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0743 241064
EXAMINER

ELECTRICAL TOPICAL QUESTIONS

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STRAND 1.0: FUNDAMENTALS OF ELECTRICITY

1.1 INTRODUCTION

1. (3 marks)
Define electricity.

Explain importance of electricity in everyday life.

b) Explain the role of each stakeholder in preventing such accidents.

5. (3 marks)
State two uses of electricity in:
a) Domestic s

b) Industrial s

6. (4 marks)
Outline four sources of electricity commonly used in households.

7. (3 marks)
Mention two reasons why embracing a career in electrical technology is important to society.

11. (3 marks)
List three common electrical hazards in the workplace.

_____

_____

_____

12. (5 marks)
a) Classify the following hazards into electrical and non-electrical:

- Wet floors near sockets
- Exposed live wires
- Overloaded plug sockets

ELECTRICAL	NON ELECTRICAL

14. (5 marks)
A factory has old wiring that often sparks. As an electrical technician, suggest:
a) Three immediate actions to prevent accidents

_____

_____

_____

b) Long-term measures to ensure safety

15. (3 marks)
Mention two safety regulations observed while installing electrical appliances in homes.

16. (5 marks)
Explain why regular inspection of electrical tools and equipment is necessary in the workplace.

20. (3 marks)
Name two places where an electrical technician can work.

_____

_____

21. (5 marks)
Explain the importance of observing safety when performing electrical tasks in:
a) Schools

_____

_____

_____

b) Factories

25. (5 marks)
A student is interested in pursuing a career in electrical technology. Recommend a five-step plan to achieve this career, including education, training, and practical experience.

_____

_____

_____

_____

_____

_____

26. (3 marks)
State two tools commonly used by electricians for installation work.

_____

_____

_____

27. (Match the following careers to their main roles:

i.	Electrician	installs wiring and electrical devices
ii.	Electrical engineer	designs circuits and systems
iii.	Electrical technician	maintains and repairs electrical equipment

ELECTRICITY TECHNOLOGY – GRADE 10

STRAND 1.2: D.C. Electric Circuits

Properties of Electric Circuits, Conductors, Insulators and Semiconductors

1. (3 marks)
Define an electric circuit. Give two properties of a good electric circuit.

_____

_____

2. (4 marks)
Differentiate between conductors, insulators, and semiconductors. Give one example for each.

5. (5 marks)
A copper wire of length 2 m and cross-sectional area 1 mm² has a resistance of 0.017 Ω·m.
a) Calculate the resistance of the wire.

b) Explain why copper is used as a conductor in most electrical circuits.

_____
_____

6. (4 marks)
State and explain **Ohm's Law**. Draw a graph showing the relationship between voltage and current for a resistive circuit.

_____
_____
_____
_____

7. (5 marks)
A series circuit has three resistors: 4 Ω, 6 Ω, and 10 Ω connected to a 12 V battery.
a) Calculate the total resistance.

b) Find the current flowing in the circuit.

c) Calculate the voltage drop across each resistor.

8. (3 marks)
Mention two practical s of DC circuits in cars.

_____

_____

9. (4 marks)
Explain how an open circuit, short circuit, dry joint, and loose terminal can be identified in a DC circuit.

_____

_____

_____

_____

10. (5 marks)
Construct a parallel resistor network using 3 resistors of values 6 Ω, 3 Ω, and 2 Ω connected to a 12 V battery.
a) Calculate the total resistance.

b) Find the current through each resistor.

11. (4 marks)
Name the instruments used to measure:
a) Current:_____
b) Voltage:_____
c) Resistance:_____
d) Power:_____

12. (3 marks)
State the precautions to observe when using an ammeter in a circuit.

_____

_____

_____

_____

13. (5 marks)

A circuit has a current of 2 A and voltage of 6 V across a resistor. Calculate:

a) Resistance of the resistor

b) Power dissipated in the resistor

14. (5 marks)

A student sets up a series-parallel network to verify Kirchhoff's laws.

a) Draw a series-parallel circuit with three resistors and two branches.

b) Using Kirchhoff's voltage and current laws, explain how the total current and voltage drops can be verified.

. (4 marks)

Illustrate with a diagram how to connect a voltmeter across a resistor in a DC circuit.

16. (4 marks)
Explain the procedure for zeroing an ammeter before use.

17. (3 marks)
State two reasons why electrical energy is measured in kilowatt-hours (kWh).

18. (5 marks)
A 12 V DC battery powers a 6 Ω resistor for 3 hours.
a) Calculate the current flowing in the resistor.

b) Calculate the energy consumed.

s of DC Circuits

19. (4 marks)
List four s of DC circuits in household appliances.

20. (5 marks)
Design a simple DC circuit to light up two bulbs (3 Ω and 6 Ω) in parallel. Include a switch and a 12 V battery.
a) Label all components.

b) Calculate the current drawn from the battery.

21. (3 marks)
Identify two safety measures to observe while constructing a DC circuit.

_____
_____
_____
_____

22. (4 marks)
Explain the difference between energy and power in a DC circuit and provide one formula for each.

_____
_____

23. (5 marks)
A DC circuit consists of a 12 V battery, a 4 Ω resistor, and a 2 Ω resistor in series. Calculate:
a) Total resistance

b) Total current

c) Voltage drop across each resistor

24. (3 marks)
Name two devices that use DC circuits in cars.

_____

_____

25. (4 marks)
Sketch a labelled diagram of a resistor network in series with two resistors. Show how voltage is divided across each resistor.

26. (5 marks)
A parallel circuit has three resistors: 2 Ω, 3 Ω, and 6 Ω connected across a 12 V battery.
a) Calculate the total resistance.

b) Find the total current drawn from the battery.

c) Find the current through each resistor.

27. (4 marks)
Explain how DC circuits are applied in:
a) Home lighting systems

_____
_____

b) Car ignition systems

_____
_____

28. (3 marks)
Mention two examples of semiconductors used in electrical circuits.

_____
_____

COMPETENCE-BASED EDUCATION – TOPICAL REVISION
Strand 1.3: Cells and Batteries
1.0 Fundamentals of Cells and Batteries

1. (3 marks)
Define a primary cell and give two examples.

_____
_____

2. (3 marks)
State the difference between a primary and a secondary cell.

_____
_____
_____
_____

3. (3 marks)
List two advantages of using rechargeable (secondary) batteries over primary cells.

_____
_____

4. (3 marks)
Mention two safety precautions to observe when handling batteries.

_____
_____

5. (3 marks)
Sketch a simple diagram of a dry cell. Label the anode, cathode, and electrolyte.

6. (4 marks)
Explain what is meant by the charging and discharging process in secondary cells.

7. (6 marks)
A 1.5 V AA cell is connected in a circuit.
a) State whether it is a primary or secondary cell.

b) Mention one practical use of this cell.

c) Explain why this type of cell cannot be recharged.

8. (5 marks)
A student wants to connect three 2 V batteries to get a total voltage of 6 V.
a) Draw the circuit for series connection.

b) Draw the circuit for parallel connection.

c) Explain which connection is suitable for higher current output.

9. (4 marks)
Describe two methods of charging secondary batteries.

10. (5 marks)
A lead-acid battery has a rating of 12 V, 7 Ah.
a) Explain what the 7 Ah rating means.

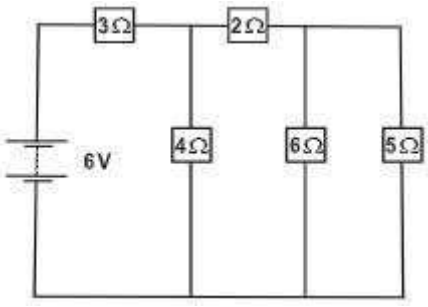
b) State one of this battery.

11. (4 marks)
Illustrate with a labelled diagram the correct method of connecting two batteries in parallel.

12. (5 marks)
List and explain three maintenance procedures for lead-acid batteries.

13. (5 marks)
a. State Ohm's law. (2 mark)

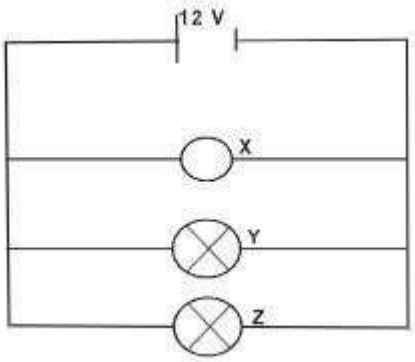
b. Study the circuit diagram (Fig 6) below and answer the questions that follow.



i. Calculate the effective resistance of the circuit. (4marks)

ii. Find the total current in the circuit. (3 marks)

c. The figure 7 below shows a low voltage lighting circuit.



i. On the figure indicate with letter S a point in the circuit where a switch could be placed that would turn off lamp Y and Z at the same time but would leave lamps X still lit. (1 mark)

ii. The current in lamp Z is 3.0 A, calculate the resistance of this lamp. (3 marks)

14. (4 marks)
Explain the effect of overcharging a secondary battery.

15. (4 marks)
Describe how internal resistance of a battery affects its performance.

16. (4 marks – includes calculation)
A student connects two 6 V batteries in series to a 12 Ω resistor.
a) Draw the circuit diagram.

b) Calculate the current flowing through the resistor.

17. (5 marks)
A car battery is rated 12 V, 50 Ah. Calculate:
a) The energy stored in the battery in watt-hours.

b) One practical way to increase the battery life.

