Mine Hoist Operator
Training Program

Test Questions
## Report Documentation Page

**Title (and Subtitle):**

MINE HOIST OPERATION TRAINING PROGRAM
(with Test Questions and Test Answers)

**Author(s):**

[Name(s)]

**Performing Organization Name and Address:**

Human Resources Research Organization (HumRRO)
300 N. Washington Street
Alexandria, Virginia 22314

**Controlling Office Name and Address:**

U. S. Bureau of Mines
4800 Forbes Avenue
Pittsburgh, PA 15213

**Report Date:**

December 1979

**Number of Pages:**

[Number]

**Distribution Statement (of this Report):**

Approved for public release; distribution unlimited.

**Distribution Statement (of the abstract entered in Block 20, if different from Report):**

[Blank]

**Supplementary Notes:**

*includes pages in Test Questions and Test Answers Booklet.

Research performed under HumRRO Project

**Key Words (Continue on reverse side if necessary and identify by block number):**

Mine Hoist Operator Training Program

**Abstract (Continue on reverse side if necessary and identify by block number):**

The purpose of this program is to train and re-train mine hoist operators. The training is in three parts. Part I the student will learn the basic components and operations of a mine hoist; in Part II the student will learn the specific components of the hoist they are being trained to operate; and Part III the student will become skilled in operating their assigned hoist. This is the Test Question Booklet and Test Answer Booklet are separate.

---

**Security Classification of this Page (When Date Entered):**

[Blank]

**Security Classification (of this Report):**

Unclassified

**Declassification/Downgrading Schedule:**

[Blank]
<table>
<thead>
<tr>
<th>CONTENTS FOR TEST QUESTIONS</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mine Hoist</td>
<td>T-1-1</td>
</tr>
<tr>
<td>Hydraulic System</td>
<td>T-2-1</td>
</tr>
<tr>
<td>Shaft</td>
<td>T-3-1</td>
</tr>
<tr>
<td>Conveyances</td>
<td>T-4-1</td>
</tr>
<tr>
<td>Headframe</td>
<td>T-5-1</td>
</tr>
<tr>
<td>Sheaves</td>
<td>T-6-1</td>
</tr>
<tr>
<td>Brake System</td>
<td>T-7-1</td>
</tr>
<tr>
<td>Clutch</td>
<td>T-8-1</td>
</tr>
<tr>
<td>Hoist Drum or Wheel Assembly</td>
<td>T-9-1</td>
</tr>
<tr>
<td>Wire Rope</td>
<td>T-10-1</td>
</tr>
<tr>
<td>Electrical System (General)</td>
<td>T-11-1</td>
</tr>
<tr>
<td>Depth Indicator</td>
<td>T-12-1</td>
</tr>
<tr>
<td>Safety Controller</td>
<td>T-13-1</td>
</tr>
<tr>
<td>Hoist Control Panel</td>
<td>T-14-1</td>
</tr>
<tr>
<td>Communication Systems</td>
<td>T-15-1</td>
</tr>
<tr>
<td>Lubrication</td>
<td>T-16-1</td>
</tr>
<tr>
<td>Inspection</td>
<td>T-17-1</td>
</tr>
<tr>
<td>Maintenance</td>
<td>T-18-1</td>
</tr>
<tr>
<td>Safety Features</td>
<td>T-19-1</td>
</tr>
<tr>
<td>Electrical System (Fundamental)</td>
<td>T-20-1</td>
</tr>
<tr>
<td>Beginning of Shift Activities</td>
<td>T-21-1</td>
</tr>
<tr>
<td>Routine Shift Activities</td>
<td>T-22-1</td>
</tr>
<tr>
<td>Emergency Procedures</td>
<td>T-23-1</td>
</tr>
<tr>
<td>End of Shift Activities</td>
<td>T-24-1</td>
</tr>
<tr>
<td>Federal Regulations</td>
<td>T-25-1</td>
</tr>
</tbody>
</table>
TEST QUESTIONS FOR THE MINE HOIST

Complete this sentence with the correct answer:

1. The mine hoist is used to ____________________________________

Above is a picture of a mine hoist. In Column I write the name of each lettered part. In Column II write the number of the sentence from the list on page T-1-2 that explains each part.

<table>
<thead>
<tr>
<th>I. Name of Part</th>
<th>II. Explanation of Each Part</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. A Control</td>
<td>9</td>
</tr>
<tr>
<td>3. B</td>
<td></td>
</tr>
<tr>
<td>4. C</td>
<td></td>
</tr>
<tr>
<td>5. D</td>
<td></td>
</tr>
<tr>
<td>6. E</td>
<td></td>
</tr>
<tr>
<td>7. F</td>
<td></td>
</tr>
<tr>
<td>I. Name of Part</td>
<td>II. Explanation of Each Part</td>
</tr>
<tr>
<td>----------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>8. G</td>
<td></td>
</tr>
<tr>
<td>9. H</td>
<td></td>
</tr>
<tr>
<td>10. I</td>
<td></td>
</tr>
<tr>
<td>11. J</td>
<td></td>
</tr>
<tr>
<td>12. K</td>
<td></td>
</tr>
<tr>
<td>13. L</td>
<td></td>
</tr>
<tr>
<td>14. M</td>
<td></td>
</tr>
<tr>
<td>15. N</td>
<td></td>
</tr>
</tbody>
</table>

**Answers for Column II**

1. The area where ore and waste are deposited.
2. The path from the surface to the underground workings.
3. The motor which turns the hoist drum or wheel.
4. The device which engages or disengages the drum from the hoist motor.
5. Gears which connect the hoist motor to the hoist drum or the hoist wheel.
6. The drum or wheel which raises and lowers the hoist rope.
7. The wire cable which raises and lowers the conveyance.
8. The mine level from which ore or waste is being hoisted.
9. The station from which the hoist is operated.
10. The device which slows, stops and holds the hoist rope.
11. The grooved wheel which supports the rope.
12. The structure which holds the head sheave.
13. The area surrounding the surface opening of the shaft.
14. The platform on which men, materials, ore and waste are hoisted/lowered.
TEST QUESTIONS FOR THE HYDRAULIC SYSTEM

Complete this sentence with the correct answer:

1. A hydraulic system enables the hoist operator to ________________________

   ________________________

Above is a picture of a hydraulic system. In Column I write the name of each lettered part. In Column II write the number of the sentence from the list on page T-2-2 that explains each part.

<table>
<thead>
<tr>
<th>I. Name of Part</th>
<th>II. Explanation of Each Part</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. A Drive Motor Control</td>
<td>________________________</td>
</tr>
<tr>
<td>3. B ________________________</td>
<td>________________________</td>
</tr>
<tr>
<td>4. C ________________________</td>
<td>________________________</td>
</tr>
<tr>
<td>5. D ________________________</td>
<td>________________________</td>
</tr>
<tr>
<td>6. E ________________________</td>
<td>________________________</td>
</tr>
<tr>
<td>7. F ________________________</td>
<td>________________________</td>
</tr>
<tr>
<td>8. G ________________________</td>
<td>________________________</td>
</tr>
<tr>
<td>9. H ________________________</td>
<td>________________________</td>
</tr>
</tbody>
</table>
Answers for Column II

1. An operating control which the operator uses to control the flow of oil in the system.
2. A sump that stores oil at low pressure.
3. A control that will start and stop the drive motor.
4. An operating mechanism, usually a cylinder and piston, that does the work.
5. An accumulator that will store oil at high pressure.
6. A pump that will pressurize oil.
7. An electric motor that operates pump.
8. A piston whose movement controls the drive motor control.

Complete these sentences with the correct answers:

10. Oil flows from the operating control into the sump or the ________________.
11. The piston moves upward and may, for example, engage the ________________.
12. When the operator wants to disengage the clutch, he/she uses the control to allow oil to flow from the operating mechanism to the ________________.
13. The piston will move ________________.
14. As oil flows out of the accumulator, the accumulator piston moves ________________.
15. This movement causes the drive motor control to start the ________________.
16. The motor operates the pump which pumps oil from the sump to the ________________.
17. This increase in oil raises the ________________.
18. When sufficient oil has been pumped, the upward movement of the accumulator piston ________________.
TEST QUESTIONS FOR SHAFT

Fill in the blank with the letter of the answer that best completes the sentence.

1. The shaft in a mine provides a path for _______.
   a. one or more conveyances
   b. power cables
   c. communication and other control links
   d. all of the above
   e. none of the above

Above is a picture of a shaft. In Column I write the name of each lettered part. In Column II write the number of the sentence from the list on page T-3-2 that explains each part.

<table>
<thead>
<tr>
<th>I. Name of Part</th>
<th>II. Explanation of Each Part</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. A Collar</td>
<td></td>
</tr>
<tr>
<td>3. B</td>
<td></td>
</tr>
<tr>
<td>4. C</td>
<td></td>
</tr>
<tr>
<td>5. D</td>
<td></td>
</tr>
<tr>
<td>6. E</td>
<td></td>
</tr>
<tr>
<td>7. F</td>
<td></td>
</tr>
<tr>
<td>8. G</td>
<td></td>
</tr>
</tbody>
</table>

T-3-1
**Answers for Column II**

1. The sides of the shaft; made of timber, steel or cement.
2. The area where the conveyance empties its load of coal or ore.
3. The opening of a level onto the shaft.
4. The area surrounding the shaft opening at the face of the mine.
5. They keep the conveyance in proper position. Vertical shafts have fixed guides made of wood timbers or steel rails or rope guides of locked coil ropes. Slope shafts have tracks to guide the conveyance and rollers to guide the rope.
6. The guard across a landing/station of the shaft.
7. The paths into the mine for power, water, air, and communications.

Fill in the blank with the letter of the answer that best completes the sentence. Read all of the choices before selecting your answer.

