MAHARASHTRA STATE BOARD OF VOCATIONAL EDUCATION EXAMINATION, MUMBAI

1	**Name of Course**	**Certificate Course in Elevator Installer**	
2	**Max no. of Students**	25	**Course Code - 411177**
3	**Duration**	6 month	
4	**Course Type**	Full Time	
5	**No. of Days per week**	6 days	
6	**No. of hours per day**	7 Hrs	
7	**Space require**	Theory Class Room – 200 sqft Practical Lab – 1000 sqft Total – 1200 sqft	
8	**Entry qualification**	S.S.C. Pass	
9	**Objective of syllabus**	To teach various skills and workmanship practices about Installation of Elevator at various sites	
10	**Employment opportunities**	After completion of this training the Participant would be able to: Install Elevator at various site.	
11	**Teachers Qualification**	Diploma / Certificate Course in concern field.	

12] **Teaching Scheme –**

Training System per Week

Theory	Practical	Total
12 Hours	30 Hours	42 Hours

13] **Examination Scheme –**

Sr	Paper code	Name of Subject	TH/PR	Hours	Max. Marks	Min Marks
1	**41117711**	ELEVATOR INSTALLATION	Theory - I	3 Hrs	100	35
2	**41117721**	PRACTICAL ON ELEVATOR	Practical - I	3 Hrs	100	50
3	**41117722**	ELEVATOR INSTALLATION	Practical - II	6 Hrs	200	100
		Total			400	185

Elevator Installer

Elevator Installation - Theory - I
The practical and theory training shall comply with IS 14665 standards which is specifically meant for elevators. - Introduction to Elevator and Types - Diagrammatic representation & Introduction to Elevator Shaft, Pit, Car Top, Head Room & Machine Room - Proper Use and inspection of Personal Protective Equipments which include Helmet (Hard Hat), Safety Shoes, Safety Goggles, Safety Harness, Safety Gloves, Safety Mask, Safety Ear Plug, Respiratory Mask. - Basic procedure to be followed in case of any accident / incident at site. - Tools & Tackles Used in Elevator Installation and safe usage techniques **Mechanical Tools :** Measurement Tape, Spanner Set (Ring and Double Spanners of different sizes), Screw Driver Set, Ball Peen Hammer, Hack Saw Frame, Cutting Plier, Nose Plier, Ratchet Set, Insulation Tape, Chain Pulley, Spirit Level, Water Level, Guide Rail Alignment Gauge. **Electrical Tools :** Tester, Tong Tester, Megger, Multimeter, Rotary Hammering Machine. - Materials Used for Elevator Erection. - Power Point presentation of different materials used for elevator erection such as Nuts, Bolts, Washers, Guide Rail, Bracket, Buffer, Over Speed Governor, Entrance
Theoretical Training (Underpinning Knowledge)
Frame Assembly, Counter Weight Frame, Motor, Landing Door Assembly, Elevator Car Assembly, Car Top Barricade, Safety Barricade, Compensating Chain, Controller, Landing Push Box Assembly, Fire Man Switch Assembly, Alarm, Car Top Junction Box, Sensor, Limit Switch, Stop Switch, etc. to be shown in Power Point Presentation - What is Scaffolding ? - Different Types of Scaffolding (Wooden & Steel) - Checking procedure whether the erected scaffolding is safe for work which includes Checking the vertical and horizontal rigidity, height & strength. - Method of arresting the scaffolding - What is Safety Barricade? - Why it is used? - Fixing procedure of Safety Barricades - Locking Procedure of the Safety Barricades - Points to be considered to ensure that there is safe access to the elevator shaft - Method of using Safety Harness, Safety Shoes and Safety Helmet. - Procedure of fastening the safety harness in the scaffolding