18. (5 marks)
Explain why series connections of batteries are preferred when higher voltage is required, but parallel connections are preferred when higher current is needed.

19. (5 marks – includes diagram)
Design a battery array that will supply 12 V and high current using 6 V, 7 Ah batteries.
a) Draw the arrangement.

a) Calculate the current flowing through the resistor.

b) Calculate the total current capacity in Ah.

20. (5 marks)
Discuss the environmental importance of safe disposal of batteries. Give two consequences of improper disposal.

21. (5 marks)
A secondary battery is showing rapid self-discharge. List and explain three possible causes.

22. (5 marks – includes calculations)
A battery has internal resistance 0.5 Ω and is connected to an external resistor of 4.5 Ω. The battery EMF is 12 V.

b) Determine the voltage drop across the battery's internal resistance.

Practical

23. (3 marks)
Sketch a simple battery maintenance station showing:

i. Water level checking

ii. Terminal cleaning

iii. Correct storage position

26. (5 marks)
Illustrate and label a Ni-Cd rechargeable battery, showing:

- Positive terminal
- Negative terminal
- Electrolyte
- Separator

24. (4 marks)
Explain the steps for safely connecting a 12 V battery to a 12 V DC circuit using a switch and load. Provide a diagram.

_____
_____
_____
_____

25. (3 marks)
A school workshop uses multiple 1.5 V cells for an electronics project. Explain why series connection is used rather than parallel.

_____
_____
_____
_____

27. (5 marks)
Calculate the total voltage of four 1.2 V AA batteries:
a) In series

b) In parallel

b) Maintenance measures to ensure safety and longevity of the batteries.

28. (5 marks)
Describe the maintenance steps for a Li-ion laptop battery to increase its lifespan.

29. (4 marks)
Explain the difference between charging with a constant current and a constant voltage method.

30. (5 marks)
A secondary battery array is to be used in a DC solar system. Discuss:
a) The type of connection you would use (series/parallel) and why.

Strand 1.4: Capacitors and Capacitance
1.0 Fundamentals of Capacitors and Capacitance

1. (3 marks)
Define a capacitor and state one practical in everyday electrical appliances.

_____

_____

2. (3 marks)
Sketch a basic capacitor and label the plates and dielectric.

b) What happens to the current as the capacitor becomes fully charged.

3. (3 marks)
State the function of a dielectric in a capacitor.

_____

_____

4. (3 marks)
Mention two types of capacitors commonly used in electronics.

_____

_____

5. (4 marks)
Explain, in simple terms, what happens when a capacitor is charged in a DC circuit.

_____

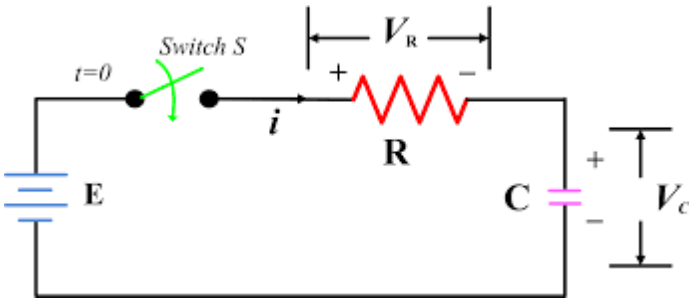
_____

6. (4 marks)
A capacitor is connected to a DC battery. Identify:
a) The direction of current flow at the instant of connection.
7. (5 marks)
Give two safety precautions to observe when handling capacitors.

_____

_____

8. (5 marks – Diagram)
The diagram shows a capacitor connected in series with a resistor across a DC supply:



a) Explain the function of the capacitor in this circuit.

_____

_____

b) Describe the voltage and current behavior over time.

_____

_____

9. (4 marks)
Explain two characteristics of capacitive circuits that are different from resistive circuits.

_____

_____

10. (5 marks – Calculation)
Three capacitors of 4 µF, 6 µF, and 12 µF are connected in series.
a) Calculate the total capacitance.

b) Explain why the total capacitance is less than any individual capacitor.

11. (5 marks – Calculation)
Two capacitors, 5 µF and 10 µF, are connected in parallel.
a) Calculate the total capacitance.

b) Explain why the total capacitance is more than any individual capacitor.

12. (4 marks)
Describe two practical s of capacitors in electrical appliances.

13. (5 marks – Diagram)
Sketch a parallel capacitor connection with values 2 μF, 3 μF, and 5 μF. Label each component.

b) State the unit of charge.

14. (4 marks)
Explain how to select an appropriate capacitor for use in a motor start circuit.

15. (4 marks – Analysis)
A 100 μF capacitor is charged to 12 V.
a) Calculate the charge stored in the capacitor.

16. (4 marks)
Describe what happens when two capacitors of unequal capacitance are connected in series across a DC supply.

17. (5 marks)
Explain how a capacitor can be used in a timer circuit for traffic lights.

18. (5 marks – Diagram & Explanation)
Design a capacitor network using three capacitors (3 μF, 6 μF, 9 μF) to supply a DC circuit with a total capacitance of 5 μF.
a) Draw the arrangement.

b) Explain your choice of series or parallel connection.

19. (5 marks – Calculation)
A 50 μF capacitor is connected in series with a 100 μF capacitor across a 12 V battery.
a) Calculate the total capacitance.

b) Determine the voltage across each capacitor.

20. (5 marks)
Discuss the importance of capacitors in smoothing voltage fluctuations in power supplies.

21. (5 marks – Practical)
A capacitor in a motor-start circuit is failing. Explain:
a) How this would affect the motor operation.

b) How to replace and test the capacitor safely.

22. (5 marks – Critical Thinking)
Compare and contrast the energy storage mechanism in capacitors and batteries. Give one advantage and one limitation of capacitors over batteries in electrical s.

Practical

23. (3 marks)
Sketch a capacitor used in a motor start circuit and label the terminals.

24. (3 marks)
Draw and label the charging and discharging curve (Voltage vs Time) of a capacitor in a series RC circuit.

25. (4 marks)
A capacitor is used in a DC motor control circuit. Explain:
a) How it helps in smooth motor start.

b) One safety precaution when handling it.

26. (5 marks – Diagram)
Illustrate a combination of two series capacitors connected in parallel to a third capacitor. Label the total capacitance.

29. (5 marks)
Discuss the role of dielectric material in increasing capacitance. Give one example of dielectric used.

27. (4 marks)
Explain why a capacitor is used in traffic light timer circuits instead of a resistor alone.

28. (5 marks)
A 200 μF capacitor stores 0.06 C of charge. Calculate the voltage across it.

30. (5 marks)

A capacitor array is required to store maximum energy in a limited voltage circuit. Discuss:

a) How to connect capacitors for maximum energy storage.

b) One safety procedure when assembling capacitor banks.

Strand 1.5: Pictorial Drawings
1.0 Fundamentals of Pictorial Drawing

1. (3 marks)
Define pictorial drawing and state one importance of using it in engineering design.

2. (3 marks – Diagram)
Sketch a cube in **isometric view** and label the three axes.

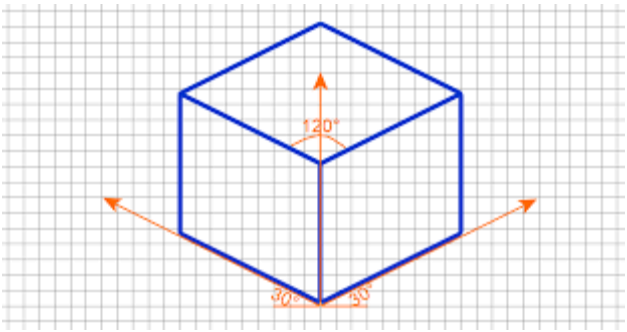
6. (4 marks – Identification)
The diagram below shows a pictorial object:

(Insert simple isometric cube diagram)

3. (3 marks)
Name two types of pictorial drawings used in technical representation.

4. (4 marks)
State two differences between **isometric** and **oblique** drawings.

5. (3 marks)
List three drawing instruments used in creating pictorial drawings.



a) Identify the type of pictorial drawing.

_____

_____

b) State one feature that distinguishes it from perspective drawing.

_____

_____

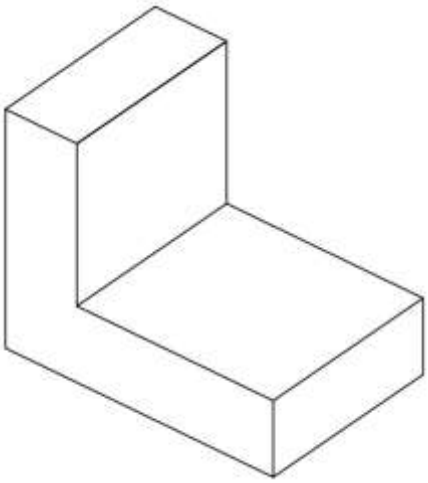
7. (5 marks)
Explain why pictorial drawings are preferred over 2D orthographic sketches in visualizing objects.

_____

_____

8. (5 marks – Drawing)
Draw an **oblique pictorial** of a rectangular prism of dimensions 40 mm × 30 mm × 20 mm. Label its front, top, and side faces.

9. (5 marks – Drawing)
From the given 2D sketch below, produce an **isometric drawing**.



10. (4 marks – Diagram)
Identify the axes in the isometric drawing of a cylinder below and mark their directions.

11. (5 marks – Calculation/Analysis)
A cube has an edge of 50 mm. In isometric projection, each axis is at 30° to the horizontal.
a) Draw the isometric projection.

b) Measure and label the dimensions on your drawing.