**Metal and Nonmetallic**

9. Shaft landings shall be equipped with ___________.
   a. substantial safety gates
   b. substantial dump areas
   c. a rope to stretch across the opening
   d. all of the above
   e. none of the above

10. All tracks leading to a shaft collar or landing shall have ___________.
    a. a stop sign
    b. positive stopblocks
    c. derail switch
    d. b and c
    e. none of the above

11. Suitable clearance at shaft stations shall be provided to allow safe movement of ___________.
    a. persons
    b. equipment
    c. materials
    d. a, b and c
    e. none of the above

12. A safe means of passage around open shaft compartments shall be provided on landings with more than one ___________.
    a. utility cable
    b. shaft guide
    c. entrance to the shaft
    d. a and c
    e. none of the above
13. Safety gates shall be ________ except when loading or unloading shaft conveyances.
   a. closed
   b. open
   c. locked
   d. lubricated
   e. none of the above

14. Shaft sets shall be ________.
   a. kept in good repair
   b. kept clean of hazardous material
   c. oiled daily
   d. a and b
   e. none of the above

15. Shafts that have not been inspected within the past ________ shall not be used until an inspection has been conducted by a competent person.
   a. day
   b. 7 days
   c. month
   d. year
   e. none of the above

16. When men are working in a shaft, ________.
   a. "Men Working Shaft" sign shall be posted at hoist
   b. "Men Working Shaft" signs shall be posted at controls
   c. the hoistman will be informed
   d. all of the above
   e. none of the above

17. Rollers used in operating inclined shafts shall be ________.
   a. kept in good repair
   b. lubricated
   c. properly aligned
   d. all of the above
   e. none of the above

Coal Mines

18. The shaft lining and parts shall be examined ________.
   a. hourly
   b. daily
   c. weekly
   d. monthly
   e. yearly

19. Safety gates shall be ________.
   a. self-closing
   b. located at all open entrances to shafts at the top
   c. located at all open entrances to shafts at each landing
   d. kept closed except when the cage is at the landing
   e. all of the above
TEST QUESTIONS FOR CONVEYANCES

Fill in the blank with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

1. A skip is used mainly to carry ________.
   a. men
   b. ore and waste
   c. some heavy equipment
   d. a and c
   e. b and c

2. A cage is used mainly to carry ________.
   a. men
   b. ore and waste
   c. equipment
   d. a and c
   e. a and b

3. A car can be used to carry ________.
   a. men, equipment if it has seats
   b. ore and waste if it has no seats
   c. heavy equipment if it has no seats
   d. all of the above
   e. none of the above

4. Fill in the blank above each illustration with the correct kind of conveyance: cage, skip or car. Write the name of each of the lettered parts.

I. ______________________________ I. ______________________________

   A. _________
   B. _________
   C. _________
   D. _________
   E. _________

   A. _________
   B. _________
   C. _________
   D. _________
5. Label the illustration cage, skip or car: 

6. Fill in the blank above the illustration with the correct kind of conveyance: cage, skip or car.

Write the name of each lettered part:

A. 
B. 
C. 
D. 

7. A skip dumps its contents by 
   a. turning upside down
   b. opening its bottom or lower side
   c. rolling sideways and activating vacuums in the dump area
   d. a and b
   e. none of the above

8. The framework that supports the skip is the 
   a. dump roller
   b. bail
   c. gate or door
   d. track or scroll
   e. none of the above
9. The shape of the _____ causes the ______ to move horizontally and turn the skip upside down or open the skip dump gate.
   a. bonnet
   b. track or scroll
   c. guide shoe
   d. dump roller
   e. tail rope

10. The ______ travels along the shaft guide and prevents the conveyance from moving horizontally in the shaft.
    a. bonnet
    b. man compartment
    c. guide shoe
    d. safety dog
    e. gate or door

11. The emergency braking device attached to the conveyance is the ______.
    a. bonnet
    b. man compartment
    c. guide shoe
    d. safety dog
    e. gate or door

12. The protective enclosure of a cage that people ride in is the ______.
    a. bonnet
    b. man compartment
    c. guide shoe
    d. safety dog
    e. gate or door

13. The ______ protects the man compartment from falling objects.
    a. bonnet
    b. man compartment
    c. guide shoe
    d. safety dog
    e. gate or door

14. The safety dog of a cage is activated by a spring if ______.
    a. the bonnet is removed
    b. slack appears in the hoist rope
    c. fraying appears in the hoist rope
    d. the guide shoes are lubricated
    e. none of the above
15. A vertical shaft hoist may have ________.
   a. two ropes with two conveyances
   b. a single rope and a single conveyance
   c. two ropes with a conveyance and a counterweight
   d. all of the above
   e. none of the above

16. A ________ may be connected to the bottom of the conveyances to balance the weight of the hoist rope.
   a. latch
   b. tailrope
   c. toggle link
   d. bonnet
   e. b and d

FEDERAL REGULATIONS
Metal and Nonmetallic Mines
17. Man cages and skips used for transporting people in any vertical shaft or any slope shaft with a 45° inclination angle shall be covered with a ____________.
   a. bonnet
   b. bar
   c. guide shoe
   d. tailrope
   e. b and c

18. Buckets shall not be used to hoist men except during ____________.
   a. shaft sinking operations, and inspection
   b. maintenance, and repairs
   c. the beginning of the shift
   d. the end of the shift
   e. a and b

Coal Mines
19. Cages used for hoisting men shall be constructed with ____________.
   a. sides enclosed to a height of at least six feet
   b. gates, safety chains or bars across the ends of the cage when people are being hoisted or lowered
   c. tailropes to balance the weight of the hoist rope
   d. a and b
   e. none of the above
20. Self-dumping cages, platforms or other devices used for transportation of men shall have a ______when men are transported in them.
   a. toggle link to allow braking
   b. bail to prevent turning
   c. locking device to prevent tilting
   d. a and c
   e. none of the above
TEST QUESTIONS FOR HEADFRAME

Complete this sentence with the correct answer:

1. The headframe in a mine is used to ________________________________

2. Write the name of each lettered mine part:
   A. __________________
   B. __________________
   C. __________________
   D. __________________

3. Write the name of each lettered mine part:
   A. __________________
   B. __________________
   C. __________________
4. Draw an arrow to indicate the fleet angle.

[Diagram showing head sheave and hoist drum]

Fill in the blank with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

5. Too great a fleet angle will result in excessive wear on the ____________.
   a. shaft
   b. drum
   c. rope
   d. conveyance

6. Federal regulations state that fleet angles on hoists installed after November 15, 1979 shall ____________.
   a. not be greater than 1 degree for smooth drums or greater than 1/2 degree for grooved drums
   b. not be less than 1 1/2 degrees for smooth drums or less than 2 degrees for grooved drums
   c. not be greater than 1 1/2 degrees for smooth drums or greater than 2 degrees for grooved drums
   d. none of the above
TEST QUESTIONS FOR SHEAVES

Complete this sentence with the correct answer:

1. A sheave is a grooved wheel which supports the hoist _______.

2. Label the lettered sheave features below:
   A. ____________
   B. ____________

3. ______ sheaves support the rope and the conveyance at the head of the shaft; ______ sheaves support the rope as it changes direction; ______ sheaves support a long length of rope.
   a. groove
   b. head
   c. diameter
   d. knuckle or curve
   e. idler

4. In the Figure to the right the groove is too small and ______.
   a. The rope will be squeezed and distorted
   b. The rope will be damaged
   c. The groove will be damaged
   d. all of the above
   e. none of the above

5. In the Figure to the right the groove is too large and ______.
   a. The rope will be squeezed and distorted
   b. The rope will be flattened
   c. The rope will weaken
   d. b and c
   e. a and c

T.6-1
6. Too small a sheave diameter can cause the ________.
   a. rope to be over-lubricated  
   b. rope to be squeezed and distorted  
   c. rope to bend sharply and possibly break wires  
   d. hoist to be overloaded  
   e. none of the above

FEDERAL REGULATIONS

Metal and Nonmetallic

7. Head, idler, knuckle and curve sheaves shall have ________ of proper contour for the specific rope diameter used.
   a. bearings  
   b. grooves  
   c. conveyances  
   d. all of the above  
   e. none of the above

8. Sheaves shall be inspected ________ and kept properly lubricated.
   a. hourly  
   b. daily  
   c. weekly  
   d. monthly  
   e. yearly

Coal Mines

9. An examination of head sheaves for broken flanges, defective bearings, rope alignment, and proper lubrication shall be made ________.
   a. hourly  
   b. daily  
   c. weekly  
   d. monthly  
   e. yearly
TEST QUESTIONS FOR BRAKE SYSTEM

Complete this sentence with the correct answer:

1. The ________ of a mine hoist stop the hoist drum and hold it in one position.

Below is a disc brake. Using the illustration as a guide, answer question 2 by filling in the blanks with the letters of the answers that best complete the sentence.

2. When the brake is applied, the ________ come together to press against the ________.
   a. ring
   b. weights
   c. pads
   d. disc
   e. shoe

Below is a ring brake. Using this illustration as a guide, answer questions 3, 4 and 5 by filling in the blanks with the letters of the answers that best complete each sentence.

3. When the hydraulic pressure is released, the ________ pulls down on the brake lever, which pulls on the ________.
   a. drawbar
   b. weight
   c. ring
   d. disc
   e. pads

T.7.1
4. When the brake shoe holders or bands are brought together, the brake shoes or bands press against the ________.
   a. drawbar
   b. weight
   c. ring
   d. disc
   e. pads

5. The two types of ring brakes are ________.
   a. jaw
   b. disc
   c. parallel motion
   d. a and c
   e. b and c

Fill in the blank with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

FEDERAL REGULATIONS

Metal and Nonmetallic Mines

6. Any hoist used to hoist men shall be equipped with a brake or brakes capable of holding its fully loaded ________ at any point in the shaft.
   a. cage
   b. skip
   c. bucket
   d. all of the above
   e. none of the above

7. The operating mechanism of the clutch of every man-hoist drum shall be provided with a lock mechanism, or interlocked electrically or mechanically with the brake to prevent ________.
   a. accidental withdrawal of the clutch
   b. accidental withdrawal of the drum shaft
   c. accidental overloading of the hoist motor
   d. a and c
   e. none of the above
8. Automatic hoists shall be provided with devices that automatically apply the __________ in the event of power failure.

Coal Mines

9. Brakes on hoists used to transport persons shall be capable of stopping and holding the fully loaded __________ at any point in the shaft, slope or incline.
   a. platform
   b. cage or other device
   c. lighting system
   d. a and b
   e. none of the above
TEST QUESTIONS FOR CLUTCH

1. The purpose of the clutch is to ________.
   a. stop the conveyance at the dump when unloading
   b. show the position of the conveyance in the shaft
   c. engage or disengage the drum from the hoist motor
   d. indicate the condition of the hoist motor
   e. b and c

2. Below is an illustration of a tooth or positive engagement clutch. Label each lettered part: clutch spider, clutch ring or operating mechanism.

