



Province of the
EASTERN CAPE
EDUCATION

SENIOR PHASE

GRADE 9

NOVEMBER 2014

TECHNOLOGY

MARKS: 120

TIME: 2 hours



This question paper consists of 16 pages.

INSTRUCTIONS AND INFORMATION

1. This question paper consists of FIVE SECTIONS: SECTIONS A, B, C, D and E.
2. Answer ALL the questions.
3. Read ALL the questions carefully before you write the answers.
4. Number your questions exactly as they appear in the question paper.
5. Write neatly and legibly.
6. Sketches must be clear, neat and done in pencil.

ALLOCATION OF MARKS		
SECTION A	QUESTION 1	
	MULTIPLE-CHOICE QUESTIONS	10
SECTION B	QUESTION 2	
	STRUCTURES	12
SECTION C	QUESTION 3	
	DESIGN AND GRAPHIC COMMUNICATION	46
SECTION D	QUESTION 4	
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SECTION E	QUESTION 5	
	ELECTRICAL SYSTEMS	21
	QUESTION 6	
	PROCESSING	10
	GRAND TOTAL	120

SECTION A: MULTIPLE-CHOICE QUESTIONS**QUESTION 1**

Choose the correct answer and write only the letter (A–D) next to the question number (1.1–1.10) in your ANSWER BOOK, for example 1.12 C.

- 1.1 A brick wall is classified as a ... structure.
- A natural
 - B man-made
 - C flexible
 - D frame
- (1)
- 1.2 ... are used to guide a designer to complete a drawing.
- A Centre lines
 - B Construction lines
 - C Outlines
 - D Dashed lines
- (1)
- 1.3 The main purpose of dimensioning in graphic communication is to make sure that the drawing ...
- A is neat.
 - B is accurate.
 - C informs the reader of its size.
 - D is complete.
- (1)
- 1.4 Grooved wheels attached to each other by a rope or cable are known as ...
- A cams.
 - B pulleys.
 - C gears.
 - D levers.
- (1)
- 1.5 ... states that PRESSURE exerted on one part of a HYDRAULIC SYSTEM will be transferred equally in all directions to other parts of the system without any loss.
- A Pressure
 - B Pascal's principle
 - C Hydraulic system
 - D Closed system
- (1)



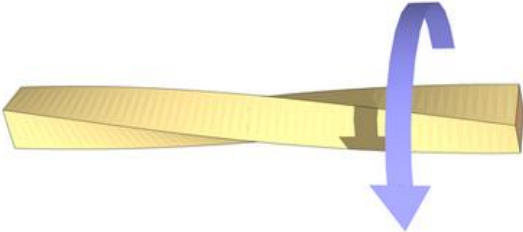
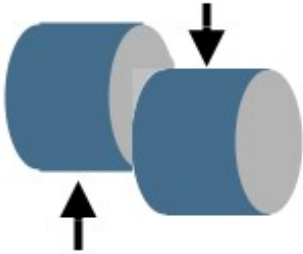
- 1.6 A measure of the amount of the mass of an object compared to its size.
- A Hardness
 - B Density
 - C Flexibility
 - D Stiffness
- (1)
- 1.7 These types of loads vibrate (constantly move).
- A Dynamic
 - B Static
 - C Heavy
 - D Even
- (1)
- 1.8 Which of the following is NOT an output device?
- A Bulb
 - B Motor
 - C Light-dependent resistor
 - D Buzzer
- (1)
- 1.9 An ammeter is used to measure the ... in a circuit.
- A energy
 - B resistance
 - C voltage
 - D current
- (1)
- 1.10 A process whereby metal and wood could be given the same coating to keep out moisture and/or oxygen that could cause wood to rot or metal to rust.
- A Electroplating
 - B Varnishing
 - C Painting
 - D Galvanizing
- (1)

TOTAL SECTION A: 10

SECTION B: STRUCTURES

QUESTION 2

2.1 State whether the forces indicated in the following illustrations (A–D) are TENSION, SHEARING, BENDING or TORSION.

	
<p>A</p>	<p>B</p>
	
<p>C</p>	<p>D</p>

(4 x 1) (4)

2.2 Read the following paragraph and answer the questions that follow.

The amaNgwane people, who live in the foothills of the Drakensberg Mountains, designed and built a very successful, but simple dwelling. This was in response to the need to build housing, using local materials. Flexible poles were set in a circle and then bent over and fastened towards the center. These formed the upright framework. Other thin poles were woven in-between to complete and strengthen the frame.

