Elevating Devices Mechanic

EDM – B

Construction Hoists

In-School Curriculum Standard

May 2012

PREFACE

This Elevating Devices Mechanic Curriculum Training Standard has been developed in keeping with the Common Format Guidelines prescribed by the Technical Standards and Safety Authority (TSSA) in conjunction with the Elevating Devices Training and Certification Advisory Board (TCAB). The Curriculum Standard reflects the content necessary for appropriate progression through each level of the Elevating Devices Mechanic in-school program.

For easy reference, a time allocation has been included for each respective reportable subject and units, along with a breakdown of theory and application in the delivery of the performance objectives.

The continual introduction of innovative techniques and more complex equipment is resulting in increasing demands for Elevating Devices Mechanics who are not only skilled in the practical aspects of the trade, but who also have a sound theoretical knowledge of the testing, diagnosing and servicing requirements. The Curriculum Standard has been developed to provide this theoretical knowledge and to offer some practical applications to complement the on-the-job work experience of the Elevating Devices Mechanic.

The Curriculum Standard has been designed to give the instructor every opportunity for flexibility and innovation without significant departures from content. Since the scope of the prescribed Curriculum Standard is quite extensive, the Mechanic-In-Training will be expected to reinforce the acquired knowledge through regular independent out-of-classroom assignments.

The Curriculum Standard includes specific references to on-the-job training. While on-the-job training has been linked to the respective in-school learning outcomes and learning content objectives, employers should not assume complete coverage in all aspects of the modules. The in-school delivery focuses primarily on the knowledge required and fundamental skills that support the respective objectives outlined in the workplace training. Employers are expected to complete the delivery of these objectives by ensuring the prescribed in-school knowledge is applied to the practical learning experiences in the work setting.

Regular evaluations of a Mechanic-In-Training's learning achievements must be performed in both theory and practical applications throughout the program.

Participation by Stakeholders

TSSA, working in collaboration with the Elevating Devices TCAB and industry members participated in the development of this curriculum guideline.

Table of Contents

Summary of Total Program In-School Training Hours

Reportable Subjects	Total	Theory	Application
1. Safety	24	24	0
2. Introduction to Construction Hoists	21	21	0
3. Mechanical Print Reading For Construction Hoists	15	6	9
4. Ladders, Scaffolding and Work Platforms For Construction Hoists	3	2	1
5. Rigging and Hoisting	14	11	3
6. Introduction to the Applicable Codes and Standards For Construction Hoists	6	2	4
7. Mechanical Practices For Construction Hoists	23.5	16.5	7
8. Construction Hoist Installation	26.5	18.5	8
12. Basic Electricity For Construction Hoists	40	29	11
13. Industrial Electricity for Hoisting Devices	40	34	6
14. Motors, Generators, Controls and AC Drives For Construction Hoists	17	17	0
15. Solid State Electronics For Construction Hoists	10.5	8	2.5
16. Circuit Tracing	22	13	9
19. General Preventive Maintenance For Construction Hoists	4	4	0
22. Hoist Car Equipment Maintenance	4	4	0
23. Hoist Hoistway and Pit Equipment Maintenance	3.5	3.5	0
Total	**274**	**213.5**	**60.5**

Number: 1

Title: Safety

Duration: 24 Total Hours

Theory: 24 Hours Application: 0 Hours

Evaluation & Testing:

- Assignments related to theory and appropriate application skills.
- Minimum of one mid-term test during the term.
- Final exam at end of term.
- Periodic quizzes.

General Learning Outcome:

Upon successful completion of this reportable subject, the individual is able to practice workplace safety in accordance with government safety regulations, manufacturer's recommendations and specifications and approved industry standards.

1.1 – Define the fundamentals of personal protective equipment.

1.2 – Describe the dangers of asbestos, synthetic mineral fibres and silica.

1.3 – Define the fundamentals of hand and power tool safety.

1.4 – Define the fundamentals of hazards in the hoistway, machine room and Pit.

1.5 – Define the fundamentals of electrical safety.

1.6 – Define the fundamentals of safety when babbitting.

1.7 – Define the fundamentals of safety when using oxy-acetylene equipment for heating and flame cutting.

1.8 – Define the fundamentals of environmental hazards.

1.9 – Define the fundamentals of Material Handling.

1.10 – Describe the safety issues relating to substance abuse.

1.11 – Describe the role of the Workplace Safety & Insurance Board (W.S.I.B.)

1.12 – Describe the workplace fire safety and prevention requirements.

1.13 – Define the essential workplace housekeeping procedures.

1.14 – Describe the types and applications of effective communication techniques.

1.15 – Identify the required Ministry of Labour and TSSA procedures for accidents and unsafe working conditions.

1.16 - Describe the public safety requirements for the workplace.

Learning Content:

1.1 – Define the fundamentals of personal protective equipment.
[1.5/0]

- personal protective equipment
  - head guarding
  - problems for hair and jewellery
  - guarding eyes, ears, hands and feet
  - use of respirators
  - protective clothing
  - use of fall arrest devices and travel restraint as per the requirements of the Occupational Health and Safety Act
  - use of back belts
  - code reference: applicable codes, standards and regulations

1.2 – Describe the dangers of asbestos, synthetic mineral fibres and silica.
[1/0]

- dangers of asbestos, synthetic products and Silica
  - recognize the toxic effects
  - define the types of potential exposure
  - use of P.P.E. to minimize effects of exposure
  - responsibilities and action procedures

1.3 – Define the fundamentals of hand and power tool safety.
[2/0]

- hand tool safety
  - safe use and application of hand tools
  - maintenance of hand tools
  - safe storage of hand tools
- power tool safety
  - inspection
  - operation
  - maintenance
  - storage
  - electrical safety
  - code reference: applicable codes, standards and regulations

1.4 – Define the fundamentals of hazards in the hoistway, machine room and pit.
[5/0]

- identify hazards when removing hoisting device from service and positioning in hoistway.
- identify hazards of placing the hoisting device back into normal service.
- Identify hazards of stored mechanical energy
- Identify hazards of stored pneumatic energy
- identify hazards of using hoistway access switches and unlocking. devices
- identify hazards of Gaining Access to and Egress from the hoisting device car pit.
- identify hazards from overhead deflector sheaves, traction sheaves and deflector sheaves on car.
- identify hazards associated with moving counterweights when on car top and in the pit.
- identify hazards associated with vanes and other devices that present a shear hazard in the hoistway.

- code reference: applicable codes, standards and regulations
- identify hazards caused from falling objects
- identify hazards of falling and exposure to electric shock
- identify hazards of moving on uneven or unstable surfaces
- identify slippery conditions
  - dirt
  - oil grease
  - ice and water
- identify hazards of working around rotating or moving equipment
- code reference: applicable codes, standards and regulations

1.5 – Define the fundamentals of electrical safety.
[3/0]

- define “tag and lockout procedures”
  - verify NO POWER
- describe the use of electrical meters and instruments
  - testing for presence of electricity
- define the hazards from stored electrical energy and other sources
  - capacitors
  - inductors
  - interconnections
- directors ruling 106/93 & 01/82
- define the safe use of jumpers
  - appropriate use
  - potential hazards
- code reference: applicable codes, standards and regulations

1.6 – Define the fundamentals of safety when babbitting.
[1/0]

- identify the requirements for Personal Protective Equipment P.P.E.
- identify the requirements for clean clothing
- define the specified Babbitt composition
- identify the required babbitting equipment
- identify the hazards associated with heating babbitt
  - use of heating equipment
  - handling molten Babbitt
- identify the dangers of moisture in babbitting
- identify the dangers of fumes in babbiting

1.7 – Define the fundamentals of safety when using oxy-acetylene equipment for heating and flame cutting.
[1/0]

- define the requirements of wearing Personal Protective Equipment (P.P.E.).
- identify the safe handling methods and storage requirements of oxy-acetylene equipment.
  - turning on and off equipment
  - hazards of using oxygen around lubricating oil or grease
  - explosion hazards
  - equipment storage and transportation
  - regulator adjustment

1.8 – Define the fundamentals of environmental hazards.
[1/0]

- chemical hazards
- physical hazards
- biological hazards
- toxic substances

1.9 – Define the fundamentals of material handling.
[1/0]

- planning storage
- specified PPE
- warm up
- adequate lighting
- communication
- use of dollies
- lifting techniques

1.10 – Describe the safety issues relating to substance abuse.
[1/0]

- describe alcohol, prescription and non-prescription drug abuse
- recognize symptoms
- awareness of programs and counseling

1.11 – Describe the role of the Workplace Safety and Insurance Board (W.S.I.B.)
[1/0]

- define the role of the W.S.I.B
- define the role and responsibilities of the employer and employee

1.12 – Describe the workplace fire safety and prevention requirements.
[1/0]

- interpret the Occupational Health and Safety Act (O.H.S.A.)
- identify potential fire hazards
- identify the class of fires and the application of the appropriate fire extinguisher
- develop an emergency action plan including evacuation procedures
- describe the use of extinguishers, respirators, stretchers and fire blankets
- describe the factors that determine when a fire should not be fought

1.13 – Define the essential workplace housekeeping procedures.
[1/0]

- Identify hazardous areas in the workplace
  - wet floors and liquid spills
  - poor illumination
  - debris in walking area
  - loose carpet and uneven surfaces
  - storage of tools and equipment

1.14 – Describe the types and applications of effective communication techniques.
[0.5/0]

- identify the four types of communication and situational applications
  - Verbal
  - Written
  - Visual
  - Body language

1.15 – Identify the required Ministry of Labour and TSSA procedures for accidents and unsafe working conditions.
[2/0]

- define the procedures for identifying and reporting unsafe conditions
- describe how to attend to injured workers
- practice writing an accident and incident report that complies with the Ministry of Labour and TSSA Accident Reporting Procedures
- review the TSSA "Emergency Evacuation Training and Certification Policy"

1.16 - Describe the public safety requirements for the workplace.
[1/0]

- define the method of notifying building personnel of hoisting device shut-down or reinstatement to service.
- define the reasons for notifying building personnel that the hoisting device has been shut down or returned to service
- define the requirement for and location of "maintenance in progress" signs
- define the equipment requirements and procedure for barricading entrances.
- define the requirements for barricading
- minimizing hazards associated with public contact with tools or materials in the work area

<u>Reference material for this section includes the following:</u>

The Act:
Occupational Health and Safety Act, R.S.O. 1990

4 Sector Regulations:
Regulations for Construction Projects, O. Reg. 213/91
Industrial Establishments Regulations, O. Reg. 851
Health Care and Residential Facilities Regulation, O. Reg. 67/93
Mines and Mining Plants Regulation, O. Reg. 854

Hoist Industry Safety Handbook

Number: 2

Title: Introduction to Construction Hoists

Duration: 21 Total Hours

Theory: 21 Hours Application: 0 Hours

Evaluation & Testing:

- Assignments related to theory and appropriate application skills.
- Minimum of one mid-term test during the term.
- Final exam at end of term.
- Periodic quizzes.

