Name:……...……Index No…….……...

Candidate's Signature: …….…….…… Date: …….……...

232/2
PHYSICS
THEORY
PAPER 2
TIME: 2 HOURS

Kenya Certificate of Secondary Education (K.C.S.E.)

Revision Kit 2018

INSTRUCTIONS TO CANDIDATES

- Write your name and index number in the spaces provided.
- Mathematical tables and non-programmable calculators may be used.
- This paper consists of section **A** and section **B**.
- Attempt all the questions in the spaces provided.
- ALL working MUST be clearly shown.

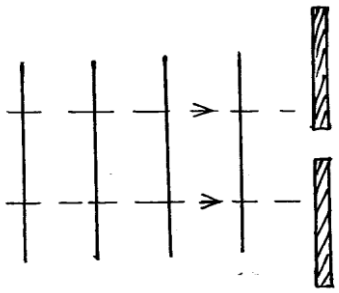
For Examiners Use

SECTION	QUESTIONS	MAXIMUM SCORE	CANDIDATE'S SCORE
A	1 – 12	25	
B	13	10	
	14	10	
	15	07	
	16	09	
	17	09	
	18		
	TOTAL	**80**	

This paper consists of 11 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

SECTION A (25 MARKS)

1. The figure below shows a series of wave fronts one wavelength apart approaching a gap between two barriers in a ripple tank



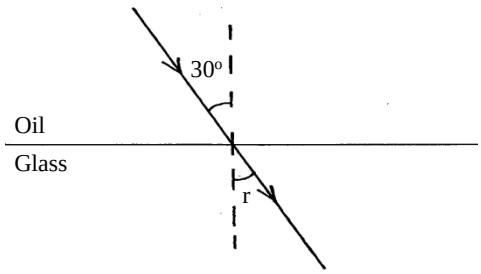
Show on the figure what happens as the waves pass the gap. (1mk)

2. A mine worker stands between two vertical cliffs 400m from the nearest cliff. The cliff are x and metres apart. Every time he strike the rock once , he hears two echoes, the first one after 2.5 seconds, while the second follows 2 seconds later.
   Calculate
   (i) The speed of sound in air. (2mks)

   (ii) The value of ***x*** (3mks)

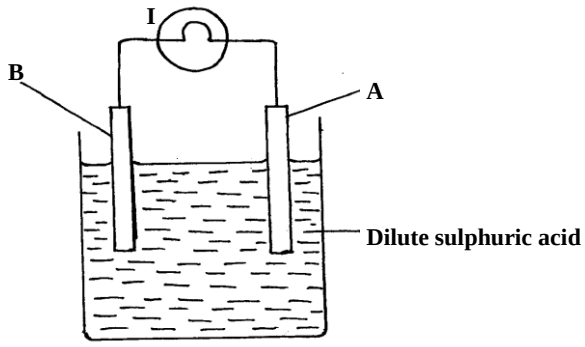
3. The coil of an electric motor is usually round on a soft iron armature. State the purpose of soft iron armature. (1mk)
   ……

4. The diagram below shows a ray of light incident on a glass-oil interface.



If the refractive indices of oil and glass are 6/3 and 3/2 respectively, determine the value of **r** (3mks)

5. The figure shows a simple cell.



Use the information on the figure to answer the questions below.

(a) Name the parts labeled **A** and **B** (1mk)

A……..

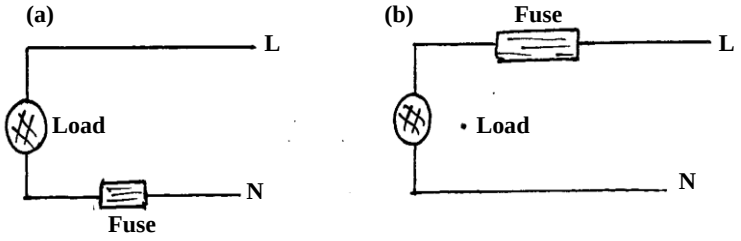
B……

(b) It is observed that the bulb goes off after a short time. Explain this observation (2mks)