12. (4 marks)
Explain the principle of **foreshortening** in oblique drawings.

13. (5 marks – Drawing & Dimensioning)
Draw an **oblique pictorial** of a triangular prism. Label the base, height, and inclined face.

14. (4 marks – Interpretation)
Examine the isometric drawing below:

a) Identify the visible faces.

_____

b) List hidden features if it were viewed in an orthographic projection.

_____

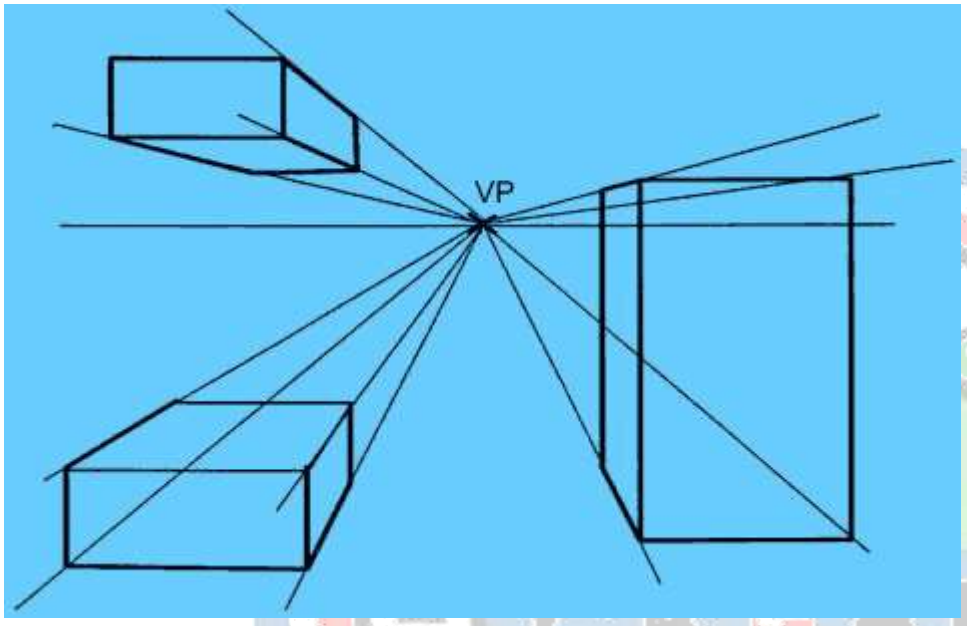
_____

_____

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15. (4 marks – Analysis)
Explain one advantage of using isometric drawing over oblique drawing in engineering design.

16. (5 marks)
The diagram below shows an object in **perspective view**:



a) Identify the type of perspective used.

b) State one limitation of perspective drawing in technical documentation.

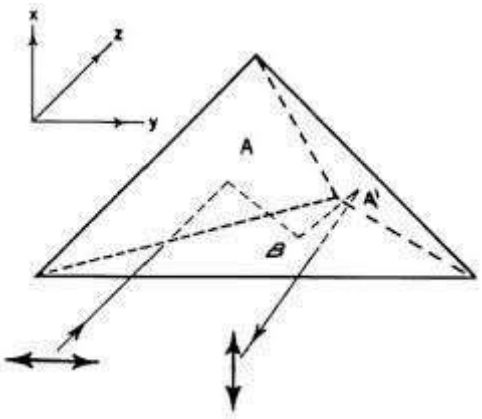
17. (4 marks)
Describe the role of **graph paper** in producing accurate pictorial drawings.

18. (5 marks – Drawing & Justification)
Create a **combined pictorial** of an L-shaped block showing both isometric and oblique views. Explain your choice of views.

19. (5 marks – Calculation & Drawing)
A rectangular block has dimensions 60 mm × 40 mm × 30 mm. Draw an isometric and a cabinet oblique view of the block. Include all dimensions.

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20. (5 marks – Interpretation)
Interpret the pictorial drawing of the object below:



a) Determine the height, width, and depth.

_____

_____

b) Suggest which faces would be hidden in a front elevation.

_____

_____

21. (5 marks – Critical Thinking)
Compare **isometric**, **oblique**, and **perspective** drawings. Discuss which type is most suitable for:
a) Technical fabrication

b) Client presentation

22. (5 marks –)
Explain how pictorial drawings can help identify errors in design before construction or manufacturing. Support your answer with a simple example.

_____

_____

_____

_____

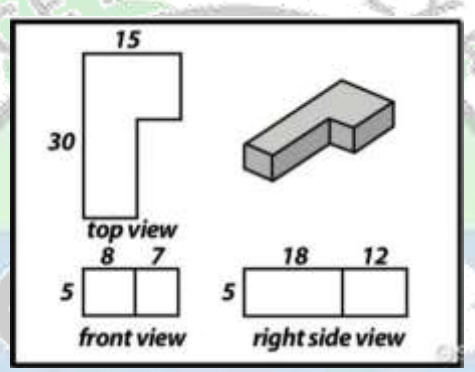
Practical

23. (3 marks – Sketch)
Draw a simple cube on graph paper in **isometric projection** and label the axes.

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24. (3 marks – Sketch)
Draw a **cylinder** in **oblique pictorial** view. Label the top, bottom, and height.

25. (4 marks – Drawing & Analysis)
From the orthographic projection below, produce an **isometric pictorial** of the object:



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26. (4 marks – Interpretation)
Interpret the pictorial below and extract the following:
a) Number of visible faces

_____

_____

b) Number of hidden edges

_____

_____

27. (5 marks – Justification & Analysis)
A design engineer wants to communicate the layout of a new electrical panel. Which pictorial drawing would you recommend? Explain your choice.

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28. (4 marks)
Explain the importance of dimensioning in pictorial drawings and give an example of where it is used in electrical or mechanical design.

29. (5 marks – Problem Solving)
Draw a **combined L-shaped block** showing both front elevation and isometric pictorial on the same sheet.

30. (5 marks)
Discuss the advantages and disadvantages of creating **pictorial drawings using CAD software** compared to manual drawings.

Strand 2.0: Electrical Machines
Sub-Strand 2.1: Magnetism
1. (3 marks)
Define magnetism. Give one example of a naturally magnetic material.

2. (3 marks)
List two properties of magnetic materials.

3. (3 marks – Diagram Identification)
The diagram below shows a bar magnet:



a) Label the north and south poles.
b) State the type of magnet.

4. (4 marks)
Explain the term "demagnetization" of a magnetic material.

5. (4 marks – True/False)
State whether the following statements are True or False:
a) Only iron can be magnetized.

b) Magnetic field lines move from the south to the north pole outside the magnet.

c) Soft iron is easily demagnetized.

_____

_____

d) Permanent magnets retain their magnetism for long periods.

_____

_____

6. (3 marks)
State two everyday s of magnets.

_____

_____

7. (4 marks)
Name one instrument used to detect magnetic fields and explain briefly how it works.

_____

_____

8. (5 marks – Drawing & Observation)
Draw magnetic field lines around a **bar magnet** using iron fillings. Indicate the direction of the field lines.

9. (5 marks – Drawing & Labeling)
Draw and label the magnetic field around a **U-shaped magnet**.

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10. (4 marks – Calculation/Analysis)
A soft iron bar is magnetized using a coil carrying a current of 2 A.
a) State the factors that increase the magnetism induced in the bar.

_____

_____

b) Give one method to increase the strength of the magnet.

_____

_____

11. (5 marks – Experimental Procedure)
Outline the steps to **magnetize a steel rod** using a coil. Include safety precautions.

_____

_____

_____

_____

12. (5 marks – Diagram Interpretation)
The diagram below shows a circular or ring magnet:



a) Draw the magnetic field lines around the ring magnet.
b) Indicate where the field is strongest.

13. (5 marks – Practical)
Explain how a magnet is used in a **loudspeaker** or **electric generator**.

_____

_____

_____

_____

14. (4 marks –)
Which of the following materials is a **soft magnetic material**?
A. Steel
B. Cobalt

C. Iron
D. Aluminum

15. (4 marks – True/False)
State whether the following are soft or hard magnetic materials:
a) Cobalt:_____
b) Soft iron:_____
c) Steel:_____
d) Nickel:_____

16. (4 marks – Short Answer)
State two ways to **care for magnets** used in electrical equipment.

_____
_____
_____
_____

17. (4 marks – Analysis)
Explain why permanent magnets are preferred in small electrical devices while soft iron is preferred in electromagnets.

_____
_____

18. (5 marks – Experimental Design & Explanation)
Design an experiment to **verify the magnetic field around a disc magnet** using a compass. Explain how the compass needle behaves.

19. (5 marks – & Diagram)
Draw a labelled diagram showing **magnetic field lines around a bar magnet** and explain how the **field strength varies** along the length of the magnet.

20. (5 marks – Critical Thinking)
Explain how **demagnetization occurs naturally** in magnets and give one method to prevent it in electrical machines.

21. (5 marks – Problem Solving)
A student performs magnetization on a soft iron rod using an electromagnet. Explain the effect of:
a) Increasing the number of turns in the coil

b) Increasing the current in the coil

c) Using a thicker rod

22. (5 marks – Practical & Analysis)
Discuss the importance of magnets in:
a) Electric motors

b) Magnetic storage devices

c) MRI machines

4.0 Practical

23. (4 marks – Sketch)
Sketch a **U-shaped magnet** and show the direction of magnetic field lines.