General Learning Outcome:

Upon successful completion of this reportable subject, the individual is able to describe the introductory information of the hoisting devices industry in accordance with historical and current hoisting systems.

2.1 – History and Terminology of Vertical Transportation

2.2 – Other Hoisting Devices

2.3 – Acts, Regulations, Standards and Codes

2.1– History and Terminology of Vertical Transportation

Duration: Total Hours: 3 Theory: 3 hours Application: 0 hours

General Learning Outcome:

Upon successful completion of this reportable subject, the individual is able to describe the history and terminology of vertical transportation and the evolution to the modern hoisting devices in accordance with government safety regulations, manufacturer's recommendations and approved industry standards.

Learning Outcomes:

Upon successful completion, the individual is able to:

2.1.1- Describe the need for hoists and how this need caused the evolution in hoisting devices from the simplest to the most technologically advanced.

2.1.2- Describe terminology concerning hoists, escalators and other hoisting devices.

Learning Content:

2.1.1- Describe the need for hoists and how this need caused the evolution in hoisting devices from the simplest to the most technologically advanced.
[1/0]

- the origin of hoisting devices

- early modern hoists
- modern hoists

2.1.2- Describe terminology concerning hoists, escalators and other hoisting devices.
[2/0]

- identify a glossary of hoisting devices terms:
  - machine room equipment
  - hoistway equipment
  - car assembly equipment
  - pit equipment

2.2 –Other Hoisting Devices

Duration: Total Hours: 9 Theory: 9 hours Application: 0 hours

General Learning Outcome:

Upon successful completion of this reportable subject, the individual is able to describe other hoisting devices covered under the Hoisting Devices Regulations in accordance with manufacturer's design features.

Learning Outcomes:

Upon successful completion, the individual is able to:

2.2.1- Define the fundamentals of dumbwaiters.

2.2.2- Define the fundamentals of material lifts.

2.2.3- Define the fundamentals of sidewalk elevators

2.2.4- Define the fundamentals of incline lifts.

2.2.5- Define the fundamentals of lifts for persons with physical disabilities.

2.2.6- Define the fundamentals of manlifts.

2.2.7- Define the fundamentals of construction hoists.

2.2.8- Define the fundamentals of passenger ropeways.

2.2.9- Define the fundamentals of stage lifts.

2.2.10- Define the fundamentals of special application elevators

2.2.11- Define the fundamentals of elevators with other types of driving machines.

Learning Content:

2.2.1- Define the fundamentals of dumbwaiters.
[1/0]

- code reference: applicable codes, standards and regulations

- Types and applications
- Basic construction features and operation

2.2.2- Define the fundamentals of material lifts. (Freight Platform Lifts).
[1.5/0]

- Ontario Regulation, Section 1. and Section 2.3. (see freight platform lifts).
- Code Adoption Document Part 3
- B44 Code, Section 7.4, 7.5, 7.6, 7.7, 7.9, 7.10, 7.11
- Outline the essential differences from elevators.
  - lifting mechanism
  - controls

2.2.3- Define the fundamentals of sidewalk elevators
[0.5/0]

- Ontario Regulation, Section 1
- B44 Code, Section 5.5

2.2.4- Define the fundamentals of inclined travel hoists.
[1/0]

- Ontario Regulation, Section 1
- B44 Code, Section 5.1, 5.4

2.2.5- Define the fundamentals of lifts for persons with physical disabilities.
[1.5/0]

- Ontario Regulation, Section 1. and Section 2
- Code Adoption Document Part 7
- CSA B355
- CSA B613

2.2.6- Define the fundamentals of manlifts.
[1/0]

- Ontario Regulation, Section 1. and Section 2
- Code Adoption Document Part 4
- B311 Code

2.2.7- Define the fundamentals of construction hoists.
[0.5 /0]

- Ontario Regulation, Section 1. and Section 2
- Code Adoption Document Part 6
- Z185 (Workers hoists) and Z256 Codes (Material Hoists)

2.2.8- Define the fundamentals of passenger ropeways. (Note that the Elevating-Device Mechanic is not certified to work on a Passenger Ropeway as identified in the Ontario Regulation 186/03 for Ski Lift machine Requirements).
[0.5/0]

- Ontario Regulation, Section 1. and Section 2

- Code Adoption Document Part 5
- Z98 Code (Passenger Ropeways)

2.2.9- Define the fundamentals of stage lifts.
[0.5/0]

- Ontario Regulation, Section 1. and Section 2
- B44 Code (Stage lifts) General rules applicable to hoists

2.2.10- Define the fundamentals of Special Application elevators
[0.5/0]

- CSA B44 Code Part 5, Section 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.8, 5.10
- Ontario Acts / Regulations

2.2.11- Define the fundamentals of hoists with other types of driving machines.

[0.5/0]

- CSA B44 Part 4, Section 4.1, 4.2, 4.3
- Ontario Acts / Regulations

2.3– Acts, Regulations, Standards and Codes

Duration: Total Hours: 9 Theory: 9 hours Application: 0 hours

General Learning Outcome:

Upon successful completion of this reportable subject, the individual is able to describe acts, regulations, standards and codes in accordance with government safety regulations, manufacturer's recommendations and specifications and approved industry standards.

Learning Outcomes:

Upon successful completion, the individual is able to:

2.3.1- Identify the basic differences between acts, regulations, standards and codes.

2.3.2- Describe the essentials of the Technical Standards and Safety Act, Regulations, Code Adoption Document, Policies and Procedures.

2.3.3- Interpret the essentials of the Ontario Building Code Act and Regulations.

2.3.4- Define the essentials of the Ontario Health and Safety Act (Construction/ Industrial) as it applies to this trade.

2.3.5- Describe the essentials of W.H.M.I.S. as it applies to this trade and industry.

2.3.6- Define the essentials of the various Codes and Standards as they apply to hoisting devices.

2.3.7- Identify the legal responsibilities as they apply in the various acts, regulations, standards and codes and how they affect this trade.

2.3.8- Identify the fundamentals of the TSSA Directors rulings.

Learning Content:

2.3.1- Identify the basic differences between acts, regulations, standards and codes.
[1/0]

- basic information concerning the differences between the topics covered in acts, those covered in regulations and those in standards
- explanation of the relationship between acts, regulations and standards
- review Code adoption documents

2.3.2- Describe the essentials of the Technical Standards and Safety Act, Regulations and Code Adoption Document Policies and Procedures.
[2/0]

- Basic information (overview) concerning topics in the Technical Standards and Safety Act and Regulations and Training and Certification of Mechanics.

2.3.3- Interpret the essentials of the Ontario Building Code Act and Regulations.
[1/0]

- Overview of the topics which are directly relevant to hoisting devices.

2.3.4- Define the essentials of the Ontario Health and Safety Act (Construction/ Industrial) as it applies to this trade.
[1/0]

2.3.5- Describe the essentials of W.H.M.I.S. as it applies to this trade and industry.
[1/0]

2.3.6- Define the essentials of the various Codes and Standards as they apply to hoisting devices.
[1.5/0]

- CSA B44, Safety Code for Hoists
- CSA C22.1 Part I, Canadian Electrical Code (Section 38)
- Overview only of the following standards:
  - CSA B311, Safety Code for Manlifts
  - CSA Z185, Safety Code for Personnel Hoists
  - CSA Z256, Safety Code for Material Hoists
  - CSA B613 Lifts for persons with physical disabilities in private residences
  - ASME A17.4 Guide for Emergency personnel

2.3.7- Identify the legal responsibilities as they apply in the various acts, regulations, standards and codes and how they affect this trade.
[0.5/0]

- Identify the legal responsibilities:
  - Hoisting devices mechanic in Training - EDM-T
  - Hoisting devices mechanic – EDM-B

2.3.8- Identify the fundamentals of the TSSA Directors rulings.
[1/0]

- refer to the TSSA web site (www.tssa.org)
- identify the legal responsibilities
- explain the reasons for directors rulings

Number: 3

Title: Mechanical Print Reading for Construction Hoists

Duration: 15 Total Hours

Theory: 6 Hours Application: 9 Hours

Evaluation & Testing:

- Assignments related to theory and appropriate application skills.
- Minimum of one mid-term test during the term.
- Final exam at end of term.
- Periodic quizzes.

General Learning Outcome:

Upon successful completion of this reportable subject, the individual is able interpret mechanical print reading in accordance with manufacturer's recommendations and specifications and approved industry standards.

