KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

GENERAL EDUCATION AND TRAINING

GRADE 9

NATURAL SCIENCES
PLC PRE-EXAMINATION
2025 TERM 4

Time: 80 Minutes

Marks: 60

Instructions and Information

1. You must answer **all the questions.**
2. Read the instructions carefully, and answer questions as instructed.
3. Number your answers exactly as the questions are numbered.
4. Write neatly and legibly.

This question paper consists of **10 pages** and contains **11 questions**.

SECTION A - ENERGY AND CHANGE (60% TERM 3 CONTENT)

QUESTION 1

Four options are provided as possible answers to the questions below. Each question has only ONE correct answer. Choose the correct answer and write ONLY the letter next to the question number in your answer book, e.g 1.1 A

1.1. Which of the following is a non-contact force?

A Tension force
B Normal force
C Friction force
D Electrostatic force (1)

1.2. The electrostatic force between two charged objects is F. The distance between them is increased. How does the electrostatic force change?

A It increases
B It decreases
C It remains the same
D None of the above (1)

1.3. The magnetic field lines OUTSIDE a bar magnet:

A Start at the south pole and end at the north pole.
B Start at the north pole and end at the south pole.
C Start at both poles and end up at infinity.
D Magnetic field lines only exist inside the bar magnet. (1)

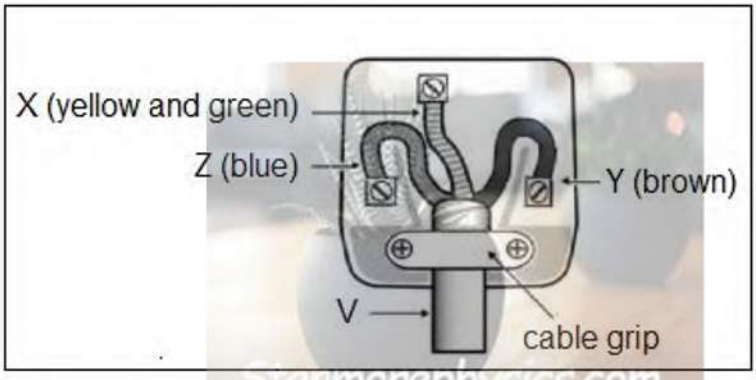
1.4. When a glass rod is rubbed with a piece of silk and becomes positively charged…

A Protons are removed from the silk.
B Protons are added to the silk.
C Protons are added to the rod.
D Electrons are removed from the rod. (1)

1.5. An electrical component which converts chemical energy into electrical energy:

A Resistor
B Buzzer
C Bulb
D Cell (1)

1.6. Which ONE of the following represents the earth wire in the power plug?



A X
B Y
C Z
D V (1)

1.7. Study the following items. Only give the LETTER of the correct answer.

Identify the items from left to right as shown above.

A Fuses, resistors, LED, circuit breaker.
B Conductors, insulators, light bulb, switch.
C Connectors, resistors, fuse, circuit breaker.
D Connectors, resistors, circuit breaker, switch. (1)

