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**Index No……………………………School……………………………………………………**

**Date………………………………….Signature……………………………**

**448/1**

**ELECTRICITY**

***(Theory)***

**Paper 1**

**Time: 2 ½ hours**

**September/October**

**WISDOM CLUSTER EXAMINATIONS 2021**

**448/1**

**ELECTRICITY**

***(Theory)***

**Paper 1**

**Time: 2 ½** hours

**September/October**

**INSTRUCTIONS TO CANDIDATES**

* This paper has 12 printed pages.
* Answer all questions in section **A** and **B**.
* Mathematical tables or non-programmable electronic calculators maybe used

**SECTION A** (**48 marks**)

*Answer* ***all*** *the questions in this section in the spaces provided.*

1. (a) Outline the procedure of connecting an ammeter to take a measurement in a circuit. (2 marks)

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(b) **Figure 1** shows a resistor with color bands.

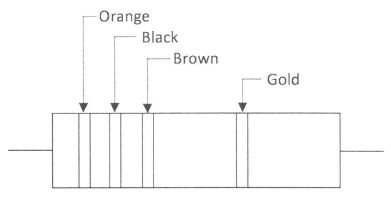


Figure 1

Determine its:

1. Nominal resistance: (1 mark)
2. Maximum resistance. (2 marks)
3. (a) State **two** reasons for using a circuit diagram when troubleshooting n electrical

equipment. (2 marks)

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(b) State **four** components of a bill of materials in project fabrication. (2 marks)

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1. (a) Explain the effect of each of the following in a p-n junction: (2 marks)
2. Forward bias;

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1. Reverse bias.

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(b) State the meaning of each of the following ratings of a light emitting diode: (2 marks)

(i) IF(max);

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(ii)VF(typ);

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1. **Figure 2** shows a transformer whose primary resistance is 1kΩ.

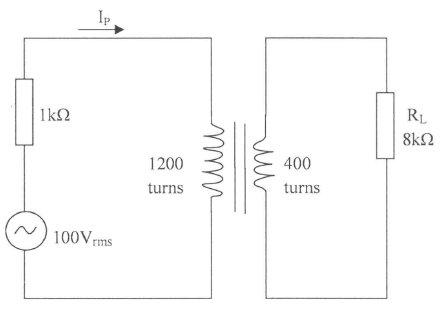


Figure 2

Determine the: (5 marks)

1. Primary current IP;
2. Voltage across RL.



1. With the aid of labeled diagrams, illustrate the arrangement of magnetic domains in:
2. Unmagnetised material;
3. Magnetized material. (3 marks)
4. (a) **Figure 3** shows a voltage divider circuit.

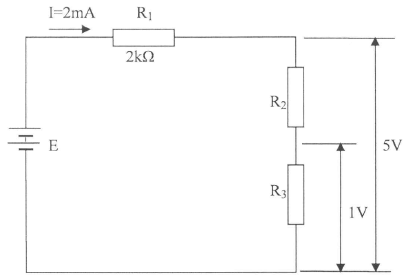


Figure 3

Determine the value of; (4 marks)

1. E
2. R2;
3. R3.
4. A consumer has the following loads connected to the supply.
5. Five 60W lights for 4 hours;
6. One 2kW kettle for ½ hour.

Calculate the total:

1. Energy consumed;
2. Cost of energy used if the rate is 80 cents per unit. (3 marks)
3. (a) State **three** safety precautions to be observed by an operator using portable electric drill. (3 marks)

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(b) Name **four** communication service provider companies currently operating in Kenya. (2 marks)

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1. (a) Name **four** types of insulating materials used in electrical circuits. (2 marks)

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(b) State **three** advantages of PVC conduit wiring systems. (3 marks)

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1. (a) Calculate the inductance required to cause resonance at 150kHZ when the capacitance is

1.0pF. (2 marks)

(b) In a 240V circuit, the load current is 2.5A. If the power factor is 0.6, calculate: (3 marks)

1. Apparent power;
2. True power.
3. Make a free hand isometric drawing of a conduit saddle in the space below. (5 marks)

**SECTION B (52 marks)**

*Answer any* ***four*** *questions from this section in the spaces provided.*

1. **Figure 4,** in the next page, shows the front elevation, end elevation and an incomplete plan of an object.
2. Complete the plan.