   A. ____________________
   B. ____________________
   C. ____________________

3. When the clutch spider of a positive engagement clutch is against the clutch ring, the ________ engage with the ________ and the rotation of the drum shaft causes the clutch spider and the ________ to rotate.
   a. drum
   b. teeth of the ring
   c. operating mechanism
   d. friction blocks
   e. teeth of the spider
4. Below is an illustration of a friction or band clutch. Label each lettered part: drum, shaft, band, spider, friction block or clutch ring.

A. ____________________________
B. ____________________________
C. ____________________________
D. ____________________________
E. ____________________________
F. ____________________________

5. When a friction clutch is engaged, the ________ press against the ________; this friction causes the ring and the attached ________ to rotate with the shaft.

a. drum
b. clutch ring
c. operating mechanism
d. friction blocks
e. shaft

FEDERAL REGULATIONS

6. The operating mechanism of the clutch of every man hoist drum shall be ________ to prevent accidental withdrawal of the clutch.

a. provided with a locking mechanism
b. interlocked electrically or mechanically with the brake
c. lubricated
d. welded to the conveyance
e. a and b
TEST QUESTIONS FOR HOIST DRUM OR WHEEL ASSEMBLY

Complete this sentence with the correct answer:

1. The hoist assembly lowers and raises ____________________________ .

2. Write the name of each lettered part.
   A. ____________________________
   B. ____________________________
   C. ____________________________

3. Write the name of each lettered part.
   A. ____________________________
   B. ____________________________
Fill in the blank with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

4. Channels in the surface of the drum are called ________.
   a. flanges
   b. grooves
   c. risers
   d. none of the above

5. Rims around the ends of the drum which keep the rope from slipping off are called ________.
   a. risers
   b. flanges
   c. grooves
   d. none of the above

6. Metal strips at the ends of the drum that raise each successive rope layer as it winds are ________.
   a. flanges
   b. grooves
   c. liners
   d. risers
   e. none of the above

7. The ________ of head (Koepe) wheel provides a groove for the hoist rope.
   a. flange
   b. LeBus
   c. liner
   d. riser
   e. none of the above

8. Label each type of grooving helical, parallel or LeBus.

   A. ________________  B. ________________  C. ________________
9. Label each type of hoist assembly single drum, one conveyance; double drum; single drum, two conveyance or head (Koepe) wheel.

A. _____________________________ B. _____________________________

C. _____________________________ D. _____________________________

Metal and Nonmetallic Mines

10. Flanges on drums shall extend radially a minimum of _______ beyond the last wrap, whichever is the lesser.
   a. 4 inches or 3 rope diameters
   b. 2 feet or 3 rope diameters
   c. 4 feet or 1 rope diameter
   d. 1 inch or 3 rope diameter
   e. none of the above

11. Where grooved drums are used, the grooves shall be of suitable size and pitch for the _______ used.
   a. flanges
   b. rope
   c. conveyance
   d. riser
   e. none of the above
**TEST QUESTIONS FOR WIRE ROPE**

Fill in the blank with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

1. Wire rope is used for ________.
   a. guy wires
   b. hoist rope
   c. shaft guides
   d. a, b, c
   e. none of the above

2. Flexible wire rope is ________.
   a. made up of many wires of small diameter
   b. used for rope that bends frequently in use
   c. made up of few wires of large diameter
   d. used for rope that doesn’t bend in use
   e. a and b

3. Wire rope that doesn’t bend in use ________.
   a. is made of many wires of small diameter
   b. has greater flexibility
   c. is made up of few wires of large diameter
   d. can be used for shaft guides
   e. c and d

Match the letter in the right column to the correct definition in the left column.

| 4. _____ lay that’s twisted to the left | A. lay |
| 5. _____ length of rope it takes for one strand to make a complete turn around core | B. right lay |
| 6. _____ lay that’s twisted to the right | C. lang lay |
| 7. _____ forms the center of the rope | D. seizing |
| 8. _____ lay with strands twisted in one direction, wires twisted in the other | E. left lay |
| 9. _____ lay with strands and wires twisted in the same direction | F. regular lay |
| 10. _____ outer wires of the rope that bear against the sheave or drum | G. core |
|        | H. crown wires |
11. Explain what this designation means: 
   \[ 2 \times 6 \]

12. Put a check beneath the correct method of measuring rope diameter:

   \[ \text{A. } \]  \[ \text{B. } \] 

13. Label each illustration right lay or left lay.

   \[ \text{A. } \]  \[ \text{B. } \] 

14. Label each illustration regular lay or lang lay.

   \[ \text{A. } \]  \[ \text{B. } \] 

15. Below is an illustration of a wire rope. Write the wire rope part for each letter.

   \[ \text{A. } \]  \[ \text{B. } \]  \[ \text{C. } \]
16. The life of the rope can be prolonged by avoiding:

A. 

B. 

C. 

17. Wire rope shape and structure are usually preserved in cutting and attaching by ________.
   a. regular lays
   b. seizing
   c. lang lays
   d. peeling the core
   e. none of the above

18. The wire rope can be attached to a drum, conveyance or other object by putting a/an ________ into the ________ of the rope and placing a/an ________ into the eye for support.
   a. end
   b. middle
   c. core
   d. thimble
   e. eye

19. The eye can be formed in a rope with a/an ________.
   a. U-clip
   b. socket
   c. wedge socket
   d. eye splice
   e. all of the above
20. The short end of the eye of the rope is the _____ or _____ end; the long end is the _____ or _____ end.
   a. live
   b. dead
   c. bitter
   d. working
   e. core

21. Below are illustrations of an eye being formed with a socket. Write the letters in the order the steps are performed.

A
B
C
D
E

1. _____
2. _____
3. _____
4. _____
5. _____

T-10-4
22. Below are illustrations of an eye being formed with a splice. Write the letters in the order the steps are performed.

A  
B  
C  
D  

1. 
2. 
3. 
4. 

23. Below are illustrations of an eye being formed with a wedge socket. Write the letters in the order the steps are performed.

A  
B  
C  
D  

1. 
2. 
3. 
4. 

T.10-5
24. Below are illustrations of an eye being formed with a U-clip. Write the letters in the order the steps are performed.

A

CALCULATE THE NUMBER OF CLIPS AND THE CLIP SPACING

D

E

THIMBLE

1. _____
2. _____
3. _____
4. _____
5. _____
25. A wire rope should be removed from the hoist if ________.
   a. there are more than 6 broken wires in 1 lay
   b. corrosion or distortion occurs
   c. crown wire diameter is less than 65% of the original
   d. the diameter is reduced
   e. all of the above

26. The wire rope can be lubricated by ________.
   a. bathing
   b. pouring
   c. painting
   d. swabbing
   e. all of the above

27. A rope with a 300,000 pound breaking strength carrying a normal load of 30,000 pounds has a safety factor of ________.
TEST QUESTIONS FOR
ELECTRICAL SYSTEM (General)

1. Voltage causes ___________ to flow through an electrical circuit.

2. If we increase the input voltage in the circuit below, the current flow will
   ___ increase   ___ decrease
   and the light will burn
   ___ brighter   ___ dimmer

```
INPUT VOLTAGE
```

3. Will more current flow through A or B? ___

```
FIXED VOLTAGE
HIGH RESISTANCE (A)
LOW RESISTANCE (B)
```

4. One of the motors is an alternating current, the other is a direct current motor.
   Identify them. A. ___ B. ___

```
ALTERNATING CURRENT SUPPLY
```

T.11.1
5. What kind of a magnet is (A)? If we reverse the current flow, will the N pole be at the Top ___ or Bottom ___.

6. These poles attract each other. The one on the right is a ___ Pole.

These poles repel each other. The one on the right is a ___ Pole.

7. In the first figure the motion of the conductor is from left to right and current flows as shown by the arrow.

In the second figure the motion of the conductor is from right to left. Show by an arrow which way the current will flow.

In the third figure the motion of the conductor is the same as in the 1st figure but the position of the poles is reversed. Indicate the direction of current flow.
8. This is a diagram of the voltage generated in a wire as it passes through a magnetic field. Indicate (with an arrow) where it enters the field, where it is in the center of the field, and where it is leaving the field.

![Diagram of voltage generated in a wire through a magnetic field]

9. Indicate with an arrow which way the armature of this motor will turn.

![Diagram of motor armature rotation]

10. Each column describes a generator.

<table>
<thead>
<tr>
<th>Strong Field</th>
<th>Slow Rotation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast Rotation</td>
<td>Weak Field</td>
</tr>
<tr>
<td>______ Output</td>
<td>______ Output</td>
</tr>
</tbody>
</table>

11. Fill in the following for an alternating current motor.

<table>
<thead>
<tr>
<th>Slip</th>
<th>Armature Current Flow</th>
<th>Power Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

T.11.3
12. Your AC hoist motor is starting to hoist a heavy load. The armature switches are
Open _____ Closed _____ . (Check one)

13. When a direct current hoist motor starts the voltage to the armature is Low _____
High _____ . (Check one)

14. When using a direct current motor as a brake to slow the hoist, current flows
Out of _____ Into _____ the motor. (Check one)

15. Some alternating current motors can be used as a brake by __________ the
direction of rotation of the magnetic field.

