

NAME.....CLASS.....CLASS NO.....

PHYSICS FORM F4 – MID-TERM CAT 2 2017

PANGANI GIRLS SECONDARY SCHOOL

Time 1HOURS

**SECTION A (20 marks)**

1.State any two sources of main electricity.

(2 marks)

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2. How can the intensity of the X-ray produced in an X-ray tube increased? (1 mark)

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3. State Lenz's Law of electromagnetic induction

(1 mark)

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4.Light of frequency  $6.5 \times 10^{14}$  Hz is directed to a metal surface of threshold frequency  $4.5 \times 10^{14}$  Hz. If the value of planks constant is  $6.63 \times 10^{-34}$ J.s. Calculate the kinetic energy of the emitted electrons in electron volts (eV). (2 marks)

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5.Explain why high voltage is used for transmitting electrical power.

(2 marks)

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6. State the device that increases or decreases the voltage being transmitted. (1 mark)

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7.State the advantage of generating a.c rather than d.c. voltage in a power station. (1 mark)

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8.State **two** sources of energy loss in a transformer

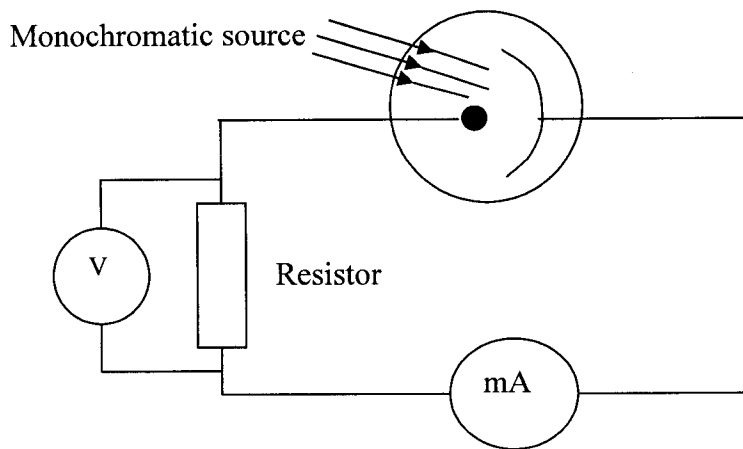
(1 mark)

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9. How can you reduce the loss of energy stated in Question 8? (One of the stated). (1 mark)

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10.The figure below shows the circuit of a photocell whose cathode is illuminated by a monochromatic source of radiation.



(i) State two ways in which the current through the millimeter may be changed. (2 marks)

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(ii) Explain why the millimeter may still show some reading even when the p.d. (V) has been reduced to zero. (2 marks)

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11.An X-ray tube has an accelerating potential of 60kV. What is the shortest wavelength of the X-ray beam? (Take the Plank's Constant  $h = 6.63 \times 10^{-34}$  Js, Charge on one electron =  $1.6 \times 10^{-19}$  C and the velocity of light,  $c = 3.0 \times 10^8$  m/s). (2 marks)

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12. Suppose you have the following appliances for use in your home.

Appliance	Power Rating (w)	Time used in hours per day
Cooker	4000	1
TV set	150	3
Electric kettle	2000	½
Radio	300	6

What is the cost to be made in a month of 30 days? If one unit is Ksh 7.60/= (2 marks)