- Precautions to be taken while working on the scaffolding - Points to be considered to ensure that there is safe access to the elevator pit - Materials assembled in the elevator pit which include Pit Ladder, Stop Switch, Two- way Switch, etc. and their function . - Method of checking the Landing Door, Pit Ladder, Pit Two Way Switch, etc. - Method of checking Car Top Stop Switch, Car Top Normal / Inspection Toggle Switch, Pit Stop Switch, Landing Doors, Pit Two Way Switch, etc. - Method of checking the Landing Door Circuits, Car Operating Panel (COP) Circuits, Pit Stop Switch, Two-way Switch, Pit Ladder, etc. - Points to be considered to ensure the safe access to the elevator car top - Materials installed in the Car Top which include Car Top Safety Barricade, Car Top junction Box, Magnet Switch, Control Panel etc. and their function - Method of operating the elevator from the Control Panel and bringing the Car Top to floor level, Method of checking car top safety barricade. - Procedure of Checking the Landing Door Circuits, Car Operating Panel (COP) Circuits, Car Door Circuit, Car Top Stop Switch and Car Top
Inspection / Normal Toggle Switch Points to ensure the safe access to elevator Machine Room Method of checking the power supply, m/c room lock, ventilation, etc. Materials installed in Machine Room which include Motor, Controller, Over Speed Governor, Trunking, etc.Safety Points to be checked in the shaft which include scaffolding, shaft lighting, shaft whitewashing, shaft width and depth, etc. Safety Points to be checked in the elevator pit which include pit waterproofing, pit lighting, pit depth, Pit Stop Switch, Pit Ladder, etc. Safety Points to be checked in the Machine Room which include Machine Room Lighting, Machine Room Locking, Machine Room Lock Out Tag Out Procedure, etc. Introduction to Electricity, Points to ensure safety while using electrical tools like Megger, Multimeter, Rotary Hammering Drill Machine, Tester, Blower, etc. Safety measures to be observed while working on connected wires or wired equipments
Five Absolutes to be ensured before start of elevator installation **- Shaft Takeover Procedure** **- Minor Builder Works (Client"s Scope)** **- Introduction to BIS & IS** **GAD explaining regarding measurements to be considered for the manufacture of template** **- Template fixing & Positioning procedure** **- Plumb Dropping & Arresting Method**

- Method of Marking & Obtaining Shaft Readings as per GAD **- Method of Machine Room Marking** **- Procedure of Fixing & Aligning Landing** **Entrance Assembly** **- Procedure for Fixing Buffer Assembly** **- Procedure for Hoisting & Aligning Cwt Frame** **- Procedure of Assembling & Aligning the Car Sling & Safety Block**
- Procedure of Fixing & Aligning Landing **Entrance Assembly** **- Procedure for Fixing Buffer Assembly** **- Procedure for Hoisting & Aligning Cwt Frame** **- Procedure of Assembling & Aligning the Car Sling & Safety Block**
- Rope Measurement as per site condition, **- Method and types of roping.** **- Method of OSG – Tension Pulley Roping** **- Method and Technical Parameters to be considered for Landing Door Alignment**
- Method of Fixing & Aligning Car Cabin Assembly, Car Top Barricade & Car Top Junction Box **- Method of Filling of Counterweight and No-Load Balancing**
Method of Fixing Controller & Drive Unit
- Basic Inspection Points
Introduction to Electricity. **- Introduction to Electrical & Electronics of Elevators** **- Electrical Safety** **- Purpose , Function and Installation** **Procedure of electrical components in the Car Top** **- Purpose , Function and Installation** **Procedure of electrical components in the Elevator Shaft, Machine Room & Head Room** **- Points to be checked prior to Slow Speed** **Commissioning & Procedure for Start Up.**
Purpose, function and Installation procedure of all mechanical components required to be installed prior to Normal Run **- Electrical Checks to be conducted prior to Normal Run** **- Adjustments before Normal Run** **- Final Inspection Procedure as per BIS Standards**
- Site Administration Techniques **- Basic Trouble Shooting & Rescue Procedures**

Practical on Elevator - Practical - I

The practical and theory training shall comply with IS 14665 standards which is specifically meant for elevators.

1. Basic Safety Training – Elevators :

(a) Use of Personal Protective Equipments

(PPE) : Inspection and Proper Usage Training of Helmet (Hard Hat), Safety Shoes, Safety Goggles, Safety Harness, Safety Gloves, Safety Mask, Safety Ear Plug, Respiratory Mask.

