



# education

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Department:  
Education  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 11**

**AGRICULTURAL TECHNOLOGY**

**NOVEMBER 2007**

**MARKS: 200**

**TIME: 3 hours**

**This question paper consists of 18 pages and a 1-page answer sheet.**

**INSTRUCTIONS AND INFORMATION**

## 1. GENERAL INSTRUCTIONS

1.1 This question paper consists of TWO sections, namely SECTION A and SECTION B.

1.2 Both sections are COMPULSORY.

## 2. SECTION A: MULTIPLE-CHOICE QUESTIONS

2.1 Answer the questions in this section on the attached ANSWER SHEET.

2.2 Follow the instructions when answering these multiple-choice questions.

2.3 Place the COMPLETED ANSWER SHEET in the ANSWER BOOK.

## 3. SECTION B: STRUCTURED QUESTIONS

3.1 This section consists of FIVE questions.

3.2 Answer the questions in this section in the ANSWER BOOK.

3.3 Number the answers correctly according to the numbering system used in this question paper.

3.4 It is in your own interest to pay attention to the accuracy and neatness of your work.

**SECTION A (COMPULSORY)****QUESTION 1: MULTIPLE-CHOICE QUESTIONS**

Various possible options are provided as answers to the following questions. Choose the correct answer and make a cross (X) over the letter (A – C) next to the question number (1.1 – 1.20) on the attached answer sheet.

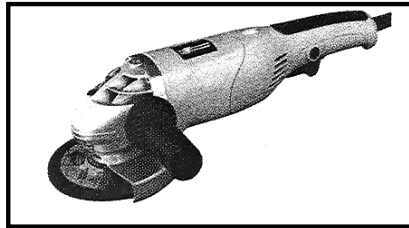
Example:	1.0	<input checked="" type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C
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- 1.1 The ... is the most important item in the workshop and must therefore be easily accessible, in case of a medical emergency.
- A first-aid box
  - B fire extinguisher
  - C Both A and B
- 1.2 The process during which a tool is heated and then cooled in order to effect a certain hardness, is called ...
- A tempering.
  - B annealing.
  - C case hardening.
- 1.3 Silicon is an adhesive that is general known as a sealant.
- Which ONE of the following properties is applicable to this adhesive?
- A Load capacity
  - B Non-flammable
  - C Water resistant
- 1.4 The function of damp course in a wall is to ...
- A bind the wall to the foundation.
  - B prevent moisture from rising up into the wall.
  - C serve as a shock absorber between the foundation and the wall.
- 1.5 The most environmentally friendly way to get rid of old oil, is to ...
- A pour it into a deep hole and cover it with soil.
  - B pour it into drums and sell it for recycling.
  - C burn it.

1.6 A transformer welder uses ... current and is suitable for welding all ferrous metals.

- A AC
- B DC
- C Both A and B

1.7 The electrical tool shown in the picture below, is used on the farm for ...



- A cutting through the mouldboard of a plough.
- B sharpening the blades of a slasher.
- C Both A and B

1.8 When building cattle pens, one will use ... wood, which is a more durable type of wood than SA pine.

- A meranti
- B wattle
- C blue gum

1.9 The mechanism on the electrical distribution board that switches off the current when too many appliances are connected to one plug at the same time:

- A Earth leakage protector
- B Main switch
- C Circuit breaker

1.10 The general earth wire of an appliance must be connected to the ... of the distribution board at all times.

- A black wires
- B earth leakage protector
- C circuit breaker

1.11 Which ONE of the following tools is used to castrate bull calves of 12 months or older?

- A Prodder
- B Burdizzo
- C Wire pliers

- 1.12 The most important procedure that should be followed to determine the accuracy of a scale before cattle are weighed, is ...
- A lubrication.
  - B painting.
  - C calibrating.
- 1.13 What is the name of the tool that is used to fasten nuts and bolts to exact specifications?
- A Stillson wrench
  - B Shifting spanner
  - C Torsion bar
- 1.14 The pump of the tractor-mounted pesticide sprayer is driven by the ... of the tractor.
- A fan belt.
  - B ground wheel.
  - C power take-off shaft.
- 1.15 The razor blade of the shear of a plough is made of ... because it is subjected to serious wear and tear.
- A cast iron
  - B mild steel
  - C high-carbon steel
- 1.16 ... is suitable to be used in the hydraulic system of a tractor.
- A Water
  - B Oil
  - C Air
- 1.17 Air-cooled engines are found in some tractors and have the advantage that the operator will never have to check the ...
- A water.
  - B oil.
  - C fuel.
- 1.18 ... is/are NOT part of the running expenses of a farm.
- A Interest on invested capital
  - B Repairs
  - C Fuel

