Name.....Index No.....

School.....Candidate's sign.....

Date.....

232/2
PHYSICS
Paper 2
THEORY
2 Hours

# FORM 4 JOINT EVALUATION EXAMINATIONS 2018

**Instructions to candidates**

1. Write your name, index number, school and date in the spaces provided above
2. Sign and write the date of the examination in the spaces provided above
3. This paper consists of two sections: A and B.
4. Answer all the questions in the spaces provided
5. All writing **MUST** be clearly shown in the spaces provided
6. Non programmable silent electronic calculators and KNEC mathematical table may be used.

**FOR EXAMINER'S USE ONLY**

| SECTION | QUESTION | MAXIMUM SCORE | CANDIDATE'S SCORE |
|---|---|---|---|
| A | 1 – 14 | 25 | |
| B | 15 | 11 | |
| | 16 | 10 | |
| | 17 | 09 | |
| | 18 | 14 | |
| | 19 | 11 | |
| | TOTAL | 80 | |

***This paper consists of 12 printed pages. Candidates should check the question paper to Ensure that all the pages are printed as indicated and no questions are missing.***

## SECTION A (25 MARKS)

1. A vertical object O is placed at the principal focus F of a diverging lens as shown in Fig. I

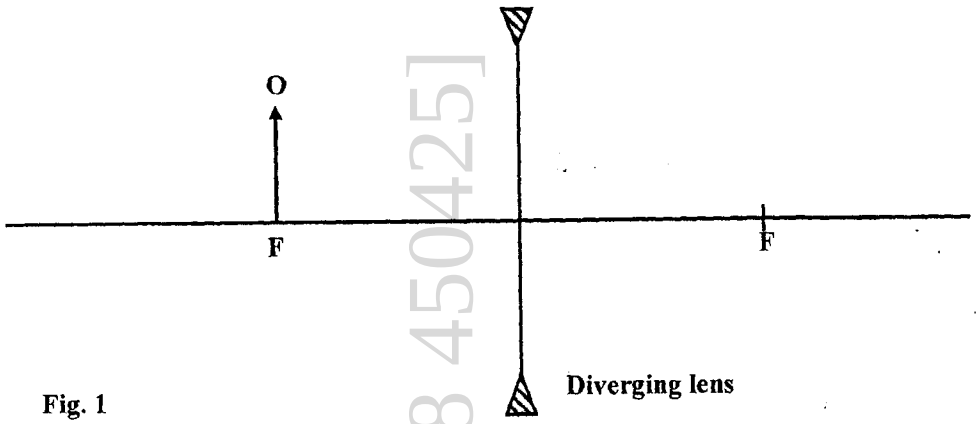



Fig. 1

Complete the diagram by drawing appropriate rays to show the image formed. (3mks)

2. Two electric heaters A and B rated 1000 W and 2500 W respectively are connected in parallel across a 240 mains supply. Calculate the ratio $R_A$: $R_B$ of their resistances. (3mks)

3. Fig. 2 represents crests of water waves approaching a wide opening.

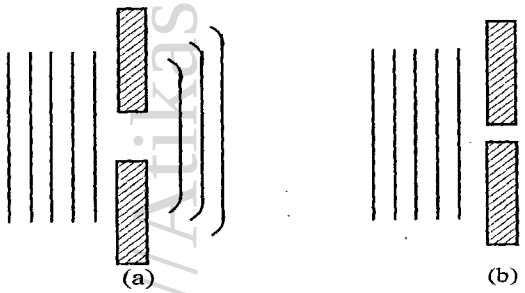



Fig. 2

Crests of the same water waves are now approaching a narrow opening. Sketch the crests after passing through the opening. (2mks)

4. Why is it advisable to store magnetized magnetic tapes in an iron box? (2mks)

5. Alpha particles are said to be more ionizing than beta particles. Give two reasons for this observation. (2mks)

6. One of the factors which affect the capacitance of a parallel plate capacitor is the area of overlap of the plates. Name **two** other factors which may **enhance** capacitance. (2mks)

7. Arrange the following electromagnetic waves in ascending order of frequency.
Infrared, x – rays, visible light, radio-waves (1mk)

8. A student set up the circuit shown in Fig. 3. The lamps didn't light when she closed the switch S.

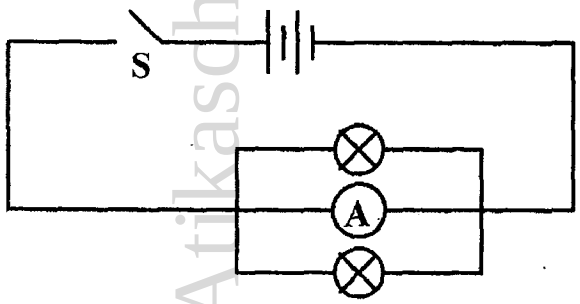



Fig 3

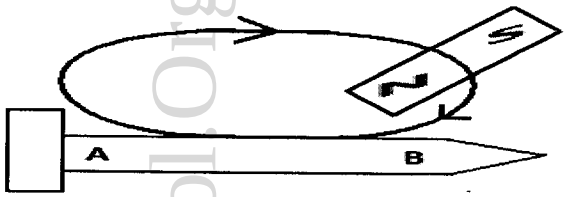
Suggest a reason for this observation. (2mks)

