



Province of the
EASTERN CAPE
EDUCATION

SENIOR PHASE

GRADE 9

NOVEMBER 2013

TECHNOLOGY

MARKS: 100

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 from SECTIONS A, B, C, D, and E.
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	MULTIPLE-CHOICE QUESTIONS	
	QUESTION 1	[15]
SECTION B	STRUCTURES	
	QUESTION 2	[20]
SECTION C	PROCESSING	
	QUESTION 3	[15]
SECTION D	SYSTEMS AND CONTROL (Mechanical Systems)	
	QUESTION 4	[25]
SECTION E	SYSTEMS AND CONTROL (Electrical Systems)	
	QUESTION 5	(18)
	QUESTION 6	(7)
		[25]

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

1.1 Choose the correct answer and write only the letter (A–D) next to the question number (1.1.1–1.1.10) in your answer book, for example 1.1.11 D.

1.1.1 can cause a structure to break or weaken.

- A Fluxing
 - B Cleaning
 - C Corrosion
 - D Galvanising
- (1)

1.1.2 A force that acts at an angle to a member and causes the member to bend is known as ...

- A tension force.
 - B bending force.
 - C twisting force.
 - D shearing force.
- (1)

1.1.3 A mechanical property of a material that allows it to resist scratching, wear and tear.

- A Hardness
 - B Toughness
 - C Flexibility
 - D Elasticity
- (1)

1.1.4 A beam bridge supported at one end only is known as a/an ...

- A arch bridge.
 - B suspension bridge.
 - C clapper bridge.
 - D cantilever bridge.
- (1)

1.1.5 A wheel with saw-shaped teeth round its rim is known as a ...

- A ratchet.
 - B cleat.
 - C valve.
 - D belt drive.
- (1)

- 1.1.6 A process in which a thin, smooth protective covering of one metal is applied to another metal.
- A Painting
 - B Varnishing
 - C Electroplating
 - D Galvanising
- (1)
- 1.1.7 This type of wood is a South African hardwood which is used for high-quality furniture.
- A Pine
 - B Tamboti
 - C Jetulong
 - D Jarrah
- (1)
- 1.1.8 The teeth on gears are called ...
- A driven gears.
 - B cogs.
 - C torque.
 - D levers.
- (1)
- 1.1.9 The ability of a conductor to stop the flow of electric current is called ...
- A ohms.
 - B amperes.
 - C voltage.
 - D resistance.
- (1)
- 1.1.10 Steel is an alloy of ...
- A copper and lead.
 - B iron and carbon.
 - C copper and zinc.
 - D lead and tin.
- (1)
- 1.2 Fill in the missing words.
- 1.2.1 is the process of destroying micro-organisms by removing moisture from the food. (1)
- 1.2.2 When a load is moving, it is ... (1)
- 1.2.3 ... is a technique used to improve strength and rigidity in structures. (1)
- 1.2.4 Materials are classified into ... and ... materials. (2)