- 1.19 What colour is the exhaust gas of a tractor when the diesel mixture is too rich?
- A Black
  - B Grey
  - C White
- 1.20 The ... pump can be used effectively to pump water from a reservoir into an irrigation system.
- A rotary
  - B jet
  - C centrifugal

**TOTAL SECTION A (20 x 2): 40**

**SECTION B (COMPULSORY)****QUESTION 1: MATERIALS AND STRUCTURES**

- 1.1 Fibreglass is increasingly being used in the agricultural environment because of its strength and versatility. Knowledge of synthetic materials plays an important role in the maintenance of structures such as water tanks.
- 1.1.1 Name FOUR precautionary measures that must be taken when working with fibreglass. (4)
- 1.1.2 What is the function of resin in fibreglass work? (2)
- 1.1.3 What is the hardening agent called? (1)
- 1.1.4 Why should the catalyst and accelerator be stored separately? (1)
- 1.2 Before working with certain metals, they can be annealed (softened) in order to put them through further working processes.
- 1.2.1 Name the TWO phases of the annealing process. (2)
- 1.2.2 Which element in metal has the greatest influence on its hardness? (1)
- 1.3 Pipes used in plumbing are manufactured from different materials.
- Choose from the list below the material that matches the descriptions that follow:
- |   |
|---|
| galvanised mild steel; copper; U.P.V.C. |
|---|
- 1.3.1 A type of pipe that is more susceptible to physical damage and requires more maintenance (1)
- 1.3.2 Corrodes easily when the protective cover is damaged or removed (1)
- 1.3.3 Easy to install and connect, does not corrode and is available in long lengths (1)
- 1.3.4 Does not corrode easily and can be used under high pressure and temperatures (1)
- 1.3.5 Can be used for tank stands (1)

1.4 Cattle on a farm must inevitably be handled, for example when they are dehorned, injected or castrated. In order to do this, the farmer needs a very strong neck clamp to immobilise the animal so that it does not injure itself or the farmer.

1.4.1 Design and draw a freehand front view of a practical neck clamp that can be used for cattle handling.

Your drawing should fit on an A4 page in the answer book.

Your drawing must include the following:

- (a) Front view (5)
- (b) Measurements (2)
- (c) Material list (2)
- (d) Scale (1)

1.4.2 Describe TWO ways of securing the clamp at the end of the cattle crush to make it a more permanent structure. (2)

1.4.3 Explain why metal pipe, instead of square tubing, is used when constructing the neck clamp. (2)

1.5 Complete the table below that compares certain qualities of cast iron and mild steel. Write only the correct answer next to the question number (1.5.1 – 1.5.5) in the answer book.

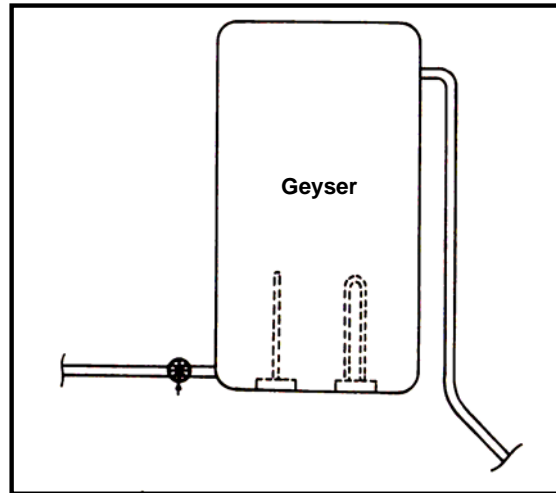
QUALITIES	CAST IRON	MILD STEEL
Weldability	1.5.1	Very good
Transformability	1.5.2	Very good
Corrosion resistance	Good	1.5.3
Durability	1.5.4	Poor (Bends/Wears easily)
Cost and economic aspects	Relatively expensive to manufacture	1.5.5

(5)  
[35]

**QUESTION 2: ENERGY**

- 2.1 The diagram below shows an electric geyser, with its various components which can be used in a milking parlour to supply hot water.