9. In the axes provided sketch the characteristic for a forward biased p-n junction diode.

(1mk)


10. A lady standing in front a mirror sees an upright image that is of the same size as herself. State with a reason the type of the mirror she was standing in front. (2mks)

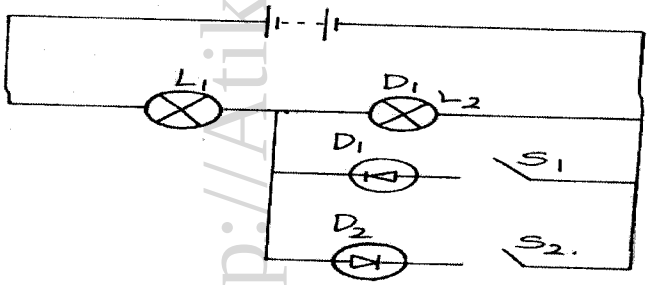
11. The figure below shows one method of making a magnet.




Name the polarity formed at:

(i) A..... (ii) B..... (1 mk)

12. Study the figure below and use it to answer the questions that follow




If $L_1$ and $L_2$ are identical bulbs, explain what happens when $S_1$ and $S_2$ is closed. (2mks)

13. State **one** difference between hard and soft X – rays. (1mk)

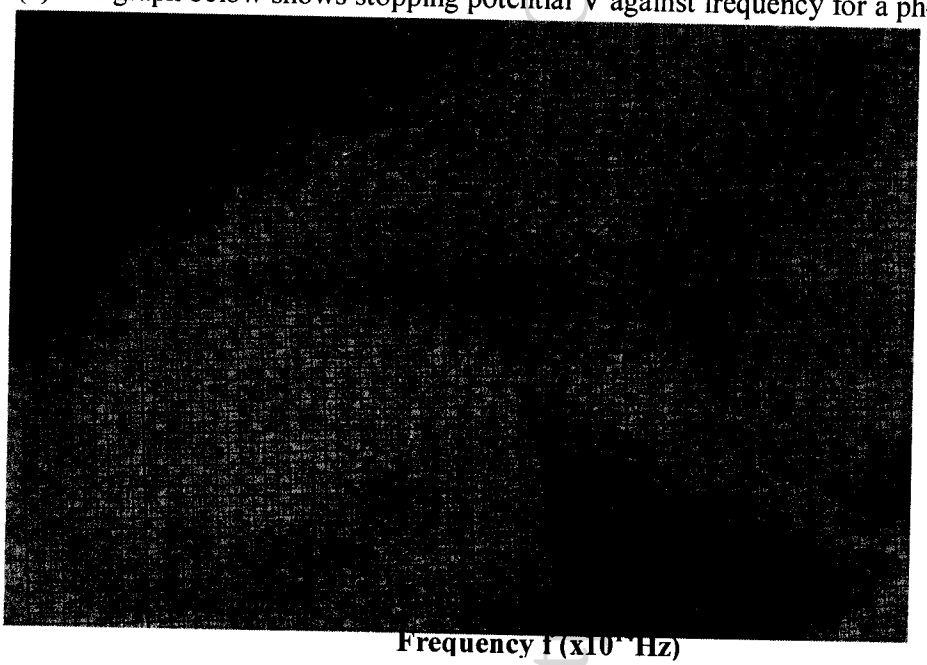
14. The transmission of mains electricity on the national grid is at high voltage. Give a reason (1mk)

## SECTION B – 55 (MARKS)

15. (a) Define the following terms as used in the photoelectric electric.
(i) Work function (1mk)

(ii) Threshold frequency (1mk)

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



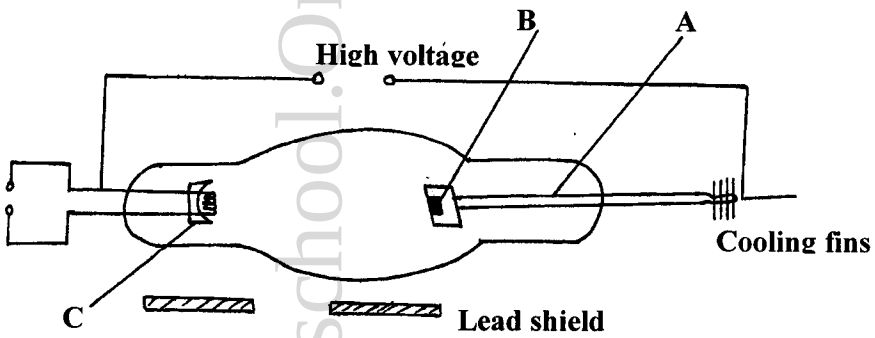
**Frequency f (x10$^{14}$Hz)**

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 $10^{-19}$ C)