TOTAL SECTION A: 15

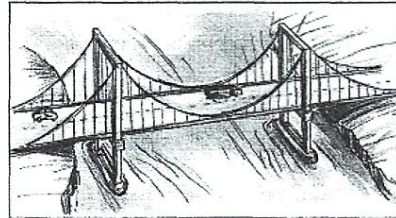
SECTION B: STRUCTURES

QUESTION 2

2.1 Read the following information about bridges and answer the questions that follow.

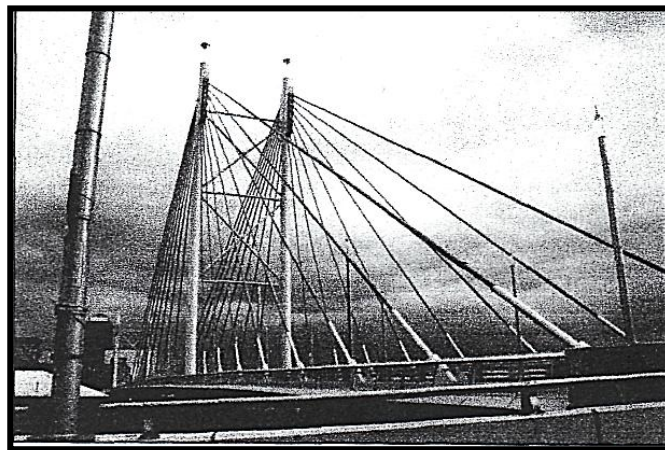
Suspension bridges

The bridges with longest spans are suspension bridges. The main support comes from a pair of huge cables held high above the gap by pillars at either end of the bridge. The cables are not pulled tightly but rather drape across. Lighter vertical cables reach down the main cables to support the bridge which hangs from the cables by means of chains, rods or wires. The cables are all under tension and the pillars under compression. The bridge pulls on two supporting towers or pillars that are very strong.



An adaption of the suspension bridge is the cable-stayed bridge. In cable-stayed bridges, each section is supported by its own cable that stretches from the bridge to the top of the nearest pillar.

This is an example of a cable-stayed bridge:



- 2.1.1 What is the purpose of building a bridge? (1)
- 2.1.2 Give TWO types of materials that are used in building these bridges. (2)
- 2.1.3 What forces (tensile or compressive) are found in the cables and pillars of both bridges? (2)
- 2.1.4 What negative effect does a bridge have on the environment? (1)

[6]

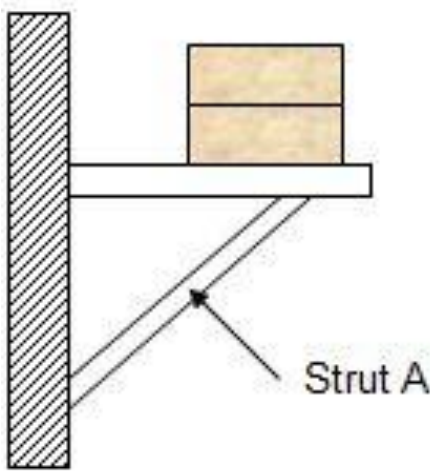
- 2.2 Match the description in COLUMN A with the correct term in COLUMN B. Write down the correct number in COLUMN A and the letter of the word in COLUMN B, for example 2.2.6 G.

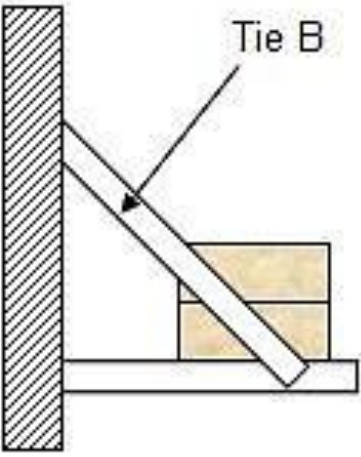
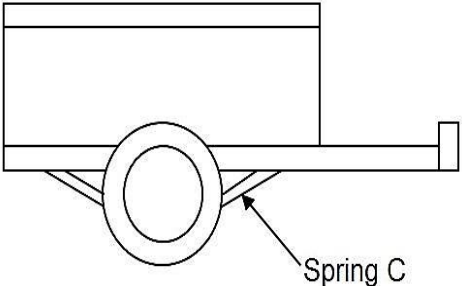
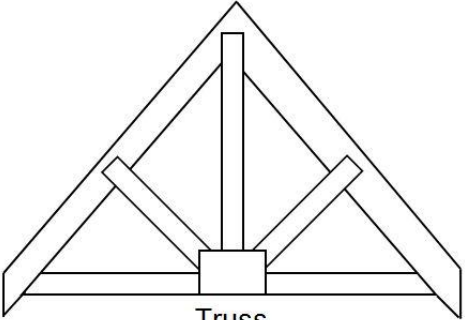

COLUMN A		COLUMN B	
2.2.1	The ability of a material to return to its original shape after it has been deformed by a force	A	Hardness
2.2.2	Electricity can easily flow through this material	B	Malleability
2.2.3	This is the strength the material has to resist being squeezed	C	Ductility
2.2.4	A material is hard enough to cut another material	D	Conductivity
2.2.5	The ability of a material to be pressed into shape without breaking	E	Elasticity
		F	Compressive Strength

(5 x 1) (5)

- 2.3 2.3.1 Explain by means of drawing the difference between even and uneven loads. (4)
- 2.3.2 Materials are able to resist forces acting on them by their properties. They can be stiff (resisting a change in shape) or flexible (allowing for change in shape by stretching).