Study the diagram and answer the following questions:



- 2.1.1 Some safety mechanisms are built into the geyser so that it functions effectively.  
Name TWO of these safety mechanisms. (2)
- 2.1.2 Name TWO safety mechanisms that are built into the electrical system of the geyser to protect a person against an electrical shock if a short circuit occurs. (2)
- 2.1.3 Why must all water installations be earthed? (1)
- 2.1.4 Briefly explain why the warm-water pipe must exit at the top of the tank and not at the bottom. (2)
- 2.2 Electrical appliances must be strictly inspected for electrical defects.  
Name THREE points that must be inspected on a regular basis. (3)
- 2.3 A large current of approximately 45 A is used during the welding process. If you work from a 15 A wall socket, you will find that the wire that leads to the plug, will heat up and the circuit breaker will trip.
- 2.3.1 Evaluate the statement above and discuss the cause of this problem. (3)
- 2.3.2 Give a solution to overcome this problem. (1)

- 2.4 An electrical motor drives the compressor unit to produce compressed air.
- 2.4.1 Name the safety precautions that must be followed when working with compressed air. (3)
- 2.4.2 Identify certain components that must be taken into account to determine if the compressor uses a single- or a three-phase motor. (3)
- [20]**

### QUESTION 3: SKILLS AND CONSTRUCTION PROCESSES

- 3.1 You want to install water pipes for a new shower in the quarters of the labourers.

Answer the following questions regarding the installation:

- 3.1.1 Choose, from the following list, which pipe thickness you would use for this installation and give a reason for your choice:

12 mm pipe or 19 mm pipe	(2)
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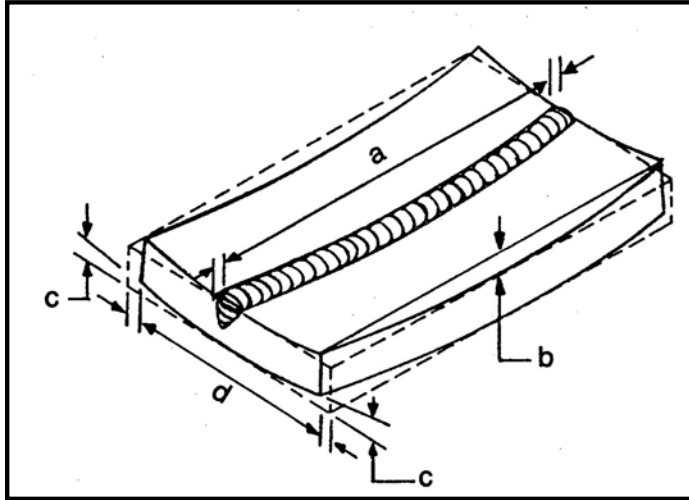
- 3.1.2 Copper and PVC pipes are normally used in the plumbing system of a house.

Which ONE of these pipes (copper or PVC) would you use for EACH of the following:

- (a) Hot water (1)
- (b) Cold water (1)

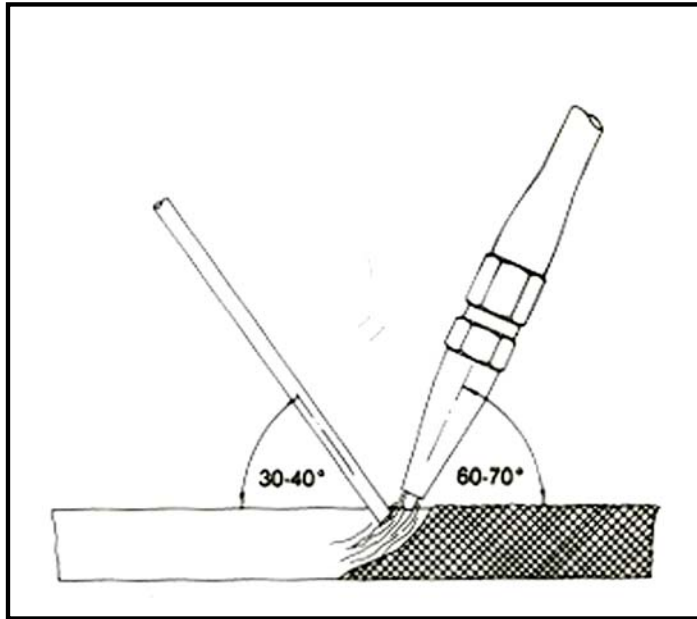
- 3.2 When a piece of metal is welded, it heats up and distortion occurs because of expansion. When the metal cools down, distortion takes place because of shrinking.

