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_2 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_2✓ (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: Na X Da = Ng X Dg

$$Na = \frac{Ng \times Dg}{Da}\checkmark$$

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

Na = 2000✓ r/min ✓ (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)

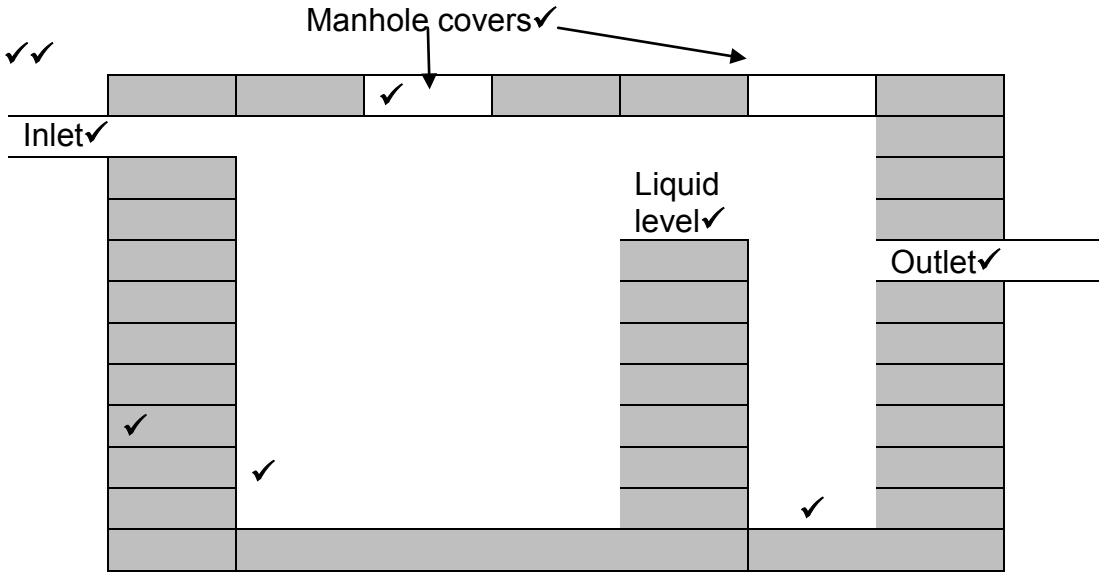
5.3.2

- 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