State whether each labelled structural component is stiff or flexible.

STRUCTURAL COMPONENT	STIFF OR FLEXIBLE
<p>A</p> 	

B	 <p>A diagram showing a vertical wall on the left, indicated by diagonal hatching. A diagonal rod, labeled 'Tie B', extends from the wall to a horizontal base. A rectangular block is positioned between the wall and the base, with the tie rod passing through it.</p>	
C	 <p>A diagram of a horizontal bar with a circular ring on the left end. A spring, labeled 'Spring C', is attached to the bar between the ring and the right end. The spring is shown in a compressed state.</p>	
D	 <p>A diagram of a triangular truss structure. It consists of three main members forming a triangle, with a vertical member extending from the top vertex to the base. The word 'Truss' is written below the structure.</p>	
E	 <p>A diagram of a dome-shaped tent. A vertical support pole, labeled 'Tent strut E', is shown extending from the ground to the top of the tent.</p>	

(5)

TOTAL SECTION B: 20

SECTION C: PROCESSING**QUESTION 3**

3.1 Read the following information and then answer the questions that follow.

Case Study: The history of canning

Food was first canned in the 1800s in France when the Emperor Napoleon Bonaparte was concerned about keeping his armies fed. He offered a cash prize to whoever developed a reliable method of food preservation. Nicholas Appert, a French baker and sweet maker discovered that heating food in sealed glass bottles preserved the food. After fifteen years of experimentation, he realised that if food is heated to a high enough temperature and sealed in airtight container, it will not spoil. Appert's canning method was used to preserve a wide range of food including meat, vegetables, fruit and even milk. This meant that soldiers fighting a long way from home could be fed properly and that sailors could have healthier diet on long voyages. Louis Pasteur demonstrated that the growth of micro-organisms causes food to spoil. Appert's method of heating the food to high temperatures killed the micro-organisms.

Sealing food in glass bottles removed air from around the food. This prevented micro-organisms from growing on the food.

Peter Durand took the canning process one step further. He developed a method of sealing food in tins rather than glass bottles. Tins had an advantage over glass bottles as they were lighter, unbreakable and easier to seal. The iron was coated with fine layer of tin to stop it from rusting. Canned foods were popular with early explorers.

- 3.1.1 Identify the need that led to the development of canning. (1)
- 3.1.2 What conditions did Appert discover that could make food last longer? (2)
- 3.1.3 Explain why these conditions help to preserve food. (1)
- 3.1.4 How did Durand improve on Appert's method of canning? (1)
- 3.1.5 What advantage did his method have? (1)
- 3.1.6 How was the lifespan of the can increased? (1)

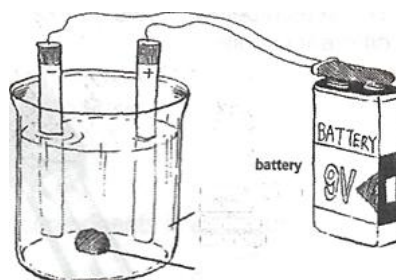
3.2 There are many ways in which we care for our environment. Match the term in COLUMN A with the description in COLUMN B. Write the number (3.2.1–3.2.5) and letter (A–F) only, for example 3.2.6 G.

COLUMN A		COLUMN B	
3.2.1	Reuse	A	We put old newspapers in the paper bin at the landfill site. The paper is then used to make packaging
3.2.2	Repair	B	Scrap dealers collect used metals such as copper. These metals are melted down and made into new items at factories
3.2.3	Recycle	C	We do not buy foodstuffs that are over packaged. This helps to reduce waste in landfill sites
3.2.4	Remanufacture	D	My brother got a puncture in his bicycle tyre. He fixed it
3.2.5	Renew	E	My mother always remembers to take her plastic shopping bags when she goes shopping. She uses them many times
		F	When the galvanising wore thin on the washing tub, we added a new layer

(5 x 1) (5)

3.3 Study the sketch below and answer the questions that follow.

Electroplating is the process of producing a thin metallic layer coating on the surface of a metallic object, using electricity.