3.1 – Architectural/Structural Prints

3.2 – Hoisting Device Layout Prints

3.3 – Hoisting Devices Mechanical Print Reading

3.1– Architectural/Structural Prints

Duration: Total Hours: 3 Theory: 3 hours Application: 0 hours

General Learning Outcome:

Upon successful completion of this reportable subject, the individual is able to interpret architectural/structural prints in accordance with manufacturer's recommendations and specifications and approved industry standards.

Learning Outcomes:

Upon successful completion, the individual is able to:

3.1.1- Identify the fundamentals of architectural/structural prints.

3.1.2- Describe the construction features of architectural/structural prints.

3.1.3- Locate and identify key elements on an architectural/structural print relating to the construction/installation of a hoisting device.

Learning Content:

3.1.1- Identify the fundamentals of architectural/structural prints.
[0.5/0]

- identify the type and application of architectural/structural drawings
  - drawing type
  - location of identifying information
    - building address
    - drawing number
    - plan views
    - elevation views
    - drawing scale
    - specifications

3.1.2- Describe the construction features of architectural/structural prints.
[0.5/0]

- nomenclature relating to sectional views
- number of landings and floor elevations
- symbols relating to :
  - doors
  - windows
  - structural beams
  - beam connections
  - fasteners
  - poured concrete
  - concrete blocks
  - masonry
  - timber
  - drywall
  - footings reinforcing rods
  - anchors
  - concrete inserts
  - through bolts
  - heating cooling and ventilation ducts
  - exhaust fans
  - plumbing
  - sanitary drains
  - sump holes
  - cored holes

3.1.3- Locate and identify key elements on an architectural/structural print relating to the construction/installation of a hoisting device.
[2/0]

- location of hoisting device in the plan views
- location of elevation views and determine floor heights and number of landings
- determine the travel, pit depth and overhead
- locate the system of grid lines on the drawings and relate position of hoisting device to the grid lines
- determine the thickness and type of finished walls for the hoistway
- determine the location of fixtures forming part of the hoisting device control equipment and other ancillary fixtures
  - Central Alarm and Control Facility (CACF)
  - lobby dispatch panel
  - recall switches

    - smoke and heat sensors
    - sprinkler heads
    - display systems
  - locate the hoisting device entrances
  - locate the hoisting device machine room
    - machine room configuration
    - secondary level configuration
    - special trenches or tunnels for:
      - oil lines
      - electrical conduit

3.2– Hoisting Device Layout Prints

Duration: Total Hours: 8 Theory: 0 hours Application: 8 hours

General Learning Outcome:

Upon successful completion of this reportable subject, the individual is able to describe hoisting device layout prints in accordance with manufacturer's recommendations and specifications and approved industry standards.

Learning Outcomes:

Upon successful completion, the individual is able to:

3.2.1- Interpret the information on a hoisting device print.

3.2.2- Identify the key aspects of hoisting device print reading.

3.2.3- Locate and identify positioning of components

3.2.4- Locate and identify clearances

3.2.5- Locate and identify power requirements

Learning Content:

3.2.1- Interpret the information on a hoisting device print.
[0/2]

  - location of identifying information
    - building address
    - drawing number
    - plan and elevation views
    - drawing scale

3.2.2- Identify the key aspects of hoisting device print reading.
[0/1]

  - location and depth of pit
  - identify the normal travel of the hoisting device
  - locate and identify the overhead and related dimensions
  - locate the width and depth of the hoistway in the plan view

3.2.3- Locate and identify positioning of components
[0/2]

- locate and identify position of guide rails
- identify the size and orientation of the car frame
- locate and identify pit equipment:
  - buffers, base, stabilizers, power cord drum
  - rail foot brackets
  - pit channels
  - compensating sheave
  - pit ladder
  - pit stop switch
  - pit light and light switch

3.2.4- Locate and identify clearances
[0/1]

- locate and identify clearances:
  - sill to sill running clearance
  - car to car counterweight clearance
  - car to hoistway wall clearance
  - clearances at top and bottom of hoistway
  - run-by, buffer stroke and clearances
  - controller and main disconnect clearances

3.2.5- Locate and identify power requirements
[0/2]

- identify the correct location of main electrical components
  - main disconnect switches
  - car light disconnect / power supply
  - signal switches
  - dispatcher disconnect switches
- confirm the hoisting device power requirements
  - voltage
  - amperage

3.3– Hoisting Devices Mechanical Print Reading

Duration: Total Hours: 4 Theory: 3 hours Application: 1hour

General Learning Outcome:

Upon successful completion of this reportable subject, the individual is able to explain hoisting device mechanical print reading procedures in accordance with manufacturer's recommendations and specifications and approved industry standards.

Learning Outcomes:

Upon successful completion, the individual is able to:

3.3.1- Describe the fundamentals of drawing title blocks, notes and abbreviations.

3.3.2- Describe the fundamentals of visualization, projection and views.

3.3.3- Explain the fundamentals of dimensioning.

3.3.4- Identify typical machine elements associated with hoisting devices.

Learning Content:

3.3.1- Describe the fundamentals of drawing title blocks, notes and abbreviations. [1/0]

- drawing title blocks
  - drawing name
  - number system
  - revisions
  - dates
- reading notes
  - importance of recognition
  - data
- understanding abbreviations
- scale indication and measuring scales

3.3.2- Describe the fundamentals of visualization, projection and views. [1/0]

- orientation of objects
- third vs. first angle of projection
- basic arrangement of views
- transference of dimensions
- auxiliary and section views
- isometric and exploded views

3.3.3- Explain the fundamentals of dimensioning. [1/0]

- definition and requirements of dimensioning
- dimensioning systems
- rules for dimensioning
- checking dimensions
- English vs. metric system of units

3.3.4- Identify typical machine elements associated with hoisting devices. [0/1]

- structural steel sections
- shafts, keys and pins
- fasteners and anchors
  - types
  - thread nomenclature
- weld symbols

Number 4

Title: Ladders, Scaffolding and Work Platforms for Construction Hoists

Duration: 3 Total Hours

Theory: 2 Hours Application: 1 Hour

Evaluation & Testing:

- Assignments related to theory and appropriate application skills.
- Minimum of one mid-term test during the term.
- Final exam at end of term.
- Periodic quizzes.

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to explain the use of ladders, scaffolding and work platforms in accordance with government safety regulations, manufacturer's recommendations and specifications and approved industry standards.

4.1 – Describe the fundamentals of using ladders.

4.2 – Explain the fundamentals of using scaffolding.

Learning Content:

4.1 – Describe the fundamentals of using ladders.
[0.5/0.5]

- ladder angle limits
- ensure secure footing
- determine the required height
- define correct positioning
- guard area in vicinity of ladder
- tie-off the ladder as required
- load limits
- maintenance and storage
- materials used to construct ladders
- code reference: applicable codes, standards and regulations
- C.S.A Certification and Duty Ratings

4.2 – Explain the fundamentals of using scaffolding.
[1.5/0.5]

- OHSA requirements (construction)
- Identify when scaffolding requires engineering
- methods of assembly and disassembly
- recognizing hazards and obstructions
- leveling

- bracing and tying-off
- guarding the work area
- installing the planking and railings
- personal protective equipment
- recognize load limits
- inspect scaffolding
- perform maintenance
- storage of scaffolding and planks
- differences between hoistway and exterior scaffolding
- code reference: applicable codes, standards and regulations

Number: 5

Title: Rigging and Hoisting

Duration: 14 Total Hours

Theory: 11 Hours Application: 3 Hours

Evaluation & Testing:

- Assignments related to theory and appropriate application skills.
- Minimum of one mid-term test during the term.
- Final exam at end of term.
- Periodic quizzes.

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to describe the safe use of rigging and hoisting equipment in accordance with government safety regulations, manufacturer's recommendations and specifications and approved industry standards.

5.1 – Define the fundamentals and types of rigging and hoisting equipment

5.2 – Describe the construction features and application of rigging and hoisting equipment.

5.3 – Explain the operating principles of rigging and hoisting equipment.

5.4 – Describe the safe use in the workplace of rigging and hoisting equipment.

5.5 – Define the fundamentals of hardware for hoisting equipment.

Learning Content:

5.1 – Define the fundamentals and types of rigging and hoisting equipment
[2/0]

- Electric chain block
- Tower crane / mobile crane / Boom truck
- Top of Car Jib Crane – electric & manual
- Forklift
- come-along
- tugger hoist
- cat-head
- electrical devices
- hydraulic devices
- pneumatic devices

5.2 – Describe the construction features and application of rigging and hoisting equipment.
[2/0]

- equipment assembly
- limitations on the use of cat-heads
- slings and sling arrangements
  - ratings
  - wire rope v/s nylon rope
- securing and balancing a load
- test lifts
- estimating weights of equipment
- load capacities of lifting equipment

5.3 – Explain the operating principles of rigging and hoisting equipment.
[1/1]

- limitations on the use of cat-heads
- slings, sling arrangements, applications
  - ratings
  - soft slings
  - wire rope
- chain block
- Tower crane / mobile crane / boom truck
- Top of Car Jib crane
- Forklift
- come-along
- tugger hoist
- cat-head
- electrical devices
- hydraulic devices
- pneumatic devices

5.4 – Describe the safe use in the workplace of rigging and hoisting equipment
[4/2]

- guarding the work area
- awareness of pinch points
- safety in the lifting area
- communications
  - verbal – including two way radio communication
  - hand signals
- ventilation and lighting
- personal protective equipment – double hook and retractable lanyard
- inspection, maintenance and repair of equipment
- recommended storage of equipment
- maintaining logbooks
- code reference: applicable codes, standards and regulations, annual testing as per regulations

5.5 – Define the fundamentals of hardware for hoisting equipment.
[2/0]

- hooks and mousing

- eye bolts and shackles
- tag lines
- shims
- fillers
- spacers
- jacks
- spreader bars

Number: 6

Title: Introduction to Applicable Codes and Standards for Construction Hoists

Duration: 6 Total Hours

Theory: 2 Hours Application: 4 Hours

Evaluation & Testing:

- Assignments related to theory and appropriate application skills.
- Minimum of one mid-term test during the term.
- Final exam at end of term.
- Periodic quizzes.

