NAME..... STREAM..... ADM.NO.....

DATE: 30TH JULY 2018

PHYSICS PAPER 2
TIME: 2HRS

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MARANDA HIGH SCHOOL

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

PHYSICS FORM FOUR
END OF TERM II EXAM 2018

INSTRUCTIONS TO THE CANDIDATE:

(a) Write your **name, admission number** and streamin the spaces provided above.
(c) This paper consists of **two** Sections **A** and **B**.
(d) Answer **all** the questions in sections **A** and **B** in the spaces provided.
(e) All working **must** be clearly shown in the spaces provided.
(f) Mathematical tables and electronic calculators **may be** used

FOR EXAMINER'S USE ONLY

Section	Question	Maximum Score	Candidate's Score
A	1-11	25	
B	12	10	
	13	09	
	14	11	
	15	11	
	16	08	
	17	06	
Total Score		80	

*This paper consists of **11 printed pages**. Candidate should check the question paper to ensure that all the papers are printed as indicated and no questions are missing.*

SECTION A (25 MARKS)

*Attempt **ALL** questions in the spaces provided*

1. State and explain the changes that would occur in the image formed if the single pinhole in a camera was replaced by a hole 1 cm wide? (2mks)

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2. **Figure 1** shows a ray of light incident on a glass with a mirror placed near but not touching the medium making an interface with air.

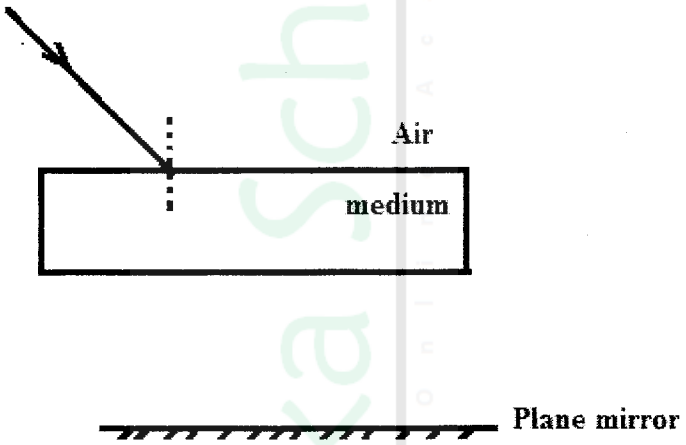

Figure 1

Given that the angle of refraction is 10° and the angle between the emergent ray and the reflected ray on the plane mirror is 30°, calculate the refractive index of the medium. (3mks)

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3. **Figure 2** shows a vertical insulated coil with current passing through. The piece of iron and steel are attached as shown.

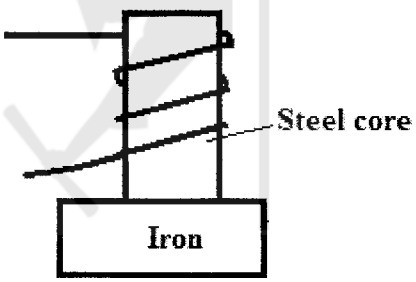

Figure 2

State and explain the observation made when current is switched off. (2mks)

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4. State how;

i) The penetrating power of X-rays is affected by reduction in their wavelength. (1mk)

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ii) Penetrating power of X-rays depends on the voltage applied across the X-ray tube. (1mk)

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5. **Figure 4** represents wavefronts of light spreading from a point source O towards a converging lens.

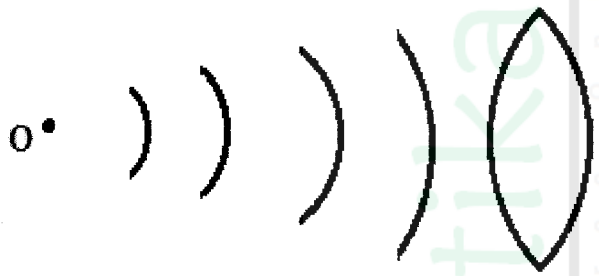

Figure 4

Draw diagrams of the wavefronts travelling from the lens when O is at the principal focus (1mk)

6. An object is placed 4 cm in front of a convex lens. A real image is produced 16 cm from the lens.

Determine;

a) the magnification produced by the lens. (1mk)

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b) the focal length of the lens (2mks)

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7. The following represents part of a radioactive series in which the chemical symbols have been replaced by letters.