1.8. Which statement is TRUE about the current in a parallel circuit?

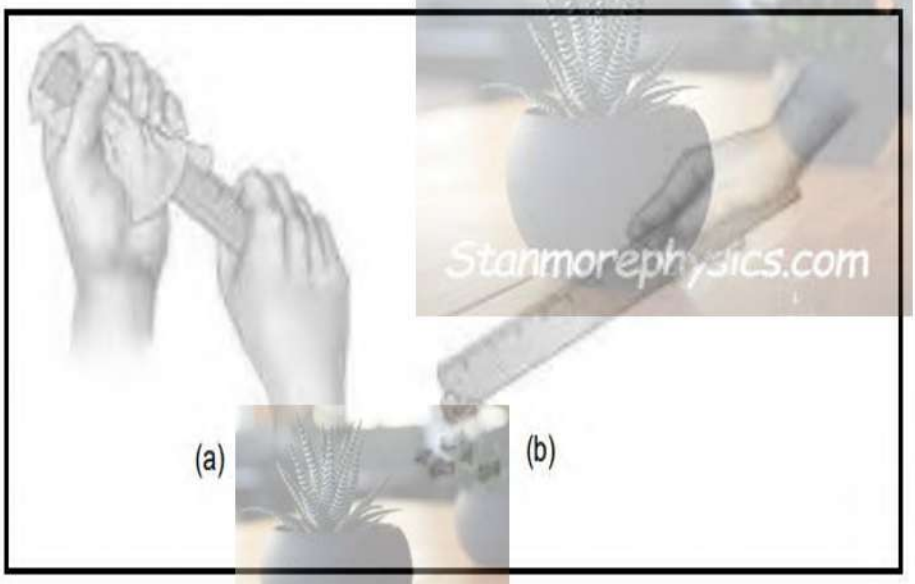
A It is produced by resistance.
B It divides among the branches.
C It decreases if another resistor is added in parallel.
D It is the same at every point in the circuit. (1)

[8]

QUESTION 2

2.1. Define the concept 'force'. (2)

2.2. A ruler is rubbed with a cloth and brought near some small pieces of paper. The paper is attracted to the ruler until the ruler touches the paper. After some time it appears as if some of the pieces of paper are repelled by the ruler.



2.2.1. Explain how the ruler obtains a positive charge when it is rubbed with a cloth. (1)

2.2.2. Explain why the papers are attracted to the ruler. (1)

2.3. Describe TWO safety precautions that can be practised during a lightning and thunderstorm. (2)
[6]

QUESTION 3

Study photographs A and B.

3.1.1. Which photograph represents a battery? (1)

3.1.2. Describe the function of a battery in an electric circuit. (2)

3.2. A group of grade 9 learners conducts an investigation to determine the relationship between the length of a conductor and the current strength. They used different lengths of the same type of conductor and measure the current strength of the conductors.

The table below shows the results they recorded.

LENGTH OF CONDUCTOR (cm)	CURRENT STRENGTH (A)
3	5
6	4
9	3
12	2
15	1

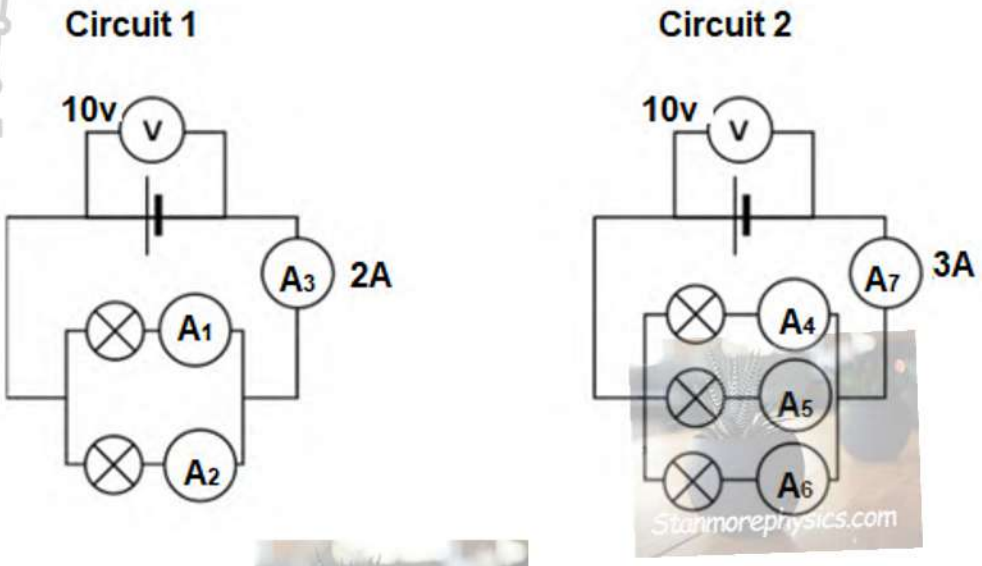
3.2.1. Write down a hypothesis for this investigation. (2)

3.3. Identify the:

3.3.1. Dependent variable (1)
3.3.2. Independent variable (1)
[7]

QUESTION 4

Circuit 1 and Circuit 2 are connected as shown in the diagram below. All the light bulbs are identical.