(b) First Aid Training :

Demonstration of the techniques used to provide immediate relief to affected people at site.

(c) Use of Tools & Tackles :

Mechanical Tools : Measurement Tape, Spanner Set (Ring and Double Spanners of different sizes), Screw Driver Set, Ball Peen Hammer, Hack Saw Frame, Cutting Plier, Nose Plier, Ratchet Set, Insulation Tape, Chain Pulley, Spirit Level, Water Level, Guide Rail Alignment Gauge.

Electrical Tools : Tester, Tong Tester, Megger, Multimeter, Rotary Hammering Machine.

(d) Material Handling & Storage Training

Identification of different materials used for lift erection at Site which include:

(i) Different types of nuts, bolts & washers

(ii) Guide Rail, Bracket, Buffer, Over Speed Governor, Tension Pulley, Entrance

Practical Training (On-Site)

Frame Assembly, Counter Weight Frame, Motor, Landing Door Assembly, Elevator Car Car Assembly, Car Top Barricade, Safety Barricade, Compensating Chain, Controller, Landing Push Box Assembly, Fire Man Switch Assembly, Alarm, Car Top Junction Box, Sensor, Limit Switch, Stop Switch, etc.

(e) Scaffolding Safety :

Demonstration of different types of Scaffolding Demonstration of how to check whether the Erected Scaffolding is Safe for Work which include how to check the vertical and horizontal correctness of the scaffolding, arresting appropriateness of the scaffolding, etc.

(f) Safety Barricade:

Demonstration of how to fix the Safety Barricade

Demonstration on the Procedure of Locking the Barricade Gates

(g) Shaft Entry:

Inspection of the Elevator Shaft to ensure safe Access

Demonstration of how to enter into the elevator shaft by using safety harness, safety helmet and safety shoes.

Demonstration on how to fasten the safety harness on to the scaffolding

Demonstration on how to stand on the scaffolding in the elevator shaft and work.

(h) Elevator Pit Entry

Inspection Points to be considered to ensure the safe access to the elevator pit

Demonstration of the materials fixed in the Elevator pit which include pit ladder, stop Switch, Two-way Switch, etc.

Demonstration on how to enter the elevator pit before putting the elevator on power

Demonstration on how to enter the elevator pit when the elevator is run in Slow Speed or Service mode.

Demonstration on how to enter into the lift pit when the elevator is run in Normal Speed or Rated Speed by checking the Landing Door Circuit, Car Operating Panel (COP) Circuit, Pit Stop Switch, Two-way Switch, Pit Ladder, etc.

(i) Car Top Entry :

Demonstration on Points to Inspect to ensure the safe access to the elevator car top.

Demonstration of the materials installed in the Elevator Car Top and their function

Demonstration of how to enter the elevator Car Top when the elevator is running in Slow Speed or Service Mode Demonstration on how to enter the elevator

Car Top for an elevator running in Normal Speed / rated Speed by checking the Landing Door Circuits, Car Operating Panel (COP) Circuits, Car Door Circuit, Car Top Stop

- Points to be considered to ensure that there is safe access to the elevator pit

Switch and Car Top Inspection / Normal Toggle Switch

(i) Machine Room Safety:

Demonstration of Points to inspect to ensure Safe access to Machine Room

Demonstration of how to enter into the Elevator Machine Room

Demonstration of the materials installed in the Machine Room which include Motor, Controller, Over Speed Governor, Trunking, etc. and their function

(j) Electrical Safety:

Demonstration of safety points to be checked in the shaft which include appropriateness of the erected scaffolding, shaft lighting, shaft whitewashing, shaft width and depth, etc.

Demonstration of safety points checked in the Elevator pit which include pit waterproofing, Pit Lighting, Pit Depth, Pit Stop Switch, Pit Ladder, etc.

Demonstration of safety points to be checked in the elevator Machine Room which include Machine Room Lighting, Machine Room Locking Procedure, Machine Room Lock Out Tag Out Procedure, etc.

Demonstration on how to safely use electrical tools like Megger, Multimeter, Rotary Hammer Drill Machine, Tester, Blower, etc.