……

……

6. The figure below shows how a fuse may be connected in electric current

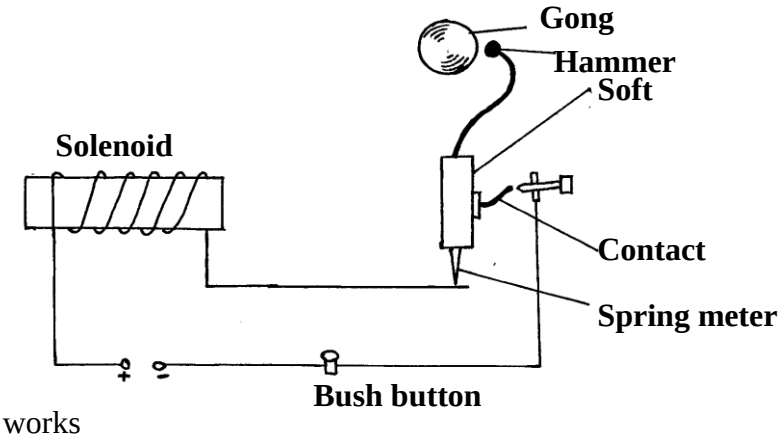


In either case the fuse blows out but (a) is dangerous while (b) is not. Explain (2mks)

……

……

7. The figure shows a simple circuit diagram of an electric bell.



Explain how it works (2mks)

……

……

8. The figure shows part of electromagnetic spectrum

Ultra violet rays	**Micro wave**	**x-rays**	**Red light**

Arrange the electromagnetic waves in the order of decreasing energy. (1mk)

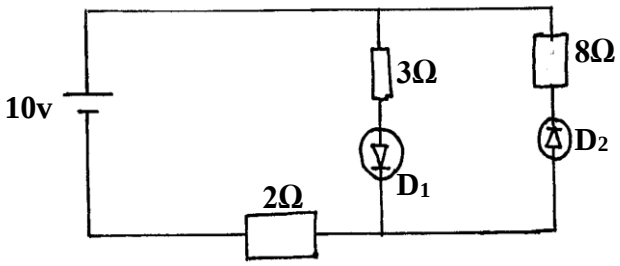
……

……

9. State **one** advantage of using optical fibres in communication. (1mk)

……

10. Find the current flowing and voltage across the 8Ω resister in the circuit. (3mks)



11. The following is part of radioactive decay series. ${}^{234}_{83}Bi \xrightarrow{\beta} {}^{90}_{84}X \xrightarrow{\alpha} {}^{230}_{b}Y$

Determine the value of **a** and **b** (2mks)

12. State **one** property of cathode rays. (1mk)

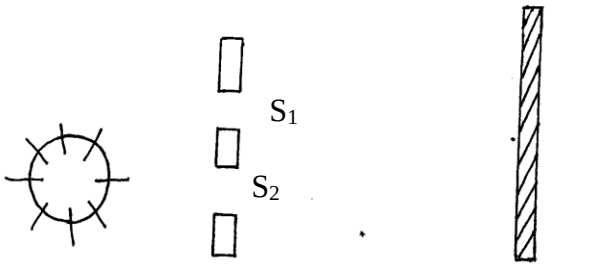
……

……

SECTION B (55MARKS)

Answer all the questions in this section

13. (a) In the experiment to observe interference of light waves a double slit is placed close to the source see figure.



(i) State the function of the double slit. (1mk)

……

……

(ii) State and explain what is observed on the screen. (3mks)

……

……

……

……

(iii) State what is observed on the screen when:

(I) The slit separation S_1S_2 is reduced. (1mk)

……

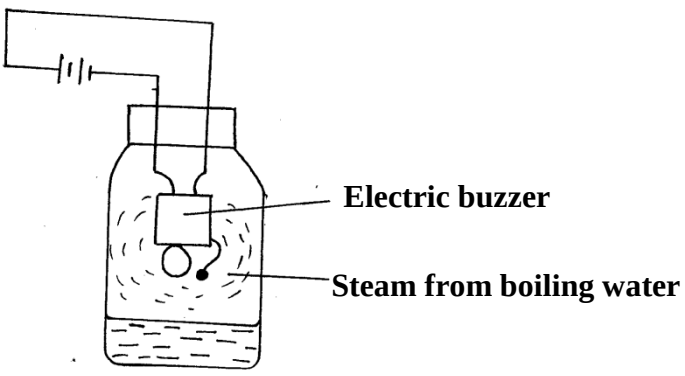
……

(II) White light source is used in place of monochromatic source. (1mk)

……

……

(c) (i) The figure below shows a set up by a student.



