



IAS YOUTH COMPUTER CENTRE

ITI IN ROOFING TECHNICIAN

Trade Theory • Practical Skills • Safety • Site Practice • Career Readiness

INSTITUTE ADDRESS

88/1, Queen Apartment, 2nd Floor, Dumdum Road, Near Life Line Medical Store, Kolkata – 700030, West Bengal

Measure • Prepare • Install • Inspect • Maintain

About This Book

This book is designed as a practical learning resource for an ITI-style Roofing Technician programme. It covers roof construction fundamentals, materials, tools, measurements, roof framing, sheet and tile roofing, waterproofing, drainage, insulation, repair, inspection and safe working at height.

DGT's current Craftsmen Training System (CTS) framework lists construction trades, publishes trade curricula and has rationalized many CTS courses around 1,200 annual notional hours; exact duration, qualification and certification depend on the officially approved trade/course being offered. ■cite■turn0search2■turn0search3■

Important course note: "Roofing Technician" is presented here as a structured training title focused on roofing skills. This book should not be treated as proof that a particular institute or course has DGT/NCVT affiliation unless that affiliation is separately verified.

Learning Outcomes

After completing this book, learners should be able to identify roofing materials and tools; read basic roof drawings; take measurements; prepare roof surfaces; perform basic installation tasks for sheet, tile and membrane systems; install flashings and drainage components; identify common defects; carry out basic maintenance; estimate materials; maintain site records; and apply safe working-at-height practices.

Safety First

Roof work can involve falls, fragile surfaces, sharp edges, lifting hazards, electrical risks, weather exposure and falling objects. Practical work must follow site risk assessments, competent supervision, appropriate PPE, safe access systems and applicable local regulations. Do not practice on an occupied or live roof without qualified supervision.

Contents

1. Introduction to Roofing & the Roofing Technician
2. Roofing Safety, PPE, Work-at-Height & Site Housekeeping
3. Roof Types, Components & Basic Construction
4. Roofing Materials: Sheets, Tiles, Membranes & Accessories
5. Roofing Tools, Equipment & Safe Use
6. Measurement, Setting Out & Basic Roofing Calculations
7. Roof Drawings, Symbols, Slopes & Basic Estimation
8. Roof Framing, Battens, Purlins & Structural Support
9. Metal Sheet Roofing: Preparation, Laying & Fixing
10. Tile Roofing: Layout, Fixing, Ridge & Valley Details
11. Waterproofing, Underlay, Flashings & Roof Sealing
12. Gutters, Downpipes, Drainage & Rainwater Management
13. Roof Insulation, Ventilation & Thermal Performance
14. Roof Repair, Maintenance & Defect Diagnosis
15. Solar Rooftop Readiness, Penetrations & Coordination
16. Quality Control, Inspection, Documentation & Site Coordination
17. Roofing Work Planning, Costing, Sustainability & Professional Practice
18. Final Roofing Technician Project, Practical Assessment & Career Readiness

Practical Portfolio: PPE checklist • Roof measurement sheet • Material identification • Roof slope exercise • Drawing interpretation • Tool inspection • Sheet installation practice • Tile layout • Flashing detail • Gutter layout • Defect inspection • Repair plan • Material estimate • Quality checklist • Final roof-work project

1. Introduction to Roofing & the Roofing Technician

Chapter Focus

Roofing protects a building from rain, sun, wind and environmental exposure. A roofing technician works with roof coverings, supporting components, weatherproofing, drainage and maintenance while coordinating with other construction trades.

Key Skills & Terms

- Roof covering
- Roof structure
- Pitch/slope
- Ridge
- Valley
- Eave
- Flashing
- Weatherproofing

Practical Exercise

Identify the parts of a sample roof or roof drawing. Label ridge, eaves, valleys, rafters/purlins, covering, flashing and drainage points.

