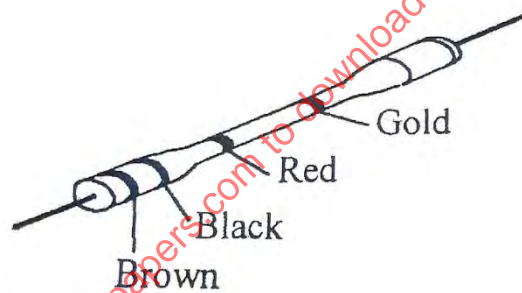


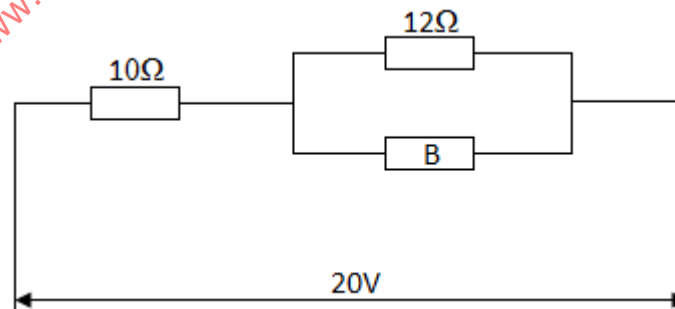
ELECTRICITY (Theory)**Paper 1****BUNAMFAN CLUSTERS EXAM 2022 (TERM 1 2022)****MARKING SCHEME**
SECTION A (48 marks)

1. (a) List **four** insulating materials used in electrical installations.
- *PVC*
 - *Glass fibre*
 - *Mica*
 - *Cotton paper and any other correct* @ 1/2 =2 marks
- (b) State **two** advantages of mineral insulated copper sheathed cables over PVC sheathed.
- *Requires no further protection.*
 - *Impervious to water and oil.*
 - *Long lasting.*
 - *Good heat resistance.* @ 1/2 =2 marks
2. (a) State Lenz's law of electromagnetic induction.
- *states that the direction of the current induced in a conductor by a changing magnetic field is such that the magnetic field created by the induced current opposes the initial changing magnetic field which produced it.* Correctly stated @ 2 marks
- (b) Name **four** applications of electromagnets.
- *Door bells, buzzers and chimes.*
 - *Relays.*
 - *Circuit breakers.*
 - *Telephone receivers.*
 - *Loud speakers.*
 - *Measuring instruments.*
 - *Sorting magnetic materials from scrap metals.*
 - *Record and play heads of cassette recorders.*
 - *Lifting magnetic materials.*
 - *Field poles for motors and generators.* Any 4 correct @ 1/2 =2 marks
3. (a) Name **four** National Polytechnics in Kenya.
- *Kisumu polytechnic*
 - *Eldoret polytechnic*
 - *Kabete National Polytechnic*
 - *Meru National Polytechnic*
 - *Mombasa National Polytechnic*
 - *Nyeri National Polytechnic*
 - *Kisii National Polytechnic*
 - *Sigalagala National Polytechnic*
 - *North Eastern Province National Polytechnic*
 - *Kitale National Polytechnic* Any 4 correct @ 1/2 =2 marks

- (b) List **two** business opportunities in the field of electricity.
- **Electrical/electronics shop**
 - **Repair workshop**
 - **Electrical contractor** *Any 2 correct @ 1/2 = 2 marks*
4. (a) State how each of the following electrical material waste should be disposed safely:
- (i) Burnt fluorescent tubes;
- **Recycle** *@ 1/2 = 1/2 mark*
- (ii) Damaged computers.
- **Recycle** *@ 1/2 = 1/2 mark*
- (b) State the application of each of the following types of extinguishers:
- (i) Carbon dioxide;
- **To put out burning gases or vapour** *@ 1/2 = 1/2 mark*
- (ii) Water.
- **Burning solid materials** *@ 1/2 = 1/2 mark*
5. (a) **Figure 1** shows a carbon resistor with color codes. Determine the value of the resistor given, (2 marks)



6. **Figure 2** shows a resistive circuit.



Determine the:

- (a) Value of the resistor **B** if the total circuit resistance is 20Ω; (4 marks)
- (b) Total circuit current. (2 marks)

7. (a) Name **four** parts of a fluorescent fitting. (2 marks)

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- (b) List four marking out tools used in fabricating sheet metal casing. (2 marks)