State and explain what happens to the sound from the buzzer as the bottle and its contents are cooled to 0^oC (3mks)

……

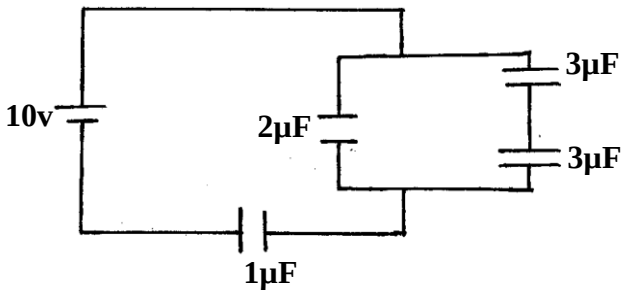
……

……

(iii) In the pipe below complete the diagram to show how air in the open pipe vibrate with a frequency of first overtone. (1mk)

Open pipe

14. (a) The figure below shows an arrangement of capacitor connected to a 10V DC supply.



Determine

(i) The combined capacitance of the arrangement. (3mks)

……

……

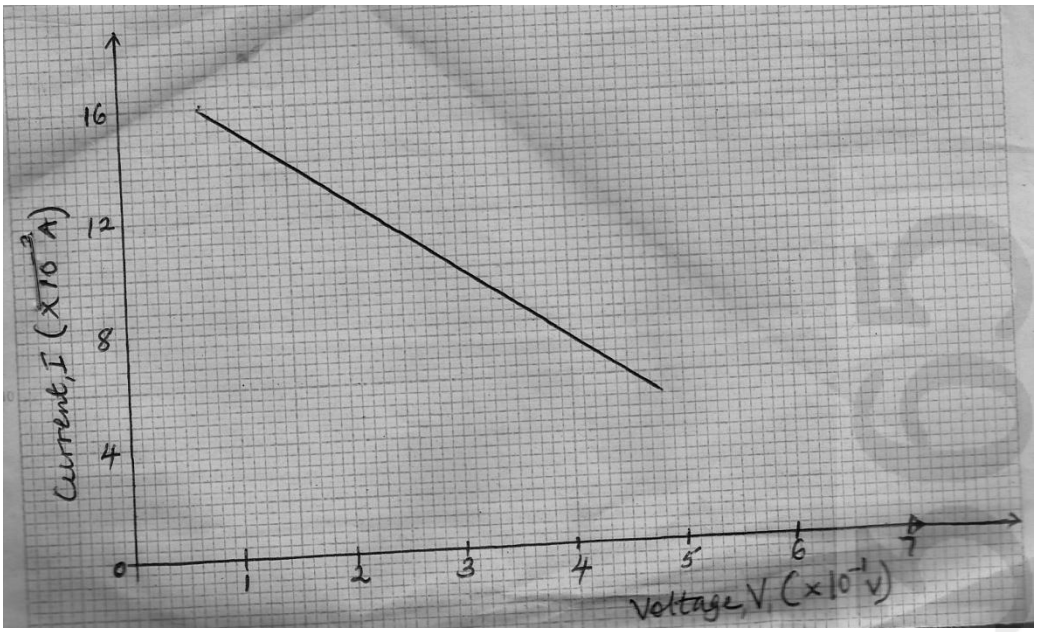
……

(ii) The total energy stored. (2mks)

……

……

(b) The graph below shows the variation of potential difference **V** with current, **I** for a certain cell.