4.1. Explain why the voltmeter readings across all the bulbs will be the same. (1)

4.2. Explain why the total current in Circuit 1 is less than the total current in Circuit 2. (2)

4.3. Determine the readings on A_4, A_5 and A_6. (1)

4.4. How does the brightness of the light bulbs in circuit 1 compare to that of the light bulbs in Circuit 2? (1)

4.5. In terms of potential difference, tabulate ONE difference between resistors connected in a series circuit and resistors connected in a parallel circuit. (2)
[7]

QUESTION 5

Koeberg Power Station is the only nuclear power station in South Africa.

5.1. The following steps are part of the process of generating electricity at a nuclear power station. Arrange the steps in the correct sequence.

Write **ONLY the LETTERS** in the correct sequence.

A Stream turns turbine.

B Stream is produced through the heating of water.

C Rotation of the turbines drive generators.

D Heat is released through nuclear fusion. (1)

5.2. Which **ONE** of the steps in Question 5.1 is not present in the generation of electricity in a coal fired power station? Write only the **LETTER** of the answer. (1)

5.3. Give **TWO** advantages of generating electricity by using nuclear energy. (2)
[4]

QUESTION 6

A washing machine has a power rating of 480 W. It takes the machine 1,5 hours to completely wash a 6 kg load of heavily soiled laundry. Eskom charges energy usage at R1,65 per kWh.

6.1. Convert 480W to kilowatt. (1)

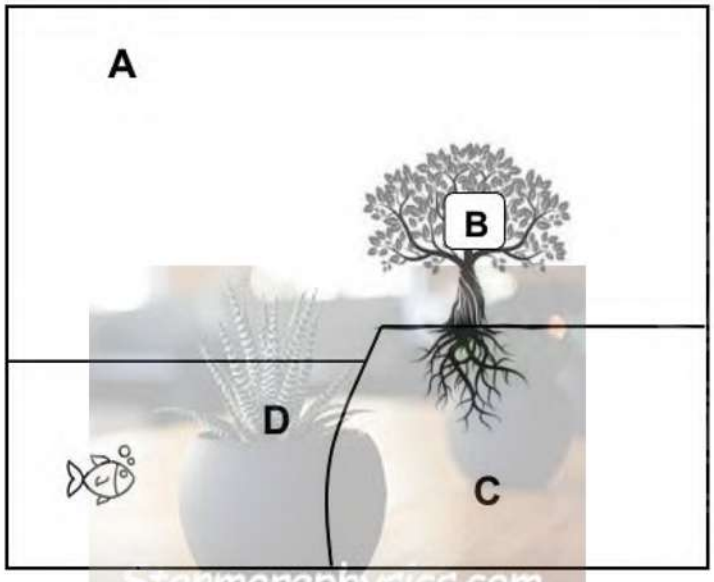
6.2. Calculate the cost if the washing machine works for 1,5 hours. (3)

You may use the formula: Cost = power rating (kW) × time × unit price **[4]**

SECTION B - EARTH AND BEYOND (40% TERM 4 CONTENT)

QUESTION 7

In the following diagram the letters A, B, C and D represent the four spheres of the earth:

