**MATHIOYA JOINT EVALUATION TEST Dec 2021**

**Kenya Certificate of Secondary Education**

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

|  |  |
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| 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* |