Demonstration on how to work safely in places where electrical wiring has been done or where electrically wired equipments are used.

1. Absolutes Prior to the Start of Elevator Installation Demonstration at site regarding the absolutes which includes elevator shaft measurements, elevator pit measurements , elevator head room measurements, machine room measurements. The parameters include civil and electrical works.
2. Stage -1 Installation Training : **(i) Template readiness as per General Arrangement Drawing (GAD)** **(ii) Template Fitting & Setting, Plumb Dropping & Arresting.** Demonstration of template fixing and positioning. Plumb Dropping & Arresting Technique.
(iii) Shaft Marking & Shaft Reading Car & Cwt Bracket Marking, Entrance Marking, Landing Box Marking. Taking Shaft Readings. **(iv) Machine Room Marking** Car & Counter center, OSG Holes, Trunking, & Controller Marking
(v) Template Permanent Fixing Demonstration of finalizing the position of the template by analyzing shaft readings as per GAD. Determining & Certifying Shaft confirmation to GAD. (Rectify / Modify is required as per site condition) **(vi) Bracket Fixing & Alignment** Marking & Drilling Holes for Fixing Brackets for Car and Counter Side. Proper Fixing Techniques of Chemical Bolt / Anchor Fasteners / grouting to enable fixing of bracket as per GAD based on site condition. Bracket Alignment as per GAD **(vii) Rail Hoisting for Car And CounterWeight** Demonstration of fixing rails using join plates. Demonstration of Rail Hoisting. **(vii) Guide Rail Alignment** Re-checking of the Plumb as per GAD Demonstration of rail alignment by using alignment gauge considering technical parameters as per GAD. **(ix) Motor Hoisting & Alignment** Demonstration of Setting I Beams on Casted Bed Blocks in Machine Room as per GAD (for MR Elevators). Demonstration of Setting Machine Bed / I Beam in the Head Room as per GAD (For MRL Elevators) Demonstration of Motor Hoisting & Motor Alignment as mentioned in the GAD
Site Visit

Elevator Installation - Practical - II

3. Stage – 2 Installation Training (i) Landing Entrance Frame Fixing & Alignment Demonstration of the procedure of fixing Landing Entrance Assembly which consists of Landing Sill, Jamb Panels, Landing Header & Brackets as per GAD. **(ii) Buffer Assembly Fixing** Demonstration of the procedure of fixing Car and Counter Weight Buffer Assembly as per GAD and site condition . **(iii) Counter Frame Hoisting and Alignment** Demonstration of Cwt Frame Hoisting & Alignment **(iv) Car Sling Assembly & Alignment** Demonstration of Car Sling Assembly & Alignment which includes assembling and aligning the Bottom Sling, Intermediate Vertical Slings and Top Sling. Demonstration of the fixing & alignment of Safety Block
(v) Car – Cwt Roping Demonstration of method of laying the ropes, rope cutting, and roping by using proper anchoring systems, gripping systems and equalizing rope tensions as per GAD. **(vi) Overspeed governor(OSG) – Tension/Pit Pulley Fixing & Roping** Demonstration of fixing OSG and Tension Pulley and Roping as per GAD and site condition. **(vii) Landing Door Assembly & Alignment** Demonstration of Landing Door Fixing & Alignment which includes aligning the coupler & roller, doors, installing the door weights, and aligning landing doors as per GAD
(viii) Elevator Car Cabin Assembly and Alignment Demonstration of Car Cabin Assembly & Alignment which includes Assembly and Alignment of Platform, Car Sill, Car Panels which include Front, Rear, Car Operating Panel (COP) & Side Panels, Car Ceiling, False Ceiling, Steadying of the Car Cabin, Fixing & Alignment of Car Door , door drive system & Car Header Unit , Fixing of the Car Top Barricade and Fixing of the Car Top junction Box as per GAD. **(ix) Counter Weight Filling** Demonstration of procedure of filling counterweights for startup
(x) Controller & Drive Installation Demonstration of Fixing of the Controller Unit at Top Most Floor / Machine Room and Drive Unit as Required as per GAD.
4. Inspection Method Demonstration of the Points to be checked after the completion of each stage (1st & 2nd Stage)
1. Stage -3 Installation Training **(i) Electrical Installations Prior to Start Up** **(a) Car Top Wiring** Demonstration of Dropping & Fixing of Traveling Cable, Car Top Junction Box