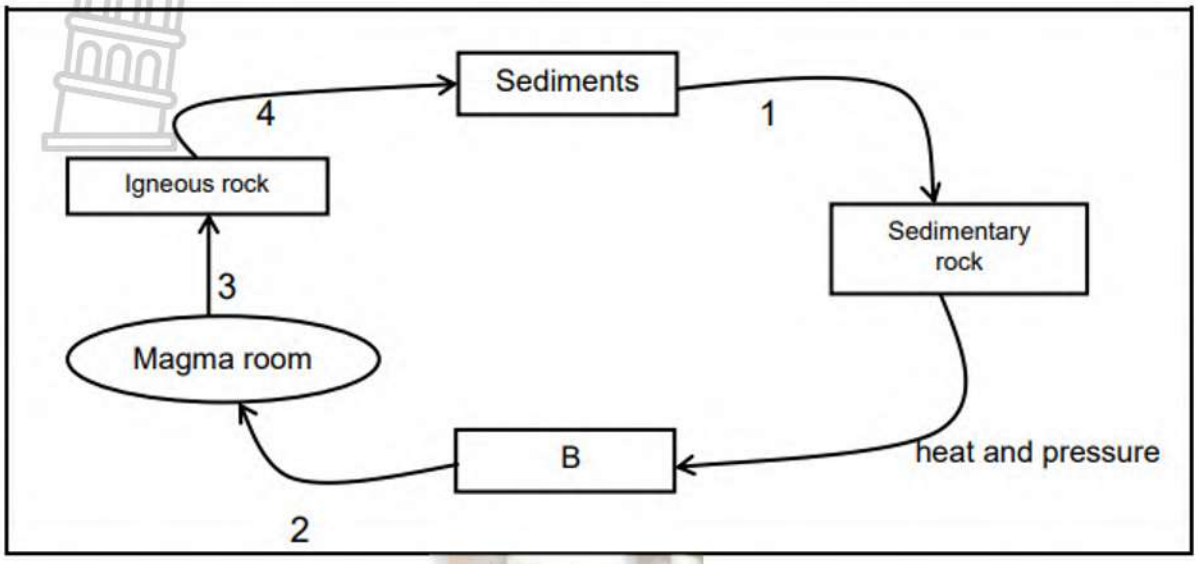


7.1. Give the correct term for the sphere represented by the letter D in the diagram. (1)

7.2. Explain the interaction between sphere B and sphere C. (2)
[3]

QUESTION 8

Study the following flow chart of the rock cycle and answer the questions that follow.



8.1. Which type of rock forms at B? (1)

8.2. Describe what happens during each of the following processes:

8.2.1. Process 2 (1)

8.2.2. Process 3 (1)

8.2.3. Process 4 (1)

8.3. Give an example of EACH of the following:

8.3.1. Igneous rock (1)

8.3.2. Sedimentary rock (1)

[6]

QUESTION 9

Read the following case study and answer the questions that follow.

How is iron extracted from iron ore

Iron is one of the most common, cheapest and most important metals. It is used in many structures such as buildings, bridges and goods such as metal poles, motor cars, nails and fences.

The extraction of iron from iron ore is not a new idea. Thousands of years ago, many men in South Africa were metal workers who extracted iron from iron ore.

Today, a large amount of iron is extracted from iron ore in huge blast furnaces.

The extraction of iron from iron ore needs several chemical processes. Use the steps below to answer the questions.

1. Iron ore, coke and limestone are added at the top of a blast furnace. Limestone (calcium carbonate) decomposes at high temperatures inside the blast furnace to form calcium oxide and carbon dioxide escapes through the top of the blast furnace. The calcium oxide that is formed reacts with the main impurity in the ore, which is sand (silicon oxide) to make a waste compound called slag (calcium silicate). The molten slag falls to the bottom of the furnace where it floats on the molten iron. The slag is tapped off and used to make cement.

2. Blasts of hot air are blown in through small holes near the bottom of the furnace. This is what gives the furnace its name: blast furnace. The hot air burns the carbon in the coke to form the gas, carbon monoxide. This reaction gives off lots of heat and the temperature in the furnace reaches 2 000°C.

3. The carbon monoxide reacts with the iron oxide to form iron and carbon dioxide. The carbon dioxide escapes through the top of the blast furnace.