From the graph determine:

(i) Internal reaction of the cell. (3mks)

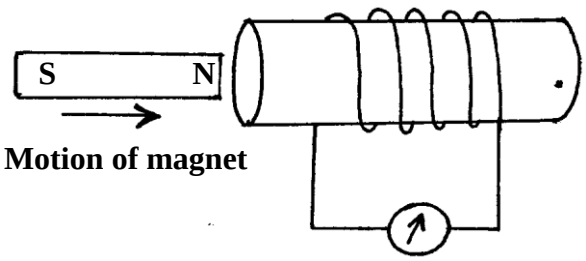
(ii) The e.m.f of the cell (2mks)

15. (a) (i) State the Lenz's law of electromagnetic induction. (1mk)

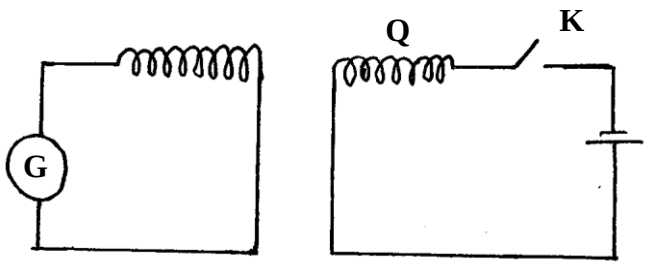
……

……

(ii) Use the law to determine the direction of the induced current in the circuit below (1mk)



(b) Two identical coils **P** and **Q** are placed close to each other as shown.



(i) State the observation on the galvanometer made when the switch **K** is closed. (1mk)

……

……

(ii) Explain the observation stated in (i) above (2mks)

……

……

(c) A student designed a transformer to provide power to an electric bell marked 24W, 6V from a 240V mains. He wound 50 turns and **N** turns on an iron ring. When he a connected the coil of 50 turns to the bell and the **N** turns coil to an a.c, he found that the transformer was only 60% efficient. Find:

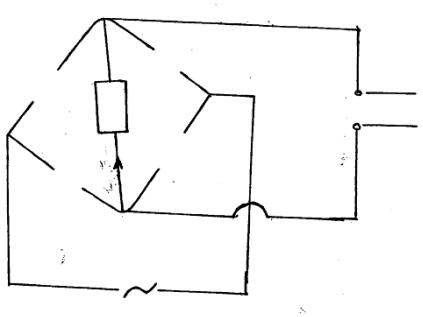
(i) The value of **N** (2mks)

(ii) The power in the coil with N turns (2mks)

16. (a) (i) With the aid of a diagram differentiate between forward biased and reverse biased diode. (2mks)

(ii) Sketch a graph to show how a current through a forward biased **p-n** function varies with potential difference across it. (2mks)

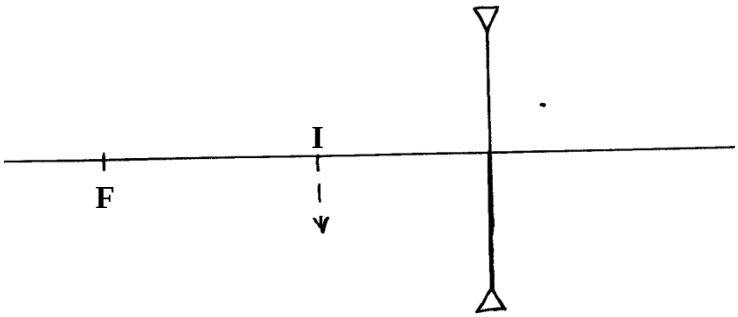
(b) The figure below shows an incomplete circuit for full wave rectification



(i) Complete the diagram to show how the diodes should be arranges for the current to flow through **R** in the direction shown with an arrow. (2mks)