3.3.1 What is meant by the term *electrolysis*? (1)

3.3.2 Give ONE reason why materials are electroplated. (1)

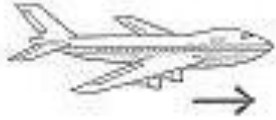
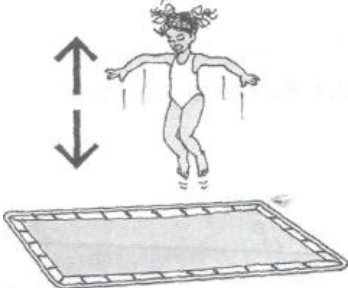
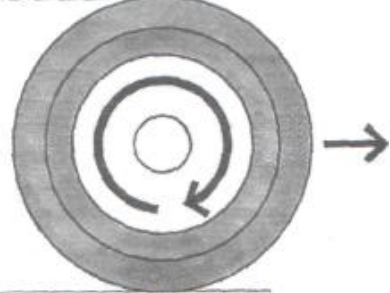
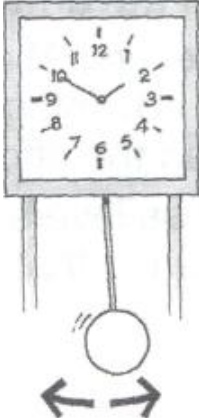
3.3.3 What happens when you scratch the surface of an electroplated object? (1)

TOTAL SECTION C: 15

SECTION D: SYSTEMS AND CONTROL (MECHANICAL SYSTEMS)

QUESTION 4

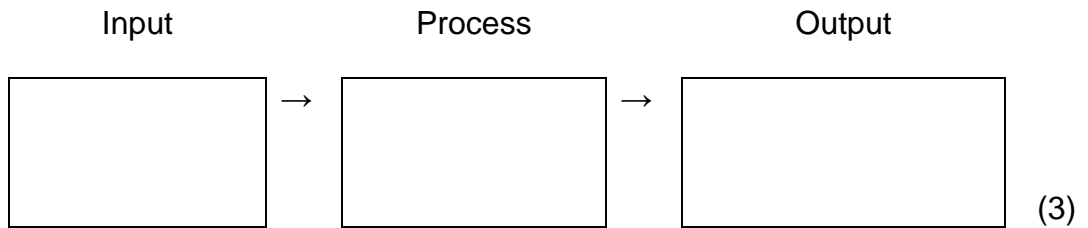
4.1 Mechanical systems make something move and they create different types of movement. Look at the pictures below and mention the type of movement created by each mechanism.

	OBJECT	TYPE OF MOVEMENT
4.1.1	 An aeroplane	(1)
4.1.2	 A person jumping on a trampoline	(1)
4.1.3	 A wheel	(1)
4.1.4	 A pendulum	(1)

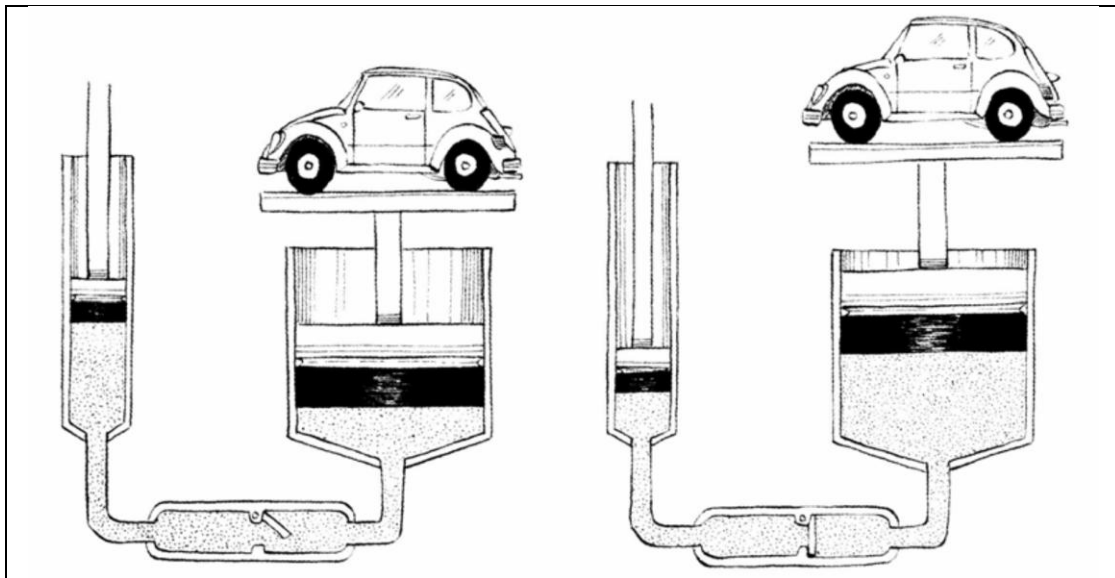
4.2 Answer the following questions.