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




(i) Why is **B** set at an angle of 45° relative to the electron beam? (1mk)

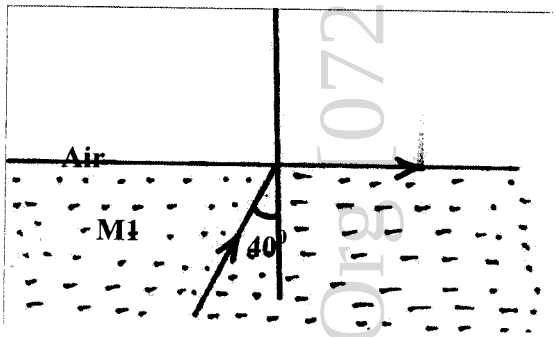
(ii) Why are cooling pins necessary? (1mk)

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

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

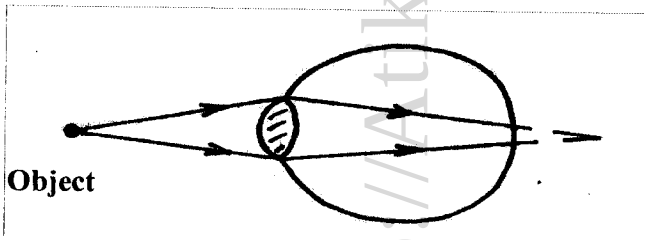
16. (a)(i) State **two** conditions for total internal reflection of light (2mks)

(ii) Figure 6 shows a ray of light travelling through medium 1 to air




Calculate the refractive index of the medium (2mks)

(b) Figure 6 shows a human eye with a defect




(i) Identify the defect (1mk)

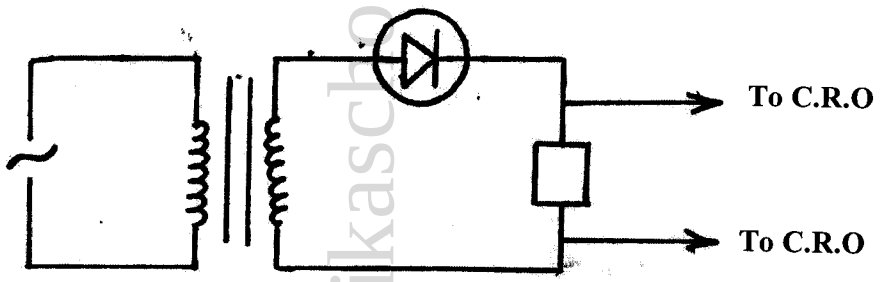
(ii) Explain how the defect could be corrected (2mks)

(iii) Draw a suitable diagram to show the correction of the defect (2mks)

(c) Outline two differences between the lens in camera and the human eye (2mks)

17. (a) What is an extrinsic semi conductor? (1mk)

(b) Figure 9 shows a P-N junction diode used in a reflection




(i) What type of rectification is shown? (1mk)

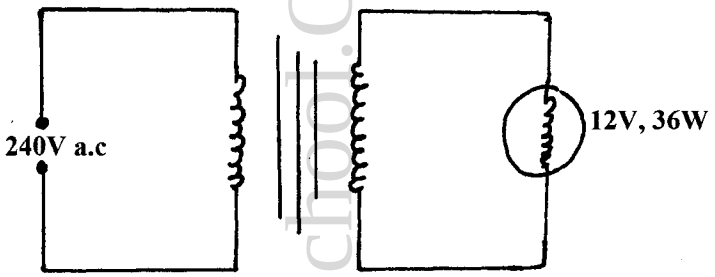
(ii) Describe how the rectification is achieved. (3mks)

(iii) State **two** disadvantages of the rectification (2mks)

(iv) In the space provided below, sketch the output signal displayed on the CRO during the rectification process (2mks)

18. (a) State Lenz's law of electromagnetic induction. (1mk)

(b) Figure below shows a transformer which is 90% efficient.