Quick Revision

1. Inspect the work area. 2. Confirm drawing and measurements. 3. Select correct tools/materials. 4. Follow safe work sequence. 5. Install or repair carefully. 6. Check waterproofing and drainage. 7. Record and report the result.

2. Roofing Safety, PPE, Work-at-Height & Site Housekeeping

Chapter Focus

Work at height is a major roofing hazard. Safe practice includes planning access, checking weather and roof condition, using suitable fall-protection systems where required, controlling dropped objects and keeping the work area organized.

Key Skills & Terms

- PPE
- Harness
- Lifeline
- Scaffold
- Ladder
- Guardrail
- Risk assessment
- Housekeeping

Practical Exercise

Complete a pre-start safety checklist for a hypothetical roof job. Identify at least 10 hazards and one control for each.

Quick Revision

1. Inspect the work area. 2. Confirm drawing and measurements. 3. Select correct tools/materials. 4. Follow safe work sequence. 5. Install or repair carefully. 6. Check waterproofing and drainage. 7. Record and report the result.

3. Roof Types, Components & Basic Construction

Chapter Focus

Roofs may be flat, pitched, hipped, gabled or shed-type. Their components vary, but the principles of load transfer, drainage, weather protection and ventilation remain important.

Key Skills & Terms

- Rafter
- Truss
- Purlin
- Ridge
- Fascia
- Barge board
- Deck
- Underlay

Practical Exercise

Draw a simple pitched roof and label at least 12 components.

Quick Revision

1. Inspect the work area. 2. Confirm drawing and measurements. 3. Select correct tools/materials. 4. Follow safe work sequence. 5. Install or repair carefully. 6. Check waterproofing and drainage. 7. Record and report the result.

4. Roofing Materials: Sheets, Tiles, Membranes & Accessories

Chapter Focus

Common roofing materials include clay or concrete tiles, metal sheets, fibre-cement products, membranes and associated accessories. Selection depends on design, climate, structure, cost and manufacturer requirements.

Key Skills & Terms

- Tile
- Profile sheet
- Standing seam
- Membrane
- Underlay
- Fastener
- Ridge cap
- Sealant

Practical Exercise

Create a material identification table showing application, advantages, limitations and handling precautions.

Quick Revision

1. Inspect the work area. 2. Confirm drawing and measurements. 3. Select correct tools/materials. 4. Follow safe work sequence. 5. Install or repair carefully. 6. Check waterproofing and drainage. 7. Record and report the result.

5. Roofing Tools, Equipment & Safe Use

Chapter Focus

Use the correct tool for the task. Tools may include tape measures, chalk lines, snips, drills, screwdrivers, hammers, levels, ladders and specialized cutting or fastening equipment.

Key Skills & Terms

- Tape measure
- Spirit level
- Chalk line
- Drill
- Snips
- Hammer
- Utility knife
- Torque control

Practical Exercise

Prepare a tool-box checklist and inspect each item for condition, correct use and storage.

Quick Revision

1. Inspect the work area. 2. Confirm drawing and measurements. 3. Select correct tools/materials. 4. Follow safe work sequence. 5. Install or repair carefully. 6. Check waterproofing and drainage. 7. Record and report the result.

6. Measurement, Setting Out & Basic Roofing Calculations

Chapter Focus

Accurate measurement reduces waste and prevents installation errors. Practice length, area, slope, overlap, spacing and material quantity calculations using site drawings and measured dimensions.

Key Skills & Terms

- Length
- Width
- Area
- Pitch
- Slope
- Overlap
- Spacing
- Allowance

Practical Exercise

Measure a mock roof plan, calculate surface area, add a stated waste allowance and prepare a material take-off.

Quick Revision

1. Inspect the work area. 2. Confirm drawing and measurements. 3. Select correct tools/materials. 4. Follow safe work sequence. 5. Install or repair carefully. 6. Check waterproofing and drainage. 7. Record and report the result.