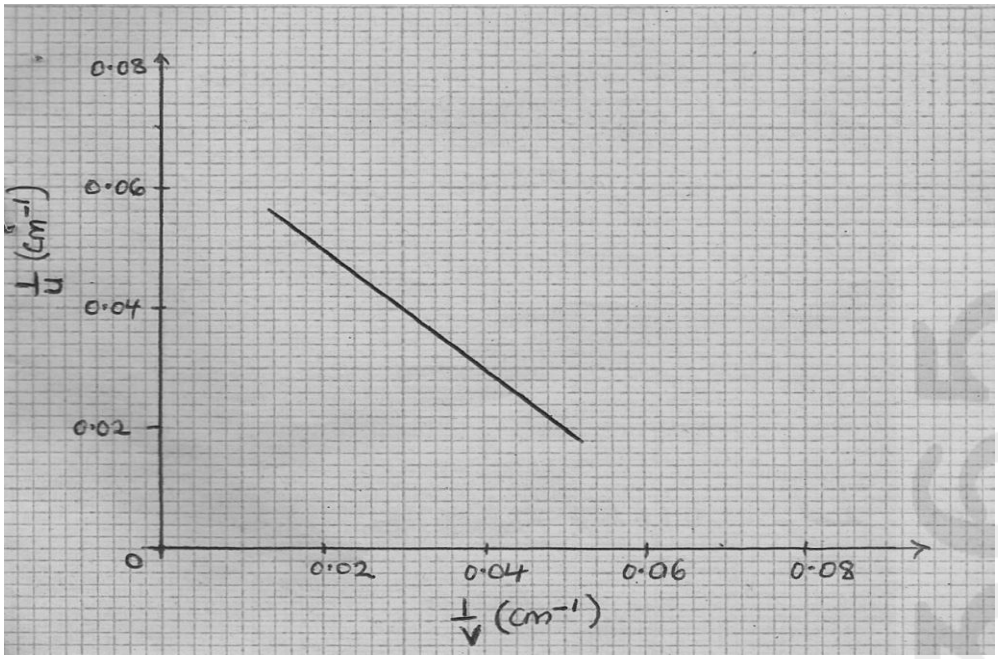
(ii) Sketch the output voltage as observed in the CRO (1mk)

17. (a) Complete the diagram below indicating the rays that will lead to the formation of the image **I** shown below and locate the object position (2mks)



(b) An object is placed 12cm from a convex lens and it forms a virtual image 36cm from the lens calculate the focal length of the lens. (3mks)

(c) The graph below shows variation of $\frac{I}{u}$ (cm $^{-1}$) with $\frac{I}{v}$ (cm $^{-1}$) for an object placed in front of a concave mirror