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is capable of describing the fundamentals of locating, accessing and interpreting the information contained within the CSA B44 Standard.

6.1 – Define the introductory information of the development of codes and standards for the CSA B44 code book.

6.2 – Define the history of the harmonized North American Elevator Code system.

6.3 – Describe the format of standards and conventions used for codes.

6.4 – Perform the procedure to access information from the CSA B44 code book.

Learning Content:

6.1 – Define the introductory information of the development of codes and standards for the CSA B44 code book.
[1/0]

- the hierarchy of Standards Canada, Canadian Standards Association (CSA) and other code writing bodies.
- code committees
- B44 Technical committee and sub-committees
  - recommended reading of the code making process at CSA
    - hierarchy
    - policies and procedures
    - organizational charts

6.2 – Define the history of the harmonized North American Elevator Code system.
[0.5/0]

- the ASME A17.1 American Elevator Standard
- NAFTA as a catalyst for harmonization
- Harmonization commencement date

- Harmonization completed with the first bi-national standard 2007 edition

6.3 – Describe the format of standards and conventions used for codes.
[0.5/0]

- the numbering system
- terminology for:
  - differences between a “code” and a “Standard”
  - interpretations
  - inquiries
  - ballots
  - letter ballots
  - define “consensus”

6.4 – Perform the procedure to access information from the CSA B44 (applicable) code book.
[0/4]

- search for keywords
- process of elimination
  - the hierarchal approach
- use of trade terms
- searching with the index
- search levels and cross references

Number: 7

Title: Mechanical Practices for Construction Hoists

Duration: 23.5 Total Hours

Theory: 16.5 Hours Application: ~~7~~ Hours

Evaluation & Testing:

- Assignments related to theory and appropriate application skills.
- Minimum of one mid-term test during the term.
- Final exam at end of term.
- Periodic quizzes.

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to describe the mechanical practice procedures for hoisting device maintenance in accordance with government safety regulations, manufacturer's recommendations and specifications and approved industry standards.

7.1 – Define the fundamentals of mechanical print reading, associated mathematics and science.

7.2– Describe the fundamentals of power transmission components.

7.3 – Describe the basic introductory information and fundamentals of bearings and seals.

7.4 – Describe the fundamentals of precision measurements.

7.5 – Describe the fundamentals of materials and fastening technology.

7.6 – Describe the basic introductory information and fundamentals of lubrication.

7.7 – Describe the fundamentals of test instruments.

Learning Content:

7.1 – Define the fundamentals of mechanical print reading, associated mathematics and science. [2/0]

- drawing types
  - orthographic
  - isometric
- drawing views of machine components
  - multi-view
  - auxiliary views
- applied mathematics
  - adding, subtracting, multiplying, dividing
  - conversion of fractions

7.2– Describe the fundamentals of power transmission components. [4.5/3]

- V-belts
- Belt drive / gear drive / direct drive
- belt sheaves
- taper bushings
- chains and sprockets
- gear and rear reducers
- couplings, keys, pins and set screws
- machine brakes
- belt alignment
  - tools
  - procedure

7.3 – Describe the basic introductory information and fundamentals of bearings and seals. [4/2]

- bearing types
  - sleeve (journal) bearings
  - anti-friction bearings
    - ball
    - taper
    - roller
    - thrust
  - mounted bearings
    - pillow blocks
    - flange cartridges
- causes of bearing failures
  - lack of lubrication
  - contamination
  - overloading
  - overheating
  - electrolysis
- identification of bearing failures
  - scoring
  - galling
  - corrosion
  - pitting
- bearing removal procedures
  - pullers
  - press
- bearing lubrication procedures
  - cleaning
  - repacking
  - grease gun
- identify seals
  - static
  - dynamic
  - application

- procedure for removal and installation of seals
  - pullers
  - drivers

7.4 – Describe the fundamentals of precision measurements.
[2/0.5]

- measurements
  - imperial system
  - metric system
- describe precision measuring tool construction features
  - micrometers
  - calipers
  - dial indicators
  - feeler gauges
  - levels – hand and transit
  - scribing tools
  - measuring tape and plumb lines
  - tool maintenance and storage

7.5 – Describe the fundamentals of materials and fastening technology.
[3/0]

- identify and describe properties and application for:
  - ferrous metals
  - non-ferrous metals
  - alloys
- identify and describe application for non-metallic materials
  - neoprene
  - plastics
  - composites
- define the mechanical properties of metals and alloys
  - tensile strength
  - yield strength
  - hardness
  - elongation rate
- identify and select fasteners for specific applications
  - bolts
  - through bolts
  - nuts
  - lock washers
  - flat washers
  - bevel washers
  - pins
  - dowels
  - retaining rings
  - screws
  - mechanical anchors
  - chemical anchors
  - shields

    - inserts
- identify thread types
    - UNC
    - UNF
    - Metric
    - NPT
    - NPTF
- identify grade of fasteners
    - head markings
    - strength of materials

7.6 – Describe the fundamentals of lubrication.
[1/0.5]

- lubricant types and properties
    - oil
    - grease
    - solids
    - gases
- use of lubrication devices
    - grease guns
    - oil cans
    - mechanical
- storage of lubrications
    - fire protected
    - ventilation
    - temperature
    - containers
    - location
- disposal requirements

7.7 – Describe the fundamentals of test instruments.
[0/1]

- use test instruments
    - tachometers
    - pressure gauges
    - torque wrenches

Number: 8

Title: Construction Hoist Installation

Duration: 26.5 Total Hours

Theory: 18.5 Hours Application: 8 Hours

Evaluation & Testing:

- Assignments related to theory and appropriate application skills.
- Minimum of one mid-term test during the term.
- Final exam at end of term.
- Periodic quizzes.

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to describe the construction and installation procedures for traction hoists in accordance with government safety regulations, manufacturer's recommendations and specifications and approved industry standards.

8.1 – Site Planning

8.4 – Machine Room Equipment

8.5 – Pit Structures

8.6 – Car Assemblies, Counterweight Assemblies and Wire Ropes

8.7 – Lock Assemblies

8.9 – Car Cab Assemblies and Traveling Cables

8.11 – Preparing and Testing for Inspection

8.1– Site Planning

Duration: Total Hours: 2 Theory: 2 hours Application: 0 hours

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to describe the fundamentals, features and application of site planning in accordance with government safety regulations, manufacturer's recommendations and approved industry standards.

Learning Outcomes:

Upon successful completion, the EDM-T is able to:

8.1.1 – Define the fundamentals of site planning.

8.1.2 – Describe the construction features and application of site planning.

Learning Content:

8.1.1 – Define the fundamentals of site planning.
[1/0]

- Verify if the site is ready for installation:
  - report to the site superintendent or General Contractor (GC**)**
  - visually inspect site
  - weather conditions and safety considerations
  - review equipment check list
  - planning job safety
  - arrange storage space
  - confirm the integrity of all fastening points
  - shoring

8.1.2 – Describe the construction features and application of site planning.
[1/0]

- identify features and application procedures
  - organize tools
  - main line disconnect switch location
  - tower fastenings
  - communication process
  - pit equipment
  - housekeeping
  - concrete pad or other bearing surfaces as per manufactures recommendations

8.4 – Machine Room Equipment

Duration: Total Hours: 2 Theory: 1 hours Application 1 hours

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to describe the installation procedures for machine room equipment in accordance with government safety regulations, manufacturer's recommendations and approved industry standards.

Learning Outcomes:

Upon successful completion, the EDM-T is able to:

8.4.2 – Define the fundamentals of wiring machine equipment.

Learning Content:

8.4.2 – Define the fundamentals of wiring machine equipment.
[1/1]

- interpret and follow electrical field wiring diagrams

- identify required wire sizes
- identify grounding requirements
- use of specialized hand tools:
  - wire strippers
  - crimping tools
  - terminal ends
- code reference: applicable codes, standards and regulations

8.5 –Pit Structures

Duration: Total Hours: 1 Theory: 1 hours Application: 0 hour

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to describe the introductory information and fundamentals of installing pit structures in accordance with government safety regulations, manufacturer's recommendations and approved industry standards.

Learning Outcomes:

Upon successful completion, the EDM-T is able to:

8.5.1 – Identify pit equipment components.

8.5.2 – Describe the methods to install pit structure.

Learning Content:

8.5.1 – Identify pit equipment components.
[0.5/0]

- identify pit equipment components:
  - buffers
  - base outriggers
  - access doors and gates
  - cable drum

8.5.2 – Describe the methods to install pit structure.
[0.5/0]

- describe installation procedures
  - base outriggers
  - cable drum
  - buffers
    - spring
    - oil
    - rubber
    - elastomeric
  - pit access doors
    - regulatory authority governing pit access requirements
  - applicable codes, standards and regulations

8.6 –Car Assemblies, Counterweight/Mast Assemblies and Wire Rope on Construction Hoists

Duration: Total Hours: 7 Theory: 5 hours Application: 2 hours

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to describe the installation procedures for car and counterweight assemblies and wire ropes in accordance with government safety regulations, manufacturer's recommendations and approved industry standards.

Learning Outcomes:

Upon successful completion, the EDM-T is able to:

8.6.1 – Describe the fundamentals of installing car and counterweight assemblies.

8.6.2 – Describe the fundamentals of installing wire ropes.