This was an ideal shape, as a domed shape is very strong with the compressive forces being distributed over the whole frame. In this way they could withstand the strong winds that blow in this area. By using natural materials they were very environmentally friendly.

The frame was then covered with bundles of grass. This provided a good insulating layer so the dwellings were warm in winter and cool in summer.



- 2.2.1 What type of structure is described? (1)
- 2.2.2 Give ONE natural material that was used by the amaNgwane people for building these dwellings. (1)
- 2.2.3 What was the ADVANTAGE of using natural materials? (1)
- 2.2.4 How was the structure strengthened against the forces that could act upon it? (2)
- 2.2.5 Give the MAIN purpose of using grass to cover the framework. (1)
- 2.3 Explain the difference between EVEN and UNEVEN loads. (2)

TOTAL SECTION B: 12

SECTION C: DESIGN AND GRAPHIC COMMUNICATION

QUESTION 3

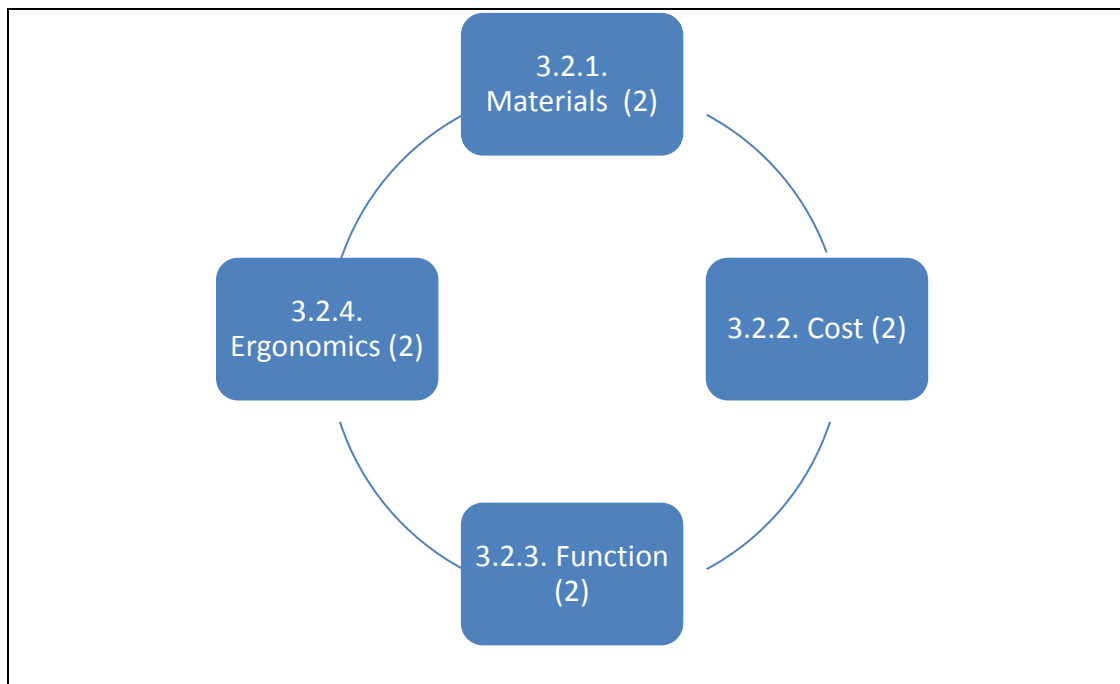
Read the scenario below and answer the questions that follow.