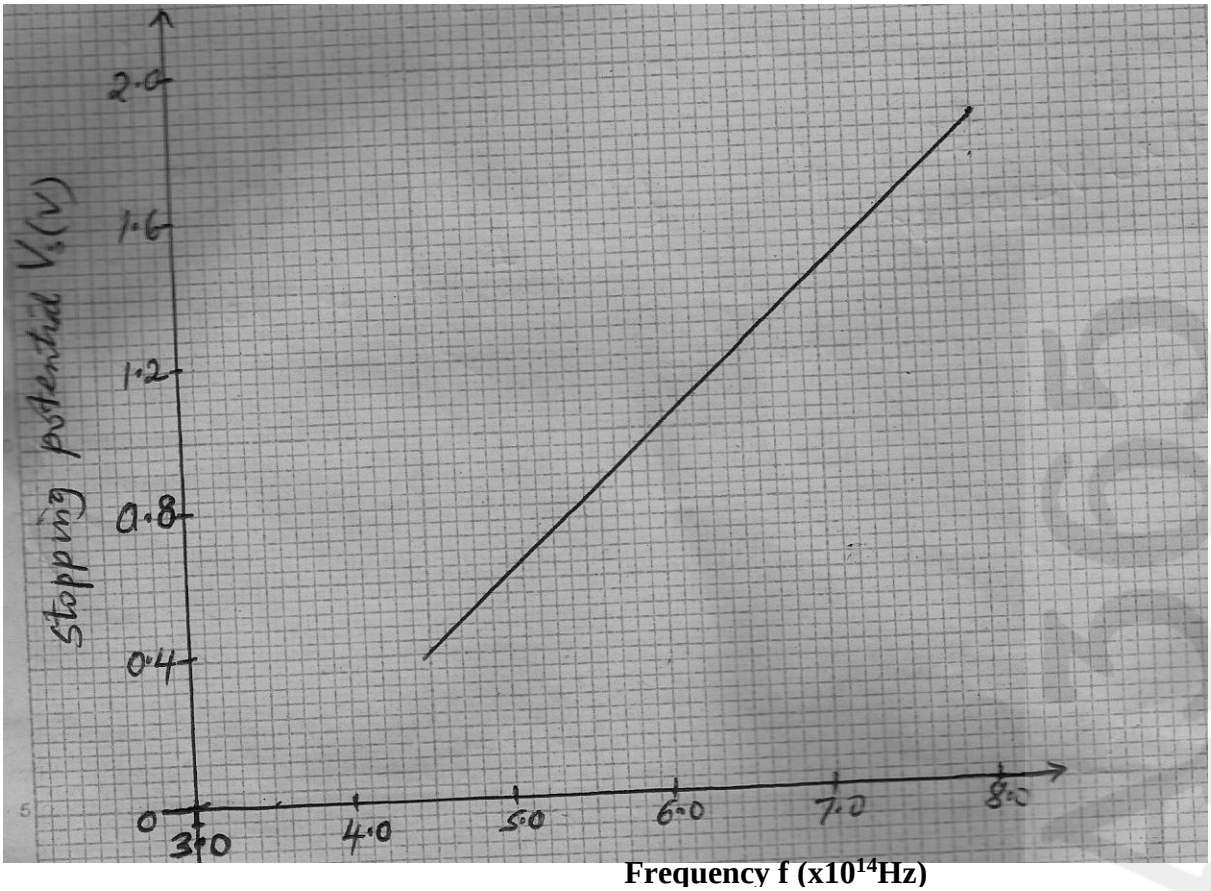


From the graph,

(i) Determine the focal of the mirror. (2mks)

(ii) Determine the image distance when the object is 20cm from the mirror. (2mks)

18. (a) The graph below shows stopping potential V against frequency for a photocell.



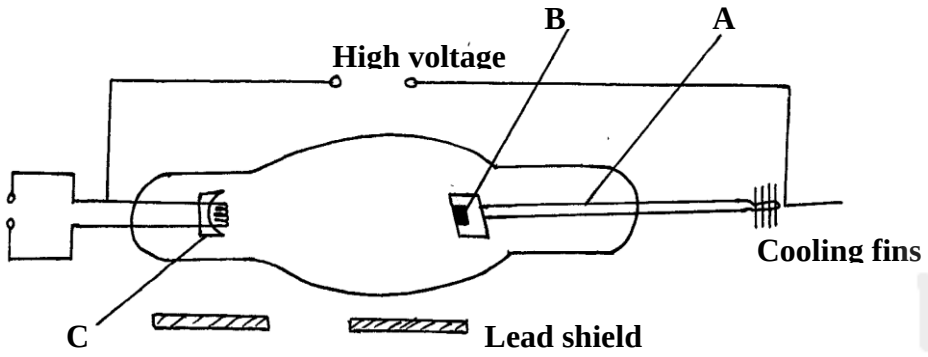
From the graph determine:

(i) Threshold frequency (1mk)

(ii) Planck's constant (2mks)

(iii) Work function of the metal (2mks)
(take **e** = 1.6 x 10-19c)

(b) The figure below shows an x-ray tube.



(i) Indicate on the diagram the path of the x-ray beam supplied by the tube. (1mk)

(ii) Why is **B** set at an angle of 45^{o} relative to the electron beam? (1mk)

……

……

(iii) Why are cooling pins necessary (1mk)

……

……

(iv) Why is the tube evacuated? (1mk)

……

……

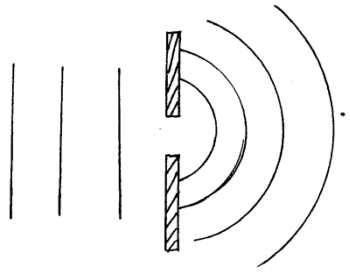
(v) State the function of the part labeled **C** (1mk)