Learning Content:

8.6.1 – Describe the fundamentals of installing car / counterweight / mast assemblies.
[3/2]

- outline the installation procedures for:
  - cars and counterweight assemblies
  - sheaves and rope hitches
- identify safety types
- installation of car and counterweight guiding means
- installation of the counterweight
- positioning procedures for car and counterweight assemblies
- procedure to balance the car and counterweight
- installing top of car jib crane
- mast assemblies
  - installing
  - extending
  - dismantling
  - max. freestanding height during erection and/or dismantle
  - full or partial base
- identifying manufacturer's procedures
- applicable codes, standards and regulations

8.6.2 – Describe the fundamentals of installing wire ropes.
[2/0]

- identify general considerations
  - care and handling of wire rope
  - rope inspection for defects
- identify types of rope and other suspension devices
  - rope lay
  - rope material

  - wire count
  - strand count
  - applications
- identify characteristics of wire rope
  - rope lays
  - rope size
  - rope stretch
- identify types of sheaves
- installation of wire ropes
  - shortening ropes
  - seizing rope
  - cutting ropes
  - governor ropes
  - rope tensioning
  - rope lubrication
  - rope termination devices
  - rope lubrication procedures
  - rope clip and eyebolt requirements
  - wedge and socket assemblies
  - run-by clearances
- recording of rope data
- applicable codes and standards

8.7 –Lock Assemblies

Duration: Total Hours: 1.5 Theory: 1.5 hours Application: 0 hours

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to describe the installation procedures for door frames, hoistway doors and lock assemblies in accordance with government safety regulations, manufacturer's recommendations and approved industry standards.

Learning Outcomes:

Upon successful completion, the EDM-T is able to:

8.7.2 – Describe the fundamentals of installing hoistway doors and lock assemblies.

Learning Content:

8.7.2 – Describe the fundamentals of installing hoistway doors/gates and lock assemblies on Construction Hoists
[1.5/0]

- identify types of:
  - gates
  - gate locks
  - wiring of landing gate

        - plug type
        - cab tyre
        - individual wire
        - taping
        - GFCI
    - describe installation procedures for:
        - gates
        - gate locks / interlocks
        - fascia plates
        - bi-parting doors
        - vertical gates
        - applicable codes, standards and regulations
        - describe grounding and bonding procedures

8.9 – Car Cab Assemblies and Traveling Cables

Duration: Total Hours: 9 Theory: 5 hours Application: 4 hour

General Learning Outcome:
Upon successful completion of this reportable subject, the EDM-T is able to describe fundamentals of installing car cab assemblies in accordance with government safety regulations, manufacturer's recommendations and approved industry standards.

Learning Outcomes:

Upon successful completion, the EDM-T is able to:

8.9.1 – Describe the fundamentals of installing traveling power cables.

8.9.2 – Describe the fundamentals of installing car cab assemblies.

8.9.3 – Describe the fundamentals of installing car door systems.

Learning Content:

8.9.1 – Describe the fundamentals of installing traveling power cables.
[3/1]

- identify types of traveling power cables
    - car power supply wire
- identify cable handling techniques
    - tools
    - personal protective equipment (P.P.E.)
- identify cable installation techniques
    - tools
    - prevention of kinking or birdcaging
    - hanger types and applications
    - cable coiling drum
    - power cable tension carriage / trolley
    - proper procedure for cable coiling
    - protection for traveling cables
        - types of cable guides

  - distance between cable guides
  - acceptable wind loads
- replacement practices
- applicable codes, standards and regulations

8.9.2 – Describe the fundamentals of installing the car assemblies. [1/2]

- identify parts of the car assembly
- describe cab assembly installation procedures for:
  - threshold, extension and guard
  - car operating panels
  - top of car equipment
  - top of car erection and dismantle / inspection station
  - emergency exit and top of car access
  - types of communication devices
  - wiring methods
    - field wiring diagram
    - top of car electrical devices
    - car operating panel
- applicable codes, standards and regulations

8.9.3 – Describe the fundamentals of installing car doors/gates systems. [1/1]

- identify types of car gates
- identify parts of car gate systems
- describe car gate system installation procedures for:
  - wiring methods
  - hanger and tracks
  - linkages
  - gate switches
  - clearance checks and adjustments
  - maintenance and lubrication

8.11 – Preparing for Inspection and Testing

Duration: Total Hours: 4 hours Theory: 3 hours Application: 1 hour

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to describe the preparation for inspection and testing of traction hoists in accordance with government safety regulations, manufacturer's recommendations and approved industry standards.

Learning Outcomes:

Upon successful completion, the EDM-T is able to:

8.11.1 – Describe the fundamentals of preparing the hoisting device for inspection.

8.11.2 – Describe the fundamentals of performing tests for inspection.

Learning Content:

8.11.1- Describe the fundamentals of preparing the hoisting device for inspection. [1/0]

- describe procedure to remove from temporary operation
  -normal operation v. erection mode
- remove all temporary jumpers
- describe procedure to set-up communication links
- describe procedure to test all safety and door/gatelock circuits
- describe completion procedure for field tests and data reports
- identification and calculation of required test weight

8.11.2- Describe the fundamentals of performing tests for inspection. [2/1]

- describe hoisting devices branch inspection procedure as per the regulatory authority
  - check building to assure it is ready for inspection
    - lighting
    - tripping hazards
  - full load safety test
  - full load running test
  - check run-by distances and clearances
  - perform ground test on primary safety circuit
  - identification of machine equipment
  - perform final cleanup activities
  - perform all redundancy tests as per manufacturers submission
  - code reference: applicable codes, standards and regulations

Number: 12

Title: Basic Electricity for Construction Hoists

Duration: 40 Total Hours

Theory: 29 Hours Application: 11 Hours

Evaluation & Testing:

- Assignments related to theory and appropriate application skills.
- Minimum of one mid-term test during the term.
- Final exam at end of term.
- Periodic quizzes.

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to describe basic fundamentals of electricity and related electrical circuits in accordance with manufacturer's recommendations and specifications and approved industry standards.

12.2 – Describe the fundamentals of electricity and relation to the structure of matter.

12.3 – Define the fundamentals and work with direct current electrical circuits.

12.4 – Define the fundamentals and work with alternating current electrical circuits.

12.5 – Describe voltage, current and resistance measurements.

12.6 – Define the principles of permanent magnetism.

12.7 – Define the principles of electromagnetism.

Learning Content:

12.2 – Describe the fundamentals of electricity and relation to the structure of matter. [1/0]

- atomic structure of matter
  - free electrons
  - source of electricity
  - define nature of electricity
  - static electricity

12.3 – Define the fundamentals and work with direct current electrical circuits. [12/4]

- define direct current
- electrical terms
  - voltage
  - amperage

- resistance
- Electro Motive Force (EMF)
- Potential Difference (PD)
- ohm's law

- electrical circuits
  - Describe operating characteristics of electrical circuits
    - series circuits
    - parallel circuits
    - series/parallel circuits
    - Kirchoff's law
    - power and heat loss
- electrical components
  - observe the operating characteristics of electrical components
  - resistors
    - series
    - parallel
    - colour coding
    - wattage
    - potentiometers/rheostats
  - capacitors
    - types
    - series/parallel
    - colour coding
    - ratings
    - timing circuits
    - uses
  - diodes
    - types
    - identification
    - uses
    - capacities
    - series/parallel

12.4 – Define the fundamentals and work with alternating current electrical circuits. [10/2]

- define alternating current
- electrical terms
- electrical symbols
  - sine wave
- RMS value of voltage and current
  - inductance
  - capacitance
  - impedance
- AC power
- Frequency control

12.5 – Describe voltage, current and resistance measurements. [2/3]

- Identify precautions
  - switching from ohmmeter to voltage and amperage scales

    - moisture and ground fault detection (GFCI)
    - electrical shock prevention
  - measure AC and DC voltage and amperage
    - analog meters
    - digital meters
  - measure resistance
    - ohmmeter
    - multi-meter

12.6 – Define the principles of permanent magnetism.
[2/1]

- define and observe characteristics of permanent magnetism
  - properties of permanent magnets
  - action of magnetic poles
  - magnetic fields
  - magnetic properties

12.7 – Define the principles of electromagnetism.
[2/1]

- define and observe characteristics of electromagnetism
  - properties of electromagnets
  - action of magnetic fields around a conductor
  - principles of induced voltage
  - effects of motion on induced voltage
  - factors that affect induced voltage
  - define Lenz's Law

Number: 13

Title: Industrial Electricity for Hoisting Devices

Duration: 40 Total Hours

Theory: 34 Hours Application: 6 Hours

Evaluation & Testing:

- Assignments related to theory and appropriate application skills.
- Minimum of one mid-term test during the term.
- Final exam at end of term.
- Periodic quizzes.

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to describe the fundamentals of industrial electricity as applied to hoisting devices in accordance with government safety regulations, manufacturer's recommendations and specifications and approved industry standards.

13.1 – Electrical System Control Devices

13.2 – Transformers

13.3 – Electrical Distribution and Control Systems

13.4 – Electrical Schematic Diagrams

13.5 – Electrical Circuit Conductors, Wiring Devices & Methods

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13.1 - Electrical System Control Devices

Duration: Total Hours: 11 Theory: 8 hours Application: 3 hours

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to describe the construction, operation and identify schematic symbols of electrical system control devices as applied to hoisting devices in accordance with government safety regulations, manufacturer's recommendations and specifications and approved industry standards.

Learning Outcomes:

Upon successful completion, the EDM-T is able to:

13.1.1 – Describe the construction features of electrical system control devices, and identify their corresponding schematic symbols.

13.1.2 – Explain the operating principles of electrical system control devices.