SCENARIO

John used to keep his coins (money) under his hostel’s bed mattress in order to raise money for the end of the year party at school. He then realised that his roommates always have a way to access his money thereby making it difficult for him to save money in a safe place. He is thus looking for a safe place to keep his money. As a technology student, you are assigned the task to help John keep his money safe and out of reach of other people.

3.1 Write down a design brief for a solution to the problem in the scenario above. (1)

3.2 Formulate at least TWO questions on EACH of the following aspects indicated in the diagram below relating to your investigation of the above scenario. (8)



3.3 Specify details for the following aspects of your design relating to the given scenario. (1)

3.3.1 People (Who is it for?) (1)

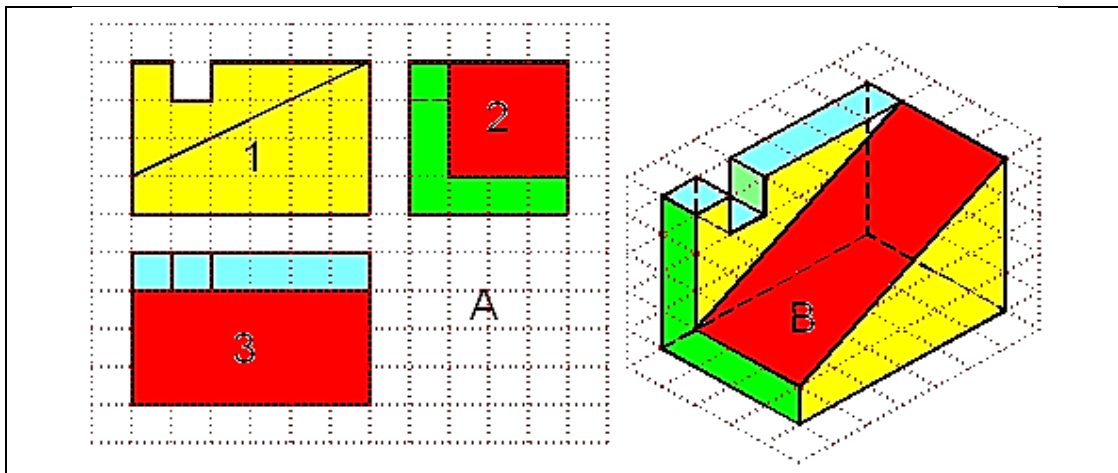
3.3.2 Purpose (What is it for?) (1)

3.3.3 Appearance (What does it look like?) (1)

3.3.4 Ergonomics (Is it easy to use?) (1)

3.3.5 Safety (Is it safe to use?) (1)

- 3.3.6 Cost (How much will it cost?) (1)
- 3.3.7 Impact (How will it affect the environment and society?) (1)
- 3.4 Neatly draw THREE free hand sketches of different ideas that will help you find a better solution. Choose ONE of your initial ideas and state a reason for selecting it next to the sketch. (8)
- 3.5 Formulate THREE questions on how your final solution will be evaluated against the specifications you listed in QUESTION 3.3. (3)
- 3.6 Draw an isometric projection of your chosen idea (The hidden detail, if any must be shown in your drawing). (6)
- 3.7 Draw a flow diagram of at least FIVE steps (sequence of operations) you will follow to make the final product. (5)
- 3.8 Study the first angle orthographic projection of the shape below and answer the questions that follow: (The isometric view on the right is provided to assist with extra visual conception of the shaped block)



- 3.8.1 Label the views marked 1, 2 and 3. (3)
- 3.8.2 Explain where you would use the following types of lines. Choose your answer from the following list:

Construction lines, outlines, hidden detail lines, show symmetry.