(i) (ii) (iii)

$$^{234}_{90}A \rightarrow {}^{234}_{91}B \rightarrow {}^{234}_{92}C \rightarrow {}^{230}_{90}D$$

a) Write the chemical symbols of the particles emitted in stages (i) and (iii). (2mks)

(i) .....

(iii) .....

b) From the equation above, name the particles with the highest ionization power. (1mk)

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8. Give a reason why lead-acid accumulator is preferred to Lenclanche battery in motor cars. (1mk)

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9. **Figure 3** shows an arrangement of three capacitors.

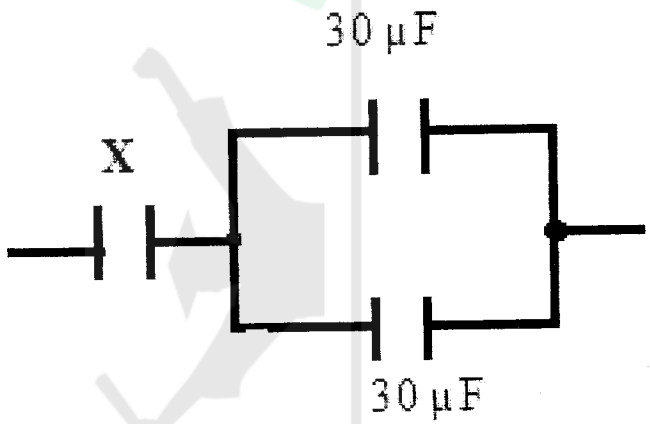

Figure 3

Calculate the value of X if the total value of the three components is 15 μF. (3mks)

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10. A resistance wire is 2m long and has a cross-sectional area of 0.5 mm^2. If its resistance is 2.6 Ω, calculate its resistivity. (3mks)

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11. **Figure 5** shows part of the electromagnet spectrum extending on both sides of the region of I.R. if A is the region of shortest wavelengths and F is region of longest wavelength;

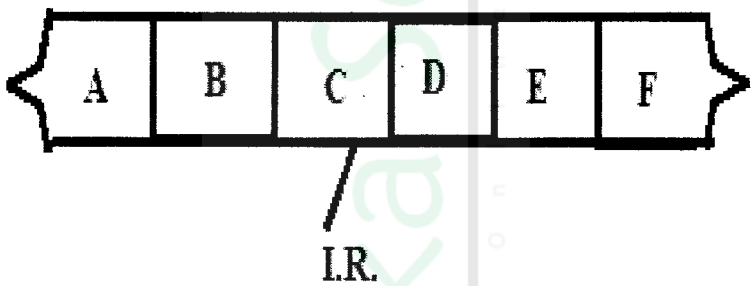

Figure 5

a) Name regions A and D. (2mks)

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b) State one difference between I.R. and X-rays. (1mk)

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SECTION B (55 MARKS)

*Attempt **ALL** questions in the spaces provided*

12. **Figure 6** shows a series of waves as might be produced in a laboratory experiment with a ripple tank. The waves are travelling from region A to region B.

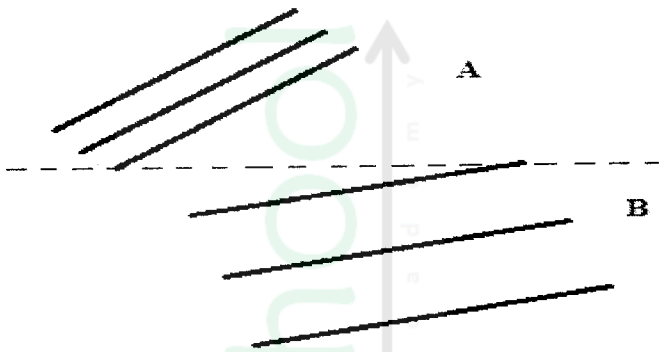

Figure 6

a) Describe how these waves are produced (4mks)

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b) State what is happening along the dotted line. (1mk)

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c) By measurement, determine the wavelength of the waves in region A and B. (2mks)

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d) Comment on the frequency of the waves in region A and B. (1mk)

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e) How does the speed of waves in region A and B compare? (1mk)

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f) Between region A and B, state where the water is shallowest (1mk)

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13. A heating coil has a resistance of 4 Ω and is connected to a 12 V supply. It is placed in a container holding 100 g of water at 20 °C.