16. Electrical machinery that is used in a mine where methane gas is a problem must
be _____ .

17. Fuses or circuit breakers must be provided to interrupt the flow of current before the
conductors _____ .

18. Exposed metal parts of electrical machinery that normally do not carry current must
be _____ .
TEST QUESTIONS FOR DEPTH INDICATOR

Answer the multiple-choice questions by filling in the blank with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

1. A depth indicator shows _______.
   a. the vertical position of the conveyance in the shaft
   b. the rope speed
   c. the volts needed for cruising speed
   d. the location of each communication system
   e. none of the above

2. Below are two depth indicators. Label each dial or cylindrical.
   A. 
   B. 

3. A dial depth indicator has a/an _______ geared to the drum which moves around the _______.
   a. shaft
   b. arrow
   c. flange
   d. dial
   e. cylinder

4. The marks shown on the dial of a depth indicator are the _______.
   a. various rope speeds
   b. position of the dump or collar
   c. position of each working level
   d. amounts of voltage needed for lowering and hoisting
   e. b and c
5. Using a dial depth indicator, the hoist operator knows the conveyance is at a certain level because _____.
   a. the arrow on the dial causes various bells to ring
   b. the flanges on the drum are marked for each level
   c. the arrow on the dial points to that position
   d. a and b
   e. none of the above

6. As the conveyance moves up and down the mine shaft, the indicator of a cylindrical depth indicator _____.
   a. moves up and down the threaded shaft
   b. moves horizontally across the drum
   c. rotates around the drum
   d. moves up and down the rope
   e. none of the above

7. Using the cylindrical depth indicator, the hoist operators know when the conveyance is at a certain level because _____.
   a. the cylinder indicator starts spinning over the mark
   b. the cylinder indicator taps against the shaft for each level
   c. the cylinder indicator stops over the mark for that position
   d. the indicator on the conveyance causes various bells to ring
   e. none of the above

8. The conveyance position may also be read easily and accurately by markings on the _____.
   a. conveyance
   b. wire rope
   c. hoist motor
   d. flanges of the drum
   e. none of the above
FEDERAL REGULATIONS

Metal and Nonmetallic Mines

9. An accurate and reliable indicator of the position of the __________ in the shaft shall be provided.
   a. skip
   b. cage
   c. bucket
   d. cars
   e. all of the above

Coal Mines

10. An accurate and reliable indicator of the position of the __________ shall be provided.
    a. cage and skip
    b. platform
    c. bucket
    d. cars
    e. all of the above

11. The depth indicator shall be placed so that it is in clear view of the __________.
    a. maintenance crew
    b. hoisting engineer
    c. people in the cage
    d. foreman
    e. none of the above

12. The depth indicator shall be checked __________ to determine its accuracy.
    a. hourly
    b. daily
    c. weekly
    d. monthly
    e. yearly
TEST QUESTIONS FOR SAFETY CONTROLLER

Fill in the blanks with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

1. The safety controller ________.
   a. is a multi-purpose safety device
   b. is synchronized with the movement of the drum shaft
   c. prevents overspeed and overtravel
   d. applies the brake of an electric hoist in case of power failure
   e. all of the above

2. The power to the hoist motor is cut off and the brake is set if the drum ________ and the weights of the governor ________.
   a. slows
   b. overspeeds
   c. move outward
   d. stops
   e. move toward the shaft

3. If the conveyance travels too far above the dump position or too far below the lowest level, power is cut by the ________ switches.
   a. overtravel
   b. overspeed
   c. overload
   d. a and c
   e. none of the above

4. The basic controller consists of ________.
   a. governor
   b. depth indicator
   c. pressure gauge
   d. a and b
   e. b and c

5. The controller permits higher speed only in the ________ stage.
   a. acceleration
   b. cruising
   c. deceleration
   d. a and b
   e. a and c
6. Label each illustration "depth indicator" or "governor."
TEST QUESTIONS FOR THE HOIST CONTROL PANEL

Complete this sentence:

1. The hoist controls and indicators are within easy reach or sight of the hoist operator because they are grouped on a control _________.

2. Below is a typical hoist control panel. Label each lettered part deadman switch, meter, control pushbuttons, drum brake and clutch control, motor control, indicator lights, or depth indicators.

   Fill in the blanks with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

3. Light indicators may ________, ________, and ________.
   a. show the condition of the bypass switches
   b. show rope speed
   c. show clutches engaged or disengaged
   d. control the clutch
   e. show safety gates opened or closed

4. Levers may be used for ________, ________, and ________.
   a. clutch control
   b. hoist motor control
   c. communications control
   d. electric brakes
   e. current flow or voltage
5. Meters may indicate _____, _____ and _____:
   a. condition of bypass switches
   b. rope speed
   c. current flow or voltage
   d. lubrication oil, air or hydraulic pressure
   e. safety gates opened or closed

6. Depth indicators show the _____:
   a. rope speed
   b. position of conveyance in the shaft
   c. safety gates open or closed
   d. lubrication oil, air or hydraulic pressure
   e. condition of the bypass switches

7. Label each illustration below single drum hoist; double drum hoist; single clutch; or double drum hoist, double clutch.

   ![Diagram of control panel]

   A.

   ![Diagram of control panel]

   B.

   ![Diagram of control panel]

   C.
Metal and Nonmetallic Mines

8. An accurate and reliable indicator of the position of the _______ in the shaft shall be provided.
   a. cage
   b. bucket
   c. skip
   d. cars
   e. all of the above

9. Hoist controls shall be placed or housed so that noise from machinery or other sources _______.
   a. can drown out signals
   b. won't prevent hoistman from hearing signals
   c. won't allow signals to be heard
   d. will prevent hoistman from hearing signals
   e. none of the above

Underground Coal Mines

10. An accurate and reliable indicator of the position of the _______ shall be provided.
    a. cars
    b. platform
    c. bucket
    d. cage or skip
    e. all of the above

11. The indicator will be placed in clear view of the hoisting engineer and shall be checked _______ to determine its accuracy.
    a. hourly
    b. daily
    c. weekly
    d. monthly
    e. yearly
TEST QUESTIONS FOR COMMUNICATION SYSTEMS

Fill in the blank with the letter of the answer that best completes this sentence:

1. A communication system in a mine is used to _________.
   a. communicate conditions
   b. transfer information
   c. provide a view of problem areas
   d. request the movement of the conveyance
   e. all of the above

Match the communication system in Column B with its use in Column A:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. _____ used for longer messages</td>
<td>A. hoist bell</td>
</tr>
<tr>
<td>3. _____ communicates conditions</td>
<td>B. telephone or radio</td>
</tr>
<tr>
<td>4. _____ used to request or order the movement of the conveyance</td>
<td>C. public address</td>
</tr>
<tr>
<td>5. _____ provides a view of likely problem areas</td>
<td>D. indicator lights</td>
</tr>
<tr>
<td>6. _____ indicates a malfunction has occurred, the power is on or off or that a machine is operating</td>
<td>E. meters and gauges</td>
</tr>
<tr>
<td>7. _____ used to pass information to many people over a wide area</td>
<td>F. closed circuit T.V.</td>
</tr>
</tbody>
</table>

Fill in the blank with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

Metal and Nonmetallic Mines

8. There will be at least two approved methods of signaling between each of the shaft stations and the hoist room, one of which shall be a _________.
   a. speaking tube
   b. bell
   c. telephone
   d. indicator light
   e. a or c
9. Hoist operators shall accept hoisting instructions only by the _____ unless it is out of order.
   a. emergency signaling system
   b. regular signaling system
   c. public address
   d. indicator light
   e. none of the above

10. When the regular signaling system is out of order, or during other emergencies, the hoist operator shall accept instructions to direct movement of the conveyances ________.
    a. by bell code
    b. only by the public address system
    c. only from authorized persons
    d. from any miner
    e. none of the above

11. There shall be a method to ________ from cages or other conveyances at any point in the shaft.
    a. signal the mine superintendent
    b. signal the hoist operator
    c. cut power to the hoist motor
    d. accelerate the conveyance to cruising speed
    e. none of the above

12. A _______ of hoisting signals shall be adopted and used at each mine.
    a. standard code
    b. variety
    c. rotating system
    d. b and c
    e. none of the above

13. The movement of a shaft conveyance on a ________ signal shall be prohibited.
    a. "two bell"
    b. telephone
    c. "one bell"
    d. bell
    e. none of the above
14. A legible signal code shall be posted prominently in the hoist house ________:
   a. within easy view of the hoistmen
   b. at each place where signals are given
   c. at each place where signals are received
   d. a, b, c
   e. none of the above

15. Any person responsible for ________ when men or materials are being transported shall
   be familiar with the posted signaling code.
   a. receiving signals for cages
   b. giving signals for cages
   c. receiving or giving signals for skips
   d. receiving or giving signals for mantrips
   e. all of the above

Underground Coal Mines

16. There will be at least two approved methods of signaling between each of the shaft
   stations and the hoist room, one of which shall be ________.  
   a. speaking tube
   b. bell
   c. telephone
   d. indicator light
   e. a or c

17. One of the methods used to communicate between shaft stations and the hoist room shall
   give signals which can be ________ while men are underground.
   a. heard at the dump level
   b. heard by the hoisting engineer at all times
   c. turned off
   d. seen by the hoisting engineer at all times
18. Signaling systems used for communication between shaft stations and the hoist room shall be tested ________.
   a. hourly
   b. daily
   c. weekly
   d. monthly
   e. yearly
TEST QUESTIONS FOR LUBRICATION

Complete these sentences with the correct answers:

1. Lubrication of mine equipment prevents ____________________________
   and is a major part of machinery maintenance.

2. The types of lubricant are ______ and ______.

   Fill in the blanks with the letter of the answer that best completes each sentence. Read
   all of the choices before selecting your answer.

3. The hoist motor, overspeed and overtravel controls, air compressor, and hydraulic pump
   are examples of mine machinery that might have ______ to be lubricated.
   a. wheels
   b. joints
   c. bearings
   d. none of the above

4. The brake, clutch, safety dogs and limit switches are examples of mine machinery that
   might have ______ to be lubricated.
   a. wheels
   b. joints
   c. bearings
   d. none of the above

5. The shaft guides and conveyance guide shoes, and the hoist rope are examples of
   ______ that might have to be lubricated.
   a. wheels
   b. joints
   c. bearings
   d. surfaces that rub together
6. Label each illustration "grease gun," "oil reservoir," or "oil flow system."