The diagram below shows the different types of distortion that occur when welding a welding run.



- 3.2.1 Name the FOUR types of shrinking (labelled a to d) in the diagram above. (4)
- 3.2.2 Name FOUR methods that can be used to prevent distortion of welding runs. (4)
- 3.2.3 Briefly describe how you would anneal a piece of mild steel. (2)
- 3.3 Hard facing is a welding technique commonly used on the farm to repair parts of machines and equipment.
- 3.3.1 Briefly explain what is meant by *hard facing*. (2)
- 3.3.2 Describe the steps that must be followed when hard facing is done. (5)
- 3.3.3 Name the kinds of wear that parts can be subjected to. (4)

- 3.4 Study the sketch of a welding technique below and answer the following questions:



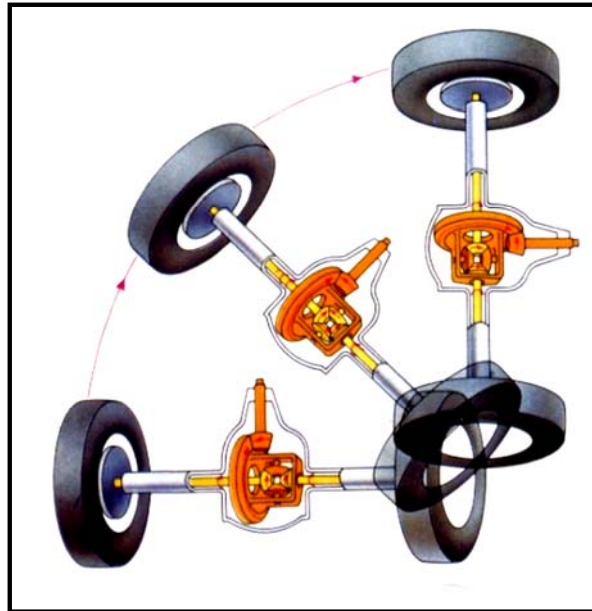
- 3.4.1 Identify this welding technique. (1)
- 3.4.2 On which type and thickness of metal can this welding technique be used? (2)
- 3.4.3 What is the name of the apparatus used in this sketch? (1)
- 3.5 When a structure like a dam is built on the farm, certain basic building principles must be kept in mind.
- 3.5.1 Briefly describe any TWO precautionary measures that must be taken to ensure a strong and stable wall. (4)
- 3.5.2 Discuss TWO factors that will influence the pressure of the water at the delivery point if a dam is used as a water source. (2)
- [35]**

#### QUESTION 4: TOOLS, IMPLEMENTS AND EQUIPMENT

- 4.1 Drive mechanisms that are found on the farm, must be safeguarded at all times.
- 4.1.1 Name THREE types of drive mechanisms on the farm that must be safeguarded. (3)
- 4.1.2 What are the requirements that these covers or safety mechanisms should comply with? (5)

- 4.2 The diagram below shows what happens to the wheels when a vehicle negotiates a bend.

Study the diagram and answer the questions that follow:



- 4.2.1 Briefly describe what happens to the wheels and differential when a tractor negotiates a bend. (3)
- 4.2.2 What is the largest gear in the differential called? (1)
- 4.2.3 The engine drives the differential by means of a prop shaft. The differential moves up and down when the vehicle negotiates over uneven terrain. A device between the differential and the prop shaft compensates for this movement.
- What is this device called? (1)
- 4.2.4 Discuss the functions of the differential. (3)
- 4.2.5 What is the function of the final drive of a tractor? (2)
- 4.2.6 When a tractor gets stuck in mud or loose soil, only one of the back wheels will tend to turn. The other one will be stationary, because of the difference in traction between the two wheels.
- What can be built into the differential to overcome this problem and to ensure that both wheels will turn to get the tractor out of the mud? (1)

4.3 Buying a new tractor is a very expensive exercise and a farmer must consider all options before he makes a choice between the different kinds, makes and models of tractors.

