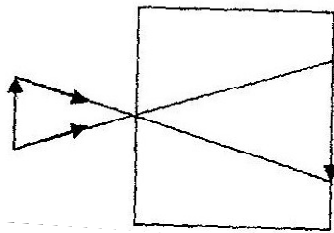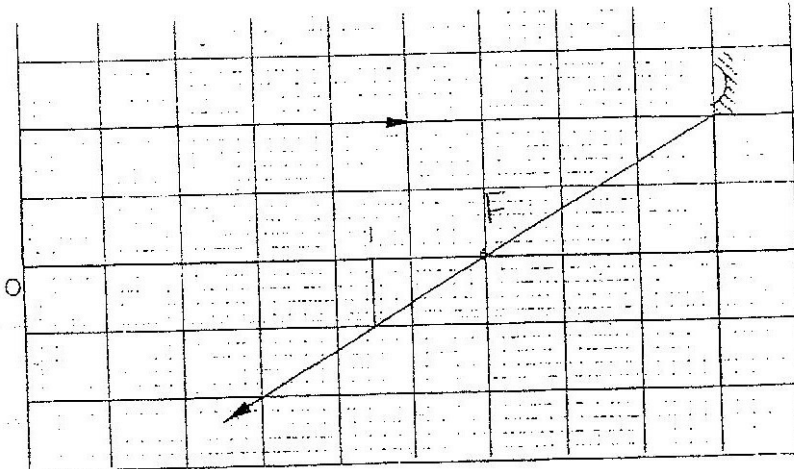# K.C.S.E 2007 PHYSICS MARKING SCHEME
PAPER 2

1.

Rays
Image and object must be labeled
Image must be enlarged

2. Alkaline cell lasts longer than lead acid cell/ remain unchanged longer
    Alkaline cell is more rugged than lead acid cell/ robust/ can withstand rough handling
    Alkaline cell is lighter than lead – acid cell (any one   (1 mark)

3. X is north   (both correct)
    Y is north   (1 mark)

4.

Correct rays
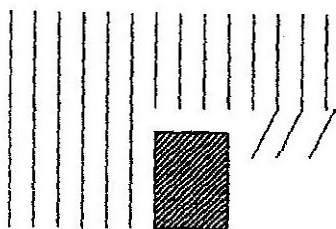F marked

5. $T = \dfrac{0.007S}{3}$ (T)

$F = {}^{1}/_{T} = 3/0.007$ (f)
      $= 429H_z \; 428.57 – 434. 80H_2$ (3 marks)

6.   Less bonding   Higher bonding

7.

Refracted away from normal
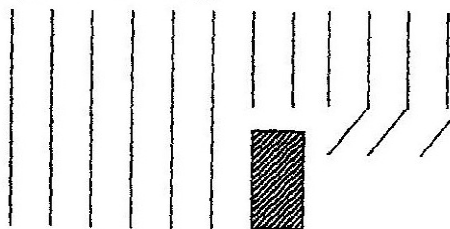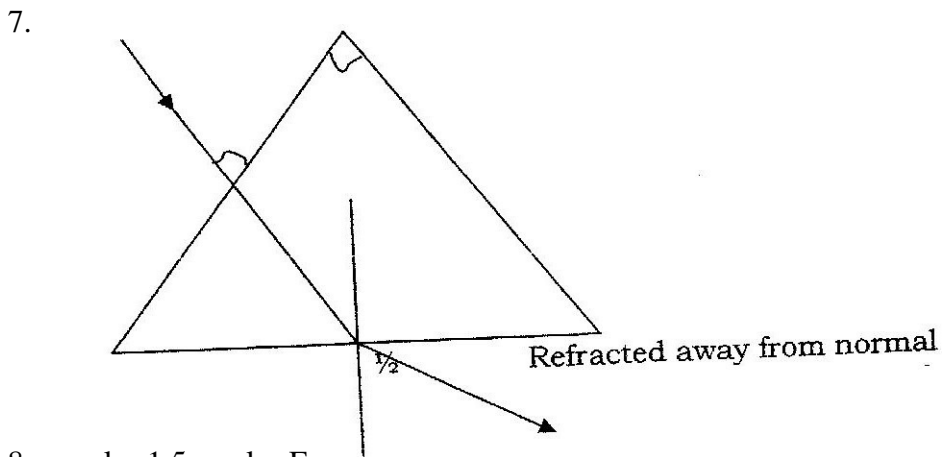
8. $l = 1.5$: or $l = \dfrac{E}{R + r}$
   $\dfrac{}{R + r}$