4.2.1 A mechanism is a simple machine. For it to work there must be an input, process and an output.

Complete the following systems diagram for a manual sewing machine.



4.3 Look at the diagrams below and answer the questions that follow.



A compound pulley system

4.3.1 What is a hydraulic system? (1)

4.3.2 Give TWO examples of machines that use hydraulics. (2)

4.3.3 Why do hydraulic systems need to have control mechanisms? (1)

4.3.4 Give an example of how control mechanisms in hydraulic systems help. (1)

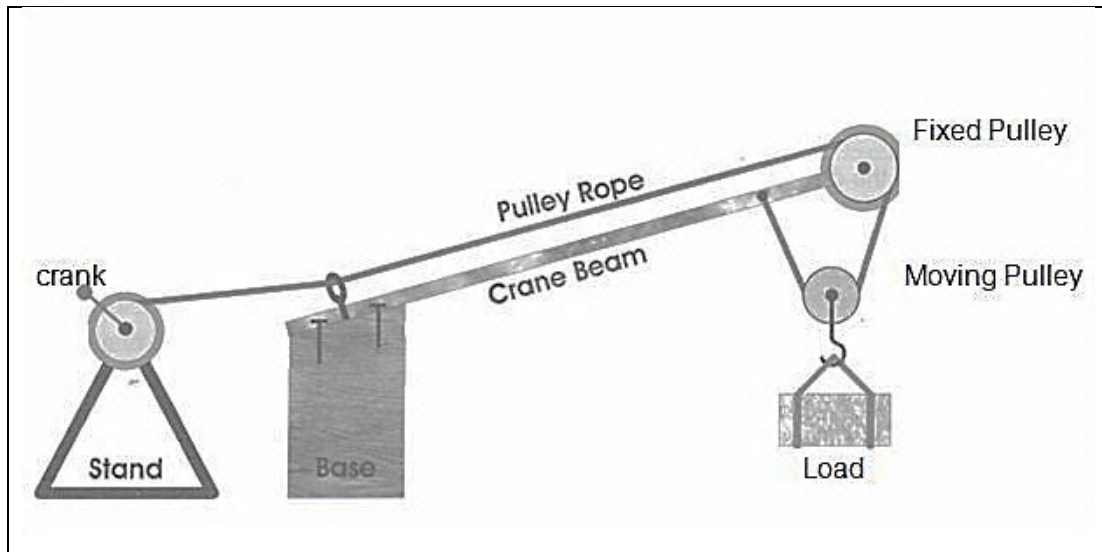
4.4 Answer the following questions.