![Figure 1]

![Figure 2]

![Figure 3]

Write the name of each lettered part for Figures 1, 2 and 3:

7. Figure 1
   A. __________________
   B. __________________
   C. __________________

8. Figure 2
   A. __________________
   B. __________________

9. Figure 3
   A. __________________
   B. __________________
   C. __________________

Answer the questions below by filling in the blanks with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

10. The person responsible for lubricating the hoist must know ________.
    a. the parts to be lubricated
    b. the method of lubricating each part
    c. the type of lubricant to be used
    d. the location of the lubricant storage
    e. all of the above

T.16.2
Federal Regulations for Metal and Nonmetallic Mines

11. Complete records shall be kept for three years of _______ shafts and hoisting equipment.
   a. tests
   b. inspections
   c. maintenance
   d. all of the above
   e. none of the above

12. Wire ropes shall be lubricated or treated with dressing _______.
   a. hourly
   b. yearly
   c. as recommended or approved by the rope manufacturer
   d. as recommended or approved by the hoist operator
   e. none of the above

13. Sheaves in operating shafts shall be inspected _______ and kept properly lubricated.
   a. hourly
   b. daily
   c. weekly
   d. yearly
   e. none of the above

14. Rollers used in operating inclined shafts shall be _______.
   a. kept in good repair
   b. lubricated
   c. properly aligned
   d. all of the above
   e. a and c
TEST QUESTIONS FOR INSPECTION

Fill in the blanks with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

1. Periodic inspections of the _______ are made to assure that operations can be conducted safely.
   a. hoist
   b. shaft
   c. related mine hoist parts
   d. all of the above
   e. none of the above

2. To inspect the mine hoist properly, the hoist operator must know _______.
   a. hoist parts that require inspection
   b. how often hoist parts require inspection
   c. method of recording information in the log
   d. conditions which indicate maintenance or attention is required
   e. all of the above

FEDERAL REGULATIONS
Metal and Nonmetallic Mines

3. A systematic inspection procedure for shaft and hoisting equipment shall be _______.
   a. developed
   b. considered
   c. followed
   d. a and c
   e. none of the above

4. The hoist equipment shall not be used if _______ is found or suspected.
   a. a damaged log
   b. a malfunction
   c. too small a load
   d. a and c
   e. none of the above
5. Complete records shall be kept for three years of inspections, tests, and maintenance of the _______.
   a. shaft
   b. hoisting equipment
   c. a and b
   d. none of the above

6. At the beginning of each shift the hoist operator shall examine the hoist and test _______.
   a. overtravel and deadman controls
   b. position indicators and braking mechanisms
   c. the ore from the previous shift
   d. all of the above
   e. a and b

7. Before hoisting persons and to assure that the hoisting compartments are clear of obstructions, empty hoist conveyances shall be operated at least one round trip after _______.
   a. Blasting in or near the shaft that might restrict or obstruct conveyance clearance
   b. Remaining idle for one shift or longer
   c. Any hoist or shaft repairs or related equipment repairs that might restrict or obstruct conveyance clearance
   d. Any oversize or overweight material or equipment trips that might restrict or obstruct conveyance clearance
   e. All of the above

8. During any 24 hour period the conveyance is used for hoisting people, conveyance connections shall be inspected at least _______.
   a. twice
   b. after each complete trip the conveyance makes
   c. once
   d. 3 times
   e. none of the above

9. After installation and before use, and at the beginning of any _______ period during which the conveyance is to be used, the conveyance shall be suitably rested and the hoist rope slackened to test for the unrestricted functioning of the safety catches and their activating mechanisms.
   a. One (1) day
   b. Three (3) days
   c. Seven (7) days
   d. One (1) month
   e. None of the above
10. The safety catches shall be inspected by a competent person at the beginning of any ________ period that the conveyance is to be used.
   a. 24 hour
   b. 3 day
   c. one (1) week
   d. one (1) month
   e. none of the above

11. Shafts that have not been inspected within the past ________ shall not be used until an inspection has been conducted by a competent person.
   a. day
   b. 7 days
   c. month
   d. year
   e. none of the above

12. Sheaves in operating shafts shall be inspected ________ and kept properly lubricated.
   a. daily
   b. weekly
   c. monthly
   d. yearly
   e. none of the above

13. Rollers used in operating inclined shafts shall be ________.
   a. lubricated
   b. properly aligned
   c. replaced at the beginning of any 24 hour period
   d. kept in good repair
   e. a, b, d

14. Hoist ropes shall be examined over the entire active length at least every ________ to evaluate wear and possible damage.
   a. day
   b. week
   c. month
   d. year
   e. none of the above
15. When examinations or other inspections reveal that the rope is worn, and at least every six (6) months, caliper measurements or nondestructive tests shall be made 
   a. Where the ropes leave the drums when the conveyances are at the regular stopping point
   b. Wherever wear is evident, and where the rope rests on the sheaves
   c. Immediately above the socket or clip and above the safety connection
   d. Where a layer of rope begins to overlap another layer on the drum, and at 100 foot intervals
   e. All of the above

16. Ropes shall not be used for hoisting when they have 
   a. more than 6 broken wires in any lay
   b. crown wires worn to less than 65 percent of the original diameter
   c. a marked amount of corrosion or distortion
   d. a combination of factors that might create an unsafe condition
   e. all of the above

17. Hoist ropes other than those on friction hoists shall be cut off at least six (6) feet above the highest connection to the conveyance at time intervals not to exceed 
   a. one day
   b. one month unless a shorter time is required by standard 57.19-126
   c. one year unless a shorter time is required by standard 57.19-126 or by conditions of use
   d. two years
   e. none of the above

18. The portion of the rope that is cut off (question 17) shall be examined and inspected by a competent person for 
   a. wear
   b. fatigue
   c. damage
   d. corrosion
   e. all of the above

19. Hoist ropes wound in multiple layers shall have a length cut off at the drum end at least three (3) times during the anticipated life of the rope and whenever necessary as required by standard 57.19-126 to 
   a. lubricate the rope
   b. distribute the wear at change-of-layer points
   c. distribute the wear at crossover points
   d. b and c
   e. none of the above
20. The length of rope cut off (question 19) shall not be a whole number multiple of the circumference of the ________.
   a. drum
   b. sheave
   c. rope
   d. shaft
   e. none of the above

Coal Mines

21. Records shall be kept of tests performed on safety catches and other devices. Each entry shall be ________.
   a. signed by the person making the test
   b. signed by the men on the shift
   c. countersigned by a responsible official
   d. a and c
   e. all of the above

22. The daily examination of hoisting equipment shall include, but not be limited to ________.
   a. visual examination of the rope for wear, broken wires and corrosion
   b. an examination of the rope fastenings for defects
   c. an examination of safety catches
   d. all of the above
   e. none of the above

23. The daily examination of hoisting equipment shall include but not be limited to ________.
   a. an examination of the cage, platforms, elevators, or other devices for loose, missing or defective parts
   b. an examination of the head sheaves
   c. an observation of the lining and all other equipment installed in the shaft
   d. all of the above
   e. none of the above
24. Records of the daily examinations of hoisting equipment shall be kept listing all items examined, and 
   a. daily entries shall be signed by the people making examinations  
   b. The reports of the examinations will be read and countersigned daily by a responsible company official  
   c. daily entries will be signed by the men on the shift  
   d. all of the above  
   e. a and b  

25. Signaling systems used for communication between shaft stations and the hoist room shall be tested 
   a. hourly  
   b. daily  
   c. weekly  
   d. monthly  
   e. yearly
TEST QUESTIONS FOR MAINTENANCE

Complete this sentence with the correct answer:

1. Maintenance in a mine is the work that is done to keep the mine hoist parts ____________ ____________

Fill in the blanks with the letter of the answer that best completes the sentence. Read all of the choices before selecting your answer.

2. Maintenance includes ________.
   a. housekeeping and inspection
   b. lubrication and repairs
   c. adjustments and replacement of parts
   d. all of the above
   e. a and c

3. Repairing, adjusting, or replacing parts before they break down is ________ maintenance.
   a. unnecessary
   b. preventive
   c. corrective
   d. annual
   e. none of the above

4. Repairing or replacing parts after they break down is ____________ maintenance.
   a. unnecessary
   b. preventive
   c. corrective
   d. annual
   e. none of the above

5. Maintenance instructions come from ________.
   a. procedures put out by mine managers
   b. local regulations
   c. federal and state regulations
   d. manufacturers' maintenance manuals
   e. all of the above

Federal Regulations for Metal and Nonmetallic Mines

6. When people are working in the shaft or in a compartment that will be affected by the hoist operation ________.
   a. a "Men Working in Shaft" sign shall be posted at the hoist
   b. the hoist operator shall be informed of the situation
   c. a "Men Working in Shaft" sign shall be posted at all devices controlling hoisting operations
   d. all of the above
   e. none of the above

T-18-1
7. Parts used to repair hoists shall have properties that will insure the _____ of the hoist.
   a. lubrication
   b. proper function
   c. safe function
   d. b and c
   e. none of the above

8. Shaft inspection and repair work done in vertical mines shall be performed from ________
   a. skips
   b. substantial platforms
   c. substantial platforms equipped with bonnets or equivalent overhead protection
   d. ladders attached to the sides of the shaft
   e. none of the above
**TEST QUESTIONS FOR SAFETY FEATURES**

Match the safety feature in Column B with its use in Column A.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. cuts off hoist power and applies brake if rope goes slack or breaks</td>
<td>A. cage bonnet</td>
</tr>
<tr>
<td>2. grips shaft guides and prevents conveyance from falling if rope breaks</td>
<td>B. deadman switch</td>
</tr>
<tr>
<td>3. cuts off hoist power and applies brake if conveyance travels too fast</td>
<td>C. rope strength</td>
</tr>
<tr>
<td>4. cuts off hoist power if conveyance travels too far up or too far down in the shaft</td>
<td>D. overtravel control</td>
</tr>
<tr>
<td>5. prevents clutch disengagement unless brake is applied</td>
<td>E. slack rope switch</td>
</tr>
<tr>
<td>6. protects persons in cage from falling objects</td>
<td>F. clutch-brake interlock</td>
</tr>
<tr>
<td>7. prevents persons and objects from falling into an open shaft</td>
<td>G. safety gate</td>
</tr>
<tr>
<td>8. provides communication links between hoist operator and persons in or near shaft</td>
<td>H. overspeed control</td>
</tr>
<tr>
<td>9. cuts hoist power and applies brake if hoist operator is disabled</td>
<td>I. communication systems</td>
</tr>
<tr>
<td>10. reduces probability of rope breaking because of additional strain</td>
<td>J. safety dog</td>
</tr>
</tbody>
</table>

Fill in the blanks with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

11. **Safe operation of the mine hoist depends upon the hoist operator's _________.**
    a. knowledge of the hoist operation
    b. positive attitude toward the job
    c. alertness
    d. all of the above
    e. none of the above
12. The hoist operator contributes to safety by proper _______ procedures.
   a. operation
   b. housekeeping
   c. inspection
   d. maintenance
   e. all of the above

13. Safety practices may be found in _______.
   a. state regulations
   b. federal regulations
   c. local regulations
   d. established operating procedures
   e. all of the above
TEST QUESTIONS FOR THE ELECTRICAL SYSTEM (Fundamental)

Match the symbol or definition in Column B to the correct word in Column A.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. _____ voltage</td>
<td>A. opposition to the flow of electricity</td>
</tr>
<tr>
<td>2. _____ current</td>
<td>B. amount of energy used</td>
</tr>
<tr>
<td>3. _____ resistance</td>
<td>C. R</td>
</tr>
<tr>
<td>4. _____ symbol for volts</td>
<td>D. pressure causing flow of electrons</td>
</tr>
<tr>
<td>5. _____ symbol for amperes</td>
<td>E. I</td>
</tr>
<tr>
<td>6. _____ symbol for resistance</td>
<td>F. E</td>
</tr>
<tr>
<td></td>
<td>G. P</td>
</tr>
<tr>
<td></td>
<td>H. rate of flow of electrons</td>
</tr>
</tbody>
</table>

Answer the following questions by filling in the blank, choosing the correct answer or solving the problem.

