SECTION A (25 MARKS)

Answer all questions in the spaces provided:

1. In Classic Kinyozi, Kericho town, a plane mirror is suspended using a string and makes an angle of 40^0 with the wall as shown in fig 1 below.

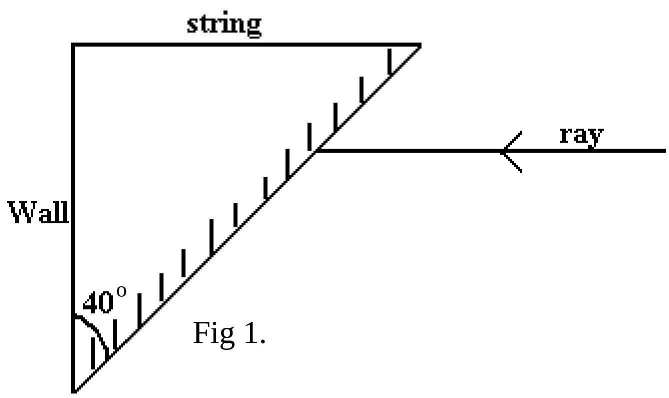


Fig 1.

A ray of light strikes the mirror horizontally as shown above. Trace the path of reflected ray and show all angles. (2mks KRC)

2. Fig 2 shows a bar Magnet placed on a wooden table. Two points P and Q are in front of the Magnet as shown.

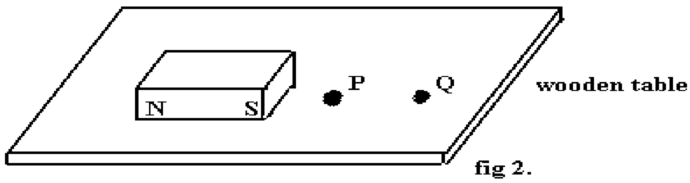
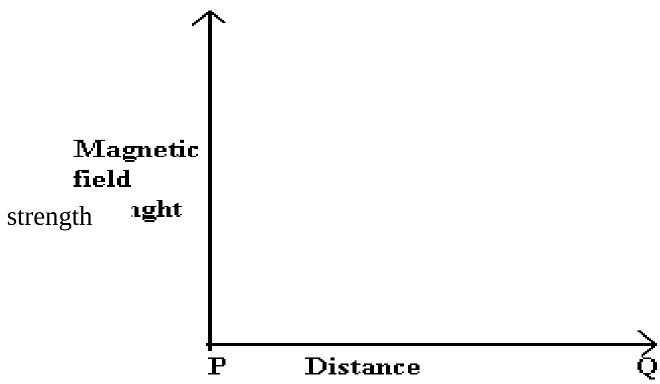
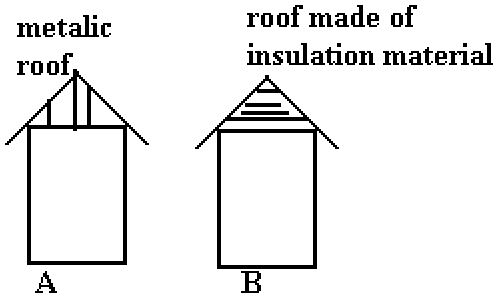


fig 2.

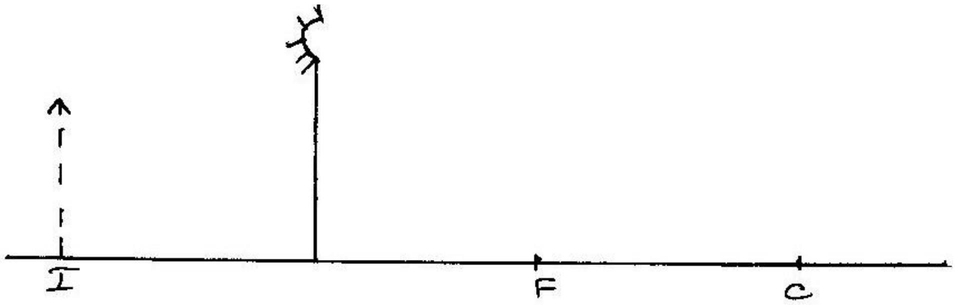
On the axes provided, sketch a graph showing how the magnetic field strength changes from P to Q (2mks KRC)