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24. (4 marks – Sketch & Label)
Draw a **ring magnet** and indicate N and S poles and field lines.

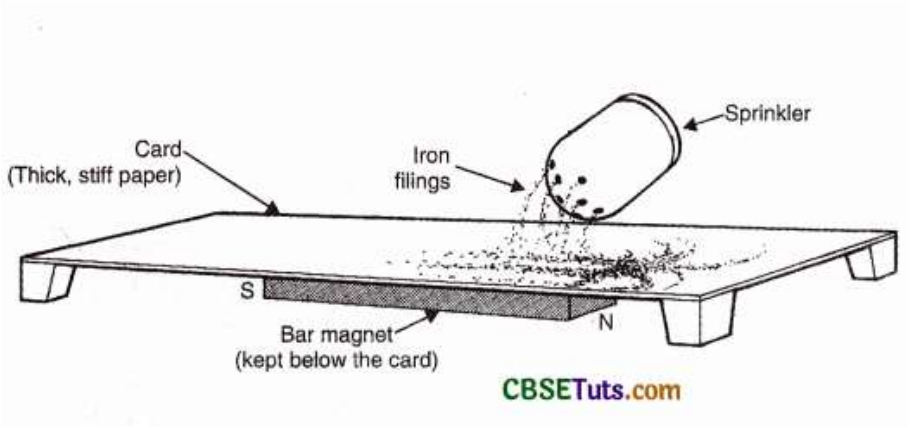
25. (5 marks – Experimental Observation)
Describe an experiment using **iron fillings** to demonstrate magnetic field patterns of:
a) Bar magnet

b) U-shaped magnet

26. (4 marks – Safety &)
Explain why magnets should be **stored with keepers** and in N-S alignment.

27. (5 marks –)
Explain the principle of operation of a **simple magnetic compass**.

28. (4 marks – Diagram &)
The diagram below shows a bar magnet under a piece of paper with iron filings sprinkled on it:



a) Draw the correct field pattern.
b) Label areas of strong and weak fields.

29. (5 marks –)
Evaluate the use of magnets in **day-to-day electrical appliances**. Include at least 3 examples.

30. (5 marks – Critical Thinking)
Explain why **soft magnetic materials** are preferred in transformer cores while **hard magnetic materials** are used in permanent magnets.

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Strand 2.0: Electrical Machines
Sub-Strand 2.2: Electromagnetism

1. (3 marks)
Define electromagnetism. Give one example of an electromagnet used in daily life.

_____

_____

2. (3 marks – True/False)
State whether the following statements are True or False:
a) Electromagnets can be switched on and off.

_____

_____

b) Permanent magnets are always stronger than electromagnets.

_____

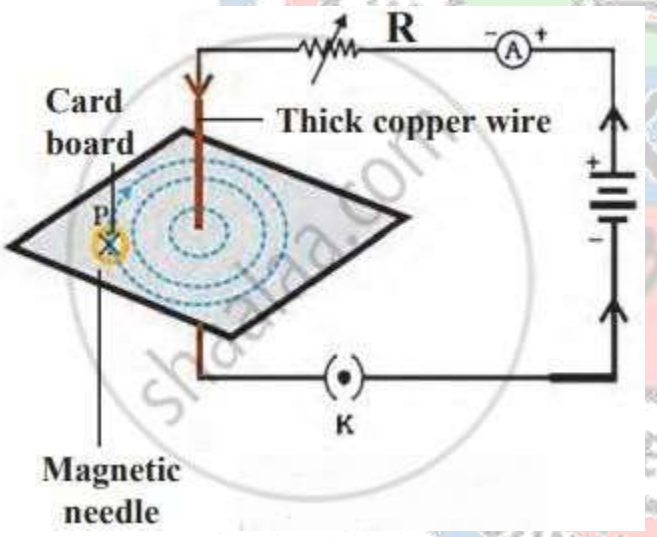
_____

c) Current direction affects the magnetic field of an electromagnet.

_____

_____

3. (3 marks – Diagram Identification)
The diagram below shows a straight conductor carrying current:



a) Name the magnetic field pattern around the conductor.

_____

_____

b) Indicate the direction of the field using the right-hand rule.

_____

_____

4. (4 marks)
List two advantages of using an electromagnet over a permanent magnet.

_____

_____

5. (4 marks – Short Answer)
State two safety precautions when constructing an electromagnet in a classroom or workshop.

_____

_____

6. (4 marks)
Identify the materials needed to construct a simple electromagnet.

_____

_____

7. (4 marks – Fill in the blank)
The strength of an electromagnet increases with _____(number of turns/current/length of wire).

8. (5 marks – Drawing & Labeling)
Draw the magnetic field around a **straight current-carrying conductor** and indicate the direction of the field lines.

9. (5 marks – Drawing & Observation)
Draw the magnetic field around a **solenoid**. Label: N-pole, S-pole, and direction of field lines.

10. (4 marks – Calculation/Analysis)
A solenoid has 50 turns and carries a current of 2 A. Explain how the following would affect the strength of the electromagnet:
a) Increasing the number of turns

b) Increasing the current

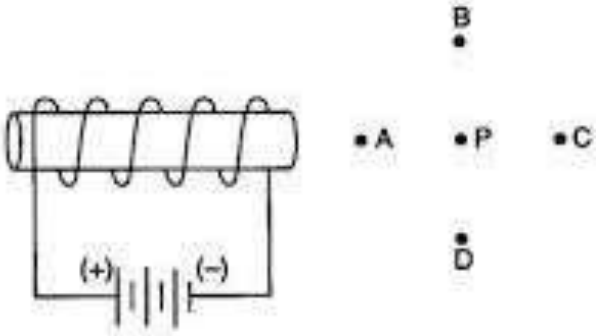
c) Using a soft iron core instead of air

11. (5 marks – Practical Procedure)
Outline the steps to **construct a simple electromagnet** using a nail, insulated copper wire, and a battery. Include safety precautions.

12. (5 marks –)
Explain how an **electromagnet is used in an electric bell**. Include a simple labelled diagram.

13. (4 marks –)
Which of the following affects the strength of an electromagnet the most?
A. Length of wire
B. Number of turns of wire
C. Diameter of the battery
D. Color of wire insulation

14. (5 marks – Diagram & Observation)
The diagram below shows a solenoid connected to a battery:



a) Label the north and south poles of the solenoid.
b) Draw the magnetic field inside the solenoid.

15. (4 marks – Short Answer)
State two s of electromagnets in industries.

_____

_____

16. (4 marks – Practical Testing)
Describe how to test an electromagnet for functionality using a small iron nail or paper clips.

_____

_____

_____

_____

17. (4 marks – Critical Thinking)
Explain why the current direction matters in an electromagnet.

_____

_____

18. (5 marks – Experimental Design)
Design an experiment to show how the number of turns in a coil affects the strength of an electromagnet. Include variables to be measured.

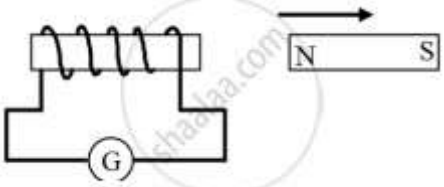
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19. (5 marks – Analysis &)
Explain how an electromagnet works in a **magnetic crane** at a scrap yard. Include diagrams to show current flow and magnetic field.

_____
_____
_____
_____

20. (5 marks – Problem Solving)
You are asked to construct an electromagnet for lifting heavier weights. Which factors would you consider:
a) Wire type and thickness:_____
b) Number of coil turns:_____
c) Core material:_____
d) Power supply:_____

21. (5 marks – Diagram Interpretation)
The diagram below shows a coil with a current flowing through it:



a) Identify the north and south poles.
b) Show the direction of the magnetic field inside and outside the coil.

22. (5 marks –)
Evaluate the importance of electromagnetism in modern electrical devices such as relays, electric bells, and MRI machines. Include at least 3 points.

_____
_____

4.0 Practical

23. (4 marks – Sketch & Label)
Sketch a **simple electromagnet** and label the battery, coil, and nail core.

24. (4 marks – Observation & Analysis)
Using the right-hand rule, indicate the direction of the magnetic field around a **current-carrying straight wire**.

25. (4 marks – Problem Solving)
If the battery voltage is increased in a solenoid circuit, explain the effect on:
a) Current

b) Magnetic field strength

26. (4 marks – Critical Thinking)
Why are soft iron cores preferred over steel in electromagnets?

27. (4 marks – & Safety)
List three safety measures when using electromagnets in practical electrical appliances.

28. (4 marks – Diagram & Analysis)
Draw a labelled **electromagnetic relay**. Explain how the coil energizes the switch.

29. (5 marks – Practical Reasoning)
Explain how you would test an electromagnet for optimal efficiency using a set of small iron weights.

30. (5 marks – & Critical Thinking)
Compare and contrast the advantages and disadvantages of using an **electromagnet vs. permanent magnet** in an electric bell.

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Strand 2.0 & 3.0: Electrical Machines & Electrical Installation
Sub-Strand 2.3: Inductors, 3.1: Generation, Transmission & Distribution of Electricity

1. (3 marks)
Define an inductor and state its main function in a DC circuit.

_____

_____

2. (3 marks – Fill in the blanks)
Energy stored in an inductor is proportional to the _____(current/magnetic flux/voltage) and _____(number of turns/core material/length).

