higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

RIGGING THEORY N2

1 AUGUST 2019

This marking guideline consists of 7 pages.

QUESTION 1

1.1
- Ensure that the rope slings are hanging on an A-frame structure.
- Ensure that the slings are separately stored, for example synthetic rope slings and steel rope slings.
- Ensure that the slings are stored in a proper storeroom with proper lighting.
- Ensure that the slings are in a good condition.
- Ensure that you do not place the slings in a damp and wet area.
- Ensure that the slings in the storeroom are inspected regularly.

(Any relevant 5 × 1) (5)

1.2
- Advantage of a thimble while retaining the flexibility of a soft eye
- Eye bearing protected from wear, thus ensuring a longer life
- Loop protected when sling is withdrawn from a load
- Can be used without additional mass and cost of a reeving thimble
- Stirrup easily replaced (5)

1.3 A – 6 × 7 fibre rope core
B – 6 × 7 steel rope core
C – 6 × 19 steel rope core (3 × 2) (6)

1.4 1.4.1 Occurs when wire ropes rub against pulley

1.4.2 Occurs when wire ropes are forced over sharp corners or if a heavy object falls on it

1.4.3 Occurs when ropes are left in wet or damp areas

1.4.4 Occurs when wire rope lifts more than its maximum load

(4 × 1) (4)
[20]

QUESTION 2

2.1 A – Lifting beam
B – Chain block
C – Lifting cage (3)

2.2 2.2.1
- Ensure that the screw jack is in a good working condition.
- Ensure that the screw is working correctly with no wear or damage to the threads.

2.2.2
- Ensure that the ratchet jack is in a good working condition.
- Ensure that the ratchet is working correctly with no slipping.

(2 × 2) (4)

2.3 A wire rope reeving system is essentially a rope system in which wire rope travels around drums and sheaves or pulleys for the purpose of hoisting or hauling. Wire rope is designed to cope with hostile environments; each individual wire is coated with zinc or is galvanised. (2)

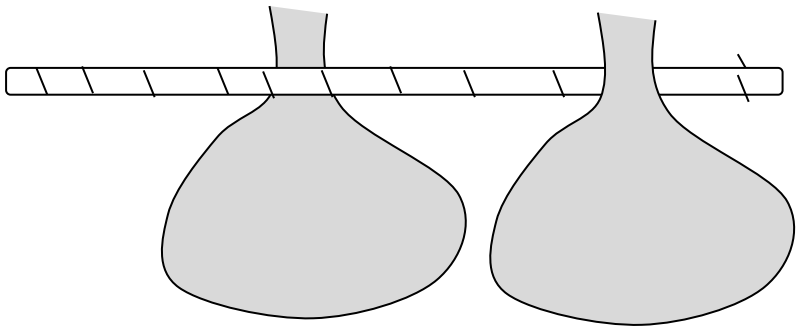
2.4 Check if all the harness straps are in a good working condition.✓
Swing the harness in a jacket movement over the shoulders. Set the harness straps in front by shortening or lengthening them and set the harness strap on the leg.✓ Check that the safety harness is not twisted after wearing.✓ (3)

2.5
- Wear on the slings
- Kinks on the slings
- Broken wires on the slings
- Corrosion on the slings (Any relevant 3 × 1) (3)

[15]

QUESTION 3

3.1



(3)

3.2
- Type of strand
- Type of rope
- Wire tensile strength
- Surface finish
- Type of lay
- Rope size (Any 4 × 1) (4)

3.3 Self-detaching pulleys can be readily detached to alter or deflect the direction of the haulage rope if the circumstances necessitate it. (2)

3.4 Alloy steel chains should not be annealed because it reduces the hardness and therefore the strength of the equipment. (1)
[10]

QUESTION 4

4.1
- The rope is coiled on a drum and a shaft is put through the drum placed on a stand or jacks.✓
- Take the rope off the drum slowly in a straight forward movement.✓ The drum revolves steadily.✓
- Do NOT let loose loops fall off the drum and bend around the shaft.✓
- Run the rope onto the sheaves so that it bends accordingly when it comes off the drum.✓
- Do NOT run the rope onto sheaves in a way that will cause reverse bending.✓ (6)

4.2
- Cracks
- Wear
- Dents and kinks
- Corrosion
- Mechanical damage (Any 4 × 1) (4)

4.3 4.3.1 Projects where the rope is submitted to excessive wear, excessive breaking loads and shocks

4.3.2 Mainly used in shaft sinking work because they are flexible (2 × 1) (2)

4.4
- Not confined to a single-rope system
- Do not have to be coiled in layers
- Greater payloads hoisted with more than one head rope
- Simpler than a drum winder (Any 3 × 1) (3)