Wiring, Car Operating Panel (COP) Wiring, Overload Switch Fixing & Wiring, Car Door Wiring, Magnet Switch Fixing & Wiring, Sensor Fixing & Wiring, Car Lighting & Fan Wiring. **(b) Shaft & Machine Room / Head Room Wiring** Fixing and Setting of Top Terminal Limit Switch and Bottom Terminal Limit Switch , Motor & Drive Wiring to Controller, Controller to Shaft Wiring, Customer Panel to Controller Wiring, Fixing and Setting of Stop Switch, Fixing and Setting of Door Zone Vanes, Landing Door Wiring, Landing Push Box Fixing & Wiring, Fire Man Switch Fixing & Wiring, Automatic Rescue Device (ARD) Fixing & Wiring, Buffer Wiring, OSG – Tension Pulley Wiring, Shaft & Machine Room Earthing **(v) Slow Speed Commissioning** Demonstration of Electrical & Mechanical Safety Checks, Drive Parameters Setting & Start up.
2. Stage – 4 Installation Training **(a) Mechanical Installations:** (i) Compensation Chain Fixing (ii) Counter Weight Screen Guard Fixing (iii) Car and Landing Toe Guard Fixing (iv) Counter Weight Frame Full Loading And Locking procedure (v) Running Clearance & Run By Clearance Adjustments (vi) Brake Adjustment **(b) Electrical Checks** Checking of all electrical circuits which include Stop Switch, Top Terminal Limit Switch, Bottom Terminal Limit Switch, OSG Switch, Buffer Switch, Overload Switch, Landing Push Box & Indicator **(c) Normal Speed Commissioning & Inspection** Demonstration of checks related to normal run and parameter setting and commissioning for normal run Inspection and Adjustment of all Electrical and Mechanical Installations as required **(d) Final Inspection** Demonstration of stage wise checks and safety checks related to all mechanical and electrical installations as mentioned above and inspection of client points as required to be completed, Leveling, Oiling & greasing of Rails, Guide Rail Filing, Guide Shoe Adjustment, Rope Adjustment, Door Freeness, Fine Tuning & Ensuring Ride Comfort, etc.
(3) Site Administration Demonstration of Site Administration procedures which include procedure to be followed during client co-ordination, project tracking, control and review methods. **(4) Basic Trouble Shooting** Demonstration of troubleshooting issues arising from landing doors, car doors and running elevator. Demonstration of rescue procedure to be adopted for people stuck in elevators

1. Full Spanner Set (Double end & ring spanners) (5-6 to 34-36) 1 Set
2. Full Screw Driver Set (6” to 10”) 1 Set
3. Full Allen Key Set 1 Set
4. Ball Peen Hammer 2 nos.
5. Cutting Plier 1 no.
6. Nose plier 1 no.
7. Tester 1 no.
8. Hacksaw 1 no.
9. Wire Stripper 1 no.
11. Measurement Tape – 5 Meters 1 no.
12. Measurement Tape – 3 Meters 1 no.
13. Rotary Hammering Machine 1 no.
14. Blower 1 no.
15. Tube Level - Spirit 1 no.
16. Tube Level - Water 1 no.
17. Multimeter 1 no.
18. Plumb Bob 1 no.
19. Pipe Wrench 1 no.
20. Punch Center 1 no.
21. Crimping Tool 1 no.
22. First Aid Box 1 no.
23. Personal Protective Equipment 1 Set
24. Dummy Static Model of the Elevator 1 no.

1. All Tools as mentioned above 1 set
2. White Board 1 no.
3. Chairs with writing pad rest 20 nos.
4. Projector 1 no.
5. Laptop 1 no.
6. Instructors Table & Chair 1 set
7. White Board Marker 1 no.
8. Duster I no.

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