3. (4 marks)
List two s of inductors in:
a) Domestic appliances

_____

_____

b) Vehicle electrical systems

_____

_____

4. (3 marks – True/False)
Determine whether the statements are True or False:
a) Inductors oppose changes in current in a circuit.

_____

_____

b) Inductors store energy in the form of electric charge.

_____

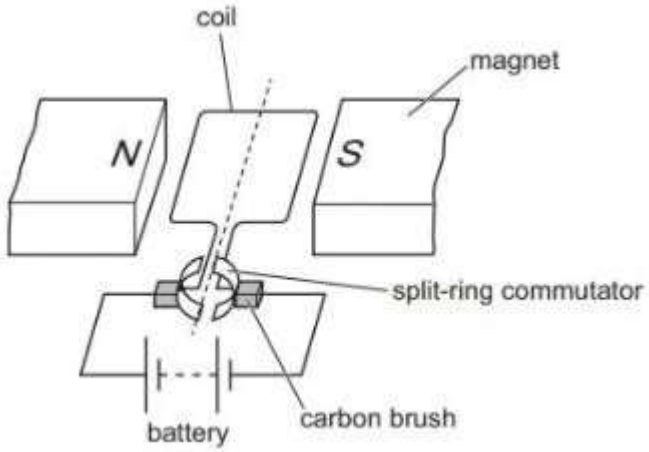
_____

c) A coil without a core has no inductance.

_____

_____

5. (4 marks – Diagram Identification)
The diagram shows a coil connected to a DC source:



a) Identify the component.

_____

_____

b) Indicate the direction of conventional current.

_____

_____

6. (4 marks)

State two factors that affect the inductance of a coil.

_____

_____

7. (4 marks)

Explain why inductors are important in smoothing current in DC circuits.

_____

_____

8. (5 marks – Drawing & Labelling)

Draw a simple inductor with a soft iron core. Label: coil, core, terminals.

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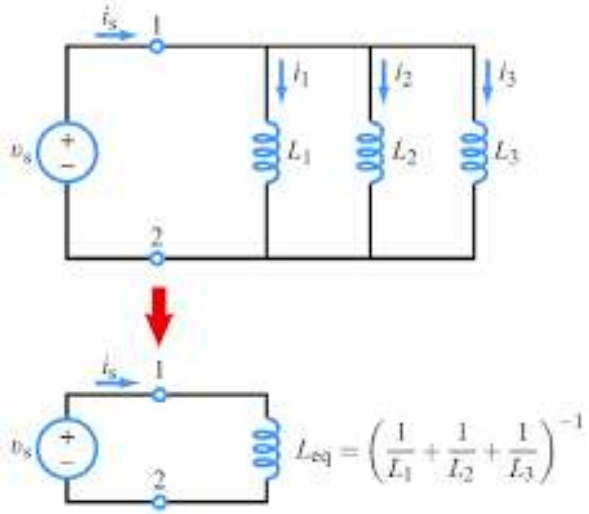
9. (4 marks – Calculation & Explanation)
A coil of 200 turns carries a current of 2 A and has an inductance of 0.5 H. Calculate the energy stored in the inductor.

10. (5 marks – Practical Procedure)
Outline the steps to construct a simple inductor using a coil of insulated copper wire and a cylindrical core. Include safety precautions.

11. (5 marks –)
Explain how an inductor is used in a relay circuit in a DC electrical appliance. Include a simple labelled diagram.

12. (4 marks –)
Which of the following increases the inductance of a coil?
A. Decreasing the number of turns
B. Using an iron core instead of air
C. Shortening the length of wire
D. Reducing current in the coil

13. (5 marks – Diagram & Observation)
The diagram below shows a series and parallel combination of two inductors:



a) Draw the equivalent inductance formula for each combination.
b) Explain which combination stores more energy.

14. (4 marks – Short Answer)
State two practical s of inductors in domestic electrical appliances.

_____
_____

15. (4 marks – Analysis)
Explain how the number of turns in a coil affects the inductance and energy storage of the inductor.

_____
_____
_____
_____

16. (5 marks – Practical Testing)
Describe a procedure to measure the performance of an inductor in a simple DC circuit using a multimeter and ammeter.

_____
_____
_____
_____

17. (4 marks – Diagram Interpretation)
Draw a simple inductor circuit and label: voltage source, coil, and current direction.

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18. (4 marks – Observation)
Explain why an inductor opposes sudden changes in current in a DC circuit.

_____

_____

_____

_____

19. (5 marks – Experimental Design)
Design an experiment to investigate how changing the number of turns in a coil affects its inductance. Include variables to measure and control.

20. (5 marks – Analysis &)
Explain the role of inductors in DC circuits of electric vehicles for energy storage and current smoothing.

21. (5 marks – Problem Solving & Diagram)
A DC circuit contains an inductor in series with a resistor and battery.
a) Draw the circuit diagram.

b) Explain how the inductor affects the current when the switch is first closed.

22. (5 marks – Practical Reasoning)
Explain the advantages of using inductors in:
a) Power supply filters

b) Timing circuits

c) Relay control circuits

23. (5 marks – &)
Evaluate the importance of inductors in domestic appliances and vehicle systems. Include at least 3 points.

24. (4 marks – Short Answer)
State two methods of generating electrical energy.

25. (4 marks – Diagram & Labelling)
Draw a labelled **3-phase 4-wire distribution circuit** showing line to line and line to neutral voltages.

26. (5 marks –)
Explain the functions of the following components in a power transmission network:
a) Transformers

b) Transmission lines

c) Circuit breakers

27. (4 marks – Model/Diagram)
Sketch a simple model of an electric power grid supplying a town from a power station. Label: generator, transmission lines, distribution lines, and consumers.

28. (4 marks – Analysis)
Explain why a grid system is important in a country.

_____

_____

29. (4 marks – Critical Thinking)
Discuss two challenges faced in transmitting electricity over long distances and how they are overcome.

_____

_____

30. (4 marks – &)
Compare the advantages of a **3-phase distribution system** over a single-phase system for industrial consumers.

_____

_____

_____

_____

_____

_____

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Strand 3.0: Electrical Installation – Consumer Intake Point
1.0 Low-Order Questions (25 marks)

1. (3 marks)
Define a consumer's electrical intake point.

_____
_____

2. (3 marks – Fill in the blanks)
At the consumer intake point, the _____protects the building against overcurrent, while the _____measures electricity consumption.

3. (4 marks)
List two types of equipment found at a consumer intake point.

_____
_____

4. (3 marks – True/False)
Decide if the statements are True or False:
a) The main switch comes before the cut-out in the supply sequence.

_____
_____

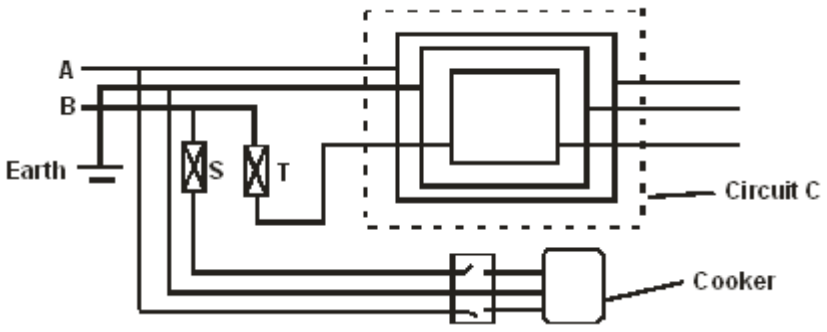
b) The earth electrode protects people from electric shock.

_____
_____

c) The energy meter controls the flow of electricity.

_____
_____

5. (4 marks – Diagram Identification)
The diagram below shows part of a section of a house wiring system.



i. Name the circuit marked circuit C. (1 mk)

_____

ii. Identify the cables marked A and B. (2 mks)

A_____

B_____

iii. Explain the function of the device marked S and T. (3mks)

_____

_____

iv. A house has three rooms each with two 240V, 60W bulbs. If the bulbs are switched on from 7.00p.m to 10.00pm daily.

a. Calculate the power consumed per day in kilowatt-hours. (2 marks)

b. Find the cost per week for lighting these rooms at sh.6.30 per kilowatt hour. (2 marks)

6. (4 marks – Short Answer)
State two safety precautions to observe when installing consumer intake equipment.

_____

_____

7. (4 marks – Matching)
Match the equipment to its function:

i. Cut-out

ii. Energy meter

iii. Main switch

iv. Consumer control unit

a) Measures electricity consumption

b) Controls overall power supply

c) Protects circuits from overcurrent

d) Distributes power to internal circuits

8. (5 marks – Diagram & Labelling)
Draw a labelled diagram showing the correct sequence of installation at a consumer intake point. Include: service cable, cut-out, energy meter, main switch, and consumer control unit.

9. (5 marks – Short Answer)
Explain why the sequence of installation at a consumer intake point must follow a specific order.

_____

_____

10. (4 marks – Safety)
List four safety measures to observe when preparing a consumer earth point.

_____

_____

_____

_____

11. (5 marks – Calculation &)
An earth electrode has a resistance of 4 Ω. If the maximum fault current is 50 A, calculate the voltage that will appear across the electrode. Comment on whether it is safe.

_____

_____

12. (5 marks – Practical)
Describe the steps to excavate and install an earth electrode according to standard regulations.

