



# basic education

Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

## **NATIONAL SENIOR CERTIFICATE**

**GRADE 12**

**AGRICULTURAL TECHNOLOGY**

**FEBRUARY/MARCH 2014**

**MEMORANDUM**

**MARKS: 200**

**This memorandum consists of 11 pages.**

**SECTION A****QUESTION 1**

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

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

**SECTION B****QUESTION 2: MATERIALS AND STRUCTURES**

- 2.1 2.1.1 Nail plate. ✓  
Hold the beams of the truss together. ✓ (2)
- 2.1.2 Pine. ✓ (1)
- 2.1.3 Triangles because of their specific shape/design are very strong. ✓  
It strengthens the construction ✓ so that the struts can carry the weight of the roof. ✓ (3)
- 2.1.4 Paint with a liquid and insect repellent ✓/retardant preservative.  
(Creosote) ✓ (2)
- 2.2 2.2.1 Within 3 months cement will lose 20% of its strength ✓ and 40% after 6 months. ✓ (2)
- 2.2.2 Cement must always be stored in a dry place free of moist. ✓ Plastic can be used to cover the cement packs ✓ so that the cement is protected against moisture. ✓ Cement bags must be stored on wooden planks ✓ to prevent moisture/damp from the floor, damaging the cement. ✓ (5)
- 2.2.3
- Building sand consists of particles between 0, 1 mm and 5 mm in size. ✓
  - Sand must be free from dust, clay, silt or organic material such as leaves and grass etc. ✓
  - Sand derived from shale or slates must be avoided. ✓
  - Building sand must have enough lime to allow the bricklayer to place the brick in position, before drying out. ✓ (4)
- 2.2.4 Shale/ slates/lime/ sandstone must be avoided. ✓ (1)
- 2.3 2.3.1 Stretcher bond. ✓ (1)
- 2.3.2 Put damp proof course (DPC) waterproofing ✓ between the foundation and the first brick layer. ✓ (2)
- 2.3.3 Galvanised steel wire or brick force ✓ can be laid on every third layer of bricks. ✓ (2)
- 2.4 2.4.1 The adhesive itself should not distort, melt or burn when heated. ✓ (1)
- 2.4.2 When placed in humid conditions, a water resistant adhesive should be used to make a joint. ✓ (1)
- 2.4.3 If we want to join elastic materials, we would use an adhesive, which would still be elastic after it has dried out. ✓ (1)

- 2.4.4 The adhesive should be able to withstand mass, weight, load or tension. ✓ (1)
- 2.4.5 Adhesive should be resistant to open flames. ✓ (1)
- 2.5
- Catalyst and accelerator should always be stored separately.(Explosion) ✓
  - Remove all resin catalyst and accelerator from skin. ✓
  - Wear gloves if skin is sensitive. ✓
  - Use acetone in well ventilated room. ✓
  - Handle resin casting carefully, they are brittle. ✓
  - Glass fibre matting has small pieces of fibre that can penetrate the skin.
  - Don't breath in glass fibre or allow it to get it in your eyes. (Any 5) (5)

**[35]**

**QUESTION 3: ENERGY**

- 3.1 3.1.1 Photo voltaic cell.✓ (1)
- 3.1.2
- Solar power technology is limitless.✓
  - Environment friendly.✓
  - It is extremely portable (easy to relocate). ✓
  - Can create more energy than is necessary for a single family's needs. ✓
  - Extra power from the solar panels can be fed back into the power grid providing, clean and free energy to people throughout an entire settlement.✓ (5)
- 3.1.3 Inverter / transformer.✓ (1)
- 3.2 3.2.1 Wind turbine.✓ (1)
- 3.2.2
- It converts the kinetic energy present in wind into mechanical energy and then into electrical energy. ✓
  - The blades are shaped like an aeroplane wing to make the most of the prevailing wind. ✓
  - The turning motion is then transferred to the turbine rotor through gears,✓causing the turbine to generate the electricity.✓ (4)
- 3.2.3
- Unreliable wind factor.✓
  - Normally produces a lot less electricity than the average fossil fuelled power station. Multiple wind turbines must be erected to make an impact.✓
  - The construction of these wind turbines can be very expensive and costly to the wildlife in the vicinity.✓
  - Commercial wind turbines are very noisy.✓
  - Protests and/or petitions usually confront any proposed wind farm.
  - People believe the countryside should be kept intact to enjoy. (Any 4) (4)
- 3.3
- Low cost because it is made of plant and animal waste.✓
  - Biodegradable and do not harm the environment when combusted.✓
  - A lot less polluting – environment friendly.✓
  - Conventional fuels takes years to regenerate not so for bio fuels.✓
  - Do not require radical changes to switch to using bio fuels.
  - Is a renewable source of energy.
  - Ethanol is very inexpensive to produce.
  - Can help prevent engine knocking. (Any 4) (4)

