higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

RIGGING THEORY N2

21 November 2022

This marking guideline consists of 6 pages.

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QUESTION 1

1.1
- Fibre.
- Steel strand.
- Wire rope.
- Plastic. (4)

1.2
- Wear in the rope.
- Corrosion in the rope.
- Fatigue in the rope.
- Accidental damage and distortion in the rope.
- Kinks in the rope. (5)

1.3 1.3.1 A long splice is used to join two ropes which are required to pass through a block. (2)

1.3.2 A short splice is simpler✓ but as this splice increases the size of the rope,✓ it cannot be used in the same way as a long splice.✓ (3)

1.4
- A – Solid thimble
- B – Drop forced open socket
- C – D Shackle (3)

1.5
- D – The diameter of the sheave.
- d – The diameter of the rope.
- D/d – Ratio indicates the increase when ropes service life lengthens. (3)

[20]

QUESTION 2

2.1
- Jack should have the rated capacity to lift the load.
- Jack should be in a serviceable condition.
- Support load.
- Should stand on a hard surface.
- Should stand at right angles to load.
- Blocks to be used if the surface is not level or hard. (6)

2.2
- Fibre rope slings must be protected from heat.
- Fibre rope slings must be protected from being wet or damp.
- Proper storage rack must be made for fibre rope slings.
- Fibre rope slings must be high above the ground and not left on the ground.
- Ropes must be neatly bound and ready for immediate use. (Any 4 × 1) (4)

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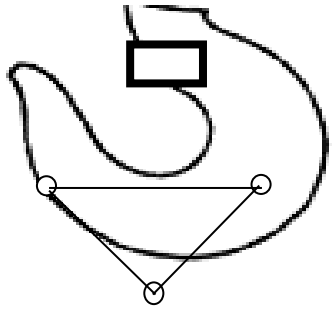
2.3



✓✓✓ (3)

2.4
- Ensure there are no cuts on the fibre of the harness.
- Ensure the safety hook is not damaged.
- Ensure that there are no worn or broken stitches on the harness.
- Ensure that the rope is not damaged.
- Ensure the latches are in a good condition, not broken, cracked, or worn.

(Any 2 × 1) (2)
[15]

QUESTION 3

3.1 Alloy steel chain should not be annealed because it reduces the hardness✓ and strength✓ of the equipment. The alloy steel chain will also stretch causing it to break easily.✓ (3)

3.2
- Check for wear.
- Check for cracks.
- Check for corrosion.
- Check for chips and bends (Any 2 × 1) (2)

3.3
- Run-overs of vehicles.
- Blasting.
- Being trapped at crossings.
- Running around or on shafts of support pulleys or return wheels.
- Falling, hanging in the air.
- Running through badly grooved rollers, guides, sleepers etc. (Any 3 × 1) (3)

3.4 Pineapple rollers are rollers of another design which is used to keep the haulage rope in its true direction. (2)
[10]

QUESTION 4

4.1
- It reduces internal friction.
- It protects against rust and corrosion.
- It retards surface wear on both the rope and the grooves of the sheaves and drums.
- It also increases the life span of the ropes because there is no traction.

(Any 3 × 1) (3)

4.2
- The Koepe hoist system is not confined to a single rope system.
- Ropes do not have to be coiled in layers.
- Much simpler than a drum winder.
- Greater payloads can be hoisted because it has more than one head rope.

(Any 3 × 1) (3)

4.3 4.3.1 Breaking force is the measured force✓ necessary to break the wire in the rope that is under extreme tension.✓ The heat assists in reducing this force.✓ (3)

4.3.2 Reserve strength is the combined strength✓ of all the wires in the rope. The outer wires exclude the strength,✓ which serves as wearing protection for the inner wires.✓ (3)

4.4 A – Grip pulley.
B – V-groove pulley.
C – Flat belt pulley. (3)

[15]

QUESTION 5

5.1
- Check the links are not bent or damaged.
- Check for cracks on hooks and attachments.
- Check for any scars or markings.
- Check for corrosion or wear.
- Check lifting pins are in good working condition. (Any 4 × 1) (4)

5.2
- Ensure that the load is put down so that there is no tension on the detachable hook.
- Release the locking lever A by using a hook.
- The gear will unleash, and the slings and bottom shackles are removed.
- Push the locking lever from the hook.
- Remove the shackle and the detachable hook from the main hook.
- Clean up the devices and store them away in the storeroom. (6)

[10]

QUESTION 6

6.1
- Overhead crane or Travelling crane
- Cantilever crane or Bridge crane.
- Gantry crane.
- Half-gantry crane.
- Wall crane.
- Tower crane.
- Jib crane. (Any 5 × 1) (5)

6.2 Tripod anchors consist of three spars or legs.✓ They are lashed together and crossed near their heads with the heels splayed out to form a tripod.✓ The heels are placed on a shoe made out of timber.✓ The tripod can only be used for a straight lift. After a tripod is assembled no rigging is required to support it.✓ (4)

6.3 6.3.1 Derricking is the movement of the jib crane when it is pivoting on a vertical plane.

6.3.2 Stability reach is the distance of the jib headpin from the point of intersection of the nearest baseline and the vertical plane passing through the centre line of the jib.

6.3.3 Margin of stability is the percentage of additional load required to bring the crane to the condition of tipping when it is handling the safe working load at any radius.

(3 × 2) (6)

6.4
- Braided slings have extreme flexibility.
- Braided slings have no spin.
- Braided slings have greater gripping power.
- Braided slings are resistant to malformation and permanent set
- Braided slings are easy to handle (5)

[20]

QUESTION 7

7.1 The Centre of gravity means the location where the centre of the entire weight of an object is theoretically concentrated. (1)

7.2 $a)\ F = m.g$
= 4000 kg × 10m/s✓
= 40 000 N✓ (2)

$b)\ W = F \times distance$
= 40 000 n × 250 m✓
= 10 000 000 Nm✓
= 10 MJ✓ (3)

7.3 $a)$ $A = l \times b$
= 1.5 m × 0.3 m✓
= 0.45 m²✓ (2)

$b)$ $M = A \times specific\ mass$
= 0.45 m² × 76 kg/m²✓
= 34.2 kg.✓ (2)
[10]

TOTAL: 100

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