_____

_____

13. (4 marks –)
Which of the following is the primary purpose of the cut-out?
A. Measure electricity consumption
B. Protect circuits from overload
C. Provide earthing
D. Distribute power

14. (5 marks – Diagram Interpretation)
Name one material used to make each of the following parts of electric machines: (2 marks)

i. Commutator segments:_____

ii. Slip rings:_____

iii. Brushes:_____

iv. Armature core:_____

15. (4 marks – Short Answer)
State two functions of the consumer control unit.

_____

_____

16. (4 marks – Observation)
Explain how a properly installed earth electrode enhances safety at the consumer intake point.

_____

_____

17. (4 marks –)
Explain why an intake point inspection is important before electricity is connected to a building.

_____

_____

18. (5 marks – Practical Design)
Design a simple installation layout for a residential building's intake point, showing the sequence from service cable to consumer control unit. Include a labelled earth electrode.

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19. (5 marks – Critical Thinking)
Explain the potential consequences of reversing the positions of the energy meter and cut-out in a consumer intake point.

_____

_____

_____

_____

20. (5 marks – Problem Solving)
A building's intake point has a total load of 12 kW and is supplied at 240 V. Calculate the maximum current and suggest the rating of the main switch and cut-out.

21. (5 marks – Safety Analysis)
A consumer intake point has been installed without a proper earth electrode. Analyse the risks to:
a) Occupants

_____

_____

b) Electrical appliances

_____

_____

22. (5 marks – & Justification)
Evaluate the importance of consumer intake equipment in ensuring safe, efficient, and reliable electricity supply. Include at least 3 points.

23. (4 marks – Short Answer)
List four types of control equipment used at a consumer intake point.

24. (4 marks – Diagram)
Sketch and label a consumer intake point for a commercial building. Include main switch, energy meter, cut-out, and consumer control unit.

25. (4 marks – Analysis)
Discuss why proper earthing is critical in areas with high rainfall and humid conditions.

26. (4 marks – Calculation)
If a fault current of 100 A flows through an earth electrode with 2 Ω resistance, calculate the potential difference developed across the electrode.

27. (4 marks – Interpretation)
Explain the function of a service cable in supplying electricity to a consumer.

_____

_____

28. (4 marks – Safety)
Explain two safety rules to follow when performing maintenance on consumer intake equipment.

_____

_____

29. (4 marks)
Describe the steps to verify the proper operation of an energy meter after installation.

_____

_____

30. (4 marks)
Justify why inspection of the consumer intake point should always precede energizing the electrical supply.

_____

_____

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Strand 3.3: Final Circuits – Domestic Installation

1. (3 marks)
Define a final circuit in a domestic electrical installation.

_____

_____

2. (3 marks – Short Answer)
List two types of final circuits commonly used in homes.

_____

_____

3. (4 marks – Fill in the blanks)
A _____circuit supplies energy to lighting points while a _____circuit supplies energy to heavy appliances like cookers and water heaters.

4. (3 marks – True/False)
State whether the following are true or false:
a) A bell circuit is a type of final circuit.

_____

_____

b) Final circuits do not require circuit breakers.

_____

_____

c) Socket outlets are connected via power circuits.

_____

_____

5. (4 marks – Matching)
Match the final circuit type to its typical use:

1. Lighting circuit:_____
2. Power circuit:_____
3. Bell circuit:_____
4. Water heater circuit:_____

a) Supplies electricity to a doorbell
b) Supplies energy to lamps
c) Supplies heavy-duty appliances
d) Supplies electricity to a geyser

6. (4 marks – List)
State four tools or materials needed to install a domestic final circuit.

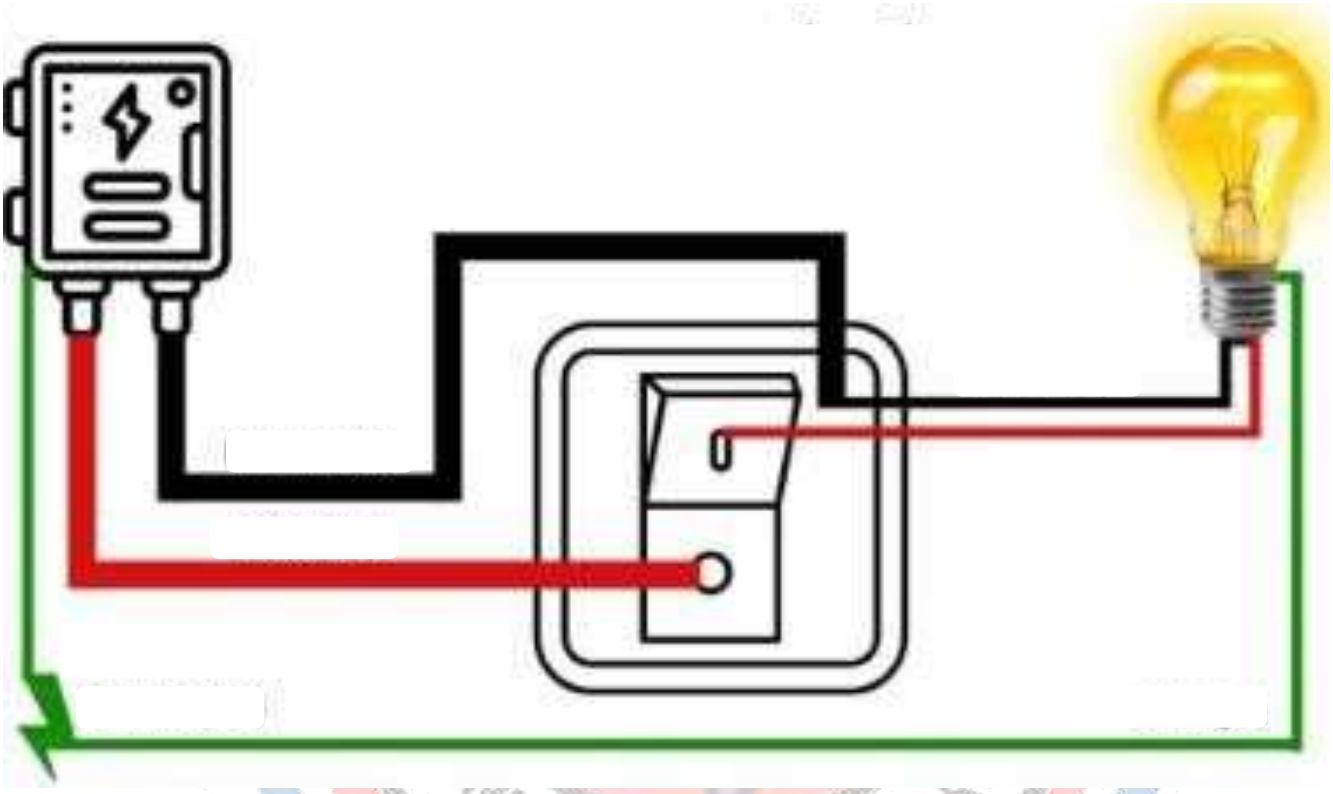
_____

_____

_____

_____

7. (4 marks – Diagram Identification)
The diagram below shows a simple final circuit with a switch, lamp, and socket outlet:



a) Label the live and neutral wires.
b) Identify the position of the switch.

8. (5 marks – Diagram & Labelling)
Draw a wiring diagram for a lighting final circuit with two lamps controlled by one switch. Label all conductors and components.

9. (5 marks)
Explain why final circuits in domestic installations are connected in parallel rather than in series.

10. (4 marks – Calculation)
A lighting circuit has two lamps, each rated 60 W, connected to a 240 V supply. Calculate the total current drawn.

11. (5 marks – Practical Sequence)
Arrange the following steps in the correct sequence for installing a final circuit:
a) Connect wires to switch
b) Install lamp holder
c) Mount the consumer unit breaker
d) Test the circuit for continuity
e) Connect socket outlets

12. (4 marks –)
Describe the steps for compiling a bill of materials for a final circuit installation task.

13. (5 marks – Diagram Interpretation)
The diagram below shows a final circuit with a cooker outlet and water heater switch:

(Insert diagram with labelled switch, socket, and heater)

a) Identify the load points.

_____

_____

b) Explain the purpose of each switch.

_____

_____

14. (4 marks –)
Which of the following is NOT part of a domestic final circuit?
A. Lamp holder
B. Switch
C. Main transmission line from substation
D. Socket outlet

15. (5 marks – Short Answer)
Explain why isolating switches are used in final circuits.

_____

_____

_____

_____

16. (4 marks – Observation)
State two precautions to observe when installing final circuits on a vertical wooden board.

_____

_____

17. (4 marks – Practical)
Explain why testing of final circuits is necessary after installation.

18. (5 marks – Diagram & Design)
Design a simple domestic final circuit containing:

i. 1 three-way switch controlling 2 lamps

ii. 1 socket outlet

iii. 1 water heater switch

Label all components and conductors.

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19. (5 marks – Problem Solving)
A 240 V lighting circuit has three 100 W lamps in parallel. Calculate:
a) The current drawn by each lamp

b) Total current in the circuit

20. (5 marks – Analysis)
A student installed a final circuit but noticed that one lamp flickers when the cooker is switched on. Analyse possible causes and propose solutions.

_____
_____
_____
_____

21. (5 marks –)
Evaluate the importance of final circuits in ensuring:
a) Safety

_____
_____

b) Efficient electricity use

_____
_____

c) Convenience in a domestic environment

_____
_____

22. (5 marks – Justification)
Justify why all domestic final circuits should be connected through appropriate protective devices (MCB or fuse) at the consumer unit.

23. (4 marks – Short Answer)
List four materials used in the installation of domestic final circuits.