[15]

QUESTION 5

5.1
- To detach the rope from the cage in the event of a high-speed overwind. This function minimises the damage to infrastructure,✓ but also releases the rope in overwinds at all speeds, including some low-speed overwinds.✓
- To latch into the spectacle plate once the rope has detached✓ and to provide a means of holding the cage from falling down the shaft.✓ (4)

5.2
- Detaching lever not working correctly
- Crack on the eye of the hook
- Worn-out pins
- Dents
- Corrosion or rust (5)

5.3 Used to lift up flat-sheet metal where the jaw grips onto the plate when lifted (1)

[10]

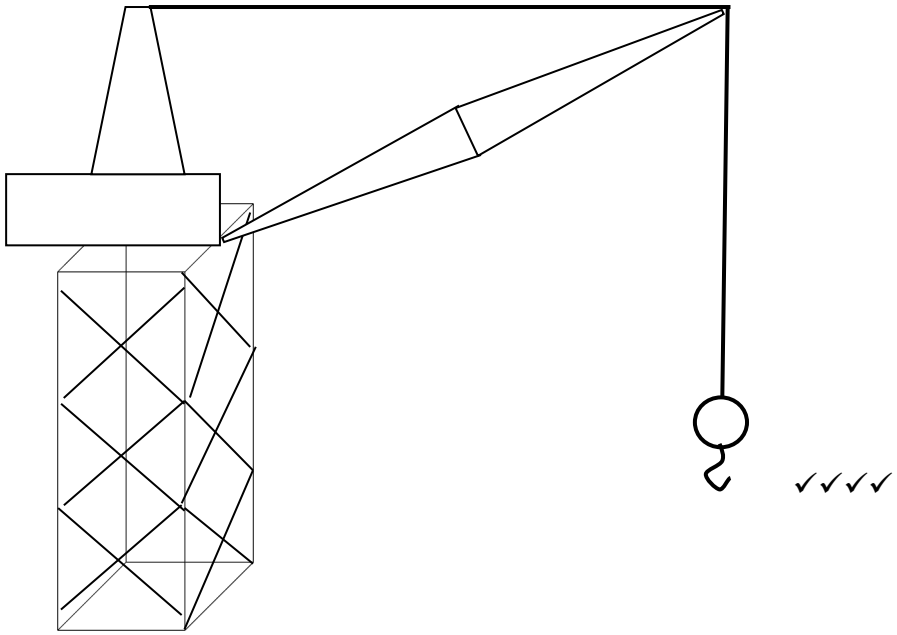
QUESTION 6

6.1 Anchorage means the load has to be anchored or a load has to be suspended by anchors, for example an anchored ship or erecting a bridge suspended by anchors. (2)

6.2 A hydraulic jack operates by hydraulic pressure which is activated by the cranking of the jack handle. The hydraulic screw must be locked for the jack to lift the load. For safety reasons ensure that another stand is placed under the load that has been lifted by the jack. (3)

6.3 Frame of steel or timber in the shape of the letter A that is erected on a vertical plane with a brace, leg, extended from the top of the A at 45° to the ground.✓ A ground member or members tie this brace to the bottom of the A-frame.✓ The boom is hinged at the horizontal member of the A.✓ The base of the A-frame and the rear brace must be firmly weighted down.✓ (4)

6.4



✓✓✓✓

(4)

6.5
- Wear
- Mechanical damage
- Cracks on bins
- Dents or kinks (4)

6.6 Crane capable of lifting, lowering and rotating a load within the scope of a circle covered by a rotating arm or jib on which a trolley runs. The jib is supported from a building wall, pillar or column. (3)

[20]

QUESTION 7

7.1 $a)$ $A1 = l \times b$
= 2,5 m × 1,2 m
= 3 m² × 2
= 6 m²✓

$A2 = l \times b$
= 2 m × 2,5 m
= 5 m² × 2
= 10 m²✓

$A3 = l \times b$
= 2 m × 1,2 m
= 2,4 m² × 2
= 4,8 m²✓

Total area = A1 + A2 + A3✓
= 6 + 10 + 4,8 m²✓
= 20,8 m²✓ (6)

7.2 $M = A \times specific\ mass$✓
= 20,8 m² × 400 kg/m²✓
= 8 320 kg✓ (3)

7.3 Total mass = mass of container + mass of goods
= 8 320 kg + 2 500 kg
= 10 820 kg✓ (1)
[10]

TOTAL: 100