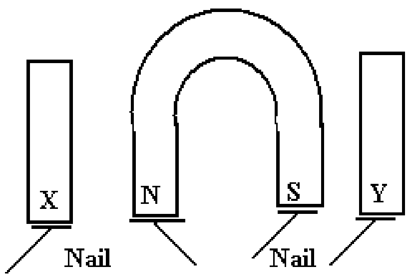
3. Fig 3 shows sketches of two types of houses built in lightning prone areas. State with reason which is safer to stay during lightning and thunderstorms? (2mks KRC)



4. Arrange the following radiation in order of increasing wavelength; ultraviolet, gamma rays, radio waves and visible light. (1mk)
5. Fig 4 shows an image I formed by an object placed in front of a convex mirror. C is the centre of curvature of the mirror. Using ray diagram, locate the object position. (3mks KRC)



6. A wire of resistance R connected in series with 1.5V cell is found to be carrying a current of 0.05A. If the wire is now connected in parallel with an identical wire, find the new current in the circuit. (3mks KRC)
7. Fig 5. Below shows a horse shoe Magnet whose poles are labeled and two other bar Magnets near it. Iron nails are attracted to the lower ends of the magnets as shown.

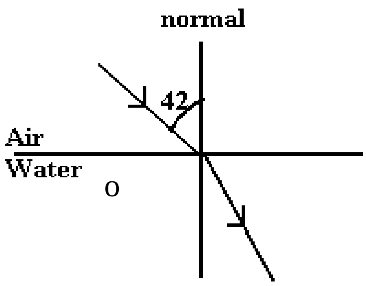


Identify the poles marked X and Y. (2mks KRC)

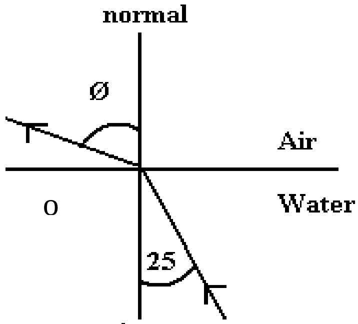
X Y

State Lenz law of magnetic induction. (1mk KRC)

8. Fig 6 (i) and (ii) show refraction of light at air-water interface. Determine angle Ø in figure 6(ii) (3mks KRC)

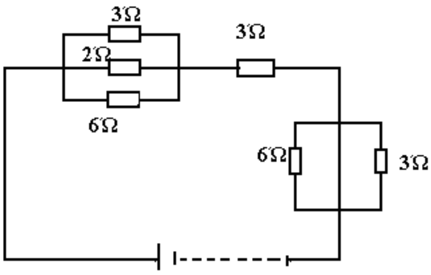


(i) Fig 6.



(ii)

9. Use the circuit in fig (10) below to answer the questions that follow.



(a). Calculate the total resistance in the circuit. (2mks KRC)

(b) Calculate effective current in the circuit. (1mk KRC)

10. Give any two (2) structural features in a transformer design which help in achieving high efficiency. (2mks KRC)

11. The fig 7 below shows a wire in a magnetic field. A current is switched on to flow through the wire in the direction shown. State the direction of motion of the wire. (1mk KRC)

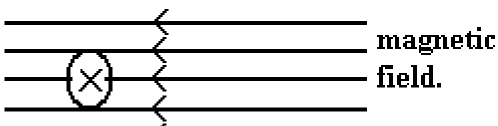
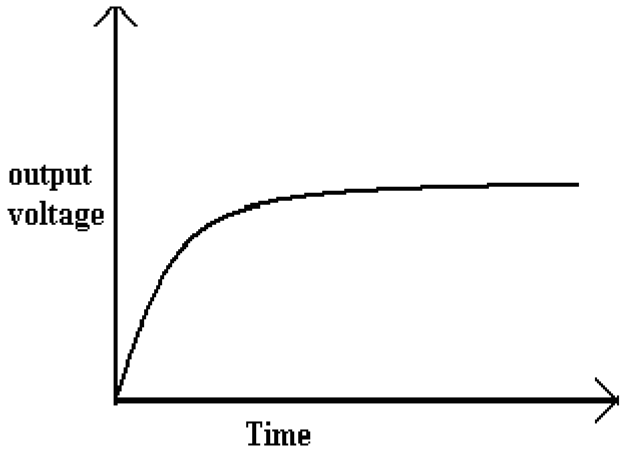


Fig 7.