4. The iron is so hot that it forms a liquid which collects at the bottom of the blast furnace.

5. The molten iron is used immediately to make steel or it is poured into moulds so that it can cool down and solidify.

9.1. Explain why this furnace is called a blast furnace? (1)

9.2. Discuss TWO ways in which the extraction of iron ore may have a negative impact on the environment. (2)

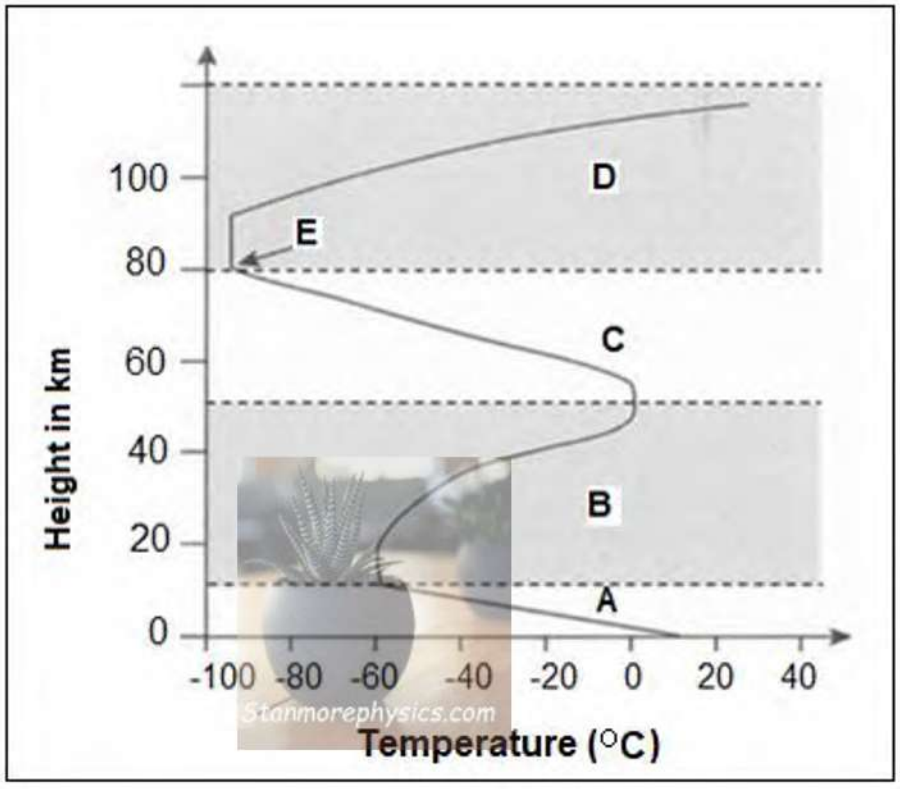
9.3. From which sphere can valuable minerals be extracted? (1)

9.4. Describe how steel is made. (2)

[6]

QUESTION 10

The graph below represents the changes in temperature in the atmosphere according to the height above the surface of the earth. The letters A – D represent the different atmospheric layers.



10.1. Provide the names of the atmospheric layers A and C shown in the graph above. (2)

10.2. Write down the temperature of atmospheric layer B at a height of 20 km above the Earth's surface. (1)

10.3. Write down the relationship between the height above the Earth's surface and the temperature in layer B when moving upward from 20 km to 50 km above the Earth's surface. (2)

10.4. Write down the name of a thin layer of gas found in B which is responsible for protecting living organisms on the surface of the Earth against harmful radiation from the Sun. (1)
[5]

QUESTION 11

11.1. Explain what happens during nuclear fusion reactions. (2)

11.2. Why is it not possible for light to escape a black hole? (1)
[3]

TOTAL: 60 MARKS

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This memorandum consists of 4 pages (excluding cover page).

