**Name.....Index Number...../.....**

**Adm……Class: ……...Candidate's Signature.....Date.....**

**PHYSICS**
**PAPER 2**
(Theory)
**JULY/AUG. 2018**
**2 HOURS**

**INSTRUCTIONS TO CANDIDATES**

i) *Write your name, admission number and index number in the spaces provided above.*
*ii) Sign and write the date of examination in the spaces provided above*
*iii) This paper consists of **TWO** sections **A** and **B***
*iv) Answer**ALL** the questions in section **A** and **B** in the spaces provided*
*v) All working **MUST** be clearly shown*
*vi) Electronic calculators and mathematical tables may be used.*
*vii) ALL numerical answers must be expressed in decimal notation.*
*viii**) **This paper has 13 pages. It is the responsibility of the candidate to ascertain that all the pages are printed as indicated and that no questions are missing.***
*ix) **Candidates should answer the questions in English.***

**For Examiners Use Only**

| Section | Question | Maximum Score | Candidates Score |
|---|---|---|---|
| **A** | **1 – 13** | **25** | |
| **B** | 14 | **14** | |
| | 15 | **9** | |
| | 16 | **13** | |
| | 17 | **9** | |
| | 18 | **10** | |
| | | **Total = 80** | |

**SECTION (25 MARKS)**
**Answer all questions in this section in the spaces provided**

1) **Figure 1** shows objects A and B placed in front of a mirror M.

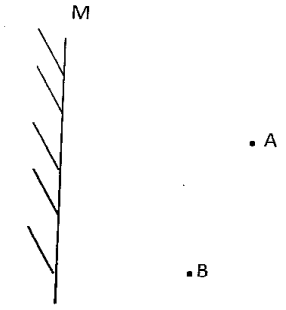


**Figure 1**

Show the position of their images $A^1$ and $B^1$. (2 marks)

2) **Figure 2**shows a negative point charge near a positively charged rod. Draw on the figure, the resulting electric field pattern. (2 marks)

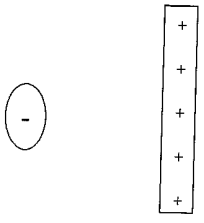


**Figure 2**

3) Calculate the magnification produced by a convex lens of focal length 10cm used in a simple microscope given that the image distance is 40cm. (3 marks)

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4) The chart below shows an arrangement of different parts of the electromagnetic spectrum.

| | | | | | |
|---|---|---|---|---|---|
| P | Q | R | Ultra violet | S | Gamma rays |

Name the radiation represented by letter Q and state one use of the radiation. (2 marks)

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5) Explain why the filament of an electric lamp is made of tungsten. (1 mark)

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6) **Figure 3** shows wave fronts in a ripple tank approaching a shallow region in the tank.

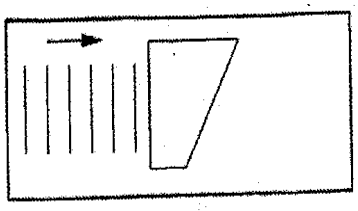

**Figure 3**

Complete the diagram to show the wave fronts as they pass over the shallow region and after leaving the region. (2 marks)

7) **Figure 4** shows two magnets A and B brought from a point above a table towards a steel pin.

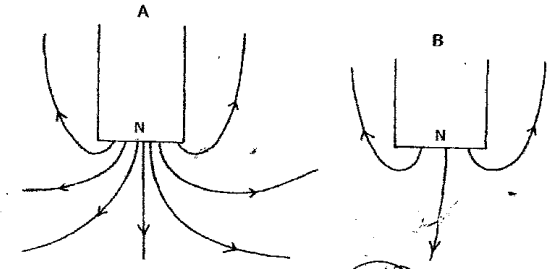


**Figure 4**

State with reason which magnet will attract the pin at a larger height above the table (2 marks).

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8) State briefly what happens to the depletion layer when a diode is forward biased. (1 mark)

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9) A soldier standing 600m from a wall blows a whistle. How long does it take for the echo to reach him? (Speed of sound in air =330m/s) (2 marks)

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10) Determine the critical angle for a ray of light passing from glass into water (refractive indices of glass and water are 1.5 &1.33 respectively). (3 marks)

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11)**Figure 5** shows a current carrying conductor placed between two strong magnets.

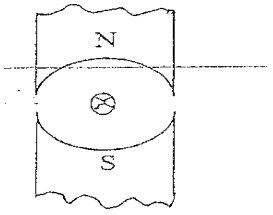


**Figure 5**

Indicate the direction of the magnetic field and the force on the conductor (2 marks)

12) In**Figure 6** complete the diagrams to show the path of the X-ray beam when it enters an electric field. (1 mark)

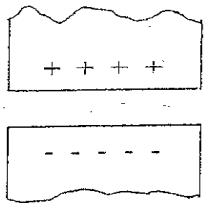


**Figure 6**

13) Light of frequency $6.5x10^{14}$Hz is radiated on a metal whose threshold frequency is $2.0\ x10^{14}$ Hz. Determinethe kinetic energy of the emitted electrons. (2 marks)
(Planck's constant $=6.63x10^{-34}$Js. )