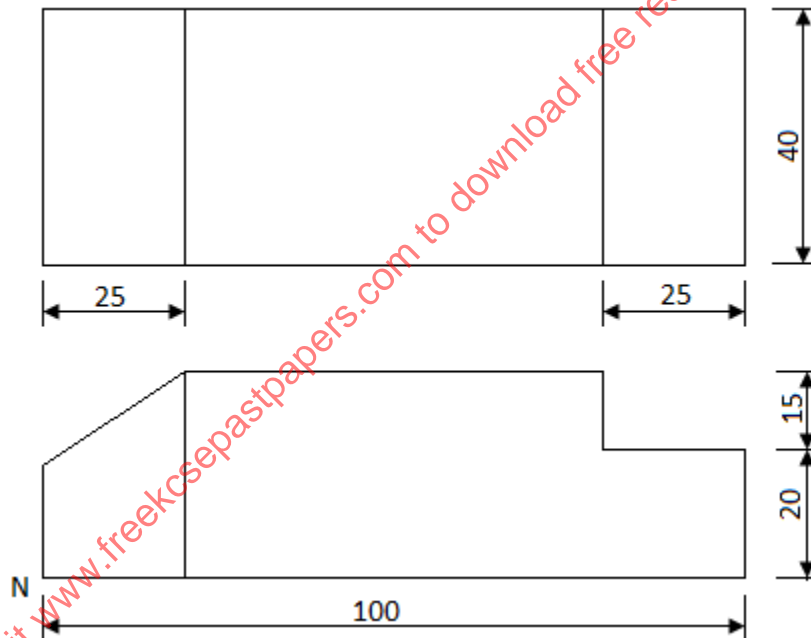
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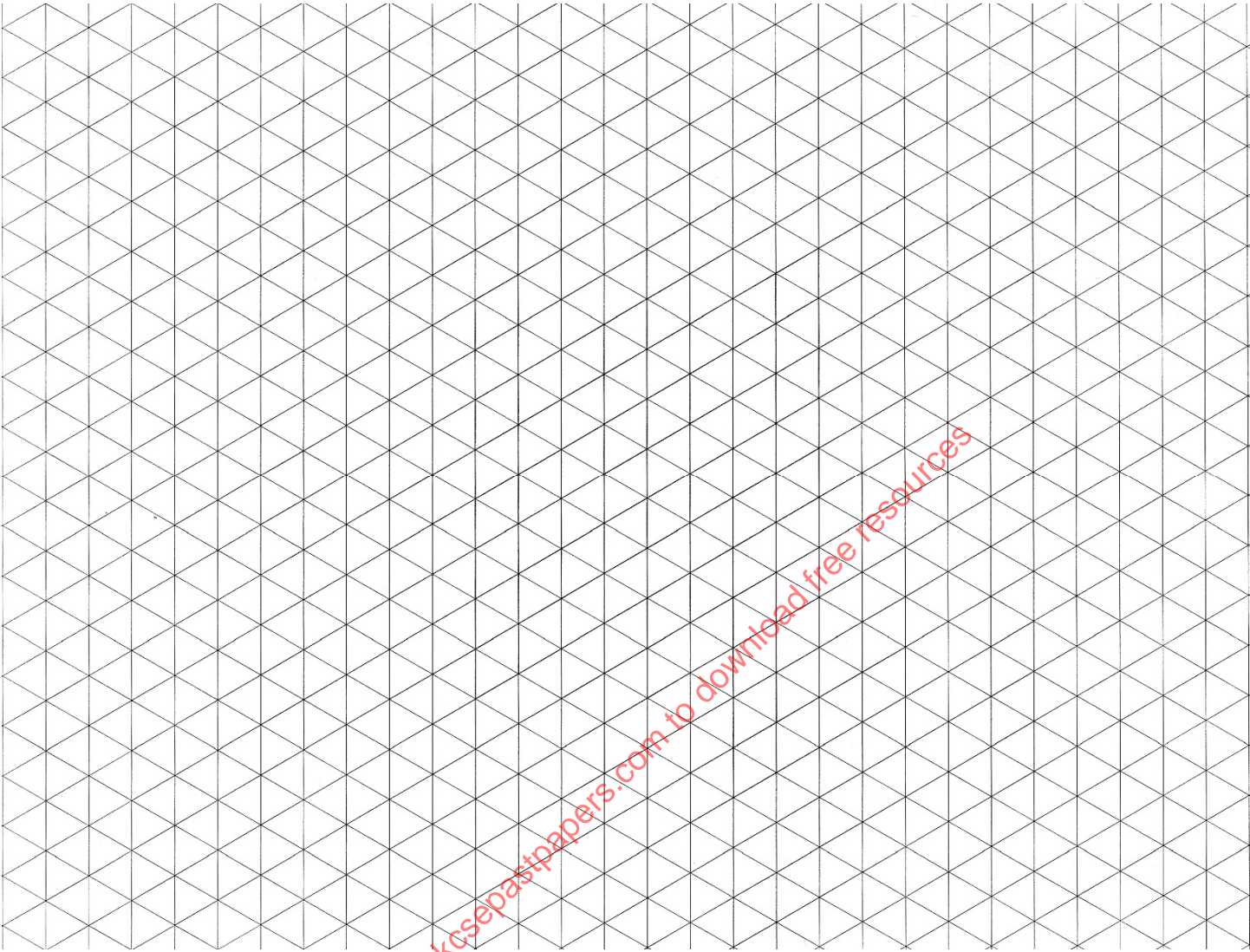
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8. (a) **Figure 3** shows two views of an object drawn in third angle projection.