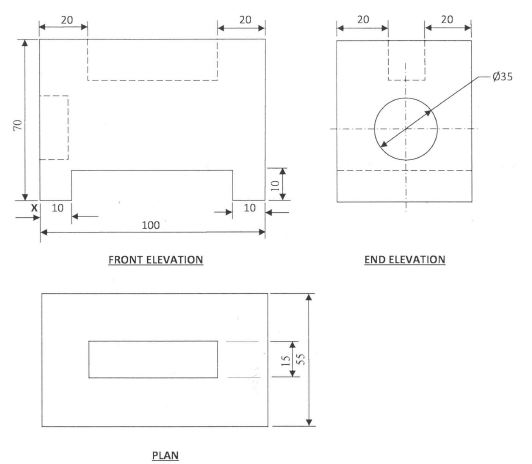
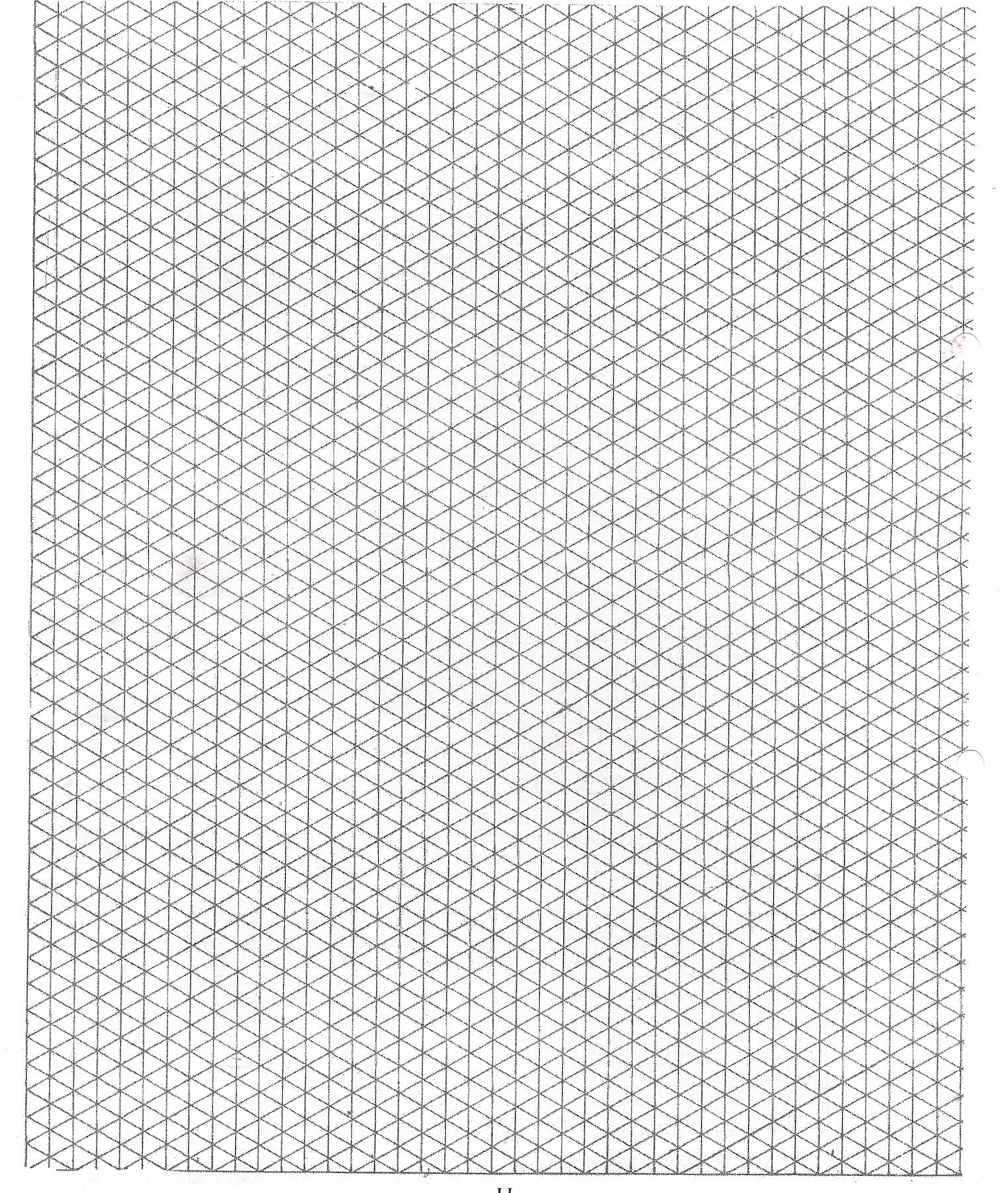