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**SECTION B (55 MARKS)**
**Answer all questions in this section in the spaces provided**

14. a)A house has the following appliances

| Appliance | Power rating W | Time used in hours per day |
|---|---|---|
| Cooker | 4000 | 1 |
| TV set | 150 | 3 |
| Electric kettle | 2000 | 0.5 |
| Radio | 300 | 6 |

i) Determine the appropriate fuse which would be required for the cooker and the radio respectively. The 240V mains available fuses are rated 40A, 35A, 20A, 13A, 3A &1A. (2marks)

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ii) Calculate the total cost of electricity paid in a month of 30 days given that all the appliances are used as shown above and 1KWh costs ksh1.85. (3 marks)

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iii) State with reason the fuse suitable for the mains switch. (2marks)

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b) Study**Figure 7** and use it to answer the questions below it.

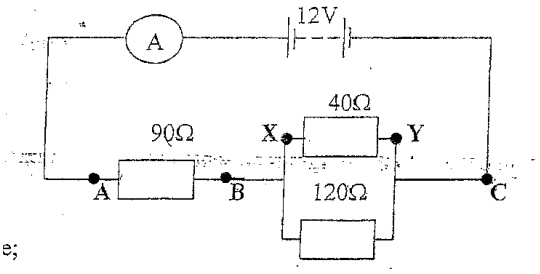


**Figure 7**

Determine the:

i) Current flowing through the ammeter. (3marks)

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ii) Potential difference between X and Y (2marks)

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c) State two factors that affect electrical resistance of a conductor. (2marks)

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15) a) Distinguish between transverse and longitudinal waves (1mark)

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b) Water waves are observed as they pass a fixed point at a rate of 30 crests per minute. A particular wave crest takes 2s to travel between two fixed points 6m apart. Determine for the wave the:

i) frequency (2marks)

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ii) wavelength (2marks)

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c) **Figure 8** shows a displacement –position graph of a slinky spring as it is continuously vibrated at one end.

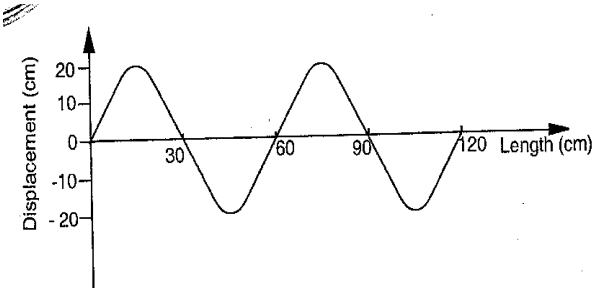


**Figure 8**

i) Name the type of wave generated. (1mark)

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ii) Determine the:

I) amplitude of the wave (1mark)

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II) wavelength of the wave (1mark)

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iv) On the same diagram draw a wave showing the wave when the frequency is doubled.

(1mark)

16) **Figure 9** shows the features of an x-ray tube.

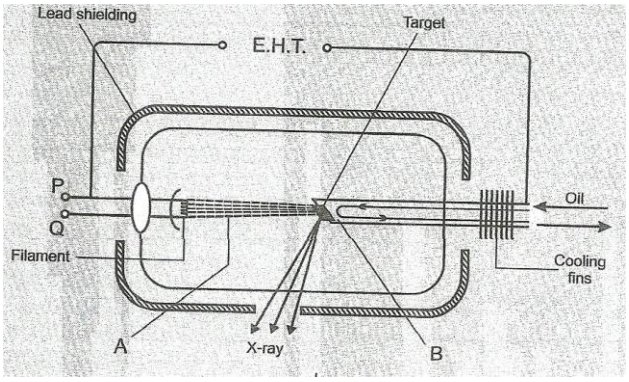


**Figure 9**

i) Name the parts labeled A and B (1mark)
A----------B----------

ii) Explain how a change in the potential across PQ changes the intensity of the x rays produced in the tube. (1mark)
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iii) During the operation of the x ray tube, the target become very hot .Explain how this heat is caused. (1mark)
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iv) What property of lead makes it suitable for use a shielding material? (1mark)
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b) X- rays are used for detecting cracks inside metal beams.

i) State the type of the X rays used for purpose above. (1mark)
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ii) Give a reason for your answer in (b)(i) above (1mark)
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c) In a certain X- ray tube electrons are accelerated by p.d of 12 kV. Assuming all energy goes to produce X-rays, determine the frequency of the X-rays produced
(Planck's constant $=6.63\times10^{-34}$Js. Charge of an electron$=1.6\times10^{-19}$C) (2marks)
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d) **Figure 10** shows the waveform of a voltage displayed on the screen of a C.R.O.
The Y-gain was 5V/cm and time base control was 10ms/cm.