12. Fig 8 below shows a graph of the output Voltage of a rectifier of four diode circuit with a smoother capacitor.



Sketch the output voltage –time graph for rectifier with one diode with no smoother capacitor. (1mk KRC)

SECTION B: (55MARKS)

Answer all questions in the spaces provided ;

13. a) Explain the following terms:

i. Extrinsic semiconductor: (1mk KRC)

ii. Dopping: (1mk KRC)

b) i. Explain briefly the dopping process involved in making n-type semiconductor. (2mks KRC)

ii. Draw a circuit diagram to illustrate a forward biased p-n Junction diode. (1mk KRC)

c) In an experiment to investigate the variation of voltage with current for certain p-n Junction diode.

p.d(voltage)	0	1.0	1.2	1.4	1.6	1.8
Current (mA)	0	3.0	9.0	19.0	32.0	60.0

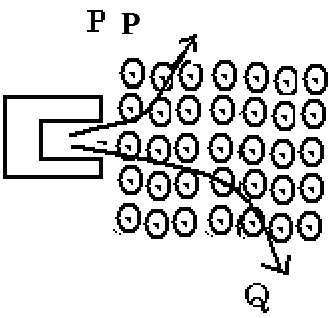
i. Draw a circuit diagram that can be used to obtain results in the table above. (3mks KRC)

ii. Plot a graph of current against p.d on the grid provided. (5mks KRC)

iii. Find the resistance when the voltage is 1.3V (1mk KRC)

14. a). Define the term half life. (1mk KRC)

b). The figure below shows paths taken by radiations from a radioactive material through a Magnetic field. Identify radiation P and Q. 2mks KRC)



P ____________

Q ____________

c). A G.M tube indicated a constant count rate of 5 counts per minute when a radioactive source was placed at a distance of about 10cm from it. When the source was moved close to about 4 cm the count rate varied as follows.

Time (min)	0	20	40	60	80
Count rate per minute.	106	70	43	34	20

(i) The count rate was constant at a distance of 10 cm away. Explain (1mk KRC)

(ii) Plot a graph of count rate against time. (5mks KRC)

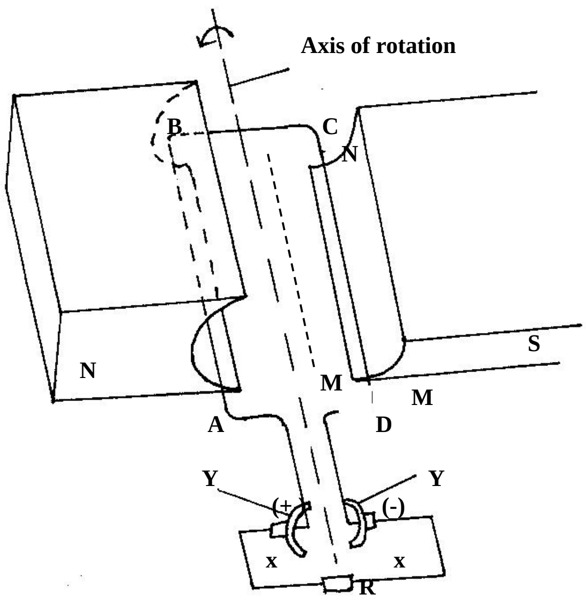
(iii) Use your graph to estimate the half life of the source. (2mks KRC)

d). Explain why α particles are more ionizing the β particle. (2mks KRC)

e). State **one** precaution that has to be observed when using a radioactive substance.

(1mk KRC)

15. The diagram below shows a simple d.c generator.



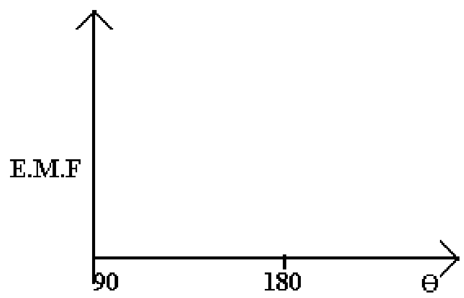
i) Name the part labeled X and Y (2mks KRC)

X Y

ii) The coil is rotated in Anticlockwise direction indicated using an arrow on the figure the direction of the induced current as the arm CD passes the position NM as shown.

