

Syllabus for Maintenance Technician for Shuttle-Less Rapier Loom

Course Name	Maintenance Technician for Shuttle-Less Rapier Loom
Sector	Textiles & Handlooms
Course Code	TXT/2024/MTRL/353
Level	4
Occupation	Maintenance Technician for Shuttle-Less Rapier Loom
Job Description	The Maintenance Technician is responsible for conducting routine maintenance work, preventive maintenance work, troubleshooting mechanical and electrical problems, and effective and speedy repairing of shuttle-less Rapier weaving machines to ensure optimal machine-utilization and production efficiency
Course Duration	Total Duration 420 Hrs (T- 90, P- 210 including OJT-60 and ES-60)
Trainees' Entry Qualification	Grade 12 – Regular OR Vocational OR 10th grade pass plus 2-year NTC/NAC OR Completed 2nd year of 3-year diploma (after 10th) and pursuing regular diploma OR 10th grade pass and pursuing continuous schooling OR 10th grade pass with 2 years experience OR Previous relevant Qualification of NSQF Level 3.0 with minimum education as 8th Grade pass with 3 year relevant experience OR Previous relevant qualification of NSQF Level 3.5 with 1.5 year relevant experience
Trainers Qualification	B. Tech/B.E. in Textile Technology/Engineering from AICTE/UGC recognized Engineering College/ university with one-year experience in the relevant field. OR 03 years Diploma in Textile Technology/Engineering from AICTE recognized board of technical education with two years' experience in the relevant field.

Structure of Course:

Module No.	Module name	Outcome	Theory (Hrs)	Practical (Hrs)	OJT (Hrs.)	Total (Hrs) [Multiple of 30]
1.	Basic Understanding of the Technology and Roles & Responsibility	Identify the roles and responsibilities of Maintenance Technician Shuttle-less Rapier Loom Weaving Machine	20	10		30

Module No.	Module name	Outcome	Theory (Hrs)	Practical (Hrs)	OJT (Hrs.)	Total (Hrs) [Multiple of 30]
2.	Maintenance of Looms-performance, operational standards and cleanliness of work area	Execute the procedure of maintenance in shuttle-less weaving looms ensuring optimal machine performance, product quality and a safe working environment	30	120		150
3.	Occupational safety hazards at work place	Maintain occupational safety hazards at work place	20	40		60
4.	Workplace communication strategies	Formulate a comprehensive effective workplace communication strategies	20	40		60
5.	OJT	Work in real job situation with special emphasis on basic safety and hazards in this domain (OJT).	-	-	60	60
6	Employability Skill	As per guided curriculum	60	-	-	60
TOTAL			150	210	60	420

SYLLABUS:

Module 1: Basic Understanding of the Technology and Roles & Responsibility

Outcome: Identify the roles and responsibilities of Maintenance Technician Shuttle-less Rapier Loom Weaving Machine

Theory Content:

- Basics of Textile Industry and its significance in domestic and global markets
- Basics of fabric formation and principles of weaving, principles of basics weaving motions – different types of weaving mechanisms: Shuttle loom, shuttle-less loom, different types of shuttle-less loom. Concept of Dobby and Jacquard
- Introduction to different weave structures: Plain Weave, Twill , Drill, Plain Satin, Stripe Satin , Dobby designs , Jacquard Designs etc. Concept of EPI , PPI etc.
- Role and responsibility of the maintenance technician.
- Technician contribution to overall production efficiency
- Basic sequences of work in weaving floor, concept of job-card, production flow, shift handover etc.
- Regular check-points of weaving machines, taking machine status.
- Different types of safety protocols
- Documentation procedure for machine performance.
- Procedure for review of work orders and pending tasks

- Introduction to different driving mechanisms of machine
- Role and function of each driving mechanism
- Handing and taking over procedure of the shift
- Effective communication and documentation during shift transitions

Practical Content:

- Identify different types of weaving machines: Shuttle vs. Shuttle-less
- Preparation of shift handover/takeover process
- Demonstrations of procedures for checking the machine status
- Prepare and implement the plan of the work orders
- Communicate with incoming/outgoing shift
- Convey essential information with incoming and outgoing shifts
- Identify and Checking of the safety hazards on the weaving floor
- Identify and inspect the tools and equipment
- Handing over/taking over documentation preparation
- Identification of different driving mechanisms of machine.

Classroom Aids:

Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook

Tools, Equipment and Other Requirements: Simulated models or miniatures versions of shuttle loom and shuttle-less Rapier loom, different structures or models of belt-drive, gear-train drive etc., basic mechanical toolbox, Aprons, hand-gloves, PPE kits.