SECTION A - ENERGY AND CHANGE (60%)

QUESTION 1

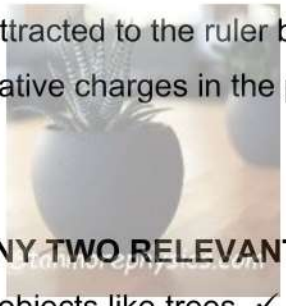
1.1. D ✓ (1)
1.2. B ✓ (1)
1.3. B ✓ (1)
1.4. D ✓ (1)
1.5. D ✓ (1)
1.6. A ✓ (1)
1.7. C ✓ (1)
1.8. B ✓ (1)
[8]

QUESTION 2

2.1. A force is a push✓ or pull. ✓ (2)

2.2.1. When you rub the ruler with a cloth, the ruler loses some of its electrons to the cloth. This makes the ruler positively charged. ✓ (1)

2.2.2. The paper pieces are attracted to the ruler because the ruler's positive charges attract the negative charges in the paper, making them stick to the ruler. ✓ (1)

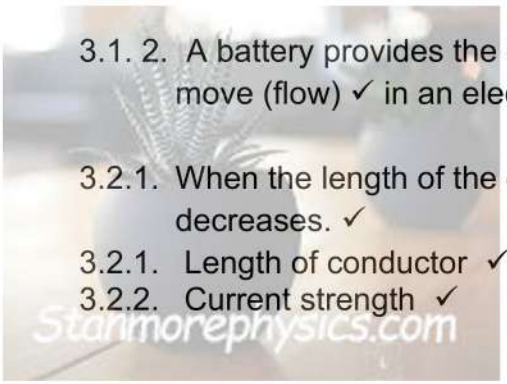


2.3. **(ANY TWO RELEVANT ANSWERS)**

(i) Stay away from tall objects like trees. ✓
(ii) Stay indoors and away from windows or stay inside a car. ✓
(iii) Do not use electrical appliances or telephones. ✓ (2)
[6]

QUESTION 3

3.1.1. B✓ (1)



3.1. 2. A battery provides the energy needed ✓ for the electrons (current) to move (flow) ✓ in an electric circuit. (2)

3.2.1. When the length of the conductor increases✓, the current strength decreases. ✓ (2)
3.2.1. Length of conductor ✓ (1)
3.2.2. Current strength ✓ (1)
[7]

QUESTION 4

4.1 **(ANY RELEVANT ANSWER)**

- The bulbs are connected in parallel ✓ (to batteries with the same potential difference).
- Bulbs connected in parallel are NOT potential dividers ✓ but current dividers.
- Voltage stays constant in parallel circuits. (1)

4.2

- Circuit 1 has less bulbs connected in parallel. ✓
- Overall resistance is higher ✓ than circuit 2.

OR

- Circuit 2 has more bulbs connected in parallel. ✓
- Overall resistance is lower ✓ than in circuit 2. (2)

4.3 $A_4 = A_5 = A_6 = 3A \div 3 = 1A$ ✓ (1)

4.4 All bulbs will have the same brightness. ✓ (1)

4.5

RESISTORS IN SERIES	RESISTORS IN PARALLEL
The total voltage across the battery is the same as the sum of the voltages across each of the resistors. ✓	The voltage is the same across each resistor. ✓

[7]

QUESTION 5

5.1 D, B, A, C ✓ (1)

5.2 D ✓ (Heat is released through nuclear fission). (1)

5.3 **(ANY TWO RELEVANT ANSWERS)**

- Nuclear energy is considered as clean energy with no harmful gases released into the atmosphere during generation. ✓
- Generation of electricity by means of nuclear energy is cost effective and reliable. ✓
- A large supply of nuclear fuel is available which is promising for future energy supply. ✓
- Nuclear fuel has an enormous energy density, meaning that a relatively small amount of fuel is needed to generate a large amount of electricity. ✓

(2)

[4]

QUESTION 6

6.1 0.48 kW ✓ (1)

6.2 Cost = power rating (kW) × time × unit price
= 0.48 ✓ × 1,5 × 1,65 ✓
= R1,19 ✓ (3)

[4]

SECTION B - EARTH AND BEYOND (40%)

QUESTION 7

7.1. Hydrosphere ✓ (1)

7.2. Organisms / plants in sphere B will absorb the water from sphere C through their roots ✓ in order to survive / grow. ✓ (2)
[3]

QUESTION 8

8.1. Metamorphic rocks ✓ (1)

8.2.