……

……

MARKING SCHEME

1



2 a) speed= 2d/t

$= \frac{400 \times 2}{2.5}$ √

= 320 mls √

b) $320 = 2\frac{(x - 400)}{4.5}$ √

$x - 400 = \frac{320 \times 4.5}{2}$

X - 400 =720

x = 1120m √

3. To concentrate the magnectic √ field for maximum time linkage

4. $n_1 \sin \theta_1 = n_2 \sin \Theta_2$

$6/3 \sin 30^0 = 3/2 \sin r$ ✓1

Sin r = 2/3x6/3 sin 30^0

= 0,667

r= 41.813^0 ✓1

5a) **A** – zinc

B- copper

b) The bulb goes off because of a simple cell polarization and local action

6) In (a) the load is before the fuse so blowing out the fuse does not cut off power from the load . ie the load is still at a higher temperature while in (b) the fumes is before the load so melting of the fumes disconnects the load from the power ✓1

2) Pushing the button completes the current making the solenoif to be magnetized .The soft iron armature is attracted towards the solenoid making the hammer to strike the gong .this brakes the contact demagnetizing the solenoid hence the armature is pulled back by the spring . The process repeats itself

8) x-rays → uv rays → red light→micro waves

9.) more information can be transmitted at the same time

O loss of energy during transmission

10) RT = 3+2 = 5-2

$I = \frac{v}{R_T} = \frac{10}{5} = 2A$ ✓1

Pd across 8-2 resistor is zero

11. 9a = 234

$a = \frac{234}{9}$

= 26

b+2 = 84

b=84-2

= 82

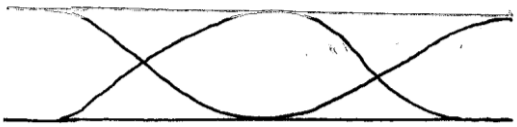
12. They are charged as they can be deflected in both magnetic and electric field
They carry energy

13 a) Is provide coherent sources ✓1

ii) - Alternating dark and bright fringes✓1
- Dark fringes due to destructive interference✓1
- Bright fringes due to constructive interference✓1

iii) I. Increased distance between the fringes ✓1
II) Coloured fringes are formed✓1

b) i) Sound becomes fainter✓1
on cooling ,steam condenses creating vacuum hence cant be transmitted ✓1

ii)  ✓1

14 a) i) $= \frac{3.5(i)}{4.5}$ ✓1

$= 0.778mf$ ✓1

ii) $E = \frac{1}{2} cv^2$ ✓1

$= ½(3.5/4.5)^{102} \times 10^{-6}$✓1

$= 3.89 \times 10^{-5}$✓1

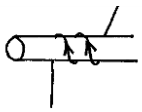
b) i) $-v = \frac{1}{\text{slope}}$

$= \frac{12 - 8}{2.6 - 4}$ ✓1

$= 0.352\Omega$ ✓1

ii) $E = 6.8 \times 10^{-1}$ v ✓1

15a) i) Lenz-Ten – the direction of induced current thick that is opposes the causing it ✓1

ii)  ✓1

b) i) deflects momentarily✓1
ii)

c) i) $\frac{Ns}{Np} = \frac{Vs}{Vp}$

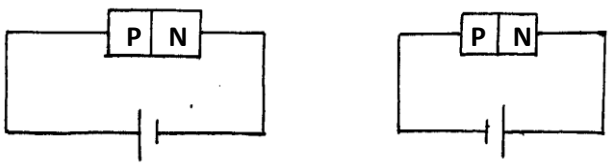
$50/N = 6/240$✓1

N= 2000 turns✓1

ii) pour/pin x 100%

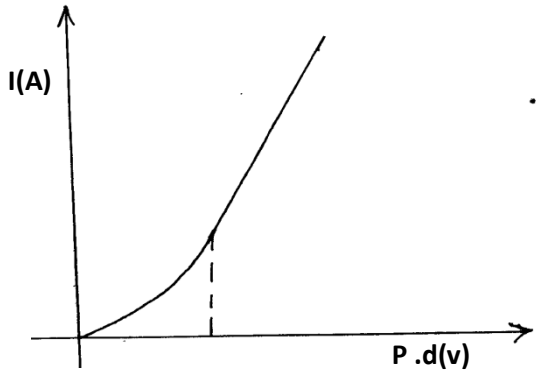
$60 \times \frac{24}{Pin} \times 100$ ✓1