4.4.1 What is a belt drive? (1)

4.4.2 Give TWO examples of machines that use belt drives. (2)

4.5 The picture below is a picture of a toy crane that uses pulley systems. It has both a fixed and a movable pulley.

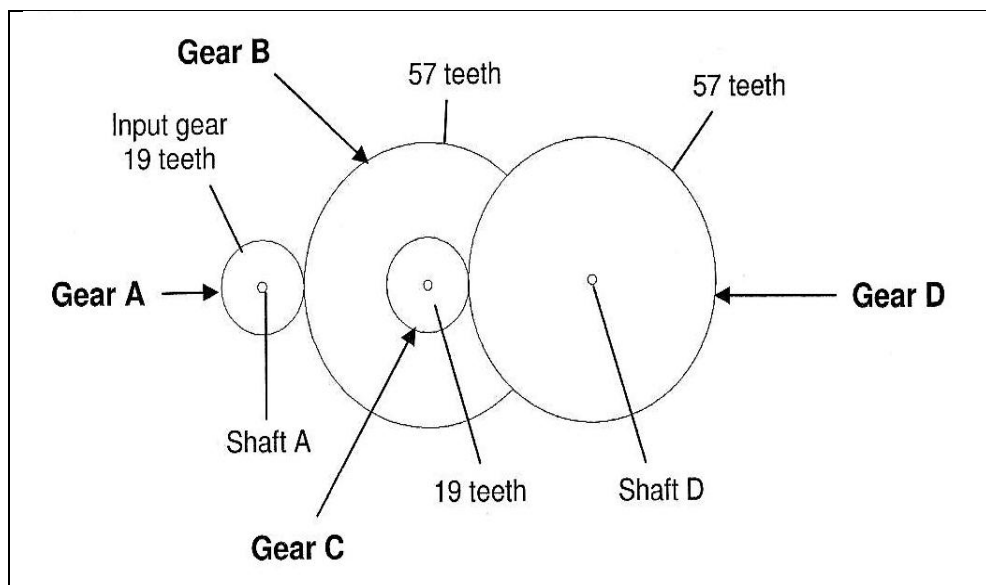
Look at the diagram and answer the following questions.



4.5.1 What would happen to the load and the winder if the winder was released accidentally with the weight? (1)

4.5.2 How can the problem mentioned in QUESTION 4.5.1 be prevented? (1)

4.6 Study the diagram of a gear system below. Gears A and C have 19 teeth each. Gears B and D have 57 teeth each. Shaft A is the axle through gear A and shaft D is the axle through gear D.



4.6.1 Is this system a simple or a compound gear system? (1)

4.6.2 Calculate the ratio between the input gear A and the output gear D.

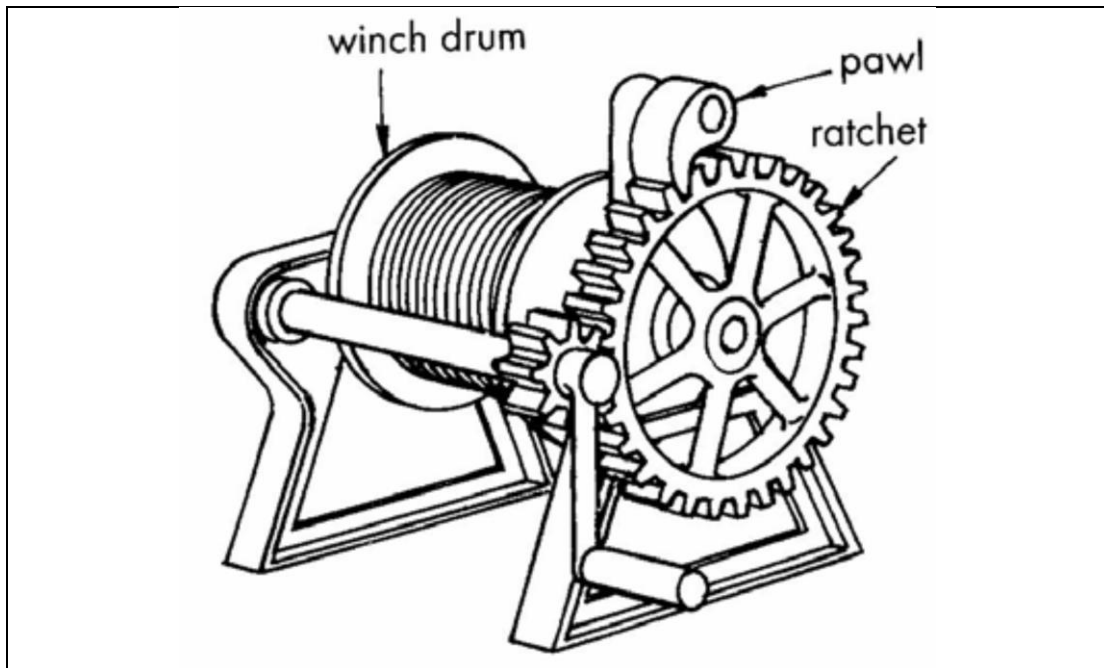
Formula:

$$\text{Gear Ratio} = \frac{\text{Output gear B}}{\text{Input gear A}} \times \frac{\text{Output gear D}}{\text{Input gear C}} \quad (3)$$

4.6.3 How much slower will shaft D turn as compared to shaft A? (1)

4.7 Mechanical control systems provide mechanical advantage to the user.

Look at the following diagram and answer the questions that follow.