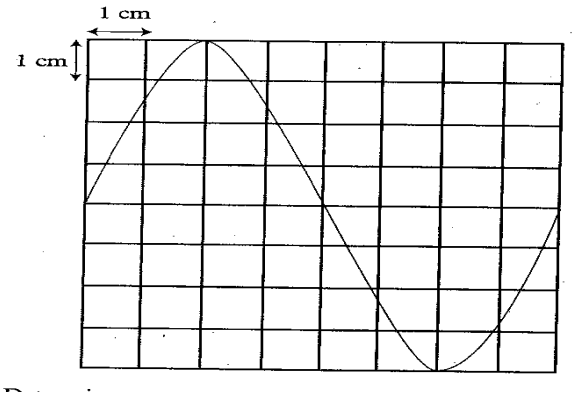


**Figure 10**

Determine the:

i) peak to peak voltage of the Y- input (1mark)

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ii) period of the signal (2marks)

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iii) frequency of the signal. (2marks)

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17) **Figure11** shows a simple electric generator.

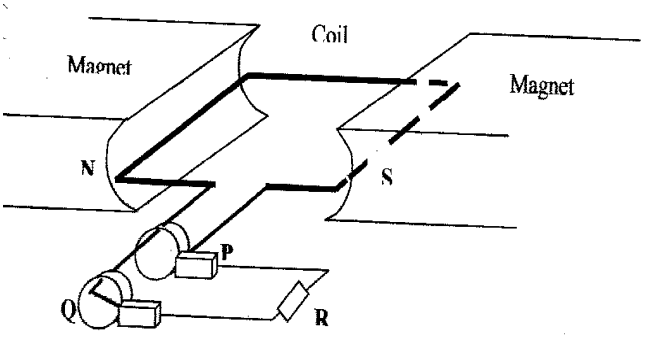


**Figure 11**

a) i) Name the parts labeled P and Q (2marks)

P---------- Q----------

ii) State two ways of increasing the magnitude of the induced current in this type of generator. (2marks)

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b) The primary coil of a transformer has 1200 turns and the secondary coil has 60 turns .The transformer is connected to a 240v a.c source. Determine the:

i) Output voltage (2marks)

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ii) Output current when the primary coil has a current of 0.5A.Assume there are no energy losses. (2marks)

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c) **Figure 12** shows a magnet being moved towards a stationary solenoid. It is observed that a current flows through the circuit in a direction Q to P.

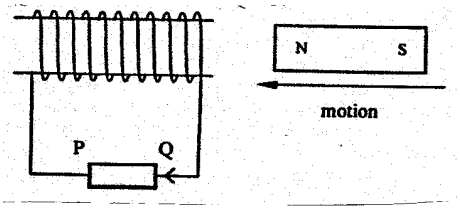


**Figure 12**

Explain why the current flows from Q to P (1 mark)

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18)a) The table below gives values for the activity of a sample of an isotope at different times. The background radiation is 4 counts per minute.

| Time (min) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 |
|---|---|---|---|---|---|---|---|---|---|
| Count rate per minute(Activity) | 96 | 78 | 62 | 54 | 45 | 39 | 34 | 31 | 29 |
| Corrected Activity | | | | | | | | | |

i) Complete the table above. (1mark)

ii) Plot a graph of corrected activity against time. (4marks)

iii) Use the graph to determine the half life of the sample (1mark)

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b) **Figure 13** shows a diffusion cloud chamber for detecting radioactivity.

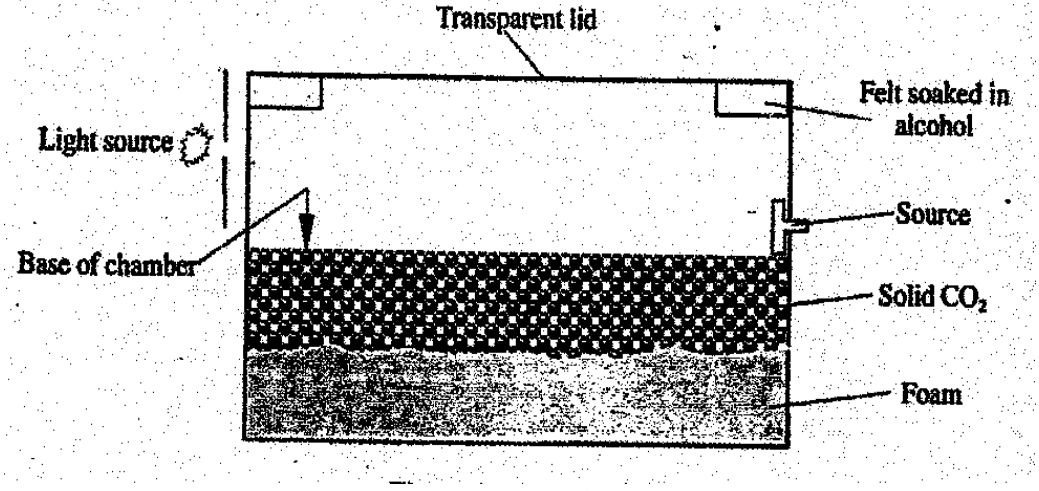


**Figure 13**

When radiation from the source enters the chamber, some white traces are observed. Explain how these traces are formed and state how the radiation is identified. ( 4 marks)

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