   $0.13 = \dfrac{1.5}{10 + r}$

   $R + 1.5\,\Omega;$
   $R = 1.5\ \Omega$ 　　　　　　　　　　　　　　　　(3 marks)

9. $R_1 = \dfrac{V^2}{P}$ 　　　　　$R_2 = \dfrac{V_2}{8P}$

   $\dfrac{R_1}{R_2} = \dfrac{V^2}{P} \times \dfrac{8P}{V^2}$

   $= 8$ 　　　　　　　　　　　　　　　　(3 marks)

10. The process of the eye lens being adjusted to focus objects at various distances
   　　　　　　　　　　　　　　　　(1 mark)

11.
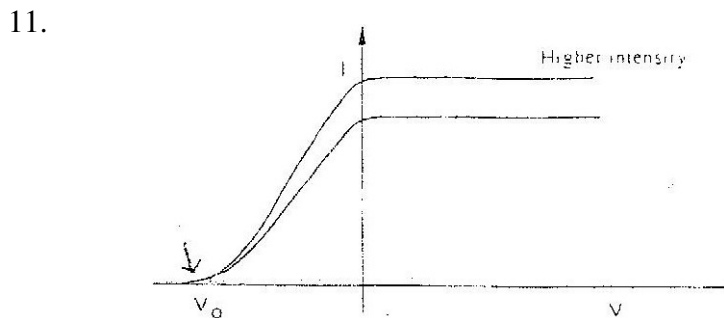
12. The higher the intensity implies greater number of electrons and hence higher saturation current
   　　　　　　　　　　　　　　　　(1 mark)

13. $a = 234$
   $b = 82$

14.

ignore circle

V_o
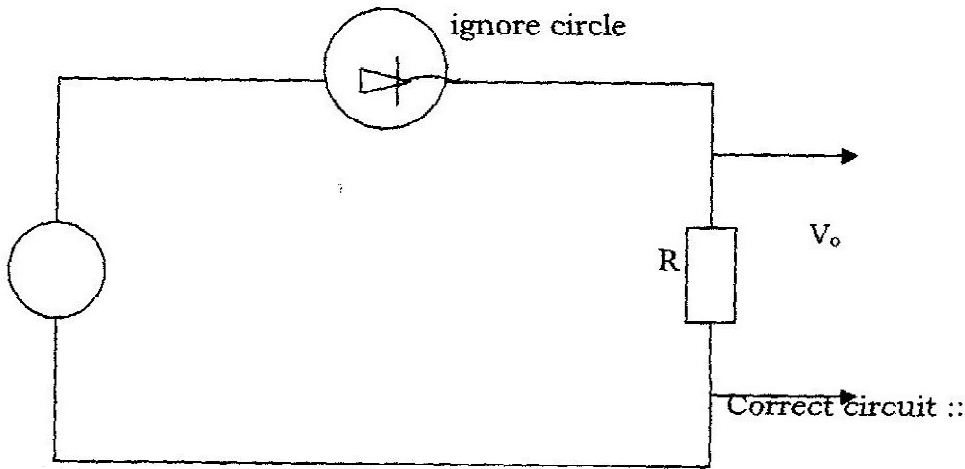
R

Correct circuit ::

SECTION B

15 (a) The ratio of the pd across the ends of a metal conductor to the current passing through it is a constant (conditions must be given)

Also $V/_1 = R$

(b) (i) It does not obey Ohm's law; because the current – voltage graph is not linear through line origin / directly proportionate

(i)   Resistance $= V/_1 =$ inverse of slope ; gradient $= \dfrac{\Delta 1}{\Delta V}$