Module 2: Maintenance of Looms-performance, operational standards and cleanliness of work area

Outcome: Execute the procedure of maintenance in shuttle-less weaving looms ensuring optimal machine performance, product quality and a safe working environment

Theory Content:

- Overview of different types of weaving looms
- Basic principles of Shuttle-less Rapier loom. Different types of Rapier looms.
- Different parts of shuttle-less rapier loom, functions of each component.
- Driving mechanisms of different parts of shuttle-less rapier loom.
- Procedures of routine maintenance: Lubrication procedures, Belt tensioning and replacement
- Different Setting points in case of shuttle-less Rapier loom; Heald settings, settings of take-up and let-off motions, mechanisms of warp-stop motion, pirn-changing mechanisms etc.
- Commonly occurred machine-problems in Rapier loom -- Procedure of troubleshooting techniques and diagnostic methods
- Major repairs and overhauls procedures
- Different areas and methods of Electrical and electronics maintenance: Wiring and connection maintenance, sensor and actuator maintenance.
- Safety guidelines to be followed
- Actions to be taken in emergency conditions.
- Commonly occurred machine-generated fabric faults and their remedies in case of shuttle-less Rapier loom : Wrong Drawing , Wrong Denting, End Out , Double End, Broken Pick, Double Pick, Missing Pick, Hand Stain , Hole, Wrong Weft, Bad Selvedge KB13. End Out, Let-Off, Take- Up problem, Temple Mark, Temple Cut, Emery Hole/ Emery Cut/ Emery Mark, Broken Pick, Missing Pick, Double Pick, Short Pick, Snarls, Impression Mark, Oil Stain, Lashing In,

Weft Catching, Selvage Cut, Loops, Weft Stitches, Warp Stitches, Bumping Mark, Weft Crack, Cloth Torn , Bad Shedding, Warp Floats, Weft Floats, Reed Mark, Bad Selvage, Starting Mark, Thin & Thick Place , Hair line crack etc.

- Procedures of regular monitoring and preventive maintenances, recording of facts, documentation procedures.
- Different check-points while inspecting the shuttle-less Rapier looms.
- Maintaining overall Cleanliness and waste-management techniques in weaving floor.

Practical Content:

- Identify, locate and apply lubricants on a working rapier loom
- Measure and adjust belt tension on a rapier loom
- Disassembling and re-assembling of different parts of rapier loom
- Replace worn-out belt if any.
- Simulate common machine-problems and use diagnostic tools
- Identify electrical and electronic malfunctions and use diagnostic tools to repair
- Practice to replace rapier head in sequential steps
- Demonstrate settings, calibration and alignment procedure
- Identify and replace damaged wiring
- Inspect and maintain the sensors and actuators
- Replace the defective items and test it
- Identification of machine-related faults in woven fabric, identification of their root-causes and rectification
- Demonstrate implementation procedure on emergency shutdown and evacuation
- Role play exercise for incoming and outgoing maintenance technicians
- Practice in maintaining shift log and preparation of report
- Demonstration of practices for Maintaining overall cleanliness, and waste-management techniques in weaving floor.

Classroom Aids:

Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook

Tools, Equipment and Other Requirements: Simulated models or miniatures versions of Rapier loom, different woven fabrics of different weaves, basic mechanical toolbox, Aprons, hand-gloves, PPE kits.

Module 3: Occupational safety hazards at work place

Outcome: Maintain occupational safety hazards at work place

Theory Content:

- Significance of routine cleaning activities of machine maintenance
- Identifying potential hazards associated with a lack of regular cleaning on tools, machines and work areas.
- Types of cleaning agents and tools
- Introduction of Occupational safety
- Overview of relevant occupational safety regulations and standards
- The responsibility of technician in compliance with safety guidelines
- Identification of Occupational safety hazards
- Identification of common hazards in the machine
- Describe types of hazards
- Application of PPE (Personal protective equipment)
- Selection and use of PPE
- Safe work practices with electrical systems
- Applications of electrical tools

- Describe the importance of immediate response during emergencies
- Fire prevention measures and firefighting equipment's

Practical Content:

- Demonstration of cleaning techniques
- Create a check list for routine cleaning tasks and their frequency
- Demonstrate the use protective clothing/equipment for specific tasks and work conditions
- Identify PPE application and its maintenance procedure
- Demonstrate the correct use of safety glasses, gloves and hearing protection
- Simulate an emergency scenario require the use of PPE
- Identify electrical hazards (power supply and points, loose and naked cables and wires, equipment malfunctions, etc.)
- Apply electrical precautions like insulated clothing, adequate equipment insulation, use dry work area etc.
- Identify safety features and emergency stop locations
- Present proper method of rescue techniques applied during fire hazard and other accidental situation.