**[20]**

**QUESTION 4: SKILLS AND CONSTRUCTION PROCESSES**

- 4.1 4.1.1 MIG or CO<sub>2</sub> welding. ✓ (1)
- 4.1.2 Preventing the welding bead to come into contact with oxygen during welding. ✓ (1)
- 4.1.3 The wire melts to form the joint ✓ between the two metals one want to join. ✓ (2)
- 4.1.4 The filler wires gets too short. ✓  
Use anti spatter or spatter release spray. ✓ (2)
- 4.1.5
- High alloy steel. (stainless alloys) ✓
  - Aluminium. ✓
  - Mild steel. ✓
- (3)
- 4.2 4.2.1
- Inverter uses a much smaller transformer than traditional arc welders. More compact, portable, lightweight. ✓
  - Consume less power/use less current. ✓
  - Cheaper to manufacture. ✓
  - An inverter welder produces a smoother arc when welding. ✓
  - Computer software constantly monitors and adjusts current and voltage during the welding process, resulting in a consistent arc. ✓
  - Welding supplies such as electrodes, welding wire and shielding gas typically last longer than when using a traditional welding power supply.
  - Adjustments to current and voltage can be made to accommodate differences in material composition and thickness, giving the welder tighter control over the welding process.
  - It is possible to use an inverter welder to power all welding processes including Stick-, Metal Inert Gas- (MIG), Tungsten- and Inert Gas (TIG) welding.
- (5)
- 4.2.2
- A rectifier converts the incoming AC (alternating current) into DC (direct current). ✓
  - This current is then switched on and off very quickly, ✓ creating a pulsed high frequency direct current. ✓
  - The high frequency, low-amperage current ✓ is fed into a transformer when it is charged into high amperage direct current, before being rectified again. ✓
- (5)
- 4.2.3
- Welding helmet. ✓
  - Welding gloves (leather). ✓
  - Welding apron (leather). ✓
  - Welding spats.
  - Welding overall.
  - Welding boots.
- (3)
- 4.2.4 CO<sub>2</sub> ✓ (1)

- 4.3 4.3.1 a - Longitudinal shrinking.✓  
b - Angular shrinking longitudinally.✓  
c - Angular shrinking.✓  
d - Lateral shrinking.✓ (4)
- 4.3.2 • Duration of welding being done.✓  
• Number of welding runs.✓  
• Degree of resistance.✓  
• Original state or condition of material that must be welded.✓  
• Welding procedure.✓ (5)
- 4.4 • Tack the prepared work pieces together. Lean the electrode in the direction of travel and point it slightly upwards.✓  
• Strike an arc and run a bead along the joint.✓  
• Shorten the arc length and increase the upward angle of the electrode if the force of the arc tends to undercut the work piece at the top of the bead. ✓ (3)

**[35]**

**QUESTION 5: TOOLS, IMPLEMENTS AND EQUIPMENT**

5.1 5.1.1

V-BELTS	FLAT BELTS
Draw tighter around pulleys when tension increases. ✓	Easily installed or taken off. ✓
Are relatively strong, and under normal circumstances do not break easily. ✓	Used over a long distance. ✓
Do not stretch or shrink in any type of weather. ✓	Easily lengthened or shortened. ✓
Last longer than flat belts. ✓	Easily joined. ✓
Do not easily slip off pulleys. ✓	Used with ease to run over a pulley situated between two bearings without removing the bearings. ✓

(10)

5.1.2 Formula:  $N_a \times D_a = N_g \times D_g$ 

$$N_a = \frac{N_g \times D_g}{D_a} \checkmark$$

$$N_a = \frac{4000 \times 150}{300} \checkmark$$

$$N_a = 2000 \checkmark \text{ r/min } \checkmark$$

(5)

5.2 5.2.1

- Check if the anchor bolts of the static machine are tight. ✓
- Check that the universal joints are well lubricated. ✓
- Check that the driving shaft guard is present and without cracks. ✓
- Ensure that the driving shaft is as straight as possible and fully coupled. ✓

(4)

5.2.2

- Do not work on the machine while it is still in motion. ✓
- Ensure that there are no loose objects lying inside the machine when starting it. ✓
- Wear safety goggles. ✓
- Do not use the machine when the rotor is out of balance. ✓
- The driving mechanism must be screened off. ✓
- Use in a well-ventilated area. ✓
- Small pieces of scrap metal must be kept away from fodder. It can cause a spark, which can start a fire. (Any 6)