7. Roof Drawings, Symbols, Slopes & Basic Estimation

Chapter Focus

Basic drawings communicate roof geometry, dimensions, details and installation intent. A technician should recognize plan views, elevations, sections and detail drawings.

Key Skills & Terms

- Plan
- Section
- Elevation
- Scale
- Dimension
- Detail
- Legend
- Roof pitch

Practical Exercise

Read a simple roof sketch and prepare a list of dimensions, materials and installation details required before work starts.

Quick Revision

1. Inspect the work area. 2. Confirm drawing and measurements. 3. Select correct tools/materials. 4. Follow safe work sequence. 5. Install or repair carefully. 6. Check waterproofing and drainage. 7. Record and report the result.

8. Roof Framing, Battens, Purlins & Structural Support

Chapter Focus

Roof coverings depend on a stable supporting system. Framing elements such as rafters, trusses, purlins, battens and decking must be correctly positioned and coordinated with the roof design.

Key Skills & Terms

- Rafter
- Truss
- Purlin
- Batten
- Decking
- Spacing
- Alignment
- Support

Practical Exercise

Create a sequencing chart for roof-frame preparation: inspection → setting out → support installation → alignment check → covering preparation.

Quick Revision

1. Inspect the work area. 2. Confirm drawing and measurements. 3. Select correct tools/materials. 4. Follow safe work sequence. 5. Install or repair carefully. 6. Check waterproofing and drainage. 7. Record and report the result.

9. Metal Sheet Roofing: Preparation, Laying & Fixing

Chapter Focus

Sheet roofing requires correct alignment, overlaps, fastener placement, cutting and edge treatment. Manufacturer instructions should determine the exact fixing pattern and fastener specification.

Key Skills & Terms

- Sheet profile
- Side lap
- End lap
- Fastener
- Washer
- Eave line
- Ridge cap
- Cut edge

Practical Exercise

Prepare a step-by-step method statement for installing a small metal-sheet roof section, including inspection points.

Quick Revision

1. Inspect the work area. 2. Confirm drawing and measurements. 3. Select correct tools/materials. 4. Follow safe work sequence. 5. Install or repair carefully. 6. Check waterproofing and drainage. 7. Record and report the result.

10. Tile Roofing: Layout, Fixing, Ridge & Valley Details

Chapter Focus

Tile roofing depends on correct layout, batten spacing, alignment, fixing and detailing at ridges, hips, valleys and penetrations. Fragile tiles must be handled carefully.

Key Skills & Terms

- Tile course
- Batten
- Ridge tile
- Hip
- Valley
- Dry fix
- Mortar
- Tile clip

Practical Exercise

Lay out a mock tile roof using a drawing. Mark starting point, course spacing, ridge detail and valley treatment.

Quick Revision

1. Inspect the work area. 2. Confirm drawing and measurements. 3. Select correct tools/materials. 4. Follow safe work sequence. 5. Install or repair carefully. 6. Check waterproofing and drainage. 7. Record and report the result.

11. Waterproofing, Underlay, Flashings & Roof Sealing

Chapter Focus

Waterproofing systems may include underlays, membranes, flashings, sealants and correctly detailed penetrations. Water must be directed away from vulnerable joints rather than trapped inside the assembly.

Key Skills & Terms

- Underlay
- Membrane
- Flashing
- Apron flashing
- Step flashing
- Sealant
- Penetration
- Water path

Practical Exercise

Draw a flashing detail around a hypothetical roof penetration and explain the intended water path.

Quick Revision

1. Inspect the work area. 2. Confirm drawing and measurements. 3. Select correct tools/materials. 4. Follow safe work sequence. 5. Install or repair carefully. 6. Check waterproofing and drainage. 7. Record and report the result.

12. Gutters, Downpipes, Drainage & Rainwater Management

Chapter Focus

Rainwater systems collect and discharge water from roof surfaces. Gutters and downpipes need suitable falls, outlets, supports and clear discharge paths.