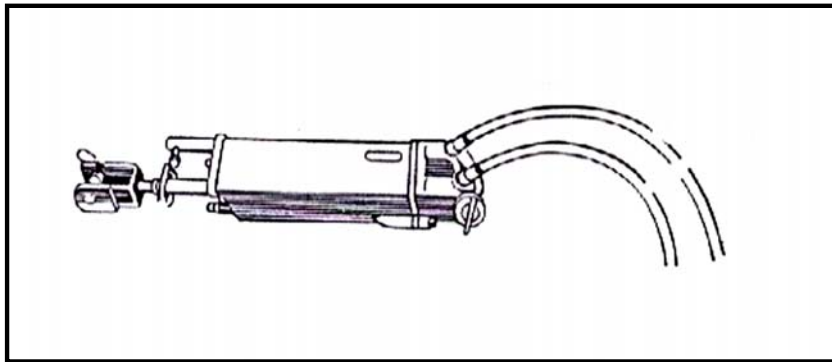
4.3.1 Name THREE factors that should be considered before buying an expensive new tractor. (3)

4.3.2 What is meant by *standardisation of farm implements*? (2)

4.3.3 Name THREE advantages of standardisation of farm implements. (3)

4.4 Give reasons for equipping of a tractor with a clutch. (4)

4.5 The diagram below shows a part of an implement that is commonly used on the farm, especially in soil moving implements.

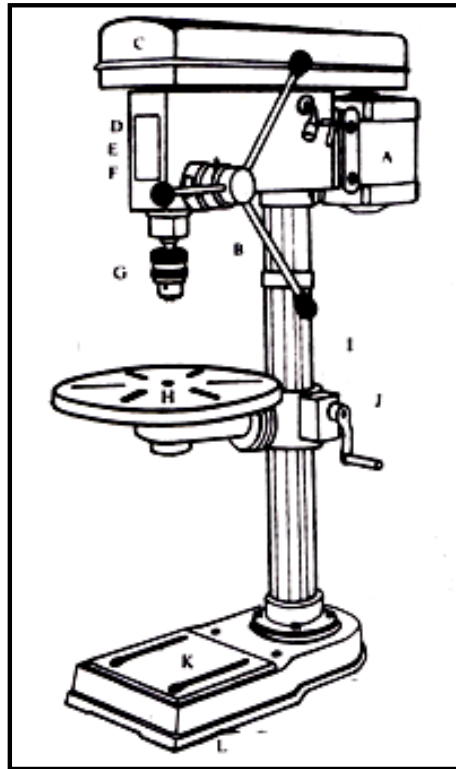


4.5.1 What is the name of this part? (1)

4.5.2 What is the function of this part? (2)

4.5.3 Where is this part used on a tractor? (1)

- 4.6 The diagram below shows a machine that is used in the workshop of a farm.

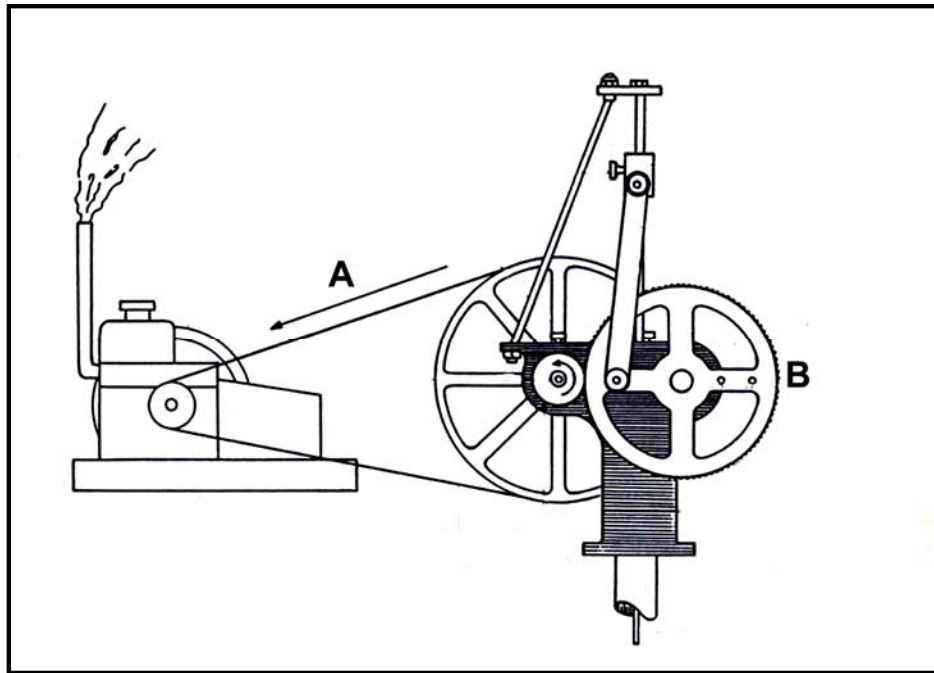


- 4.6.1 Name this machine. (1)
- 4.6.2 Name TWO functions of this machine. (2)
- 4.6.3 Name the part labelled G. (1)
- 4.6.4 State the function of the part labelled G. (1)