= 40 W ✓1

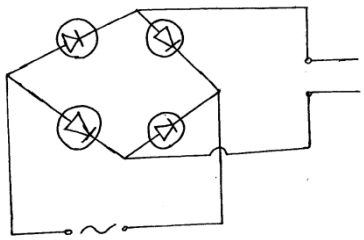
16. a 

- In forward braising p- region is connected to positive terminal of external power wher n- region is connected to negative terminal to potential barrier reduced
- in reverse bias of potential barrier increased

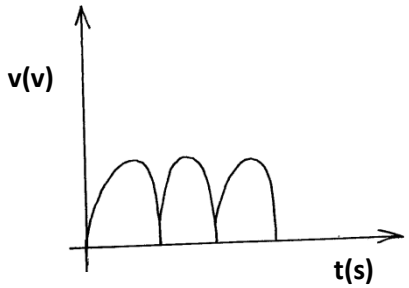
ii)



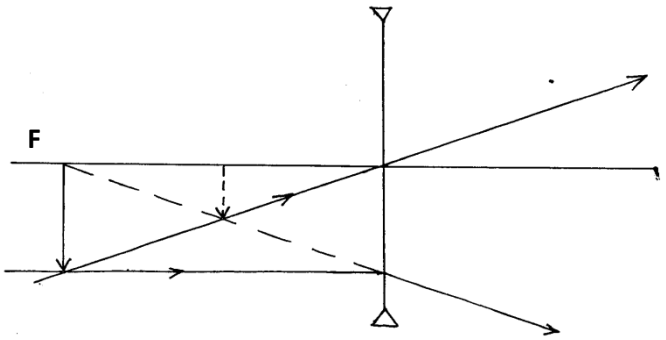
b) i)



ii)



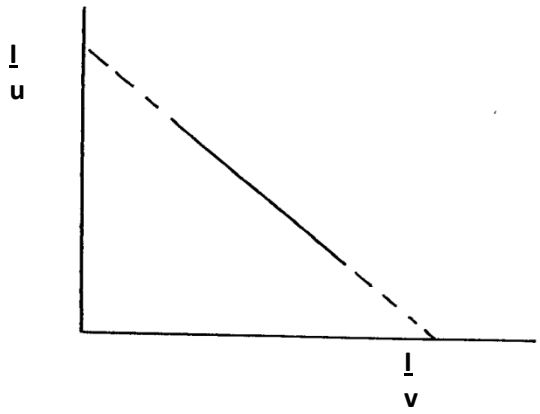
17. a)



b) u = 12cm
v = - 36cm
u
f = 1/u+1/v
=1/2 +1/-36
= 1/12 – 1/36
3-1/36
= 2/36
F= 36/2

= 18 cm

c)



(i) $\frac{I}{u}$ – intercept = 0.07

$\frac{I}{f} = 0.07$

f = 0.07 = 1/ 0.07

= 14.29cm

(ii) $\frac{I}{f} = \frac{I}{u} + \frac{u}{v}$

$\frac{I}{14.29} = \frac{I}{20} + \frac{I}{v}$

$\frac{I}{V} = \frac{1}{14.29} - \frac{1}{20}$

= 0.07 – 0.05

= 0.02

$V = \frac{1}{0.02}$

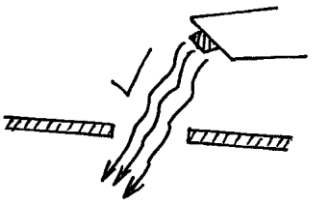
= 50cm

18 a) i) fo = 3.5×10^{14} H2

ii) h/e = slope
h = $6{,}737 \times 10^{-34} \times 3.5 \times 10^{14}$
= 2.358×10^{-17}

iii) Wo = hfo
$6.737 \times 10^{-34} \times 3.5 \times 10^{14}$
2.358×10^{-17}J

b) i)



ii) for x-ray beam to pass through the window ✓1
iii) cools the arrode✓1
iv) prevents collision between electrons and air ✓1
v) force electrons onto the target✓1