$= \dfrac{(0.74 - 0.70) \text{ V}}{(80 - 50) \text{ mA}}$

$= \dfrac{0.4V}{30 \times 10^{-3} \text{ A}}$

$= 1.33\Omega$

$1.20 - 1.45 \; \Omega$ (range)   (3 marks)

(iii) From the graph current flowing when pd is 0.70 is 60.MA

Pd across R $= 6.0 - 0.7 = 5.3$v

$R = \dfrac{5.3 \text{ V}}{36\text{mA}}$

$= 147\Omega$

$= 139.5 - 151.4\Omega$ (3 marks)

(c) Parallel circuit $1/30 + 1/20 = 5/60$ or $60/50$
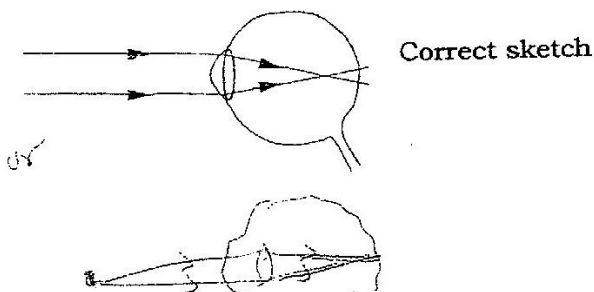
$R = 12 \; \Omega$

Total resistance $= 10 + 12 = 22\Omega$ (2 marks)

(ii) $1 = V/_R = {}^{2.1}/_{22} = 0.095$A   (1 mark)]

(iii) V = lR $= 10 \times \dfrac{2.1}{22}$

$= 0.95$

16.

Correct sketch

Diverging effects should be seen (2 marks)

(b) (i)   A   diaphragm
             B   Film   (2 marks)

(ii)   The distance between the lens and the film / object is adjusted; so that the image is formed on the film
        Adjust the shutter space/ adjust the aperture   (2 marks)

(iii)   Shutter – opens for some given time to allow rays from the object to fall on the film creating the image impression/ exposure time is varied
        A   (diaphragm) controls intensity of light entering the camera (3mks)
        B   (film) – coated with light sensitive components which react with ight to crate the impression register/ recorded or where image is formed.

(c) (i)   magnification = v/u = 3
            Since v + u = 80
                  U = 80 – v

            $\dfrac{v}{80 - v} = 3$

            V= 240 – 3v
            V= 60cm   (3 marks)

(ii)   From above u = 20cm

       $^1/_f = 1/v + 1/u = 1/60 + 1/20$ (2 marks)
       F = 15cm   (15 marks

17. (a)   The induced current flows in such a direction that its magnetic effect
           oppose the change producing it.

(b)   As the diaphragm vibrates, it causes the oil to move back and forth in the magnetic cutting the filed lines, this causing a varying e.m.f to be induced in the coil which causes a varying current to flow. (1 mark)

(ii)   Increasing number of turns in the coil – increasing of the coil
       Increasing the strength of the magnet (any two correct) (2 marks)

$\dfrac{Vp}{Vs} = \dfrac{Np}{Ns}$

$\dfrac{400}{Vs} = \dfrac{1200}{120}$

Vs = 40V

(ii) $I_p = 600/400 = 1.5A$ (2 marks)

(iii) $Ps = P_p = 600W$
        $l_s = {}^{600}/_{40} = 15A$ (1 mark)

18.   (a) (i)   A   Grid
                B   Filament   (2 marks)

        (ii)   Filament heats cathode
                Electron boil off cathode (theremionic emission)   (2 marks)

        (iii)   Accelerating   (1 mark)
                Focusing

        (iv)   Across X - plates   (1 mark)

        (v)   To reduce collisions with air molecules that could lead to ionization

        (b)   Height   = 4 cm
                Peak value   = 4 x 5
                               = 20V
        (ii) $\underline{2 \text{ wavelength}}$ = 16 cm
                     T   = $8 \times 20 \times 10^{-3}$
                              = 0.16S
                $f = {}^1/_T = {}^1/_{0.16}$
                $= 6.25H_z$

        (iii)