4.7.1 What is the function of the winch in the drawing? (1)

4.7.2 Which mechanism can turn in only one direction? (1)

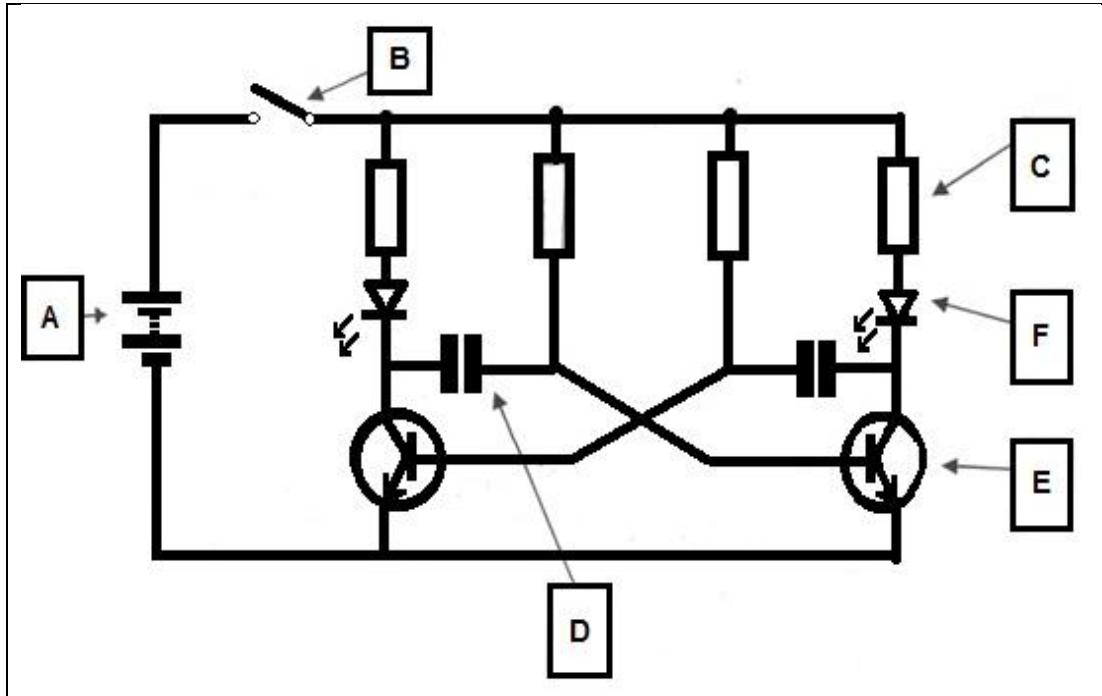
4.7.3 What is the locking mechanism in a car seatbelt called? (1)

TOTAL SECTION D: 25

SECTION E: SYSTEMS AND CONTROL (ELECTRICAL SYSTEMS)

QUESTION 5

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



5.1.1 Label components A–E. (5)

5.1.2 Indicate whether each component is an input, process or output component.

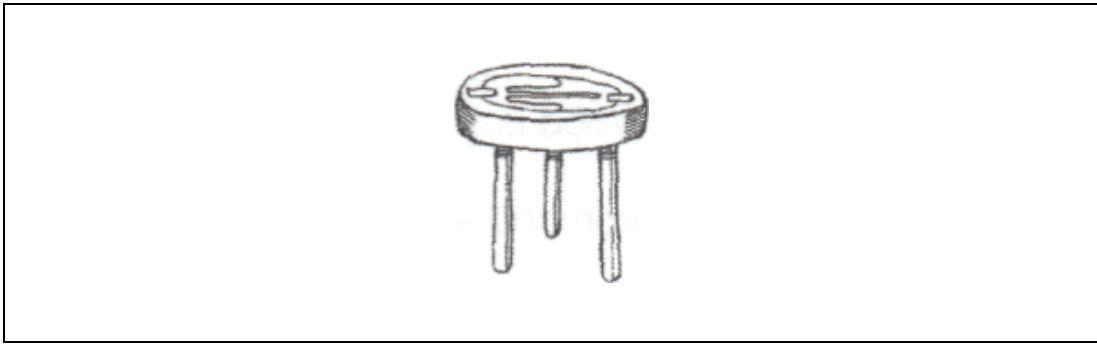
Complete the following table in your answer book and insert the information that is asked in QUESTIONS 5.1.1 and 5.1.2, for example:

Letter of component	Name of component	Input, Process, Output
F	LED	Output

(5)

5.1.3 What happens when the circuit is switched on? (1)

5.2 This is an input device that is used in an electric circuit.

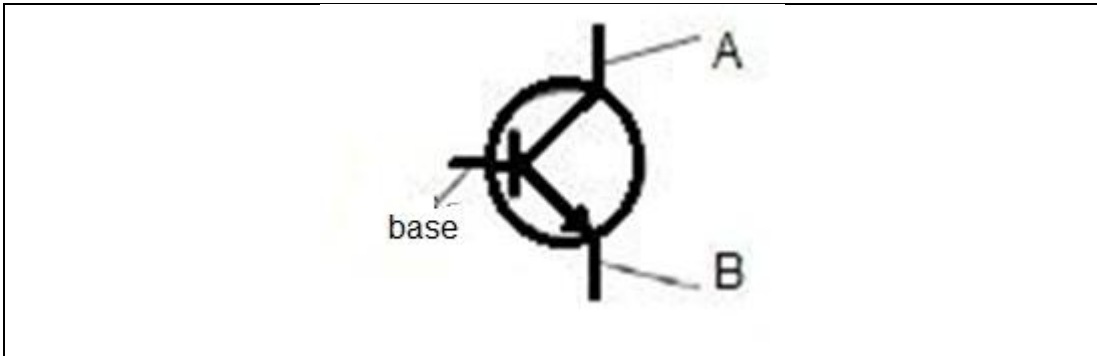


5.2.1 What is this device called? (1)

5.2.2 What happens to its resistance when it gets dark? (1)

5.2.3 Draw a neat symbol that is used to represent this component in an electric circuit. (2)

5.3



5.3.1 What does this component do in electronic circuits? (1)

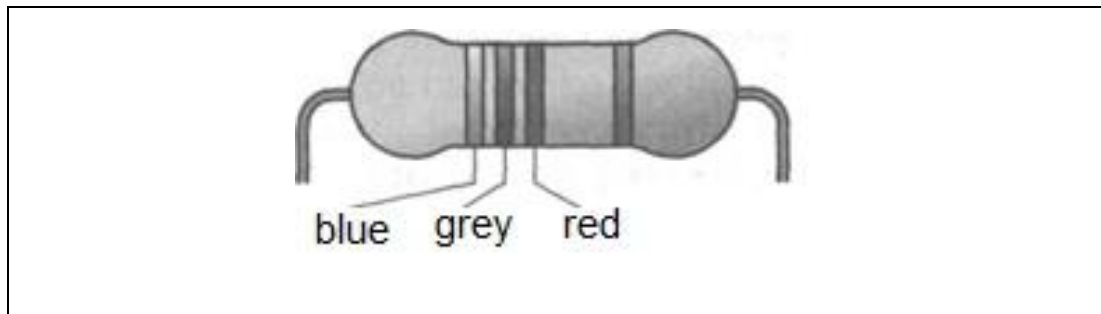
5.3.2 Label the TWO missing labels **A** and **B**. (2)

[18]

QUESTION 6

- 6.1 Look at the following colour code chart and work out the resistance of the resistor below.

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	



- 6.1.1 What is the resistance of this resistor? (3)
- 6.1.2 Why are resistors important to electronic circuits? (1)
- 6.2 State the colours found in the following resistor:
- 6.2.1 50 Ω (3)

[7]

TOTAL SECTION E: 25
GRAND TOTAL: 100