7. A unit of electrical pressure is a/an _____.

8. A unit of current is a/an _____.

9. A unit of resistance is a/an _____.

10. A/an _____ is a substance that has low resistance to electricity.

11. The formula for Ohm's Law is _____.

12. If there are 240 volts going into a 12 ohm circuit, how many amperes are flowing? _____

13. Twenty-five amperes are flowing in a 125 volt circuit, what is the resistance? _____

14. Find the current flow in a 110 volt parallel circuit with 3 resistances: \( R_1 = 10; \ R_2 = 11; \ R_3 = 22 \). _____

15. Find the current flow in a 100 volt series circuit with 5 resistances: \( R_1 = 5; \ R_2 = 2; \ R_3 = 8; \ R_4 = 2; \ R_5 = 3 \). _____
16. Some commonly used insulators are _____.
   a. rubber
   b. aluminum
   c. porcelain
   d. a and c
   e. b and c

17. The perfect conductor is _______.
   a. gold
   b. copper
   c. carbon
   d. rubber
   e. nonexistent

18. A/an _______ is equal to the area of the cross-section of a round wire that is 1/1000 of an inch in diameter.
   a. kilowatt
   b. foot pound
   c. circular mil
   d. mil
   e. none of the above

19. Current is measured by a/an _______.
   a. voltmeter
   b. ammeter
   c. rheostat
   d. watt hour meter

20. Voltage is measured by a/an _______.
   a. voltmeter
   b. ammeter
   c. rheostat
   d. watt hour meter

21. If a hoist lifts 900 pounds 20 feet in 10 seconds, how many foot pounds per second of power does it use? ___________________________

22. How much work is done by a motor that raises 650 pounds 9 feet? _______________

23. A motor raises a 50 pound load 5 feet per second for 10 seconds. How much work is done? ___________________________

24. One horsepower is the power needed to do _____ foot pounds of work in one second or _____ foot pounds of work in one minute.
   a. 50
   b. 500
   c. 550
   d. 33,000
   e. 330
25. How many horsepower are needed to run the hoist if 11,000 pounds of ore are to be lifted at a speed of 300 feet per minute? (Ignore friction losses)

26. The power of a 75 horsepower motor can be expressed as __________ watts.

27. 7,000 watts = ____ kilowatts.

28. If 220 volts cause 15 amperes to flow in a circuit, the power used is _____ watts.

29. If 2200 watts are used for 2 hours, how many watt hours of work are done?

30. How much power is used if 110 volts cause 15 amperes to flow in a circuit?

31. Work done by an electrical machine is measured by a/an ____. 
   a. voltmeter  
   b. ammeter  
   c. rheostat  
   d. watt hour meter  

32. The power used in a circuit is ______ watts if there are 18 amperes flowing through 20 ohms resistance.

33. Electricity is usually transmitted at very high ____ and low ____ since line losses increase rapidly as current is increased.
   a. resistance  
   b. voltage  
   c. current  
   d. amperage  

34. Suppose a motor draws 10 amperes at a normal load. If the conductor to the motor is damaged, how many watts of power per ohm of resistance are lost and turn to heat? __________

35. A fire hazard may be created by ____ .
   a. poor electrical connections  
   b. electrical conductors that are too small  
   c. damaged conductors  
   d. all of the above
36. What kind of a magnet is (a)? If we reverse the current flow, will the N pole be at the Top or Bottom.

![Diagram of a magnet with current flow and battery](image)

37. These poles attract each other. The one on the right is a Pole. These poles repel each other. The one on the right is a Pole.

![Diagram of poles attracting and repelling](image)

38. In the first figure the motion of the conductor is from left to right and current flows as shown by the arrow.

In the second figure the motion of the conductor is from right to left. Show by an arrow which way the current will flow.

In the third figure the motion of the conductor is the same as in the 1st figure but the position of the poles is reversed. Indicate the direction of current flow.

![Diagram showing current flow in different configurations](image)
39. This is a diagram of the voltage generated in a wire as it passes through a magnetic field. Indicate (with an arrow) where it enters the field, where it is in the center of the field, and where it is leaving the field.

![Voltage Diagram]

40. If the number of wire turns on the current flow of a magnetic field is increased, the strength of the magnetic field _____.
   a. remains the same
   b. decreases
   c. increases
   d. reverses the turn of the armature

41. _______ current flows in one direction, then another; _______ current flows in one direction.

42. _______ current is more dangerous than _______ current.
   a. direct
   b. magnetic
   c. armature
   d. alternating

43. Direct current voltage can be lowered by passing it through a/an _______.
   a. rheostat
   b. commutator
   c. motor
   d. phase
44. A/an ______ changes rotary motion into electrical energy; a/an ______ turns electrical energy into rotary motion.
   a. electric motor
   b. generator or dynamo
   c. field magnet
   d. transformer

45. The principal parts of a direct current electric motor are ______.
   a. brushes, armature, transformer, field magnets
   b. brushes, dynamo, commutator, transformer
   c. brushes, armature, commutator, field magnets
   d. armature, commutator, field magnets

Principles of Electric Motor Operation

46. Reversing the flow of current through the coil of an electromagnet ______.
   a. reverses the dynamo
   b. stops the armature
   c. increases the armature current
   d. reverses the poles of the magnet

47. When the brushes of a direct current motor change commutator segments, the current flow or voltage in the armature coil ______.
   a. stops the armature
   b. is reversed
   c. reverses the dynamo
   d. starts the dynamo

48. The magnetic forces that rotate the armature are increased by ______.
   a. increasing the armature current
   b. reversing the armature current
   c. removing the brushes
   d. decreasing the armature current

49. Power output of the motor is decreased by ______.
   a. increasing the armature current
   b. reversing the armature current
   c. removing the brushes
   d. decreasing the armature current

50. Changing the direction of current flow in either the armature or the ______ reverses a direct current motor.
   a. field coils
   b. rheostat
   c. voltmeter
   d. ammeter
51. Each column describes a generator; what is the output for each?

<table>
<thead>
<tr>
<th>Strong Field</th>
<th>Slow Rotation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast Rotation</td>
<td>Output</td>
</tr>
<tr>
<td>Weak Field</td>
<td>Output</td>
</tr>
</tbody>
</table>

52. Fill in the following for an alternating current motor using high, medium or low.

<table>
<thead>
<tr>
<th>Slip</th>
<th>Armature Current Flow</th>
<th>Power Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

53. _______ commutator brushes are hard and cause wear on the motor commutator but they last longer than other types of brushes.

a. carbon  
b. rubber  
c. porcelain  
d. copper

54. _______ commutator brushes cause little commutator wear but they chip and cause sparking.

a. carbon  
b. rubber  
c. porcelain  
d. copper

55. A wire that is connected to each commutator brush and the power supply is called a/an _______.

a. rheostat  
b. shunt  
c. pigtail  
d. resistor

56. Sparking of commutator brushes may be corrected by _______.

a. chipping the brushes  
b. changing the armature current  
c. changing the position of the brush  
d. reversing the motor

57. Sparking of commutator brushes may be caused by _______.

a. broken brushes  
b. ground wires  
c. a worn commutator  
d. a and c
58. Current generated in the armature coil of a direct current generator is changed from alternating current to direct current as it passes through the _______.
   a. field coils
   b. commutator
   c. resistance
   d. ammeter

59. Voltage generated in a direct current generator increases as the _______ and the speed of the armature increase.
   a. weakness of the field
   b. strength of the field
   c. speed of the commutator
   d. speed of the brushes

60. Current flow through the armature coils of an alternating current motor is caused by _______.
   a. an induced voltage
   b. low slip
   c. sparking
   d. voltage in the field coils

61. When slip is high, an alternating current motor has _______ power output.
   a. low
   b. no
   c. high
   d. partial

62. Increasing the current flow in the _______ increases the speed of direct current motors and alternating current motors.
   a. field coils
   b. commutator
   c. armature
   d. ammeter

63. Full voltage applied to a direct current motor armature that is stopped _______.
   a. will reverse the motor
   b. can cause damage
   c. can reverse the poles of electromagnet
   d. decreases the slip

64. If a voltage drop causes the armature of a running DC motor to slow and stop, enough current may be forced through the armature to _______.
   a. reverse the armature rotation
   b. decrease the slip
   c. reverse the poles of the electromagnet
   d. burn the armature coils
65. Voltage to the armature in a mine hoist motor can be increased by ______.  
   a. blowing a fuse  
   b. strengthening or weakening the DC generator magnetic field  
   c. changing the output voltage of the rectifier  
   d. b and c

66. A ______ motor has the field coil and the armature in parallel; they are both connected across the power supply.  
   a. shunt  
   b. compound  
   c. series  
   d. parallel

67. A ______ motor has one terminal of the field coil connected to one terminal of the armature; the two are then connected across the power supply.  
   a. shunt  
   b. compound  
   c. series  
   d. parallel

68. A ______ motor has two fields.  
   a. shunt  
   b. compound  
   c. series  
   d. parallel

69. Current for the main generator magnetic fields can be provided by a/an ______.  
   a. voltmeter  
   b. exciter generator  
   c. transformer  
   d. ammeter

70. A direct current motor can be used as a brake by ______.  
   a. using alternating current in the motor armature  
   b. increasing the voltage to the motor armature  
   c. reducing the voltage to the motor armature  
   d. a and c