Key Skills & Terms

- Gutter
- Outlet
- Downpipe
- Gutter fall
- Leaf guard
- Rainwater
- Discharge
- Overflow

Practical Exercise

Prepare a basic gutter and downpipe layout for a rectangular building and identify inspection/cleaning points.

Quick Revision

1. Inspect the work area. 2. Confirm drawing and measurements. 3. Select correct tools/materials. 4. Follow safe work sequence. 5. Install or repair carefully. 6. Check waterproofing and drainage. 7. Record and report the result.

13. Roof Insulation, Ventilation & Thermal Performance

Chapter Focus

Insulation reduces unwanted heat transfer while ventilation can help manage moisture and roof temperature. Design must consider climate, roof assembly and condensation risk.

Key Skills & Terms

- Insulation
- Ventilation
- Vapour control
- Condensation
- Thermal bridge
- Airflow
- Roof cavity
- Heat transfer

Practical Exercise

Compare two roof assemblies and identify where insulation and ventilation could be positioned.

Quick Revision

1. Inspect the work area. 2. Confirm drawing and measurements. 3. Select correct tools/materials. 4. Follow safe work sequence. 5. Install or repair carefully. 6. Check waterproofing and drainage. 7. Record and report the result.

14. Roof Repair, Maintenance & Defect Diagnosis

Chapter Focus

Common defects include leaks, corrosion, loose fasteners, cracked tiles, blocked gutters, failed sealants, damaged flashings and poor overlaps. Diagnosis should start with inspection and evidence rather than guesswork.

Key Skills & Terms

- Leak
- Corrosion
- Crack
- Loose fastener
- Blocked gutter
- Failed sealant
- Ponding
- Defect

Practical Exercise

Complete a roof inspection report for a fictional building with five defects. For each, record location, likely cause, evidence and recommended action.

Quick Revision

1. Inspect the work area. 2. Confirm drawing and measurements. 3. Select correct tools/materials. 4. Follow safe work sequence. 5. Install or repair carefully. 6. Check waterproofing and drainage. 7. Record and report the result.

15. Solar Rooftop Readiness, Penetrations & Coordination

Chapter Focus

Solar installations can interact with roof coverings, flashings, waterproofing and structural components. Roofing technicians should coordinate with qualified solar/electrical teams and avoid unauthorized penetrations.

Key Skills & Terms

- PV module
- Mounting
- Penetration
- Flashing
- Cable route
- Load
- Seal
- Coordination

Practical Exercise

Create a coordination checklist for a rooftop solar project covering roof condition, mounting locations, waterproofing and post-work inspection.

Quick Revision

1. Inspect the work area. 2. Confirm drawing and measurements. 3. Select correct tools/materials. 4. Follow safe work sequence. 5. Install or repair carefully. 6. Check waterproofing and drainage. 7. Record and report the result.

16. Quality Control, Inspection, Documentation & Site Coordination

Chapter Focus

Quality control includes checking dimensions, alignment, fasteners, overlaps, flashings, drainage, surface condition and housekeeping. Records provide evidence of completed work.

Key Skills & Terms

- Inspection
- Checklist
- Tolerance
- Alignment
- Photographic record
- Snag
- Completion
- Handover

Practical Exercise

Create a quality inspection sheet with at least 15 checkpoints and a sign-off column.

Quick Revision

1. Inspect the work area. 2. Confirm drawing and measurements. 3. Select correct tools/materials. 4. Follow safe work sequence. 5. Install or repair carefully. 6. Check waterproofing and drainage. 7. Record and report the result.

17. Roofing Work Planning, Costing, Sustainability & Professional Practice

Chapter Focus

Efficient roofing work requires planning materials, labour, access, sequence, weather windows and waste management. Sustainable practice includes reducing material waste, separating recoverable materials and maintaining roofs to extend service life.