Figure 4

1. On the isometric grid provided, draw the isometric projection of the object making X as the lowest point. (13 marks)



1. **Figure 5** shows waveforms A and B. their vertical and horizontal scales are given.

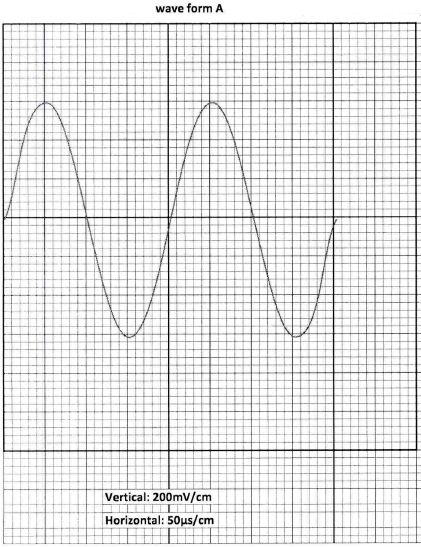
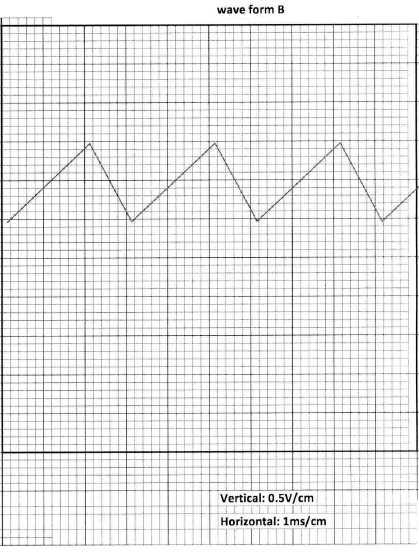
 

Figure 5

1. Name each of the **two** waveforms. (1 mark)

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1. State the number of cycles displayed in each waveform. (2 marks)

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1. Calculate; (10 marks)
2. Frequency of waveform A;
3. Amplitude of each waveform;
4. RMS voltage of waveform A

1. (a) Draw a labeled diagram of a consumer unit with the following circuits. (11 marks)
2. Lighting circuit
3. Water heater circuit;
4. Bell circuit
5. Cooker circuit;
6. Ring circuit.
7. State the typical fuse ratings for any **four** of the final circuits in (a). (2 marks)

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1. **Figure 6** shows an amplifier circuit whose current gain is 50.

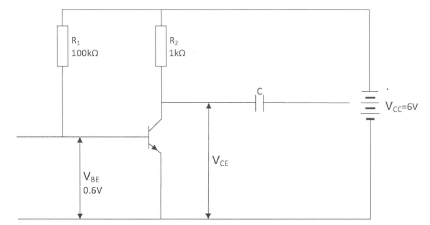


Figure 6

1. (i) Name the type of transistor.

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(ii) State the function of the capacitor C.

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(iii) Name the type of biasing. (3 marks)

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1. Calculate the values of; (10 marks)
2. Voltage across R1;
3. Base current IB;
4. Collector current IC;
5. Voltage VCE.
6. **Figure 7** shows an R-L-C circuit.

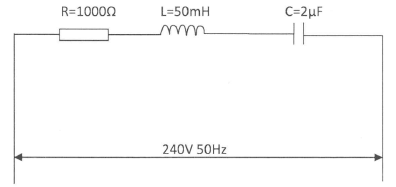


Figure 7

1. Calculate the:
2. Impedance of the circuit; (7 marks)
3. Current. (3 marks)
4. Draw the phasor diagram. (3 marks)

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