8.2.1. Melting ✓ of metamorphic rocks. (1)
8.2.2. Cooling ✓ of magma. (1)
8.2.3. Weathering / Erosion and transport ✓ of igneous rocks. (1)

8.3.

8.3.1. Granite ✓ / Pumice ✓/ Basalt ✓ (Any ONE) (1)
8.3.2. Limestone ✓ / Sandstone ✓ / Shale ✓ (Any ONE) (1)
[6]

QUESTION 9

9.1 A blast of hot air is blown in through small holes near the bottom of the furnace. ✓ (1)

9.2

- It gives off carbon dioxide which increases the level of carbon dioxide in the air ✓
- It uses coke which is a form carbon dioxide that is made from coal. ✓
- Coal is a fossil fuel so it is a non-renewable resource. ✓ (ANY 2) (2)

9.3 Lithosphere ✓ (1)

9.4 Molten iron is mixed with carbon ✓at very high temperatures ✓ (2)
[6]

QUESTION 10

10.1 A – Troposphere ✓
C – Mesosphere ✓ (2)

10.2 - 60°C ✓ (1)

10.3 As the height increases ✓ , temperature also increases ✓
OR
Temperature increases with an increase in height. ✓ (2)

10.4 Ozone ✓ (1)
[6]

QUESTION 11

11.1 Nuclear fusion reaction:
Changes light elements into heavier elements,✓ releasing a lot of energy in the process. ✓ (2)

11.2 The gravitational pull is too strong. ✓ (1)
[3]

TOTAL: 60 MARKS

BALANCED WEIGHTING GRID FOR NS GRADE 9 PLC PRE-EXAMINATION 2025

QUESTION NO.	LOW ORDER	MIDDLE ORDER	HIGH ORDER	TOTAL
FORCES				
1.1	1			1
1.2	1			1
1.3	1			1
2.1	2			2
2.2.1		1		1
2.2.2		1		1
2.3		2		2
				9
ELECTRIC CELLS AS ENERGY SYSTEM				
1.4	1			1
1.5	1			1
3.1.1	1			1
3.1.2		2		2
				5
RESISTANCE				
3.2.1			2	2
3.3.1		1		1
3.3.2		1		1
				4
SERIES AND PARALLEL CIRCUITS				
1.8	1			1
4.1		1		1
4.2		2		2
4.3		1		1
4.4		1		1
4.5	2			2
				8
SAFETY WITH ELECTRICITY				
1.7	1			1
1.8	1			1
				2
ENERGY AND THE NATIONAL ELECTRICITY GRID				
5.1	1			1
5.2	1			1
5.3		2		2
				4
COST OF ELECTRICAL POWER				
6.1		1		1
6.2			3	3
				4
THE EARTH AS A SYSTEM				
7.1	1			1
7.2		2		2
				3
LITHOSPHERE				

8.1	1			1
8.2.1		1		1
8.2.2		1		1
8.2.3		1		1
8.3.1	1			1
8.3.2	1			1
				6
MINING OF MINERAL RESOURCES				
9.1		1		1
9.2			2	2
9.3	1			1
9.4		2		2
				6
ATMOSPHERE				
10.1	2			2
10.2		1		1
10.3		2		2
10.4	1			1
				6
BIRTH, LIFE AND DEATH OF STARS				
11.1			2	2
11.2	1			1
				3
% IN EXAMS	40%	45%	15%	
TOTAL MARKS	**24**	**27**	**9**	**60**