24. (4 marks – Diagram)
Sketch a simple bell final circuit including bell, switch, and supply. Label all components.

25. (4 marks – Short Answer)
Explain the significance of a neutral wire in final circuits.

26. (4 marks – Calculation &)
A power circuit supplies a kettle rated 2000 W at 240 V. Calculate the current drawn. Suggest the minimum rating of the protective fuse.

27. (4 marks – Interpretation)
Describe the function of the consumer unit in distributing electricity to final circuits.

28. (4 marks – Safety)
Explain two hazards of improperly installed final circuits.

29. (4 marks –)
List the steps for connecting a socket outlet in a domestic final circuit.

30. (4 marks – Critical Thinking & Justification)
Explain why final circuits are usually installed after the main power intake has been verified and energized safely.

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COMPETENCE-BASED EDUCATION – TOPICAL REVISION

Strand 4.0: Electronics – Semiconductor Theory

1. (3 marks)

Define a semiconductor material.

_____

_____

2. (3 marks – Short Answer)

Give two examples of semiconductor materials.

_____

_____

3. (4 marks – Fill in the blanks)

A _____semiconductor has no impurities, while a _____semiconductor has impurities added to modify its conductivity.

4. (3 marks – True/False)

State whether the following are true or false:

a) Silicon is a commonly used semiconductor.

_____

_____

b) Conductivity in intrinsic semiconductors is high at room temperature.

_____

_____

c) Extrinsic semiconductors are made by doping intrinsic semiconductors.

_____

_____

5. (4 marks – Matching)

Match the type of semiconductor with its description:

i. N-type

ii. P-type

iii. Intrinsic

iv. Extrinsic

a) Semiconductor with electrons as majority carriers

b) Pure semiconductor with no impurities

c) Semiconductor with holes as majority carriers

d) Semiconductor created by adding impurity atoms

6. (4 marks – List)

State four characteristics of semiconductor materials.

_____

_____

_____

_____

7. (4 marks – Diagram Identification)
The diagram below shows a PN junction:

(Insert simple PN junction diagram: N-type region, P-type region, depletion layer)

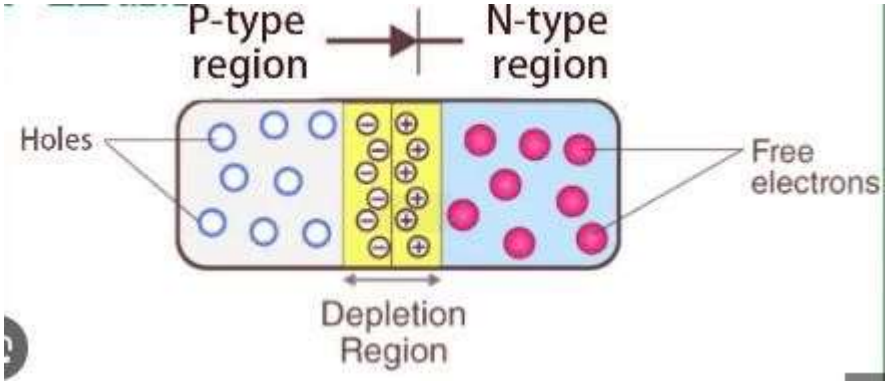
a) Label the P-type and N-type regions.
b) Identify the depletion region.

8. (5 marks – Diagram & Labelling)
Draw and label a PN junction showing the flow of current when forward biased.

9. (5 marks – Short Answer)
Explain the difference between intrinsic and extrinsic semiconductors.

10. (4 marks –)
A silicon semiconductor has been doped with phosphorus. Identify the type of semiconductor formed and the majority carriers.

11. (5 marks – Diagram & Analysis)
The diagram below shows a P-type and N-type material before forming a junction:



a) Explain what happens when the junction is formed.

b) Identify the majority and minority carriers in each region.

12. (4 marks – Short Answer)
Describe two practical s of semiconductors in electronics.

13. (5 marks – Practical)
List the steps involved in doping a semiconductor material.

14. (4 marks –)
Which of the following increases conductivity in a semiconductor?
A. Removing all electrons
B. Cooling to absolute zero
C. Adding impurities
D. Using a perfect insulator

15. (5 marks – Short Answer)
Explain the formation of a depletion layer in a PN junction.

16. (4 marks – Observation &)
Why is silicon preferred over germanium in most electronic devices?

17. (4 marks – Practical & Diagram)
Sketch the energy band diagram for a P-type and N-type semiconductor. Label conduction and valence bands.

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18. (5 marks – Diagram & Design)
Draw a model to show covalent bonding in an N-type semiconductor. Label the donor atoms and extra electrons.

19. (5 marks – Analysis)
A semiconductor diode is forward biased. Explain the movement of charge carriers across the junction and the effect on current flow.

20. (5 marks – Problem Solving)
Given a PN junction diode, calculate the direction of conventional current if the P-terminal is connected to +12 V and the N-terminal to 0 V. Explain your reasoning.

21. (5 marks –)
Evaluate the importance of semiconductors in modern electronics and communication devices.

22. (5 marks – Justification)
Justify why doping is necessary in creating functional semiconductor devices such as diodes and transistors.

23. (4 marks – Diagram & Labelling)
Sketch and label a diode symbol used in circuit diagrams.

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24. (4 marks – Short Answer)
List two materials used for N-type and two for P-type semiconductors.

25. (4 marks – Short Answer)
Explain the role of holes in P-type semiconductors.

26. (4 marks – Practical)
Describe how you would test a PN junction diode using a multimeter.

27. (4 marks – Critical Thinking)
Explain why the conductivity of semiconductors increases with temperature.

28. (4 marks – Analysis)
A student observed no current in a reverse-biased diode. Explain why.

29. (4 marks –)
List the steps to create a simple semiconductor model using locally available materials for classroom demonstration.

30. (4 marks –)
Discuss two safety precautions to observe when handling semiconductor materials in a laboratory.

Strand 4.0: Electronics – Semiconductor Diodes

1. (3 marks)

Define a semiconductor diode.

_____

_____

2. (3 marks – Short Answer)

State two types of semiconductor diodes used in domestic appliances.

_____

_____

3. (4 marks – Fill in the blanks)

In _____bias, a diode allows current to flow, while in _____bias, a diode blocks current.

4. (3 marks – True/False)

Determine whether the following statements are True or False:

a) A diode can conduct in both directions.

_____

_____

b) Electron-hole recombination occurs in a forward-biased diode.

_____

_____

c) Zener diodes are used for voltage regulation.

_____

_____

5. (4 marks – Matching)

Match the type of diode to its common use:

i. LED

ii. Zener diode

iii. Power diode

iv. Infrared diode

a) Voltage regulation
b) Lighting and display
c) High current rectification
d) Remote sensing

6. (4 marks – List)

List four s of semiconductor diodes in everyday life.

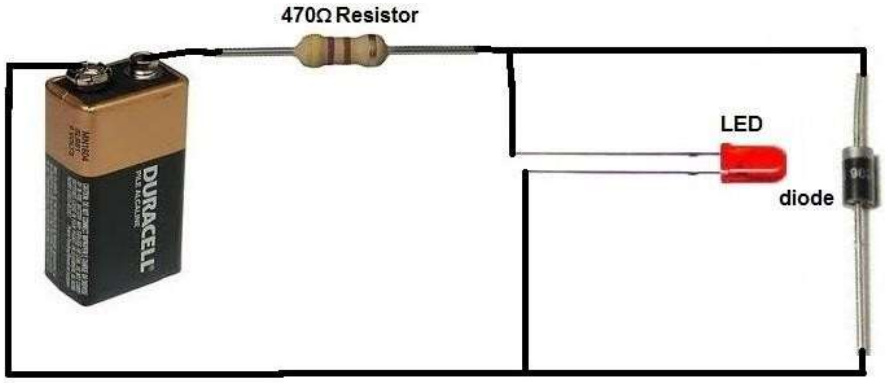
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7. (4 marks – Diagram Identification)
The diagram below shows a simple diode circuit:



a) Label the anode and cathode of the diode.
b) Indicate the direction of conventional current when the diode is forward biased.

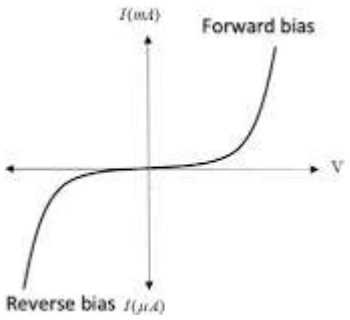
8. (5 marks – Diagram & Labelling)
Draw a forward-biased diode circuit and label the anode, cathode, and direction of current flow.

9. (5 marks – Short Answer)
Explain the difference between a forward-biased and reverse-biased diode.

10. (4 marks – Practical)
Describe an experiment to determine the I-V characteristics of a diode using a power supply, ammeter, and voltmeter.

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11. (5 marks – Diagram & Analysis)
The graph below shows the I-V characteristics of a diode:



a) Identify the threshold voltage.

_____

_____

b) Explain the behavior of the diode in reverse bias.

_____

_____

12. (4 marks – Short Answer)
Explain two reasons why diodes are used in rectifier circuits.

_____

_____

13. (5 marks – Practical)
Sketch a simple half-wave rectifier circuit and label all components.

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14. (4 marks –)
Which of the following diodes is commonly used for voltage stabilization?
A. LED
B. Zener diode
C. Infrared diode
D. Schottky diode

15. (5 marks – Problem Solving)
A diode is connected in series with a 1 kΩ resistor across a 12 V battery. The diode has a forward voltage of 0.7 V. Calculate the current flowing through the circuit.