**[40]**

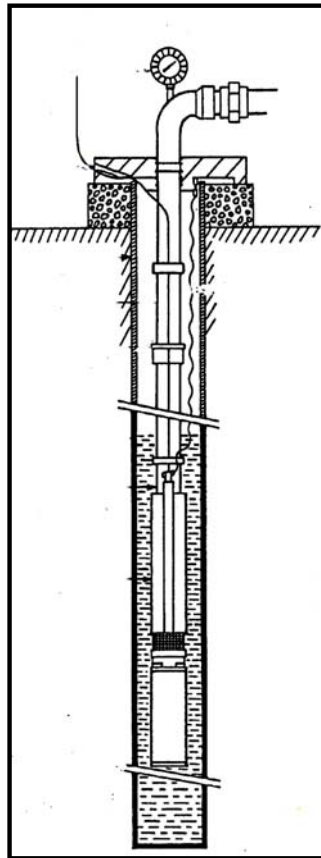
**QUESTION 5: IRRIGATION AND WATER MANAGEMENT**

5.1 The diagram below shows a pump that is driven by an engine.



- 5.1.1 What is this device called and what is its function? (2)
- 5.1.2 Name the type of drive that is used between the pump and the engine. (1)
- 5.1.3 The turning direction of the drive belt is indicated by the arrow A.  
Will the turning direction of the gear indicated by the letter B be clockwise or anticlockwise? (1)
- 5.1.4 The engine must be cooled in some way.  
Describe the thermo siphon cooling system as used in stationary engines. (3)

5.2 Pumps are used on farms for pumping water to various applications.

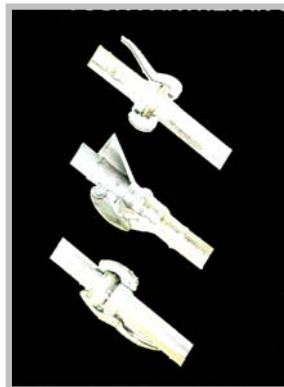


5.2.1 Identify the pump in the diagram above. (1)

5.2.2 Name TWO disadvantages of the electrical submersible pump. (2)

5.2.3 Briefly discuss any FOUR criteria that can be considered in the choice of an appropriate pump. (4)

5.4 Aluminium pipes are mainly used for irrigation purposes on the farm.



Name the advantages of aluminium pipes. (5)

- 5.4 Name the points that should be kept in mind when installing drinking water for animals. (5)
- 5.5 Briefly describe how a farmer can drain away spilled water from a drinking trough. (1)
- 5.6 Design and sketch a simple septic tank that can be used on the farm to get rid of waste.

Marks will be allocated for the following:

- 5.6.1 Line work (1)
- 5.6.2 Scale (1)
- 5.6.3 Neatness (1)
- 5.6.4 Design (1)
- 5.6.5 Correctness (1)
- [30]**

**TOTAL SECTION B: 160**

**GRAND TOTAL: 200**

NAME:

**ANSWER SHEET****SECTION A****QUESTION 1**

1.1	A	B	C
1.2	A	B	C
1.3	A	B	C
1.4	A	B	C
1.5	A	B	C
1.6	A	B	C
1.7	A	B	C
1.8	A	B	C
1.9	A	B	C
1.10	A	B	C
1.11	A	B	C
1.12	A	B	C
1.13	A	B	C
1.14	A	B	C
1.15	A	B	C
1.16	A	B	C
1.17	A	B	C
1.18	A	B	C
1.19	A	B	C
1.20	A	B	C

**TOTAL SECTION A (20 x 2):      40**

<b>SECTION A:</b>	<input type="text"/>
<b>SECTION B:</b>	<input type="text"/>
<b>TOTAL:</b>	<input type="text"/>