(i) Determine the number of turns in secondary coil if the number of turns in the primary coil is 4000. (2mks)

(ii) Determine the current in the primary coil if the bulb is operating normally (3mks)

(iii) Explain why long distance power transmission is done at a very high voltage. (2mks)

(c) Suppose you have the following appliances for use in your house.

| Appliances | Power rating (W) | Time used hours/day |
|---|---|---|
| Cooker | 4000 | 1 |
| TV set | 150 | 3 |
| Electric kettle | 2000 | ½ |
| Radio. | 300 | 6 |

(i) Determine the fuse which would be required for the cooker and the radio (240V main potential available given are rated 40A, 35A, 20A, 13A, 3A and 1A) (2mks)

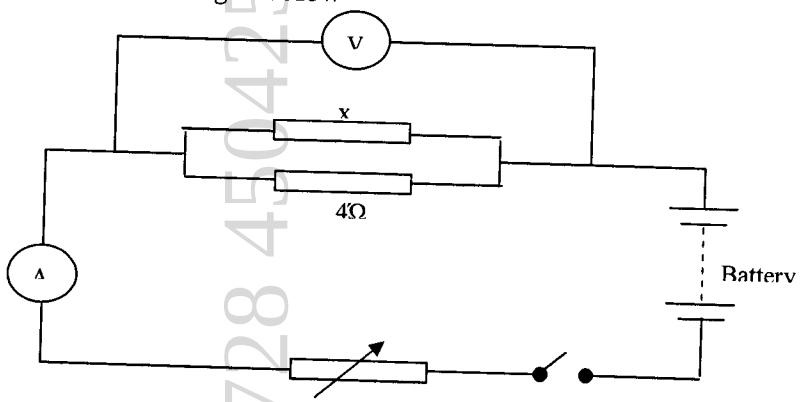
(ii) What is the cost to be made in a month of 30 days if 1 unit in KWh is Ksh 1.85(3mks)

(ii) Current electricity is normally transmitted in terms of alternating current and not direct current in power transmission lines. Explain why. (1mk)

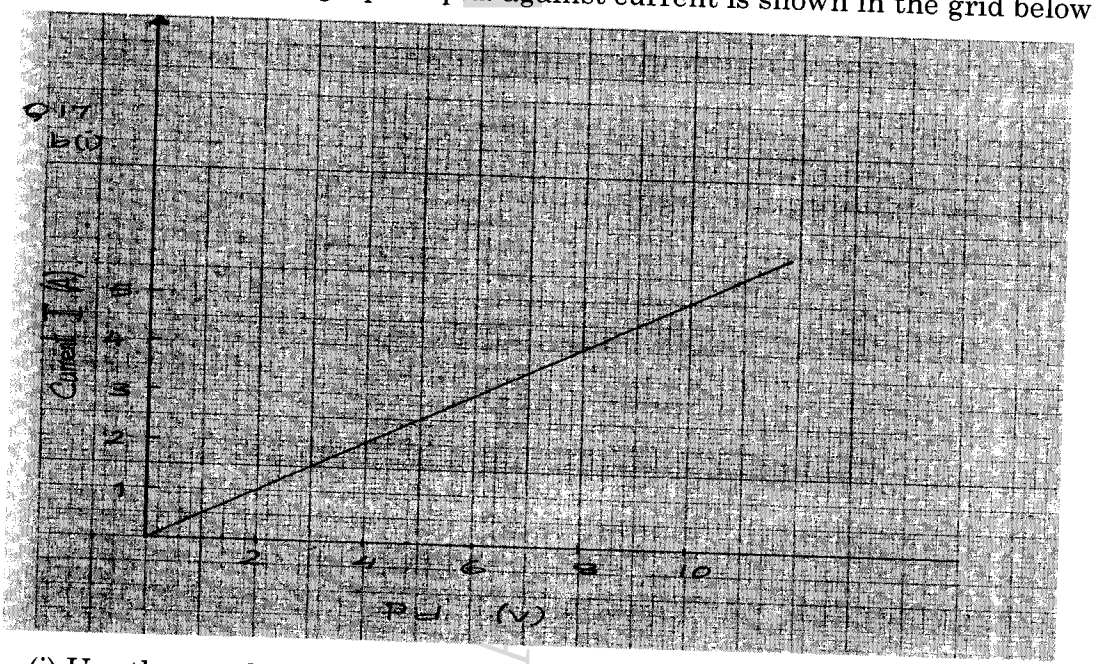
19. (a) State Ohm's law (1mk)

(b) Two resistors 4Ω and the other unknown resistor x are connected in a circuit as shown in the fig 7 below

Fig. 7




The current I passing through the combination is measured for various potential differences, A graph of p.d. against current is shown in the grid below.




(i) Use the graph to determine the total resistance of the combination. (3mks)

(ii) Determine the value of the unknown resistance x (2mks)

(c) i) Define background radiation as used in radioactivity. (1mk)

ii) The half – life of Cobalt – 60 is 5years.How long will a sample take for the activity to decrease to $^{1}/_{16}$ of its original value.

(3mks)

**END**