- On the grid provided, make a free hand isometric sketch with corner N as the lowest point. (3 marks)



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(b) Outline **two** ways that can be used to troubleshoot a faulty television. (2 marks)

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9. (a) With the aid of sketches, distinguish between P-N-P and an N-P-N transistor. (3 marks)

(b) Name **four** applications of a P-N junction diode. (2 marks)

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10. (a) State three advantages of digital instruments over analogue instruments. (3 marks)

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(b) An ideal transformer connected to a 240V mains supplies a 12V, 120W lamp. Calculate the:
(i) Transformer's turns ratio; (3 marks)

(ii) Current taken from the supply. (3 marks)

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SECTION B (52 marks)

Answer any four questions in the spaces provided.

11. (a) (i) Convert 23_{10} to binary. (2 marks)

(ii) Convert 11011_2 to decimal. (2 marks)

(b) Draw a truth table for each of the following logic gate;
(i) NOR; (4 marks)

(ii) NAND. (4 marks)

(c) Name two applications of logic gates. (1 mark)

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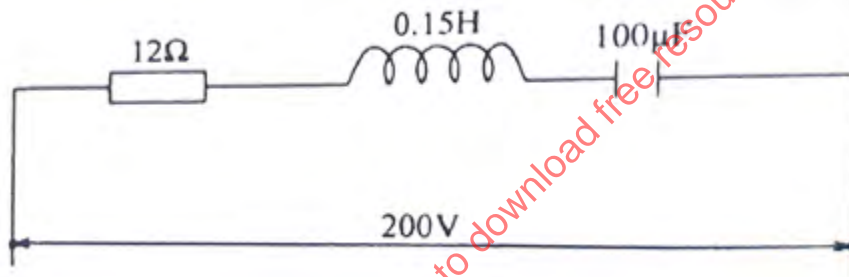
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12. (a) Draw a sine wave and indicate the following:

- (i) Peak value;
- (ii) Instantaneous value;
- (iii) Cycle.

(5 marks)

(b) **Figure 4** shows an RLC circuit.



Calculate the:

(i) Inductive reactance;

(2 marks)

(ii) Capacitive reactance;

(2 marks)

(iii) Circuit impedance;

(2 marks)

(iv) Circuit current.

(2 marks)

13. (a) State;

(i) **Two** advantages of a moving coil instrument.

(2 marks)

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(ii) **Two** essential features of an analogue instrument.

(2 marks)

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(b) With the aid of a labelled diagram, explain the Flemmings right hand rule to demonstrate the direction of induced EMF. (6 marks)

(c) show that for two capacitors C_1 and C_2 connected in series, the total capacitance is given by:

$$C_T = \frac{C_1 \times C_2}{C_1 + C_2}$$

(3 marks)

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14. (a) State:
(i) **Two** advantages of trunking over steel conduit wiring systems. (2 marks)

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(ii) **Two** advantages of MCBs over rewirable fuses. (2 marks)

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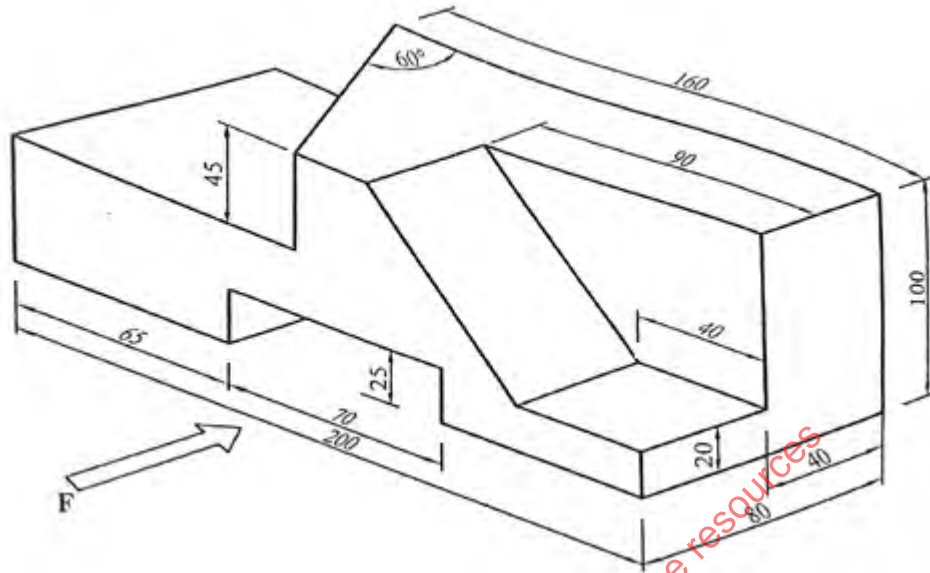
(b) (i) Draw and label a diagram of a switch start fluorescent fitting. (6 marks)

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(ii) Outline **three** tests carried out in a completed electrical installation. (3 marks)

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15. **Figure 5** shows a machine block drawing of an isometric projection.



Draw the following views in **full size** in first angle projection:

- Front elevation in the direction of arrow **F**;
- Plan;
- Indicate **six** dimensions.

(13 marks)

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