I) Calculate;

a) The current flowing. (2mks)

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b) The power of the circuit. (2mks)

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c) The energy produced in 5 minutes. (2mks)

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d) The rise in temperature of the water assuming no heat is lost. (specific heat capacity of water = 4200 J/kgK. (2mks)

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II) State the reason why the heater is coiled. (1mk)

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4. The graph in **figure 7** shows how the current I through the tungsten filament lamp varies with voltage v across it.

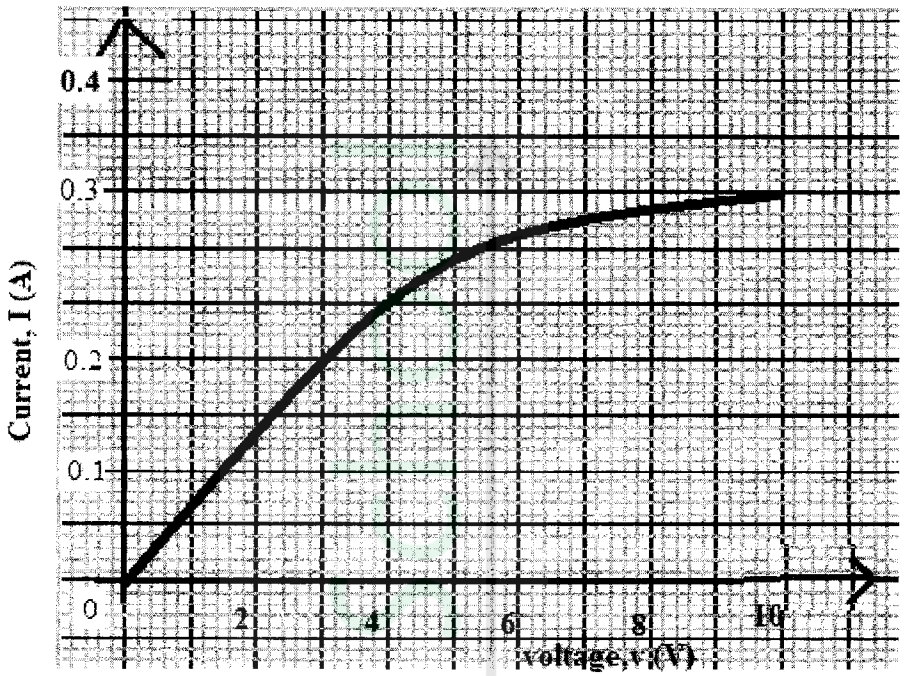

Figure 7

a) State with reason whether or not the tungsten filament obeys ohm's law. (2mks)

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b) Determine the resistance when current, I is 0.2 A (3mks)

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c) From the graph, state the relationship between current and voltage (1mk)

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d) State and explain how the resistance of the filament is affected when the voltage increases from 2V to 6V (2mks)

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Draw a circuit diagram you would use to take readings to plot this graph. (3mks)

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15. a) **Figure 8** shows a thick straight copper wire XY connected to the terminals of a sensitive centre zero galvanometer. XY is placed in between the poles of a horseshoe magnet.

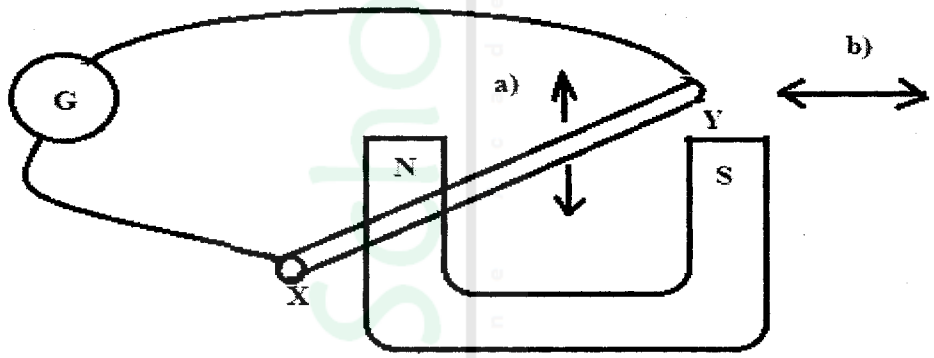

Figure 8

i) State and explain the observation made on the galvanometer when the wire XY moves horizontally as shown in (b). (2mks)