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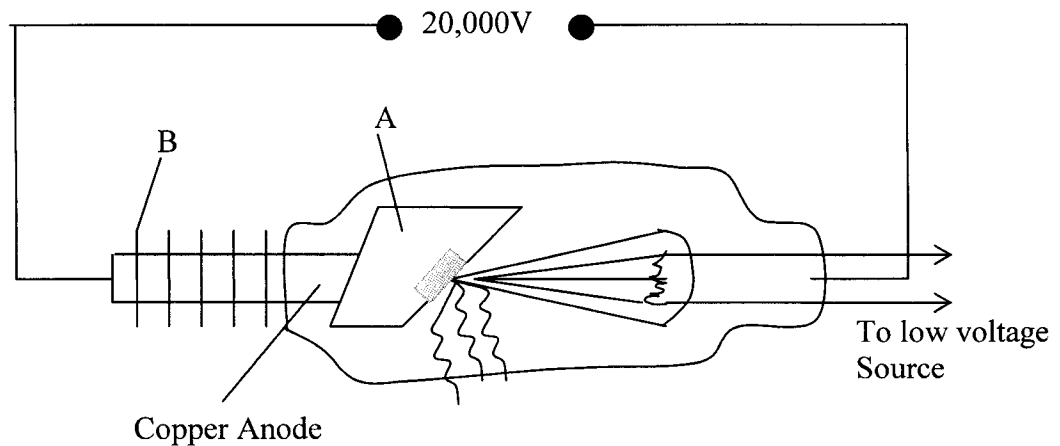
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**SECTION B (30 marks)**

13. The diagram represents an X-ray tube. The Anode is made up of thick copper metal with an insert of tungsten as shown in the diagram. Take the Charge on one electron =  $1.6 \times 10^{-19}C$  and the mass (m) of an electron to be =  $9.1 \times 10^{-31} Kg$ .



(i) What are the functions of A and B? (2 marks)

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(ii) Explain how X-rays are produced from the tube. (2 marks)

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(iii) Why is the anode made of thick copper metal? (1 mark)

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(iv) How can the penetration power be controlled in the tube? (2 marks)

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(v) If the potential difference between the Anode and the cathode is 20Kv as shown in the diagram what would be the velocity of the electrons hitting the target? (2 marks)

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14. (a) A transformer has 800 turns in the primary winding and 40 turns in the secondary winding. The alternating e.m.f connected to the primary is 240 V and the current flowing is 0.2 A. Find (i) the secondary e.m.f. (2 marks)

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(ii) The current flowing in the secondary if there are no power losses. (2 marks)

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(iii) The power in the secondary if this is 90 % of that in the primary. (2 marks)

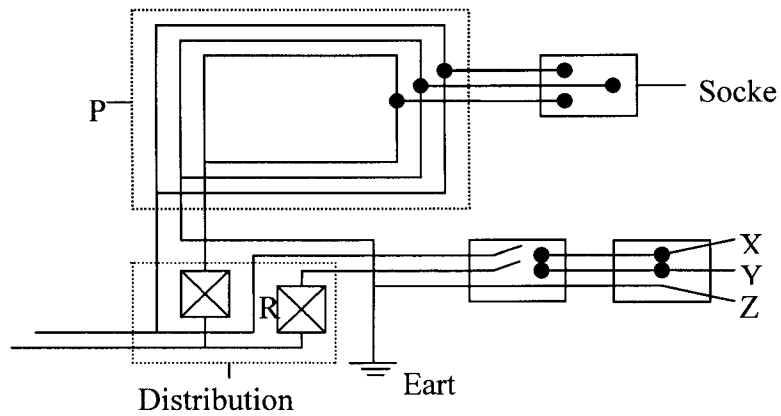
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(iv) The e.m.f across the secondary when the alternating e.m.f of 240 V connected to the primary is replaced by a steady e.m.f of 240 V. (2 marks)

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(b) Why are transformers works only on alternating current but not direct current? (1 mark)

15. (a) (i) The figure below shows a section of a house wiring system



(i) Name:  
 The circuit labeled P (1 mark)  
 The terminals labeled X and Y

X.....Y..... (2 marks)

II Give a reason why R is connected to Y but not to X (2 marks)

(b) A 3KW heater is fitted with a 35W indicator lamp and a 15W fan. These three components of the appliance are connected directly to the 250V mains and switched on and off together. When the appliance is operating calculate

(i) The total power. (1 mark)

(ii) The total current (2 marks)

(iii) The energy used in four hours (2 marks)

(c) State any two application of main electricity. (2 marks)