(6)

5.2.3

- Regular lubrication. ✓
- Hammers should be replaced with the correct type. ✓
- Hammer mill must be correctly anchored. ✓
- PTO coupling done correctly. ✓
- Clean after each job.
- Sieves and screens inspected on a regular base. (Any 4)

(4)



- 5.3 5.3.1
- The piston-type pump is driven off the tractor's engine ✓ and creates a high oil pressure in that part of the system between the pump and the control valve. ✓
  - The moment the operator moves the control valve plunger to the right, ✓ the oil under pressure flows via the non-return valve to the cylinder and the piston and shaft are forced in the out direction. ✓
  - When the control valve is moved into the opposite direction, ✓ a small hole in the control valve is exposed, allowing the oil to return to the oil tank through the same pipe. ✓
  - The weight ✓ of the implement forces the piston to return to its original position. ✓ (8)
- 5.3.2
- Straight-cut gear (Spur gear). ✓
  - Helical gear. ✓
  - Double helical gear (Herringbone gear). ✓ (3)
- [40]**

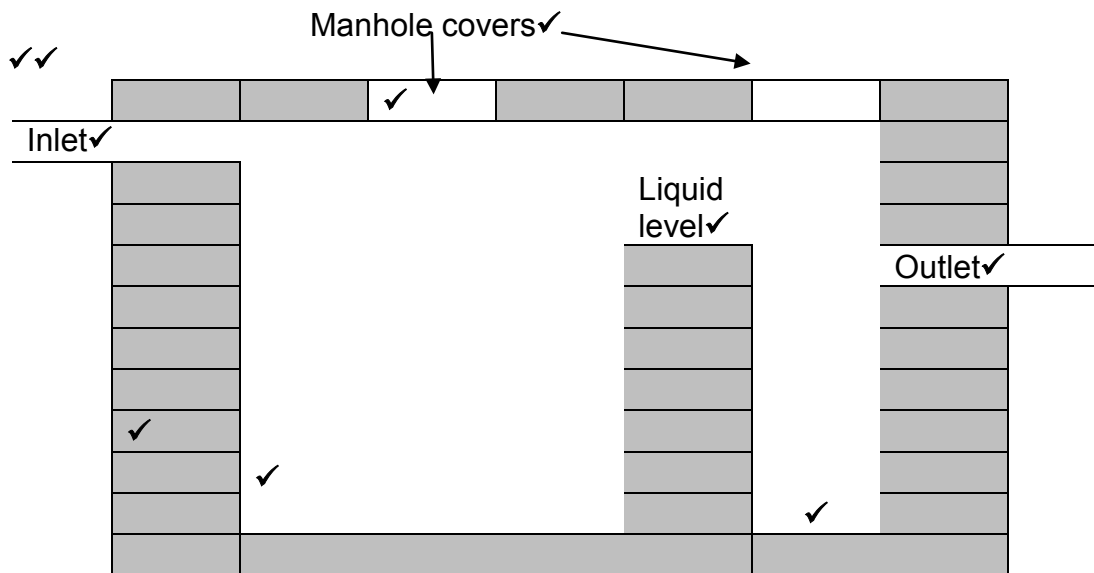
**QUESTION 6: WATER MANAGEMENT**

6.1 6.1.1 Marks will be allocated for:

Correctness. ✓✓✓✓

Labelling. ✓✓✓✓

Neatness. ✓✓



(10)

- 6.1.2
- The incoming effluent will be diverted downward with a minimum of splashing, ✓ allowing the solids to sink to the bottom. ✓
  - When the water level rises high enough ✓ it flows over the dividing wall into the second compartment. ✓
  - When water rises high enough in the second compartment, it will flow out at the outlet pipe at the top part of the compartment ✓ and seep away into the soil. ✓
  - The bacteria will break down the solid waste ✓ during the process and therefore rehabilitated water will drain from the outlet, while solids stay longer to be broken down completely. ✓

(8)

- 6.1.3
- Near boreholes. ✓
  - Drinking water installations. ✓
  - Near the house. A suitable distance away from the house. ✓
  - Near traffic. ✓
  - Where people eat, wash or work regularly. (Any 4)

(4)

- 6.2
- Pressure high enough to satisfy needs. ✓
  - Prevent spillage. ✓
  - Joints watertight. ✓
  - Removal of spillage water. ✓
  - Protect all valves. ✓

(5)

- 6.3
- For correct calibrating of the sprayers. ✓
  - Effective scheduling of irrigation. ✓
  - To prevent the over utilisation of the water source. ✓
- (3)  
**[30]**

**TOTAL SECTION B: 160**  
**GRAND TOTAL: 200**