Learning Content:

13.1.1- Describe the construction features of electrical system control devices, and identify their corresponding schematic symbols.
[6/2]

- switches
  - switch notation
  - contacts and ratings
  - pushbutton type
  - toggle switch
  - rotary switch
  - snap action switch
  - limit switches (positive acting)
  - dual in line switches (DIP)
- relays
  - basic relay
    - coils
    - types of contacts
  - types of relays
    - AC v/s DC relays
    - plug in relays
    - reed relays
    - memory relays (set/reset, mechanical latching)
    - phase monitoring
    - solid state
    - Normally Open (N/O) contacts
    - Normally Closed (N/C) contacts
    - power contacts
- relay ratings
- identify common relay circuits
  - relay interlocks (electrical and mechanical interlock)
  - self holding contacts
  - diode controlled relay
- solenoids
- timers
  - air and oil dashpot
  - motor driven
  - thermal or bimetallic
  - solid state timers
- contactors
- main line disconnect switches
  - purpose
  - ratings
  - auxiliary contacts

- circuit protection devices
  - fuses (ratings, types)
  - circuit breakers
  - overload relays
  - over temperature sensing devices

- rectifiers
- Printed circuit boards
- Ground panel
  - uses and contents
  - wiring

13.1.2- Explain the operating principles of electrical system control devices. [2/1]

- switches
  - effects of operation under load
  - DIP/switch settings/operation
- relays
  - contact wipe
  - contact gap
  - contact material
  - contact conditions
  - mechanical operating principles
  - electrical operating principles
  - magnetic operating principles
- solenoids
  - mechanical vs. electrical operation
- timers
  - on delay/off delay
  - adjustment
- contactors
  - contact wipe
  - contact gap
  - contact material
  - contact conditions
  - mechanical operating principles
  - electrical operating principles
  - magnetic operating principles
- main line disconnect switches
  - types
  - hazards
- circuit protection devices
  - adjustment
- rectifiers
  - heat dissipation

13.2 - Transformers

Duration: Total Hours: 7 Theory: 6 hours Application: 1 hour

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to define the fundamentals of electrical transformers in accordance with government safety regulations, manufacturer's recommendations and approved industry standards.

Learning Outcomes:

Upon successful completion, the EDM-T is able to:

13.2.1 – Define the fundamentals of electrical transformers.

13.2.2 – Describe the construction features of electrical transformers.

13.2.3 – Explain the principles of operation of electrical transformers.

Learning Content:

13.2.1- Define the fundamentals of electrical transformers. [2/0]

- transformer fundamentals:
  - transformer action
  - moving magnetic fields
  - transformer losses
  - transformer ratings
- transformer types
  - air core
  - iron core
  - auto transformers
  - step up and step down transformers

13.2.2- Describe the construction features of electrical transformers. [2/0.5]

- transformer construction features
  - primary windings
  - secondary windings
  - winding turns/voltage ratio
  - nameplate data
- transformer voltage, current and power ratings
- practical transformers
- step up and step down transformers

13.2.3- Explain the principles of operation of electrical transformers. [2/0.5]

- transformer operation
  - primary windings
  - secondary windings
  - moving magnetic fields
  - transformer losses
  - step up and step down transformers

13.3 - Electrical Distribution and Control Systems

Duration: Total Hours: 2 Theory: 2 hours Application: 0 hours

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to define the fundamentals of electrical distribution and control systems in accordance with government safety regulations, manufacturer's recommendations and approved industry standards.

Learning Outcomes:

Upon successful completion, the EDM-T is able to:

13.3.1 – Describe the construction features of electrical distribution and control systems.

13.3.3 – Define the installation code requirements pertaining to CEC Section 38.

Learning Content:

13.3.1- Describe the construction features and operating principles of electrical distribution and control systems.
[6/0]

- electrical power circuits
  - motor start circuits
  - power circuits
- motion control systems
  - AC induction motors
  - static drives
  - variable voltage- Variable frequency drives
- brake controls
  - DC
  - AC
  - brake cooling through resistance

13.3.3 – Define the installation code requirements pertaining to CEC.
[2/0]

- applicable codes and standards

13.4 - Electrical Schematic Diagrams

Duration: Total Hours: 5 Theory: 3 hours Application: 2 hours

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to define the fundamentals and draw electrical schematic diagrams in accordance with code requirements and manufacturers symbols.

Learning Outcomes:

Upon successful completion, the EDM-T is able to:

13.4.1 – Define, interpret and draw the fundamentals of electrical schematic diagrams.

13.4.2 – Identify power control functions in electrical schematic diagrams.

Learning Content:

13.4.1- Define, interpret and draw the fundamentals of electrical schematic diagrams. [1/1]

- define electrical schematic diagram nomenclature
- read and interpret electrical schematic diagrams
- draw electrical schematic diagrams

13.4.2- Identify power control functions in electrical schematic diagrams. [2/1]

- locate and identify power and control functions in an electrical schematic diagram.
  - power circuit
  - rotating equipment
  - power supplies
  - fuses and breakers
  - overload/overheat devices
  - safety circuit
  - direction circuit
  - brake circuit
  - car and hoistway gate interlocks

13.5 - Electrical Circuit Conductors, Wiring Devices and Methods

Duration: Total Hours: 14 Theory: 11 hours Application: 3 hours

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to define the fundamentals of electrical circuit conductors and safety systems in accordance with government safety regulations, manufacturer's recommendations and approved industry standards.

Learning Outcomes:

Upon successful completion, the EDM-T is able to:

13.5.1 – Define wiring & circuits for landing doors/gates, hoistway equipment and traveling power cables

Learning Content:

13.5.1 Wiring & circuits for landing gates/doors, hoistway equipment and traveling power cables [9/0]

- Wiring to the ground panel
  - define concept of detecting phase loss and use of RPR to open circuit
  - hazards of phase loss detection (wide voltage range)
  - RPR at ground panel or in car
  - wiring methods of landing gates to ground panel and/or car (cab tyre, wires, plug in
  - grounding and fusing

- GFCI

- Wiring the hoistway and machine equipment
  - wiring tools
  - wiring materials
  - wiring hardware
  - hoistway devices
    - interlocks
    - safety circuit
    - direction limits
    - slack rope switch
  - marking wires and cables
  - connecting machine equipment wires
  - connecting landing wires
  - temporary run circuit
    - jumpers
    - risks and hazards

- Traveling Power Cables
  - general description
  - construction of traveling cables
  - proper handling
  - preparation
  - installation
  - replacement
  - protection
  - cable trolley

Number: 14

Title: Motors, Controls and AC Drives for Construction Hoists

Duration: 17 Total Hours

Theory: 17 Hours Application: 0 Hours

Evaluation & Testing:

- Assignments related to theory and appropriate application skills.
- Minimum of one mid-term test during the term.
- Final exam at end of term.
- Periodic quizzes.

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to describe the fundamentals of electrical generator and motor systems as applied to hoisting devices in accordance with government safety regulations, manufacturer's recommendations and specifications and approved industry standards.

14.2 – Motor Principles

14.4– AC Motors, Drives and Controls

14.2 - Motor Principles

Duration: Total Hours: 4 Theory: 4 hours Application: 0 hours

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to define the fundamentals of motors for hoisting devices in accordance with government safety regulations, and approved industry standards.

Learning Outcomes:

Upon successful completion, the EDM-T is able to:

14.2.1 – Describe the basic fundamentals and operating principles of electric motors.

Learning Content:

14.2.1- Describe the basic fundamentals and operating principles of electric motors [4/0]

- motor Action
- speed of a motor
- efficiency
- hysteresis Loss

- types of Motors
- motor Action
- speed of a motor
- efficiency
- hysteresis Loss
- types of Motors

14.4 - AC Motors, Drives and Controls

Duration: Total Hours: 13 Theory: 13 hours Application: 0 hours

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to define the fundamentals of AC motors, drives and controls for hoisting devices in accordance with government safety regulations, and approved industry standards.

Learning Outcomes:

Upon successful completion, the EDM-T is able to:

14.4.1 – Define the fundamentals and applications of AC motors for hoisting devices.

14.4.2 – Describe the construction features and operating principles of AC motors for hoisting devices.

14.4.4 – Describe AC motor drive and control systems for hoisting devices.

Learning Content

14.4.1- Define the fundamentals and applications of AC motors for devices.
[4/0]

- motor action (AC)
- rotating field
- simple AC motors
  - induction motors
  - capacitance in an AC circuit
  - synchronous motors
  - AC series motors
  - three phase motors
  - variable frequency motors

14.4.2- Describe the construction features and operating principles of AC motors
[3/0]

- AC motor construction features:
  - main frame
  - pole pieces
  - stator
  - rotating field winding
    - "WYE" connections
    - "Delta" connections

  - Proper wiring of connections
  - Reversing direction of rotation
- rotor
- name plate data

- AC motor performance characteristics
  - torque
  - current draw

14.4.4- Describe AC motor drive and control systems for hoisting devices. [6/0]

- drives and control systems (drive box)
  - AC motor solid state drive units
  - Types of motor control
    - open loop VF
    - closed loop VF
    - flux Vector
    - open loop Vector
  - encoders
  - braking circuit and DC Buss

Number: 15

Title: Solid State Electronics for Construction Hoists

Duration: 10.5 Total Hours

Theory: 8 Hours Application: 2.5 Hours

Evaluation & Testing:

- Assignments related to theory and appropriate application skills.
- Minimum of one mid-term test during the term.
- Final exam at end of term.
- Periodic quizzes.

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to describe the fundamentals of solid state electronic devices as applied to hoisting devices in accordance with government safety regulations, manufacturer's recommendations and specifications and approved industry standards.

15.1 – Electronic fundamentals

15.2 – Diodes

15.3 – Transistors

15.4 – Thyristors

15.7 – Digital Systems

15.1- Electronic Fundamentals

Duration: Total Hours: 1 Theory: 1 hours Application: 0 hours

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to describe the electronic fundamentals in accordance with government safety regulations, manufacturer's recommendations and approved industry standards.