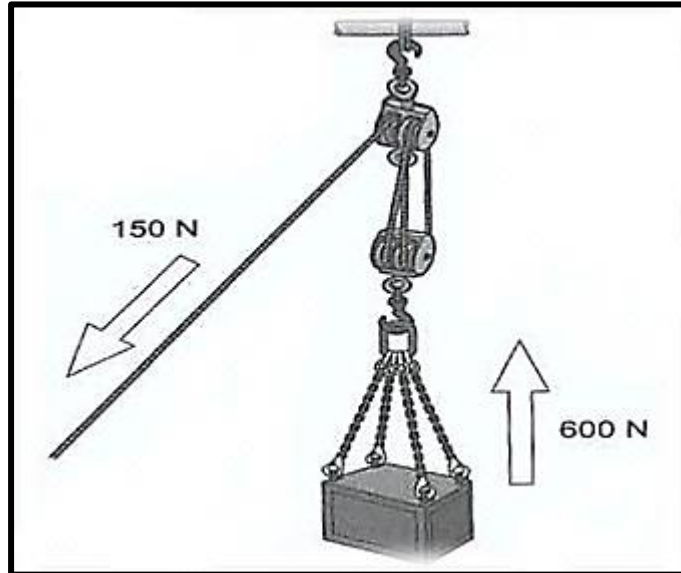
- (a) Chain lines (1)
- (b) Dark lines (1)
- (c) Dashed lines (1)
- (d) Feint lines (1)

TOTAL SECTION C: 46

SECTION D: SYSTEMS AND CONTROL (MECHANICAL)

QUESTION 4

4.1 Calculate the mechanical advantage of the pulley below.



(3)

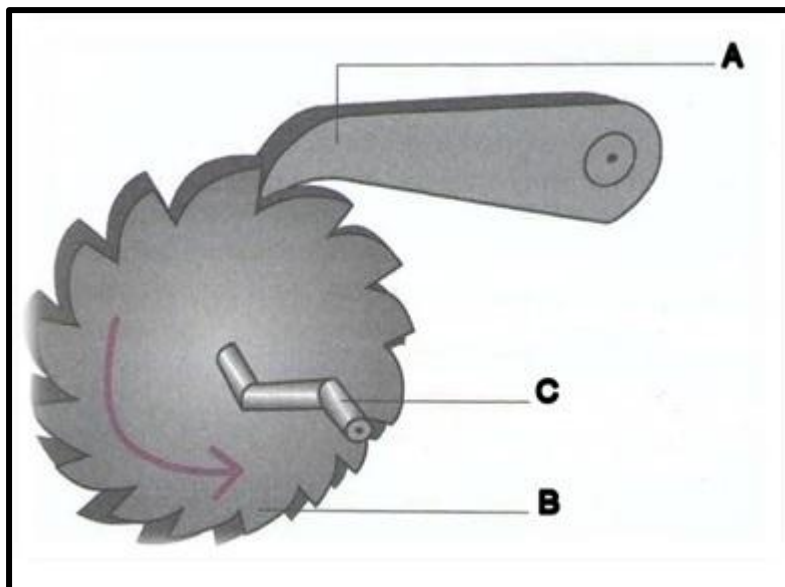
4.2 What is the main function of a disc brake?

(1)

4.3 Most bicycles use rim brakes, where a braking force is applied to the rim of the wheel. Give any TWO advantages of using rim brakes in bicycles.

(2)

4.4 The mechanism below is an important control device used in many systems.



4.4.1 Name the parts labelled **A**, **B** and **C**.

(3)