71. An alternating current motor can be used as a brake by ______.  
   a. reducing the current flow to the armature  
   b. reversing the rotating field  
   c. substituting direct current in one or two of the phases  
   d. b and c
72. Alternating current voltage is raised by a/an _____ and lowered by a/an _____
   a. step-down transformer
   b. step-up transformer
   c. rheostat
   d. laminations

73. It is more economical and safer to have ______ where power is transmitted and to have ______ where power is used.
   a. high voltage
   b. low voltage
   c. alternating current
   d. direct current

74. ______ reduce the flow of eddy currents.
   a. ammeters
   b. transformers
   c. laminations
   d. commutators

75. A transformer has ______
   a. primary coil
   b. secondary coil
   c. common core
   d. all of the above

76. The build up of magnetism in the core of a transformer causes a voltage to be generated in the ______
   a. secondary coil
   b. primary coil
   c. commutator
   d. brushes

77. As the current reverses itself in the primary coil of a transformer, the magnet is reversed and causes a reverse voltage to be generated in the ______.
   a. secondary coil
   b. commutator
   c. brushes
   d. ammeter

78. The power flowing into the primary coil of a transformer is ______ the power flowing out of the secondary coil.
   a. about 6 watts less than
   b. about 6 watts more than
   c. about equal to
   d. twice the amount of
79. The voltage going into the primary coil and the voltage going out of the secondary coil of a transformer are proportional to the number of _______.
   a. coils in the transformer
   b. brushes on the commutator
   c. turns of wire in each coil
   d. pigtails

80. Suppose a transformer is as follows:
   \[ \begin{align*}
   P_p &= 1100 & P_s &= \\
   N_p &= 110 & N_s &= 50 \\
   E_p &= 110 & E_s &= \\
   I_p &= I_s &= \\
   \end{align*} \]
   What is \( P_s \) ?, \( I_p \)?

81. In the above transformers what is \( E_s \)?

82. What is \( I_s \)?

83. Flammable materials used near sparking electrical machinery _______.
   a. could cause a fire
   b. could create a safety hazard
   c. can't cause a fire because of conductors
   d. a and b

84. Federal regulations require that electrical machinery used where flammable dust, gas or vapors may be present must _______.
   a. be enclosed
   b. use direct current
   c. use a transformer
   d. have a shunt motor

85. Every electrical circuit must have conductors that _______ without overheating.
   a. are large enough to carry the normal circuit flow
   b. are made of silver
   c. can carry an acceptable overload (25%)
   d. a and c

86. Chemical changes from an electric current flowing through a mixture of dissolved metallic compounds and water are called _______.
   a. rotation
   b. grounding
   c. electrolysis
   d. transforming
87. The voltage difference between metal structures in moist areas can be reduced by the _______ of all equipment.
   a. transforming
   b. grounding
   c. electrolysis
   d. b and c

88. To prevent over current flow, a piece of metal called a/an _______ is placed in the circuit in series with the load.
   a. circuit breaker
   b. armature
   c. fuse
   d. commutator

89. Too many amperes flowing through this piece of metal (see question 85) generate heat which melts it and ________________.

90. A magnetic switch preventing over current flow which is placed in the circuit in series with the load is called a/an _______.
   a. circuit breaker
   b. armature
   c. fuse
   d. commutator

91. The circuit will be broken by a/an _______ if lightning strikes the power line.
   a. ammeter
   b. voltmeter
   c. lightning arrester
   d. commutator

92. The state of Illinois permits a maximum voltage of _______ watts on exposed wires.

93. Before personnel can work on electrical equipment, _______.
   a. power must be on
   b. power must be cut off from the equipment
   c. measures must be taken to prevent the return of power to machines until work is completed
   d. b and c
TEST QUESTIONS FOR BEGINNING OF SHIFT ACTIVITIES

The hoist operator visually inspects the hoist at the beginning of the shift. Match each hoist part in Column A with the letters of its possible defects from Column B:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ______ hoist anchorage, structure, and drum</td>
<td>A. burned or worn contacts</td>
</tr>
<tr>
<td>2. ______ brakes</td>
<td>B. frayed insulation</td>
</tr>
<tr>
<td>3. ______ wiring</td>
<td>C. loose connections</td>
</tr>
<tr>
<td>4. ______ hoist rope</td>
<td>D. loose couplings on conveyance and safety cables</td>
</tr>
<tr>
<td></td>
<td>E. structural cracks</td>
</tr>
<tr>
<td></td>
<td>F. loose bolts and nuts</td>
</tr>
<tr>
<td></td>
<td>G. abnormal hydraulic or pneumatic pressure</td>
</tr>
<tr>
<td></td>
<td>H. loose shoes or worn bands</td>
</tr>
<tr>
<td></td>
<td>I. no slack in safety cable</td>
</tr>
<tr>
<td></td>
<td>J. needs lubrication</td>
</tr>
</tbody>
</table>

Complete this sentence with the correct answers:

5. The hoist operator finds out what happened on the previous shift by ___________________ and ___________________.

   Fill in the blanks with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

6. Complete records of _________ of shafts and hoisting equipment will be kept in logs.
   a. installation
   b. lubrication and maintenance
   c. inspection and tests
   d. b and c
   e. all of the above

7. The hoist operator runs the empty conveyance the length of the shaft _________.
   a. at slow speed
   b. to assure that the shaft is clear
   c. to assure that the controls operate properly
   d. at cruising speed
   e. a, b and c
8. To lubricate the hoist with an installed grease system, the hoist operator _______.
   a. inspects for grease at the lubrication points
   b. tests the operation of the system
   c. checks the supply of grease in the reservoir
   d. all of the above

9. Below is a picture of an oil flow system. Part of the inspection steps are given. Fill in the blanks with the word that best completes each step.
   A. Inspect oil supply in the _________.
   B. Inspect _________. (look at pressure gauge)
   C. Inspect for _________.
   D. Inspect sight glass for normal _________.
   E. Request _________. if necessary.

10. Below is a picture of an oil reservoir system. Part of the inspection steps are given. Fill in the blanks with the word that best completes each step.
    A. Inspect oil supply in the _________.
    B. Inspect bearings for _________.
    C. Request _________.

11. Below is a picture of a safety controller and the steps followed to test the overspeed cutout. Number the steps in the order they are performed.
    ____ Manually raise weights on the governor
    ____ Check to see that main power switch opens
    ____ (power is OFF)
    ____ Set the brake and stop the hoist
    ____ Close main power switch if it opens

12. Below is an illustration of the deadman switch. To test the deadman switch the hoist operator tries to apply power to the hoist while _______.
    a. his/her foot or knee is pressing the switch
    b. his/her foot or knee is not pressing the switch
13. To test the power to the hoist control stand, the hoist operator will ______, ______, ______, ______, ______, and ______. (Put in the order they are done. Some may be used more than once).

   a. request assistance if test fails
   b. move motor control in one direction
   c. note deflection of ammeter
   d. close the power switch
   e. move motor control in the other direction

14. Below is a picture of a conveyance in a shaft, and the steps the hoist operator follows to test the overtravel cutout switch. Number the steps in the order they are performed.
   (Assume the power switch opens)

   Return conveyance to normal operating area
   Move the conveyance above/below the collar/deepest landing
   Set the brake and put the motor control on OFF
   Close the overtravel bypass switch

15. Below is a picture of a conveyance in a shaft, and the steps the hoist operator follows to test the slack rope switch and the conveyance safety dogs. Number the steps in the order they are performed. (Assume the test is successful)

   Slack the hoist rope
   Set the brake
   Put motor control on OFF
   Support the conveyance
   Remove the supports
   Raise conveyance slowly until it is lifted off the supports if beams are used.
   Close slack rope bypass switch
TEST QUESTIONS FOR ROUTINE SHIFT ACTIVITIES

Complete this sentence with the correct answers:

1. The hoist operator's basic job is to move a/an ___________ from one level to another quickly and ___________.

2. The five steps a conveyance is moved in are listed below. Number them in the order they are performed:
   _____ Cruise
   _____ Stop
   _____ Decelerate
   _____ Start
   _____ Accelerate

Fill in the blanks with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

3. The deadman switch is ______ when hoisting people.
   a. open (turned off)
   b. closed (turned on)

4. To start the conveyance moving, apply power ______ and ______ the brake.
   a. slowly
   b. quickly
   c. release
   d. apply

5. The _______ and _______ must be kept within allowable limits during acceleration.
   a. depth indicator
   b. loading level
   c. rope speed
   d. current flow

6. The hoist operator may use _______ to prevent excessive conveyance speed.
   a. the motor control
   b. the hydraulic brake
   c. the mechanical brake
   d. electrical braking
   e. all of the above
7. When the hoist operator reduces power and speed during deceleration, he/she watches
the _________ and _________ .
   a. deadman by pass switch
   b. rope speed meter
   c. brake
   d. depth indicator

8. As the conveyance approaches the destination, the hoist operator closely watches the
markings on the _______ or _______ .
   a. conveyance
   b. depth indicator
   c. drum
   d. rope
   e. brake

9. When the signal to stop is received, the hoist operator sets the brake and _______ .
   a. applies more power
   b. cuts off the power
   c. turns off the safety controller
   d. a and c
   e. none of the above

Complete this sentence with the correct answer.

10. People and materials may not be raised or lowered at the same time in the same shaft
during ____________ .

   Below are the steps for raising ore manually and automatically. Choose the hoist
operation that is similar to the one you will be operating and number the steps in the order
they are performed.

11. Manual operation
   Single Level Mine — Single Skip Hoist
   _____ Receive and interpret signal to hoist when skip is full
   _____ Hold skip at the dump with brake or low power application
   _____ Lower skip to work level
   _____ Raise skip to dump level
   _____ When skip is empty, lower to work level and repeat

T.22.2
12. **Manual Operation**
   **Single Level Mine — Double Skip Hoist**
   - Raise the first skip to the dump level when it is full; this action lowers the second skip to the loading level
   - Lower one skip to loading level; this action raises the other skip to dump level
   - Repeat the first step when the first skip is dumped and the second skip is loaded.