Learning Outcomes:

Upon successful completion, the EDM-T is able to:

15.1.1 – Identify solid state electronic components used in hoisting devices.

Learning Content:

15.1.1- Identify solid state electronic nomenclature & symbols used in elevating devices. [1/0]

- diodes
- transistors
- thyristors
- integrated circuits
  - analog
  - digital

15.3 - Transistors

Duration: Total Hours: 10 Theory: 6 hours Application: 4 hours

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to describe the construction, operation and perform testing procedures of transistors in accordance with government safety regulations, manufacturer's recommendations and approved industry standards.

Learning Outcomes:

Upon successful completion, the EDM-T is able to:

15.3.1 – Define the construction features and operating characteristics of transistors.

Learning Content:

15.3.1- Describe the construction features and operating characteristics of transistors.
[1/0.5]

- identify transistor circuit arrangements
  - common emitter
  - common base
  - common collector

15.4 – Thyristors

Duration: Total Hours: 5 Theory: 3 hours Application: 2 hours

General Learning Outcome:
Upon successful completion of this reportable subject, the EDM-T is able to describe the construction features and operating characteristics of thyristors in accordance with government safety regulations, manufacturer's recommendations and approved industry standards.

Learning Outcomes:

Upon successful completion, the EDM-T is able to:

15.4.1 – Describe the construction and operation features of thyristors.

Learning Content:

15.4.1- Describe the construction features of thyristors.
[2/0]

- define the purpose and function of thyristors
  - describe the practical application of SCR'S
- define the configuration of thyristors
  - silicon controlled rectifiers (SCR'S)
  - voltage-current characteristics
  -
- describe the basic construction features of thyristors
  - silicon controlled rectifiers (SCR'S)

15.7 - Digital Systems

Duration: Total Hours: 6 Theory: 4hours Application: 2 hours

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to describe the fundamentals, testing of digital systems for solid state electronic devices in accordance with government safety regulations, manufacturer's recommendations and approved industry standards.

Learning Outcomes:

Upon successful completion, the EDM-T is able to:

15.7.3 – Define the fundamentals of microprocessors for solid state electronic systems.

15.7.4 – Describe the testing procedures of power systems for solid state electronic devices.

15.7.5 – Describe the programmable logic control (PLC) system for microprocessors.

Learning Content:

15.7.3- Define the fundamentals of microprocessors for solid state electronic systems. [1/0]

- define the fundamentals, purpose and function of microprocessors
- define the terms relating to microprocessors
  - hardware
  - software
  - CPU

15.7.4- Describe the troubleshooting procedures for solid state electronic devices. [1/1]

- testing procedures for integrated circuits
- troubleshooting procedures for microprocessors
  - fault logs
  - error codes

15.7.5- Describe the programmable logic control system for microprocessors. [2/1]

- define Programmable Logic Control (PLC)

- describe the features of the programmable logic control
- identify the applications for programmable logic control
- outline the function of the programmable logic control feature

Number: 16

Title: Circuit Tracing

Duration: 22 Total Hours

Theory: 13 Hours Application: 9 Hours

Evaluation & Testing:

- Assignments related to theory and appropriate application skills.
- Minimum of one mid-term test during the term.
- Final exam at end of term.
- Periodic quizzes.

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to trace and diagnose hoisting devices electrical/electronic circuits in accordance with government safety regulations, manufacturer's recommendations and specifications and approved industry standards.

16.1 – Fundamentals of Circuit Tracing

16.2 – Hoisting Devices System Control Circuit Tracing

16.3 – Electrical / Electronic Test Equipment

16.4 – Troubleshooting Procedures

16.1- Fundamentals of Circuit Tracing

Duration: Total Hours: 2 Theory: 2 hours Application: 0 hours

General Learning Outcome:

Upon successful completion of this reportable subject, the is EDM-T is able to define the fundamentals of circuit tracing electrical schematic diagrams in accordance with government safety regulations, manufacturer's recommendations and approved industry standards.

Learning Outcomes:

Upon successful completion, the EDM-T is able to:

16.1.1 – Review electrical/electronic wiring diagram nomenclature.

16.1.2 – Define the fundamentals of circuit tracing.

Learning Content:

16.1.1- Review electrical/electronic wiring diagram nomenclature.
[1/0]

- review electrical/electronic schematic wiring diagram nomenclature
- review reading and interpreting procedures for electrical/electronic schematic wiring diagrams

16.1.2- Define the fundamentals of circuit tracing.
[1/0]

- review electrical/electronic schematic wiring diagram nomenclature
- review reading and interpreting procedures for electrical/electronic schematic wiring diagrams
- locate and identify features of electrical/electronic wiring diagrams:
  - field wiring
  - straight line (schematics)
  - identify wiring diagram symbols used by major manufacturers
  - nomenclature

16.2 - Hoist Devices System Control Circuit Tracing

Duration: Total Hours: 3 Theory: 2 hours Application: 1 hour

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to describe the procedure to perform circuit tracing of hoisting devices system wiring diagrams in accordance with government safety regulations, manufacturer's recommendations and approved industry standards.

Learning Outcomes:

Upon successful completion, the EDM-T is able to:

16.2.1 – Define the procedure to perform circuit tracing of Constant Pressure relay, P.L.C. and microprocessor based Control Systems.

16.2.2 – Define the procedure to perform circuit tracing of Single Automatic Push Button relay, P.L.C. and microprocessor based Control Systems.

Learning Content:

16.2.1- Define the procedure to perform circuit tracing of Constant Pressure relay, P.L.C. and microprocessor based Control Systems.
[1/0.5]

- review electrical/electronic schematic wiring diagrams for hoisting device constant pressure control systems
- identify the main system components
- trace the circuit from the power source through the wiring, connections, electrical/electronic devices and return ground path

16.2.2- Define the procedure to perform circuit tracing of Single Automatic Push Button relay, P.L.C. and microprocessor based Control Systems.
[1/0.5]

- review electrical/electronic schematic wiring diagrams for hoisting device single automatic button control systems
- identify the main system components

- trace the circuit from the power source through the wiring, connections, electrical/electronic devices and return ground path

16.3 - Electrical/Electronic Test Equipment

Duration: Total Hours: 3.5 Theory: 2 hours Application: 1.5 hours

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to describe the function, construction features, operation and use of electrical/electronic diagnostic test equipment in accordance with government safety regulations, manufacturer's recommendations and approved industry standards.

Learning Outcomes:

Upon successful completion, the EDM-T is able to:

16.3.1 – Define the purpose and fundamentals of diagnostic test equipment.

16.3.2 – Define the construction features, types and applications of diagnostic test equipment.

16.3.3 – Explain the principles of operation of diagnostic test equipment.

16.3.4 − Perform inspection and testing procedures using diagnostic test equipment in accordance with the manufacturer's recommendations.

Learning Content:

16.3.1- Define the purpose and fundamentals of diagnostic test equipment. [0.5/0]

- electric meters (analog v. digital)
- safety when testing electrical/electronic circuits

16.3.2- Define the construction features, types and applications of diagnostic test equipment. [0.5/0]

- ammeter
- voltmeter
- ohmmeter
- digital multi-meter (DMM)
- continuity circuit tester
- high and low impedance multi-meters
- current probe
- induction pickup

16.3.3- Explain the principles of operation of diagnostic test equipment. [0.5/0]

- ammeter
- voltmeter
- ohmmeter
- high and low impedance multi-meters
- meggers

16.3.4- Perform inspection and testing procedures using diagnostic test equipment in accordance with the manufacturer's recommendations
[0.5/1.5]

- ammeter, voltmeter, ohmmeter
- continuity circuit tester
  - high and low impedance multi-meters
  - current probe
- induction pickup

16.4 - Troubleshooting Procedures

Duration: Total Hours: 13.5 Theory: 7 hours Application: 6.5 hours

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to describe and carry out the trouble shooting procedures of electrical/electronic circuits in accordance with government safety regulations, manufacturer's recommendations and approved industry standards.

Learning Outcomes:

Upon successful completion, the EDM-T is able to:

16.4.1 – Describe electrical/electronic circuit trouble shooting procedures.

16.4.2 – Perform trouble shooting procedures on hoisting device electrical/electronic control circuits.

Learning Content:

16.4.1- Describe electrical/electronic circuit trouble shooting procedures.
[1/0.5]

- describe the various troubleshooting processes

16.4.2- Perform trouble shooting procedures on hoisting device electrical/electronic control circuits.
[6 /6]

- perform troubleshooting procedures on constant pressure, relay, P.L.C. and microprocessor based control circuits
- perform troubleshooting procedures on single automatic push button relay, P.L.C. and microprocessor based control circuits
- perform troubleshooting procedures on safety, relay, P.L.C. and microprocessor based control circuits

Number: 19

Title: General Preventive Maintenance for Construction Hoists

Duration: 4 Total Hours

Theory: 4 Hours Application: 0 Hours

Evaluation & Testing:

- Assignments related to theory and appropriate application skills.
- Minimum of one mid-term test during the term.
- Final exam at end of term.
- Periodic quizzes.

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to describe the general maintenance procedures and safety procedures for the installation, service, repair, modernization or alterations to hoisting devices in accordance with government safety regulations, manufacturer's recommendations and specifications and approved industry standards.

19.2 – Liability Concerns

19.3 – Preventive Maintenance Practice

19.2– Liability Concerns

Duration: Total Hours: 3 Theory: 3 hours Application: 0 hours

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to define the liability concerns for installing/constructing, servicing, repairing, maintaining, or modernizing hoisting devices in accordance with government safety regulations, manufacturer's recommendations and specifications and approved industry standards.

Learning Outcomes:
Upon successful completion, the EDM-T is able to:

19.2.1- Define the relevant information and specific details regarding the difference between an incident and an accident.