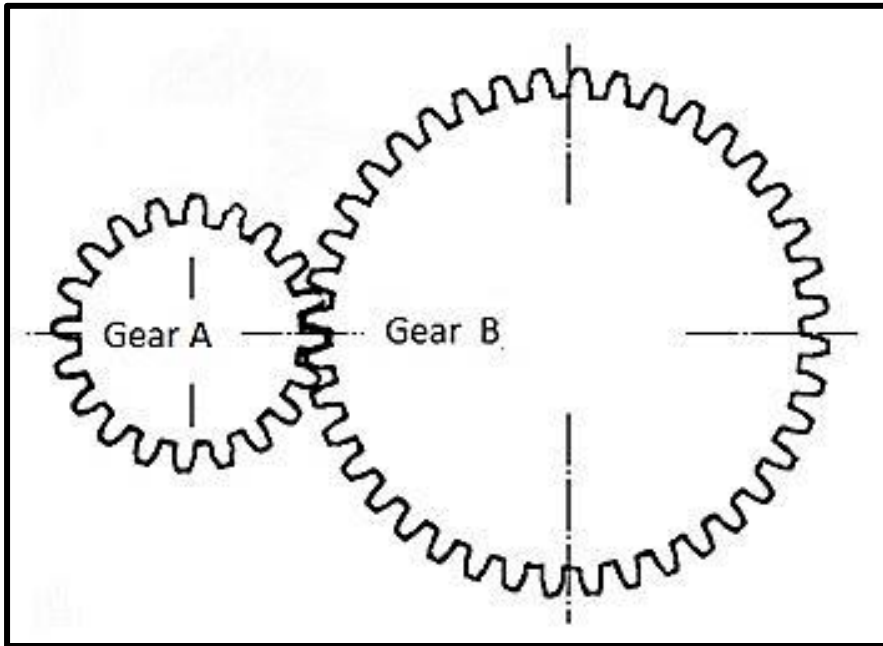
4.4.2 What is the purpose of part **C** in the above mechanism?

(1)

4.4.3 Give ONE example of a device that uses this locking system.

(1)

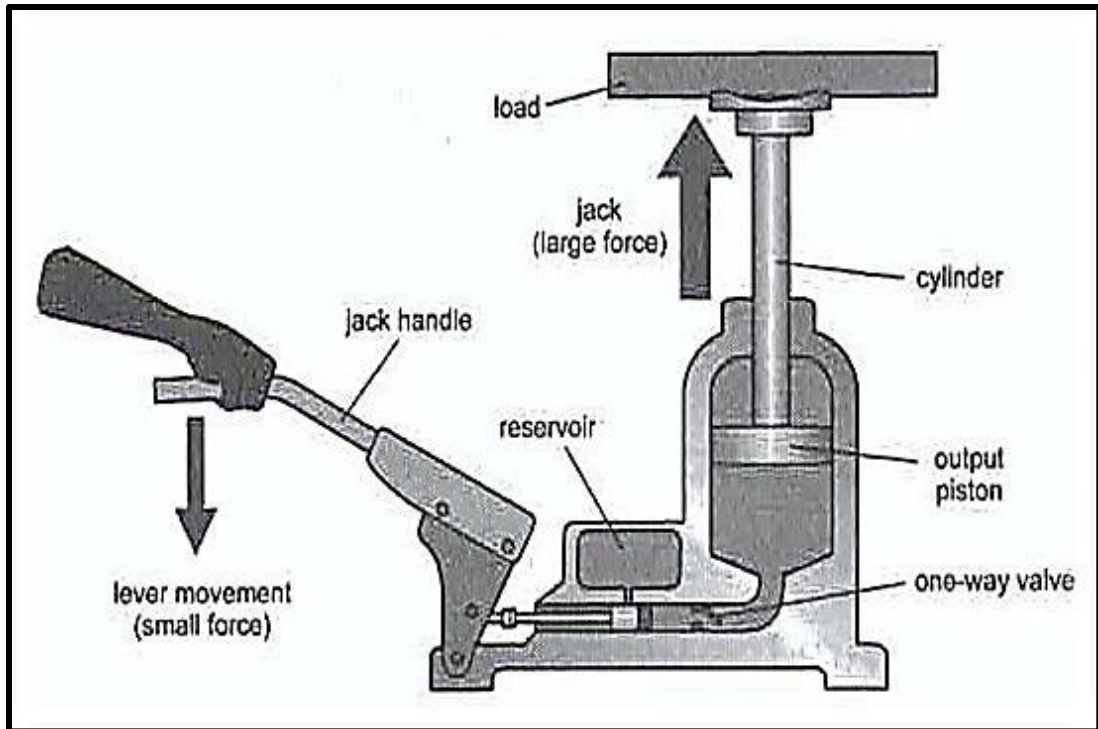
- 4.5 The diagram below shows a typical gear train. Gear **A** is connected to a motor. Study the diagram and answer the questions that follow.
(When gear **A** rotates 10 times, gear **B** rotates 5 times)



