higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

PLANT AND EQUIPMENT
NQF LEVEL 3

19 November 2024

This marking guideline consists of 5 pages.

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QUESTION 1

1.1 False
1.2 True
1.3 False
1.4 True
1.5 True

(5 ×1) **[5]**

QUESTION 2

2.1
- Whether the man walks up the gentle slope✓ or climbs up the steep slope,✓ the work stays the same.✓
- This is because in both cases, the task is to move the box from the bottom to the top of the hill.✓✓
- This means if you decrease the distance,✓ you increase the force✓ that you must apply and vice versa.✓
- This makes the same amount of work✓ easier to do because it takes less effort.✓ (10)

2.2
- Effort
- Load
- Fulcrum
- Load arm
- Effort arm (5)

2.3
- Conveyor belt
- Builder's hoist
- Tower crane
- Luffing jib crane
- Mobile crane (5)

[20]

QUESTION 3

3.1
- Another 30% of the power in a car engine is wasted✓ through friction of the moving parts.✓
- The rest is lost to heat.✓ (3)

3.2
- Electric motors are efficient:✓ Electric motors have a very high efficiency of up to 95%.✓ By contrast, petrol engines have an efficiency of about 10% at idle and about 30% at full throttle, while diesel engines have an efficiency of up to 45%.✓
- Electric motors require minimum maintenance:✓ Electric motors require less maintenance✓ than internal combustion (IC) engines and electrical engines do not require an oil change.✓
- Electric motors are cheap in terms of energy cost:✓ The energy costs of IC engines vary between 4✓ and 15 times as much as those of an electric motor.✓
- Electric motors are quiet:✓ Electric motors are generally much quieter to operate✓ than IC engines.✓

(12)

3.3
- As air cools at night, water moisture in the atmosphere condenses onto cold surfaces.✓
- The more air inside the tank at night, the more condensation there will be on the inside walls of the tank.✓
- Water rusts the tank,✓ corrodes the fuel pump and injectors, and promotes the growth of bacteria in empty tanks.✓
- Always make sure that the tank is full before nightfall to minimise the risk of condensation inside the tank.✓ (5)

[20]

QUESTION 4

4.1
- Loads on engines are not always constant.
- There is greater resistance climbing a hill or pulling a load.
- Engines can only develop usable torque over a limited range of engine speed.
- At times, greater rim pull is needed.
- Greater torque is needed to drill big holes than small holes.

(Any of the FOUR or any correct answer is acceptable) (4)

4.2 $$Gear\ ratio = \frac{number\ of\ teeth\ on\ output\ gear}{number\ of\ teeth\ on\ input\ gear}$$ ✓✓ (2)

4.3
- Disengage the transmission from the engine by holding the clutch pedal down and move the gear stick up from second gear into neutral.
- Thereafter, move the gear stick to the right below third gear and move the gear stick up into the third gear again and engage the clutch by releasing the clutch pedal. (2 × 2) (4)

[10]

QUESTION 5

5.1
- Parts list
- Manufacturer's manual
- Maintenance schedule
- Lubrication chart (4)

5.2
- Maintenance that must be done almost every day
- First-level maintenance that must be done every few months, i.e. every 10 000 km or 20 000 km
- Second-level maintenance that does not have to be done often, but must be done when the manual says it should be done, i.e. every 80 000 km

(3 × 2) (6)

5.3
5.3.1 False
5.3.2 True
5.3.3 False
5.3.4 True

(4 × 1) (4)

5.4
- Disconnect the battery from the vehicle's electrical system.
- Disconnect the cables from the battery terminals.
- Remove the battery. (3)

5.5 A single fitment has one wheel assembly✓ on each side of the rear axle,✓ whereas a twin fitment has two wheel assemblies✓ on each side of the rear axle. (3)

[20]

QUESTION 6

6.1 A self-priming water pump automatically✓ prepares itself for use✓ when you switch it on,✓ whereas a non-self-priming water pump cannot pump✓ out the air✓ in the pump and pipe.✓ (6)

6.2 The main purpose of a dynamo is to convert mechanical energy✓ into electrical energy through magnetic induction.✓ (2)

6.3 Erratic electricity is a problem when wires heats up.✓ The danger is that the wires could melt and cause fires.✓ A higher temperature in the wires✓ can also cause the electric motors of the tools that are being used to burn out.✓ (4)

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6.4
- Some tools such as a jackhammer are very loud.
- The air can create a lot of dust if the area is not kept well ventilated.
- Excessive dust can lead to severe breathing problems.
- If you pump air into a container to store it for later use, the container can explode if you pump too much air into it.

(Any of the FOUR or any correct answer is acceptable) (3 ×1) (3)
[15]

QUESTION 7

7.1 Oxygen regulators have blue knobs to adjust the pressure,✓ while acetylene regulators have red knobs to adjust the pressure.✓ (2)

7.2 Spatter is small pieces of weld metal✓ that splashes while you weld.✓ (2)

7.3
- Welders mask: to protect eyes from bright light and flying sparks
- Apron: to protect your body from sparks and heat; made out of fire-proof materials
- Earplugs: to protect the eardrums, which can be damaged from loud noise

(Any other correct answers are acceptable) (3 × 2) (6)
[10]

TOTAL: 100

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