13. **Manual Operation**
   **Multi-Level Mine — Double Skip Hoist (with clutch)**
   - Disengage clutch and lower the second skip to the desired level
   - Raise one skip to the dump level; apply brake
   - Re-engage clutch when second skip is in position
   - Repeat loading procedure when the full skip is dumped and the empty skip is loaded
   - Raise full skip to dump level; this action lowers other skip to the loading level

14. **Automatic Product Hoist**
   - Push START button
   - Lower skip manually to loading level
   - Receive and interpret signal to hoist when skip is full
   - Set hoist switch on AUTOMATIC

Fill in the blanks with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

15. The hoist operator stops an automatically operated hoist by ________.
    a. closing the deadman switch
    b. releasing the clutch
    c. pushing the STOP button
    d. noting the depth indicator and rope speed meter
    e. a and b

16. The people in an automatic elevator select their destination level by ________.
    a. signaling the hoist operator
    b. pushing the correct button
    c. marking the depth indicator
    d. none of the above
TEST QUESTIONS FOR EMERGENCY PROCEDURES

Fill in the blanks with the letter of the answer that best completes each sentence.

1. The hoist operator should know the emergency procedures for conditions ________.
   a. in the mine that require evacuation
   b. in the hoist area that prevent safe operation of the hoist
   c. in the mine that may endanger personnel underground but don't require evacuation
   d. all of the above
   e. none of the above

2. If an emergency occurs in the hoist area, the hoist operator ________.
   a. calls the mine superintendent
   b. requests the necessary assistance
   c. corrects the situation
   d. waits for an inspection check the: notifies the foreman
   e. b or c

3. Emergencies that may occur in the hoist area may include ________.
   a. loss of all power or power to individual units
   b. mechanical defects in hoist rope, brakes or clutch
   c. motor generator failure
   d. electrical braking failure
   e. all of the above

Below are the steps the hoist operator performs for different emergency procedures. Number the steps for each procedure in the order they are performed.

4. To restore lost power, the hoist operator will:
   ____ Restart other machinery
   ____ Set the brake
   ____ Restore power
   ____ Put the hoist control on OFF
   ____ Make sure the other machinery is switched off
5. To return the conveyance to the operating area of the shaft after overtravel, the hoist operator will:

- Engage the overtravel bypass switch
- Disengage the overtravel bypass switch
- Use the controller to move the conveyances to within the operating area

6. To restore power to the hoist after the overspeed control cuts off power, the hoist operator will:

- Reset power ON switch
- Put the controller in OFF
- Set the brake

7. Below is an illustration of a hydraulic system. To restore or add air pressure to the system, the hoist operator will:

- Open the air valve and bleed air from the reservoir
- Connect the compressor to the air reservoir
- Restart the hydraulic pump
- Start the compressor and charge the air reservoir
- Stop the hydraulic pump and close the pump valve
- Stop the compressor when the pressure is back to normal and disconnect it
8. In many mines it is the hoist operator's responsibility to alert personnel about ______.  
   a. fire  
   b. ventilation failure  
   c. flooding  
   d. all of the above  
   e. none of the above

9. The hoist operator's responsibility during an emergency which requires evacuation is to operate the hoist until ______.  
   a. the first cage is unloaded  
   b. all personnel are clear of the endangered area  
   c. the cage is at the loading level  
   d. the ore and waste is unloaded  
   e. a and c

10. If the hoist station is underground, the hoist operator will need a respirator with an independent ______________ to use during the evacuation period.
TEST QUESTIONS FOR END OF SHIFT ACTIVITIES

Fill in the blanks with the letter of the answer that best completes each sentence. Read all of the choices before selecting your answer.

1. To put the hoist in a release state at the end of the shift, the hoist operator _______.
   a. moves the conveyances to mid-shaft position
   b. secures the conveyances
   c. enters necessary information in the log
   d. moves the conveyances clear of the landing level
   e. all of the above

2. The hoist operator records _______ in the log at the end of the shift.
   a. the foreman’s activities
   b. the hoist condition
   c. problems encountered during the shift
   d. b and c
   e. none of the above

3. To secure the conveyances, the hoist operator does the following:
   _______ , _______ , _______ , _______. (Write in correct order).
   a. sets the brake
   b. sets the motor control on OFF
   c. checks that conveyances balance
   d. applies power slowly
   e. turns the power switch off
TEST QUESTIONS FOR HOISTING PROCEDURES
FEDERAL REGULATIONS

Metal and Nonmetallic Mines

Fill in the blanks with the letter of the answer that best completes each sentence or write the word that best completes each sentence.

HOISTING PERSONNEL

1. No person shall operate a hoist unless within the preceding _______ he has had a medical examination by a qualified, licensed physician who shall certify his fitness to perform this duty. Such certification shall be available at the mine.
   a. week
   b. month
   c. 12 months
   d. 3 years
   e. none of the above

2. When a manually operated hoist is used, a qualified hoistman shall remain within hearing of the telephone or signal device ________
   a. only during the beginning of the shift
   b. only when ore or waste is being hoisted
   c. at all times while any person is underground
   d. only at the end of the shift
   e. none of the above

3. When automatic hoisting is used, a competent operator of the hoist shall be readily available at or near the hoisting device ________
   a. only during the beginning of the shift
   b. while ore or waste is being hoisted
   c. while any person is underground
   d. only at the end of the shift
   e. none of the above

4. Only _________ persons shall be in hoist rooms.
5. Only experienced hoistmen shall operate the hoist
   a. except in cases of emergency
   b. except at the end of the shift
   c. except in the training of new hoistmen
   d. except at the beginning of the shift
   e. a and c

6. During shift changes a/an ___________ person shall be in charge of each trip in which persons are hoisted.

RIDING IN THE CONVEYANCE

7. In shafts inclined over 45 degrees, the operator shall determine and post in the conveyance or at each shaft station the ___________. Each person shall be provided a minimum of 1.5 square feet of floor space.
   a. maximum number of persons permitted to ride in a hoisting conveyance at one time
   b. minimum number of persons permitted to ride in a hoisting conveyance at one time
   c. number of persons required for each job
   d. a and c
   e. none of the above

8. Men shall __________ conveyance in an orderly manner.
   a. enter
   b. ride
   c. leave
   d. all of the above
   e. none of the above

9. Men shall not enter or leave conveyances __________.
   a. when the safety gate is open
   b. which are in motion
   c. after a move-conveyance signal is given to hoistmen
   d. b and c
   e. none of the above

10. Cage doors or gates shall be ___________ while men are being hoisted.

11. Cage doors shall not be opened until the cage has come to a ___________.
12. Men shall not ride in ________.
   a. skips or buckets with materials
   b. skips or buckets with muck
   c. skips or buckets with supplies
   d. skips or buckets with tools other than small hand tools
   e. all of the above

13. Persons shall not ride the ________ of any shaft conveyances except when necessary for inspection and maintenance, and then only when suitable protection for persons is provided.
   a. crosshead
   b. rim
   c. bonnet
   d. bail
   e. all of the above

RAISING AND LOWERING MEN

14. Hoistmen shall use extreme ________ when hoisting or lowering men.

15. The ________ speed for hoisting men shall be determined for each shaft and this speed shall not be ________.

16. Men shall not be hoisted at a speed faster than ________ except in an emergency.
   a. 1,000 feet per minute
   b. 2,500 feet per minute
   c. 2,500 feet per hour
   d. 2,500 feet per second
   e. none of the above

17. When men are hoisted in buckets, speeds shall not exceed 500 feet per minute and shall not exceed 200 feet per minute when within ________ of the intended station.
   a. 10 feet
   b. 800 feet
   c. 300 feet
   d. 100 feet
   e. none of the above
18. Maximum normal operating acceleration and deceleration shall ________.
   a. exceed 6 feet per second
   b. not exceed 6 feet per second per second
   c. not exceed 1 foot per second per second
   d. be 50 feet per second
   e. none of the above

19. Conveyances shall not be lowered by the brakes alone except during ________.

20. When combinations of cages and skips are used in the same compartment ________.
   a. muck can be hoisted with personnel during shift changes
   b. the cages shall be enclosed
   c. the hoist speed shall be reduced to manspeed not to exceed 1,000 feet per minute
   d. muck shall not be hoisted with personnel during shift changes
   e. b, c, d

21. During shift changes, rock or supplies shall not be hoisted in the same shaft as men and
    supplies during shift changes ________.
   a. except at the beginning of the shift
   b. unless the deadman switch is broken
   c. unless compartments and bins are partitioned to prevent spillage
   d. unless bins can spill into the cage
   e. none of the above

22. Open hooks shall not be used to hoist ________.
   a. cages
   b. buckets
   c. skips
   d. all of the above
   e. b and c

23. Buckets shall be stopped about 15 feet from the ________ to await a signal from one
    of the crew on the bottom for further lowering.
   a. collar
   b. first landing
   c. dump area
   d. shaft bottom
   e. none of the above
24. All buckets shall be stopped after being raised about three (3) feet above the shaft bottom and ________.
   a. the bucket will be stabilized before a continue hoisting signal is given
   b. hoisting to the crosshead will be at minimum speed
   c. the signaling device will be attended constantly until the bucket reaches the guides
   d. when persons are hoisted, signaling devices are attended until crosshead is engaged
   e. all of the above

25. Where mine cars are hoisted by cage or skip, means for blocking cars shall be provided ________.
   a. at all landings
   b. on the cage
   c. for at least one point in the shaft
   d. a and b
   e. none of the above

26. When tools, timbers, or other materials are being lowered or raised in a shaft by means of a bucket, skip or cage, they shall be secured or so placed that ________.
   a. they won't strike the sides of the shaft
   b. they will strike the sides of the shaft
   c. they can move about freely
   d. they can slide easily from side to side
   e. none of the above

PLACING THE CONVEYANCE IN RELEASE STATE

27. When conveyances controlled by a hoist operator are not in use, they shall be released and the conveyances shall be raised or lowered a suitable distance ________.
   a. to allow persons to board or load the conveyance
   b. to allow persons to get on the top of the conveyance
   c. to prevent persons from boarding or loading the conveyance
   d. a and b
   e. none of the above

Underground Coal Mines

28. Where persons are transported into or out of a coal mine by hoists, a qualified hoisting engineer shall be on duty while any ________ is underground.
29. A hoisting engineer is not necessary for automatically operated ________
   a. elevators
   b. cages
   c. platforms
   d. all of the above
   e. none of the above

30. An attendant shall be on duty at the surface when men are being hoisted or lowered ________
   a. until the beginning of each operating shift
   b. at the beginning of each operating shift
   c. at the end of each operating shift
   d. a and b
   e. b and c