- 4.5.1 Identify the DRIVEN gear. (1)
- 4.5.2 Give a reason for your answer in QUESTION 4.5.1. (1)
- 4.5.3 Gear **A** rotates in a clockwise direction. In which direction will gear **B** rotate? (1)
- 4.5.4 Calculate the velocity ratio of this gear system if gear **A** has 20 teeth and gear **B** has 40 teeth.

Formula: **velocity ratio** = $\frac{\text{number of teeth on driven gear}}{\text{number of teeth on driver gear}}$ (2)

4.6 Below is a drawing of a hydraulic jack. Draw a systems diagram for the hydraulic jack.



(3)

4.7 Give an example of where each of the following components is used in real life.

4.7.1 Cleat (1)

4.7.2 One-way valve (1)

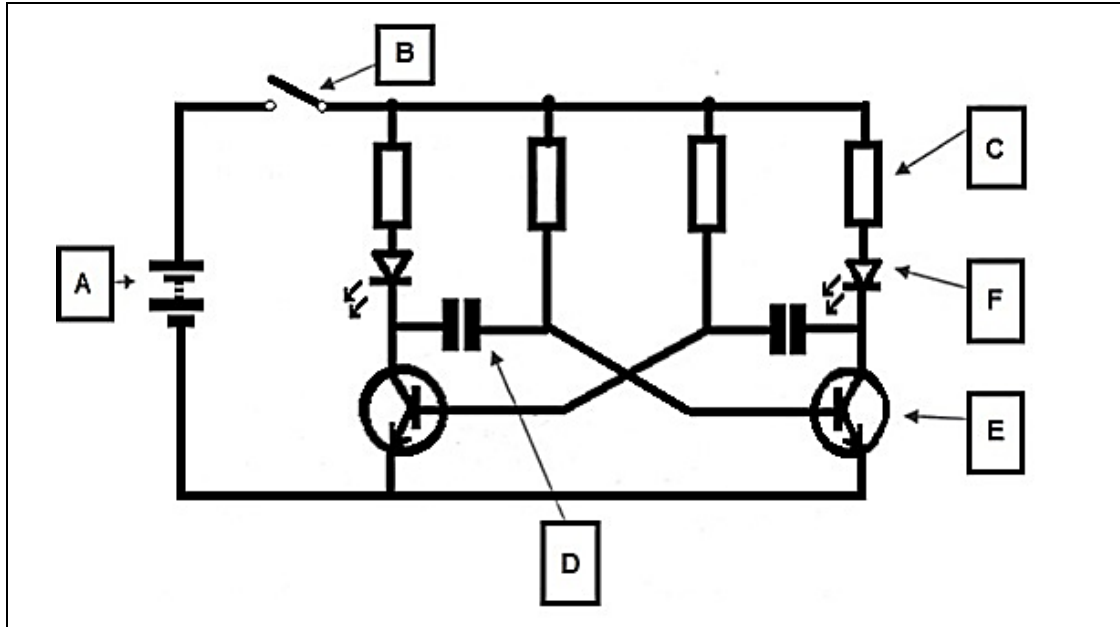
TOTAL SECTION D: 21

SECTION E: SYSTEMS AND CONTROL (ELECTRICAL)

QUESTION 5

5.1 Study the electronic circuit below and answer the questions that follow.

Identify all the different components marked A–F.



(6)

5.2 A bulb is connected to a 12 V electrical supply and controlled by a switch. Calculate the resistance of the bulb when the switch is ON and the current through the bulb is 3 A.