19.2.2- Define the relevant information and specific details regarding securing the site and witnesses following an accident.

19.2.3- Describe the procedure to follow regarding the requirements to notify company officials and the TSSA officials following an incident or accident.

19.2.4- Describe the relevant information and specific details regarding the method of recording observations and obtaining all available information.

19.2.5- Explain the difference between the responsibilities of the owner and that of the contractor.

Learning Content:

19.2.1- Define the relevant information and specific details regarding the difference between an incident and an accident.
[0.5/0]

- define an incident
- define an accident

19.2.2- Define the relevant information and specific details regarding securing the site and witnesses following an accident.
[0.5/0]

- define the procedure to secure a site
- define the procedure to document details about a witness

19.2.3- Describe the procedure to follow regarding the requirements to notify company officials and the TSSA following an incident or accident.
[0.5/0]

- describe the procedure to notify company officials
- describe the procedure to notify the TSSA

19.2.4- Describe the relevant information and specific details regarding the method of recording observations and obtaining all available information.
[1/0]

- describe the method to record observations following an incident or accident
- describe the method to obtain all available information following an incident or accident

19.2.5- Explain the difference between the responsibilities of the owner and that of the contractor.
[0.5/0]

- define the owner responsibilities
- define the contractor responsibilities
- explain the differences in responsibilities between each
- review the TSSA accident/ incident report form
- reference regulations

19.3– Preventive Maintenance Practice

Duration: Total Hours: 1 Theory: 1 hours Application: 0 hours

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to describe the general preventative maintenance practices for hoisting devices in accordance with government safety regulations, manufacturer's recommendations and specifications and approved industry standards.

Learning Outcomes:

Upon successful completion, the EDM-T is able to:

19.3.6 Define the relevant information and specific details regarding log books.

Learning Content:

19.3.6- Define the relevant information and specific details regarding log books. [1/0]

- identify historical introduction of log book
- outline the value and advantages of log books
- define the purpose of the log book
- identify the information that must be entered into the log book
- use of log books for extra relevant information
- provide example of typical log book
- code reference: applicable codes, standards and regulations

Number: 22

Title: Hoist Car Equipment Maintenance

Duration: 4 Total Hours

Theory: 4 Hours Application: 0 Hours

Evaluation & Testing:

- Assignments related to theory and appropriate application skills.
- Minimum of one mid-term test during the term.
- Final exam at end of term.
- Periodic quizzes.

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to describe the maintenance procedures for hoist cars in accordance with government safety regulations, manufacturer's recommendations and specifications and approved industry standards.

22.1 – Define the maintenance procedures for hoist car doors and gates.

22.2 – Define the maintenance procedures for hoist enclosures.

22.3 – Define the maintenance procedures for hoist car tops.

22.4 – Define the maintenance procedures for hoist car bottoms.

22.5 – Define the maintenance procedures for hoist car safeties.

Learning Content:

22.1 – Define the maintenance procedures for hoist car doors and gates.
[0.5/0]

- identify the checks required for car gates
  - gate switches
  - guide tracks / shoes
  - suspension gate cable
  - lubrication

22.2 – Define the maintenance procedures for hoist enclosures.
[0.5/0]

- identify the checks required for car inside car components
  - operator controls
  - operation of communication system
  - cab interior

22.3 – Define the maintenance procedures for hoist enclosure car tops.

[1/0]

- identify the checks required for car top components
  - load weighing devices
  - guides
    - shoes
    - slippers
    - rollers
  - clean adjust and lubricate guides as required
  - clean adjust and lubricate as required
  - wire rope shackles, hitches and springs
  - sheaves, guards and shafts
  - data plates
  - electrical switches and switch assemblies
  - car top cleaning
  - escape hatch
  - lubrication
    - manual / automatic

22.4 – Define the maintenance procedures for hoist car bottoms.
[1/0]

- identify the checks required for car bottom components
  - safeties
  - load weighing devices
  - guide shoes, slippers, rollers
    - clean, adjust and lubricate as required
  - traveling cable attachments
  - buffer striker plates
  - reference code: applicable codes and standards
  - mechanical stored energy
    - pipe stands
    - rail clamps
    - buffers

22.5 – Define the maintenance procedures for car safeties.
[1/0]

- define types and application of safeties
  - type A
  - type B
  - type C
  - type D
- describe the principles of operation for the safety types
- describe the method of disassembling, cleaning, lubricating, reassembling and adjusting safeties
- define the tests required to ensure a safety is operating correctly
- reference code: applicable codes, standards and regulations
- factory rebuild of safeties
  - TSSA Director's Order 213/07

Number: 23

Title: Hoist Hoistway and Pit Equipment Maintenance

Duration: 3.5 Total Hours

Theory: 3.5 Hours Application: 0 Hours

Evaluation & Testing:

- Assignments related to theory and appropriate application skills.
- Minimum of one mid-term test during the term.
- Final exam at end of term.
- Periodic quizzes.

General Learning Outcome:

Upon successful completion of this reportable subject, the EDM-T is able to describe the maintenance procedures for hoist hoistways in accordance with government safety regulations, manufacturer's recommendations and specifications and approved industry standards.

23.1 – Define the safety requirements when performing maintenance in hoistways.

23.3 – Define the maintenance procedures for the hoist hoistway counter weight assembly.

23.4 – Define the maintenance procedures for hoist hoistway vanes and switches.

23.7 – Define the maintenance procedures for hoist hoistway traveling cable suspension and potential interference with the building structure.

23.8 – Define the maintenance procedures for hoist hoistway car top sheave clearances, including deflector sheave mounted under machine beams.

23.9 – Define the maintenance procedures for hoist hoistway pit equipment.

Learning Content:

23.1 – Define the safety requirements when performing maintenance in hoistways.
[0.5/0]

- working around moving equipment
- single car / double car
- counter weights

23.3 – Define the maintenance procedures for the hoistway counter weight assembly.
[0.5/0]

- identify the required condition checks for counter weight assembly components
  - rope hitch

  - shackles
  - springs
  - guide rollers
  - buffer
  - buffer striker plate
- reference code: applicable codes, standards and regulations

23.4 – Define the maintenance procedures for hoist hoistway cams and switches.
[0.5/0]

- identify the required condition checks for switches
  - operation

23.7 – Define the maintenance procedures for hoist hoistway traveling cable suspension and potential interference with the building structure.
[0.5/0]

- identify the required checks and maintenance of traveling cable suspension
  - normal and abnormal wear
  - traveling cable hanging loop

23.8 – Define the maintenance procedures for hoistway cathead car top sheave clearances
[0.75/0]

- identify the required checks and maintenance of hoistway cathead sheave clearances
  - normal and abnormal wear
  - car top clearance and run-by (especially after replacing ropes)
  - overhead cathead, shaft and bearings
- clean and lubricate as required

23.9 – Define the maintenance procedures for hoist hoistway pit equipment.
[0.75/0]

- identify the required checks and maintenance of pit equipment
  - oil buffers
  - buffer mounting arrangements
  - car counterweight run-by
  - limit and other EPD switches
  - code reference: applicable codes, standards and regulations
- describe the cleaning, lubricating and adjusting procedures

MINIMUM EQUIPMENT & SUPPLIES FOR EACH PROGRAM REPORTABLE SUBJECT

Provide Examples of the following items

1. Safety:
- Code Books (Z185, Z256, C22.1, B311)
- Acts and Regulations
- Code Adoption
- Policies and Procedures

2. Introduction to Hoisting Devices:
- Fall Arrest Harness
- Personal Protective Equipment (PPE)
- Oxy-Acetylene simulator
- Fire extinguisher for A,B,C
- WSIB reporting forms
- OHSA construction

3. Mechanical Print Reading:
- Architectural, Structural and Mechanical Prints

4. Ladders, Scaffolding and Work Platforms:
- Various types of Ladders
- Scaffolding and Planks
- Various types of rope fastening devices
- Beam clamps
- Crosby clips
- Rigging hardware
- Rope terminations

5. Rigging and Hardware:
- Come along
- Small manual chain block
- Assorted slings

6. Introduction to applicable codes and standards:
- The Current CSA B44 code book with updates

7. Mechanical Practice:
- Assorted components of belt, chain and power transmission systems
- Assorted bearings, bushings and seals
- Precision measuring tools and instruments
- Assorted mechanical test instruments

8. Traction Hoist Installation:
- Various rail sizes and fastening devices
- Rail alignment tools/gauges
- MR layout drawings
- MR floor layout template
- Typical MR equipment
- Various wiring devices, tools and components
- Typical Pit equipment components

- Wire rope, fastenings and terminations
- Typical entrance frame and door components
- Typical hoistway door interlocks
- Duct and conduit systems
- Typical hoistway switches
- Typical travelling cables and fastening devices
- Car top inspection station; COP
- Typical car door operators
- Typical door protective devices
- Typical car door components
- Typical TSSA inspection forms

12. Basic Electricity:
- Various electrical components
- Hand tools and electrical testing devices
- Permanent magnets and electro-magnetic components

13. Industrial Electricity for Hoisting Devices:
- Typical electrical control devices
- Various types of transformers
- Typical electrical schematic drawings
- Various types of circuit conductors and wiring devices
- Wiring tools, materials and hardware

14. Motors, Generators, Controls and AC Drives:
- No additional equipment required

15. Solid State Electronics:
- Various types of solid state electronic components
- Various PLC's and microprocessor controls

16. Circuit Tracing:
- Typical relay control systems
- Typical power control drive systems

19. General Preventive Maintenance:
- Typical log books as required by provincial regulations
- Typical test equipment

22. Hoist Car Equipment Maintenance:
- Typical car safeties and/or components
- Car guides

23. Hoist Hoistway and Pit Equipment Maintenance:
- No additional equipment required