionic emission* *ii) They travel in straight lines* *(Other property) They cause fluorescent surfaces to glow* *(b) i) Intensity of radiation**ii) Energy of radiation**iii) Type of metal* *(c) (i)* ***The slope represents the value of the Planck’s constant h*** ***(ii) The region OX represents the value of Work function Wo in Joules******(d) i) Wo = hfo******= 6.62 x 10-34 x 5.37 x 1014******= 3.55 x 10-59J******(ii) K.E = ½ mev2******= ½ x 9 x 10-31 x (7.9 X 105)2******= 2.808 x 10-19J*** ***hf = Wo + K.E*** | *√ 1mark-**√ 1mark-**√ 1mark- Any one**√ 1mark-**√ 1mark-**√ 1mark -Correct subst.* *√ 1mark- Correct ans. with unit**√ 1mark –K.E**√ 1mark –Subst. in Einstein’s equation**√ 1mark- Correct ans.* |
| *18 a) A. Cooling fins H. Cathode**b) Tungsten or molybdenum has high melting point to withstand high temperatures.**c) To ensure efficient dissipation of heat.**d) To absorb the stray x-ray radiations which would otherwise affect the x ray tube operators**e) To prevent electrons from losing energy due to collisions with air molecules and ionization.**f) The temperature of the cathode increases. This increases the number of electrons released hence the intensity of x-rays.**g) Hard x-rays of very short wavelengths are produced.**h) By efficient cooling fins on the outside of the tube.**By circulating oil through the channels in the copper anode.* | *√ 1mark-√ 1mark-**√ 1mark-**√ 1mark-**√ 1mark-**√ 1mark-**√ 1mark-**√ 1mark-**√ 1mark-* |
| *19 a)** *Capacitor stores electric charge while cell as a device to convert chemical energy to electrical energy.*
* *Capacitor is passive component of circuit while cell is an active component of circuit.*
* *Capacitor discharges instantly while cell runs for longer time.*

*b)**c) (i) P.d increases.* *(ii) Charge remains unchanged.**(iii) Capacitance decreases.**d)*  *e) i)Milliameter reading which is initially high gradually reduces to zero.**ii) Voltmeter reading increases from zero to maximum value (4.5V).**iii) .* * *Negative charges flow from negative terminal of the battery to the plate connected to it.*
* *At the same rate, negative charges flow from the other plate of the capacitor towards the positive terminal of the battery.*
* *Equal positive and negative charges appear on the plates.*
* *A potential difference is therefore set on the plates.*
 | *√ 1mark- Any one**√ 1mark- (Direction tied to shape of the field lines)**√ 1mark-**√ 1mark-**√ 1mark-**√ 1mark-Capacitance √ 1mark -Correct subst. Q=CV**√ 1mark- Correct ans.**√ 1mark –**√ 1mark –* *√ 1mark*  *√ 1mark* |
| *c)*  | *√ 1mark- Smooth curve flattening for max. voltage* |