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ii) Show the direction of current in the galvanometer when the wire XY is moving vertically upwards within the magnetic flux. (1mk)

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iii) State how the magnitude of the induced e.m.f. could be increased using the above set up. (1mk)

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b) A transformer designed to operate a 12 V lamp from a 240 V supply has 1200 turns on the primary coil. Assuming that the transformer is 100 % efficient,
Calculate;

i) The number of turns on the secondary coil. (3mks)

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ii) The current passing through the primary coil when the 12 V lamp has a current of 2 A flowing through it. (3mks)

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c) State one application of eddy currents. (1mk)

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16. A metal surface has a work function of 4.92 eV.

i) Find the maximum wavelength of radiation that will cause the emission of photoelectrons from the metal. (3mks)

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ii) Calculate the maximum kinetic energy in joules of the electrons emitted when the metal is irradiated with ultraviolet light of frequency 1.8×10^5 Hz. (2mks)

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iii) Calculate is the stopping potential of this metal? (3mks)

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17. **a) Figure 9** shows a sketch of the time-base voltage:

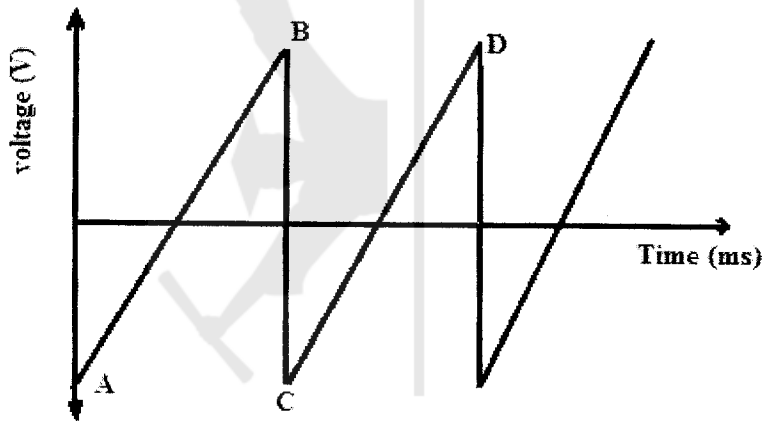

Figure 9

I. State what happens to the spot along sections:

i) AB. (1mk)

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ii) BC. (1mk)

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II. State the plate to which the time-base control is connected. (1mk)

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b) **Figure 10** shows a circuit designed by a student during a Science and Engineering fair for charging a battery. Use it to answer the questions that follow;

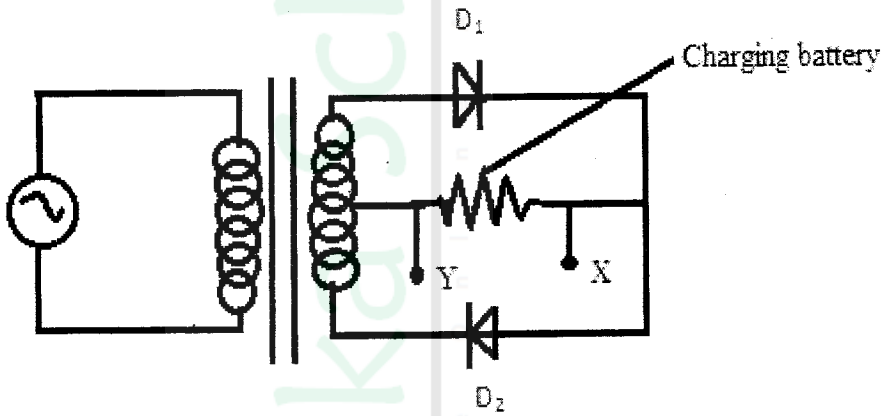

Figure 10

a) What is rectification (1mk)

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b) What type of rectification is illustrated in the figure above (1mk)

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c) State the polarity at X (1mk)

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END