Key Skills & Terms

- Work plan
- Material take-off
- Labour
- Productivity
- Waste
- Recycling
- Maintenance
- Handover

Practical Exercise

Prepare a one-day work plan for a small roof repair, including resources, sequence, safety controls, material quantities and completion checks.

Quick Revision

1. Inspect the work area. 2. Confirm drawing and measurements. 3. Select correct tools/materials. 4. Follow safe work sequence. 5. Install or repair carefully. 6. Check waterproofing and drainage. 7. Record and report the result.

18. Final Roofing Technician Project, Practical Assessment & Career Readiness

Chapter Focus

The final project should demonstrate safe preparation, accurate measurement, material selection, installation technique, waterproofing/drainage detailing, inspection and professional documentation.

Key Skills & Terms

- Method statement
- Risk assessment
- Installation
- Inspection
- Estimate
- Handover
- Viva
- Portfolio

Practical Exercise

Final project: prepare a complete roofing package for a small building—roof drawing, measurement sheet, material estimate, risk assessment, installation sequence, drainage plan, quality checklist, defect report and practical demonstration.

Quick Revision

1. Inspect the work area. 2. Confirm drawing and measurements. 3. Select correct tools/materials. 4. Follow safe work sequence. 5. Install or repair carefully. 6. Check waterproofing and drainage. 7. Record and report the result.

Roofing Site Safety Checklist

Work permit/risk assessment reviewed • weather checked • access secured • ladders/scaffold inspected • fall-protection system checked • PPE worn • fragile surfaces identified • electrical hazards controlled • exclusion zone established • tools secured • materials stacked safely • housekeeping maintained.

Roof Measurement Sheet

Building | Roof type | Length | Width | Pitch | Roof area | Overlap | Waste allowance | Net material quantity | Accessories

Material Take-Off Template

Item | Specification | Unit | Quantity | Allowance | Total | Supplier/Source | Remarks

Roof Inspection Record

Location | Roof component | Defect | Evidence | Likely cause | Urgency | Recommended action | Completion date

Quality Control Checklist

Roof dimensions verified • framing alignment checked • covering alignment checked • overlaps correct • fasteners correct • flashings installed • sealants complete • ridge/valley details checked • gutters have suitable fall • downpipes secure • penetrations sealed • waste removed • final inspection recorded.

Maintenance Schedule

Monthly/seasonal visual checks: gutters, downpipes, visible flashings, loose or damaged coverings and vegetation. After severe weather, arrange an appropriate inspection. Do not walk on fragile roofs without a safe access system and competent supervision.

Final Practical Assessment

Part A: safety and PPE. **Part B:** tools and material identification. **Part C:** measurement and setting out. **Part D:** roof drawing interpretation. **Part E:** sheet/tile installation task. **Part F:** waterproofing/flashing task. **Part G:** gutter/drainage task. **Part H:** inspection and defect report. **Part I:** viva and portfolio review.

Career Readiness

Potential work areas include roofing installation, roof maintenance, construction support, waterproofing assistance, sheet/tile roofing, roof inspection support and self-employment. Actual job titles, eligibility and certification requirements depend on the employer, jurisdiction and officially recognized qualification.

Glossary

Rafter — sloping structural member supporting a roof assembly. **Purlin** — member supporting roof sheets/covering or rafters as designed. **Batten** — strip supporting tiles or other roof components. **Flashing** — weatherproofing component at joints and penetrations. **Ridge** — upper horizontal intersection of sloping roof surfaces. **Valley** — internal intersection where roof slopes meet. **Eave** — lower edge of a sloping roof. **Underlay** — secondary protective layer below the roof covering. **Pitch** — inclination of a roof. **Fascia** — board/member at the roof edge, often supporting gutter components.



IAS YOUTH COMPUTER CENTRE

ITI IN ROOFING TECHNICIAN

Measure • Prepare • Install • Inspect • Maintain

88/1, Queen Apartment, 2nd Floor, Dumdum Road, Near Life Line Medical Store, Kolkata – 700030, West Bengal