Formula: ($V = I \times R$; $I = \frac{V}{R}$; $R = \frac{V}{I}$)

(Show ALL calculations)

(3)

5.3 State whether each of the following is an INPUT, PROCESS or OUTPUT device.

5.3.1 Thermistor

(1)

5.3.2 LED

(1)

5.3.3 Photovoltaic panel/cell

(1)

5.4 The picture below shows an example of a processing device that is used in many different circuits.



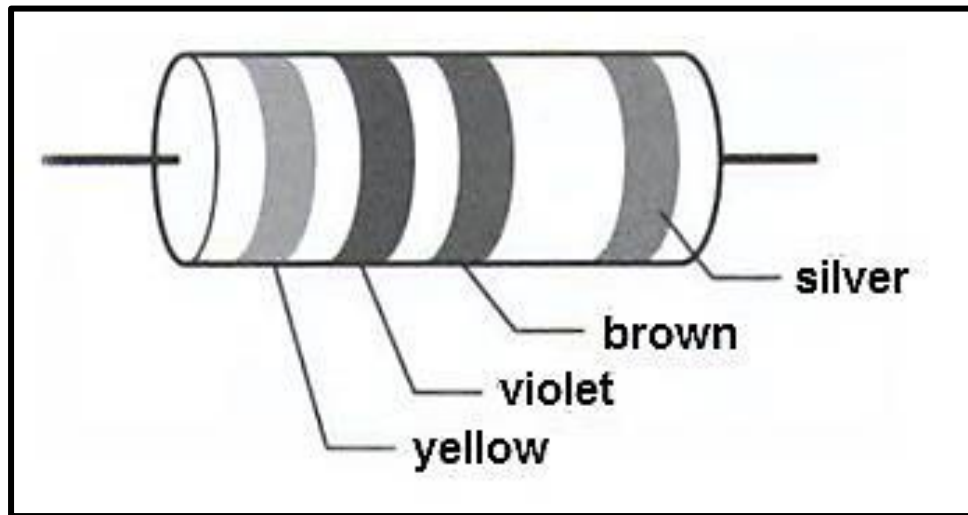
5.4.1 Name this device. (1)

5.4.2 Give at least ONE basic function performed by this device. (1)

5.4.3 Identify the THREE different terminals marked e, b and c. (3)

5.5 Use the colour code chart to answer the questions that follow.
(Show ALL working.)

Colour	1 st Band	2 nd Band	3 rd Band	4 th Band
Black	0	0		Accuracy/ Tolerance Gold = ±5 % Silver = ±10 % None = ±20
Brown	1	1	0	
Red	2	2	00	
Orange	3	3	000	
Yellow	4	4	0000	
Green	5	5	00000	
Blue	6	6	000000	
Violet	7	7	0000000	
Grey	8	8	00000000	
White	9	9	000000000	



5.5.1 What is the resistance value of the resistor? (3)

5.5.2 What is the accuracy rating of this resistor? (1)

[21]

QUESTION 6: PROCESSING

6.1 Suggest ONE food product that can be preserved through the following preservation methods.

6.1.1 Salting (1)

6.1.2 Drying (1)

6.1.3 Pickling (1)

6.2 Study the picture below and answer the questions that follow.



6.2.1 Write down PVC in full. (1)

6.2.2 Write down any TWO physical properties of plastics. (2)

6.3 The logo below shows three elements of recycling. Choose the correct element of recycling that best describes the processes listed below.



6.3.1 Waste materials are collected, processed and remanufactured into new products. (1)

6.3.2 An old bicycle tube is used to fix a leak in a pipe. (1)

6.3.3 Use a shopping basket for shopping instead of buying a shopping bag. (1)

6.4 Give ONE word for the following process described below.

A protective layer of zinc is applied to iron or steel to prevent it from rusting. (1)
[10]

TOTAL SECTION E: 31
GRAND TOTAL: 120