(1mk KRC)

iii) Sketch on the axis below a graph of the e.m.f generated against the angle as arm CD rotates from 90° to 180°

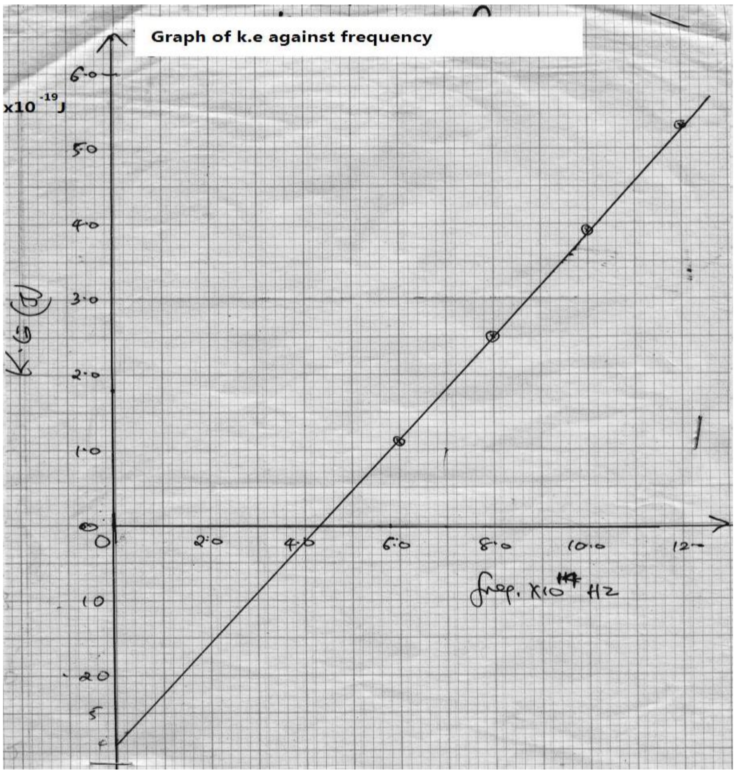


b) A cell drives a current of 3.2A through a 2.8 Ω resistor. When it is connected to 1.6Ω resistor, the current that flows is 5A. Find the:

(i) E.m f (E) for the cell. (2mks KRC)

(ii) Internal resistance (r) for the cell. (2mks KRC)

c) The graph below shows the variation of kinectic energy (K.e) of a photo electric emitted against frequency of the incident radiation.



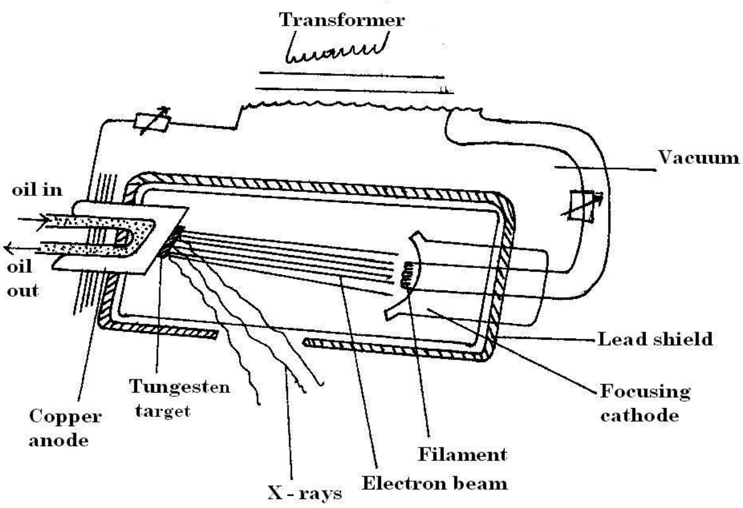
From the graph the equation hf =hf$_o$ + ke holds, determine

(i) The threshold wavelength λ_o (2mks KRC)

(ii) Planck's constant h (3mks KRC)

Hence calculate the work function. w$_o$ (2mks KRC)

16. The figure below shows the essential component of a X-ray tube.



(i) how are the produced electrons accelerate toward the anode? (1mk KRC)

(ii) Why is the target made of tungsten? (1mk KRC)

(iii) How is the cooling achieved in this kind of x-ray machine. (3mks KRC)

(iv) Why would it be necessary for the target to rotate during operation of this machine? (1mk KRC)

(v) Why is the machine surrounded by lead shields? (1mk KRC)

b). If the accelerating voltage is 200Kv. Calculate

i. Kinetic energy of the electron arriving at the target. ***Take (e=1.6 x10 $^{-19}$)*** (2mks KRC)

ii. If 0.1% of the electron energy is converted into X rays, determine the minimum wavelength of the emitted X rays. ***(h = 6.63 x 10^{-34} Js and C = 3.0 x 10^{8}m/s)*** (3mks KRC)