16. (4 marks – Observation & Analysis)
Why is a diode preferred over a mechanical switch in switching circuits?

_____

_____

17. (4 marks – Diagram & Labelling)
Draw and label a full-wave bridge rectifier circuit using four diodes.

18. (5 marks – Analysis)
Explain the process of electron-hole recombination in a forward-biased diode and its effect on current flow.

19. (5 marks – Practical &)
Describe how you would troubleshoot a diode circuit that is not conducting. Include at least three possible faults.

20. (5 marks –)
Evaluate why Zener diodes are critical in protecting electronic appliances.

21. (5 marks – Design)
Design a diode-based voltage regulation circuit using a 12 V power supply and a Zener diode of 6.8 V. Explain how it maintains a stable output voltage.

22. (5 marks – Justification)
Justify why LEDs are preferred over incandescent bulbs for energy-saving lighting in modern homes.

23. (4 marks – Short Answer)
List two types of diodes used in commercial sensing s.

24. (4 marks – Diagram & Labelling)
Sketch a diode in reverse-bias connected to a resistor and label all components.

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25. (4 marks – Critical Thinking)
Explain why diodes conduct current only in one direction.

26. (4 marks – Practical)
Describe the steps to connect a diode for use as a rectifier in a simple AC circuit.

27. (4 marks – Observation &)
A diode in an appliance has failed. Explain the possible effect on the appliance.

28. (4 marks –)
Which diode is best suited for low-current, low-voltage indicator lights?
A. Power diode
B. LED
C. Zener diode
D. Schottky diode

29. (4 marks –)
Explain how infrared diodes are used in remote controls.

30. (4 marks –)
Discuss two safety precautions when handling and testing semiconductor diodes in a workshop.

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Strand 4.0: Electronics – Transistors

1. (3 marks)

Define a semiconductor transistor.

_____

_____

2. (3 marks – Short Answer)

List two types of transistors commonly used in electronic circuits.

_____

_____

3. (3 marks – Fill in the blanks)

A _____transistor has three terminals called base, collector, and emitter.

4. (4 marks – True/False)

Determine whether the following statements are True or False:

a) A transistor can amplify current.

_____

_____

b) FET stands for Field Emission Transistor.

_____

_____

c) Transistors are used in switching circuits.

_____

_____

d) BJT stands for Bipolar Junction Transistor.

_____

_____

5. (4 marks – Matching)

Match the type of transistor to its common :

i. BJT

ii. FET

iii. Darlington transistor

iv. Phototransistor

a) Light detection
b) High current amplification
c) Voltage amplification
d) Switching circuits

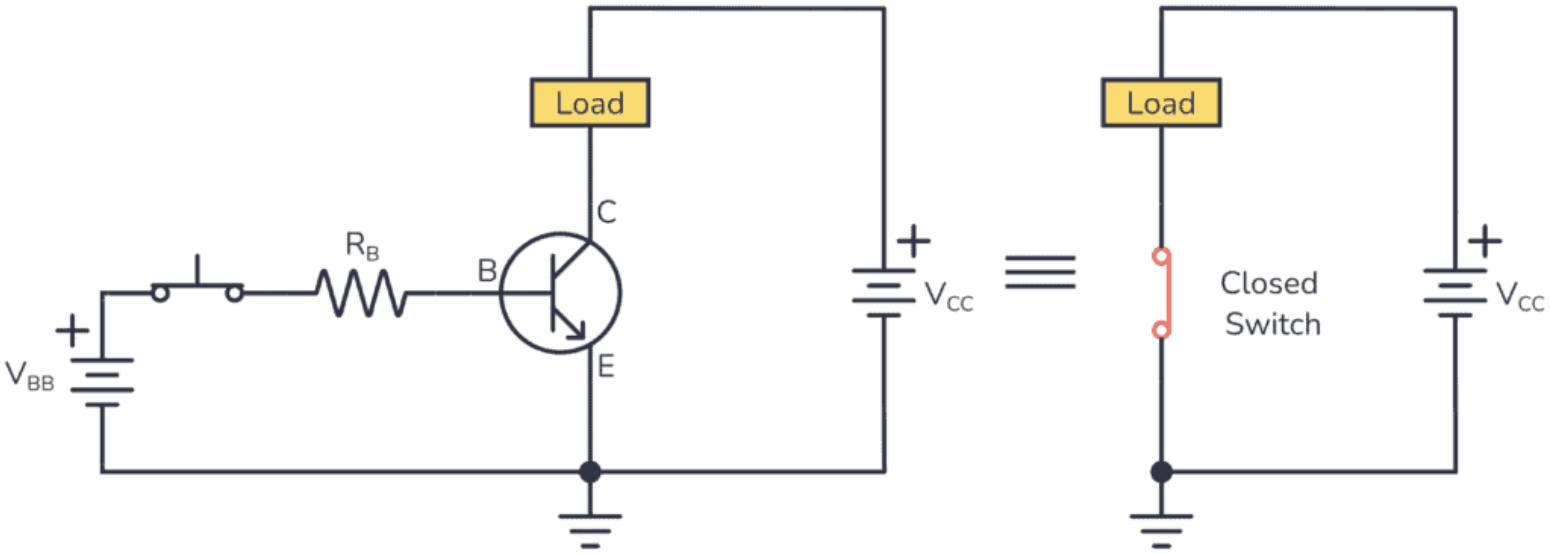
6. (3 marks – List)

List three s of transistors in everyday electronic devices.

_____

_____

7. (5 marks – Diagram Identification)
The diagram below shows a basic BJT circuit:



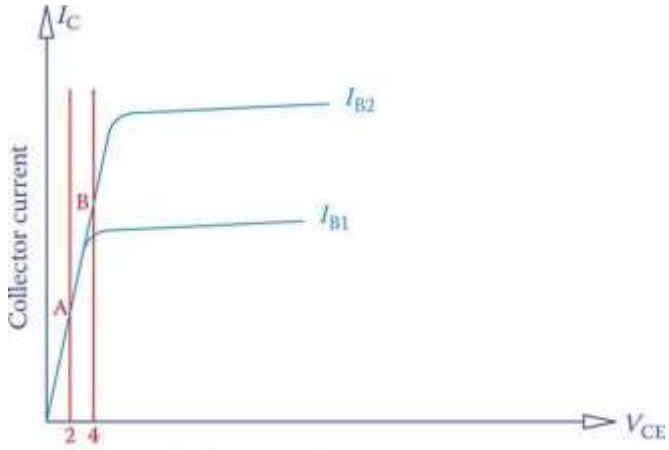
a) Label the base, collector, and emitter.
b) Indicate the direction of current flow from collector to emitter.

8. (5 marks – Diagram & Labelling)
Draw a circuit diagram for a common-emitter transistor amplifier and label all terminals.

9. (5 marks – Short Answer)
Explain the difference between a BJT and an FET in terms of operation.

10. (4 marks – Practical)
Describe an experiment to verify the current-voltage characteristics of a BJT.

11. (5 marks – Graph Interpretation)
The graph below shows the V-I characteristics of a transistor:



a) Identify the active, cutoff, and saturation regions.
b) Explain the effect of increasing base current on collector current.

12. (4 marks – Short Answer)
Explain why a transistor is called a "current-controlled device."

_____

_____

13. (5 marks – Circuit Drawing)
Draw and label a transistor switch circuit that turns on a lamp when the base receives a positive signal.

14. (4 marks –)
Which of the following is an advantage of using a transistor instead of a mechanical switch?
A. Lower cost
B. Current amplification
C. Bulky size
D. Mechanical durability

15. (4 marks – Problem Solving)
A BJT has a current gain (β) of 100. If the base current is 2 mA, calculate the collector current.

_____

_____

16. (4 marks – Observation & Analysis)
Why is it important to prevent overcurrent through the base of a transistor?

_____

_____

17. (5 marks – Diagram & Labelling)
Sketch a simple FET amplifier circuit and label the gate, drain, and source.

18. (5 marks – Analysis)
Explain the principle of operation of a transistor in amplification mode.

19. (5 marks – Practical &)
Describe the steps to assemble a transistor switching circuit for controlling a small motor.

20. (5 marks –)
Evaluate why transistors have replaced vacuum tubes in modern electronic devices.

21. (5 marks – Design)
Design a BJT amplifier circuit for an audio signal. Include resistor values, supply voltage, and explain how biasing ensures proper operation.

22. (5 marks – Justification)
Justify the use of FETs in high-impedance input circuits instead of BJTs.

23. (4 marks – Short Answer)
List two types of transistor configurations used in amplifiers.

24. (4 marks – Diagram & Labelling)
Draw a common-collector (emitter-follower) transistor circuit and label the terminals.

25. (4 marks – Critical Thinking)
Explain why a Darlington pair has higher current gain than a single BJT.

26. (4 marks – Practical)
Describe how you would test a transistor with a multimeter to determine if it is functional.

27. (4 marks – Observation)
A transistor in a switching circuit is stuck in saturation. Explain the effect on the load device.

28. (4 marks –)
Which transistor is most suitable for low-noise, high-frequency s?
A. BJT
B. FET
C. Darlington
D. Phototransistor

29. (4 marks –)
Explain how phototransistors are used in automatic lighting systems.

30. (4 marks –)
Discuss two safety precautions when handling and testing transistors in an electronics laboratory.