Classroom Aids:

Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook

Tools, Equipment and Other Requirements:

Protective Gloves, Head Caps, Safety Goggles, Safety Boots, Mouth Masks, coats and aprons; ear plugs or muffs; eye and facial protection; head-wear; lifting assistance;

Module 4: Workplace communication strategies

Outcome: Formulate a comprehensive effective workplace communication strategies

Theory Content:

- Explain purpose or common goals of each member in a group of willing to work toward. Members feel that they played a role in determining these goals and the methods used to achieve them.
- Describe the task between each members in group, but also with its own processes and operating procedures.
- Maintain Communication is clear and direct manner.
- Interpret machine performance data and metrics
- Explain key indicators of machine health and efficiency
- Establish clear reporting procedures for machine running and performance
- Generate machine performance reports and sharing them with the team
- Discuss supervision policy as a leader who can bring the group together and build an environment in which the team can work together effectively.
- Compliance with industry regulations: Understanding industry regulations, organizational policies and procedures. Ethical considerations. Health and safety compliance

Practical Content:

- Demonstrate the purpose or common goals of each member in a group of willing to work toward. Members feel that they played a role in determining these goals and the methods used to achieve them.
- Identify the task between each members in group, but also with its own processes and operating procedures. The group periodically evaluates its performance.

- Exhibit the accurately receive information and instructions from the supervisor and fellow workers, getting clarification where required.
- Apply Communication is clear and direct manner.
- Exhibit enterprise ethical standards and requirements for interacting with other employees and staff.
- Apply good communication environmental practices in workplace.
- Simulate/role play of ethical dilemmas in the workplace
- Familiarize with relevant industry standards and regulations
- Illustrate organizational policies and procedures

Classroom Aids:

Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook

Tools, Equipment and Other Requirements:

Protective Gloves, Head Caps, Aprons, Safety Goggles, Safety Boots, Mouth Masks, Sanitizer, Food Safety Manual, communication tools, communication manual, On-task Communication, Instant Chats , Video Conferencing, Voice Calls, Audio Recording, Discussion Forums, Instant File Sharing, External Communication

Module 5 : OJT

Outcome: Work in real job situation with special emphasis on basic safety and hazards in this domain

Practical Content:

Assessor will check report prepared for this component of Practical training of the course and assess whether competency has been developed to work in the real job situation with special emphasis on basic safety and hazards in this domain. (The trainee is expected to undertake work in actual workplace under any supervisor / contractor for **60 Hours.**)

Module 6 : Employability Skills (60 Hrs)**Key Learning Outcomes****Introduction to Employability Skills**

Duration: 1.5 Hours

After completing this programme, participants will be able to:

1. Discuss the Employability Skills required for jobs in various industries
2. List different learning and employability related GOI and private portals and their usage

Constitutional values - Citizenship

Duration: 1.5 Hours

3. Explain the constitutional values, including civic rights and duties, citizenship, responsibility towards society and personal values and ethics such as honesty, integrity, caring and respecting others that are required to become a responsible citizen
4. Show how to practice different environmentally sustainable practices.

Becoming a Professional in the 21st Century

Duration: 2.5 Hours

5. Discuss importance of relevant 21st century skills.
6. Exhibit 21st century skills like Self-Awareness, Behavior Skills, time management,

critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn etc. in personal or professional life.

7. Describe the benefits of continuous learning.

Basic English Skills

Duration: 10 Hours

8. Show how to use basic English sentences for everyday conversation in different contexts, in person and over the telephone
9. Read and interpret text written in basic English
10. Write a short note/paragraph / letter/e -mail using basic English

Career Development & Goal Setting

Duration: 2 Hours

11. Create a career development plan with well-defined short- and long-term goals

Communication Skills

Duration: 5 Hours

12. Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette.
13. Explain the importance of active listening for effective communication
14. Discuss the significance of working collaboratively with others in a team

Diversity & Inclusion

Duration: 2.5 Hours

15. Demonstrate how to behave, communicate, and conduct oneself appropriately with all genders and PwD
16. Discuss the significance of escalating sexual harassment issues as per POSH act.

Financial and Legal Literacy

Duration: 5 Hours

17. Outline the importance of selecting the right financial institution, product, and service
18. Demonstrate how to carry out offline and online financial transactions, safely and securely
19. List the common components of salary and compute income, expenditure, taxes, investments etc.
20. Discuss the legal rights, laws, and aids

Essential Digital Skills

Duration: 10 Hours

21. Describe the role of digital technology in today's life
22. Demonstrate how to operate digital devices and use the associated applications and features, safely and securely
23. Discuss the significance of displaying responsible online behavior while browsing, using various social media platforms, e-mails, etc., safely and securely
24. Create sample word documents, excel sheets and presentations using basic features
25. utilize virtual collaboration tools to work effectively

Entrepreneurship

Duration: 7 Hours

26. Explain the types of entrepreneurship and enterprises
27. Discuss how to identify opportunities for potential business, sources of funding and associated financial and legal risks with its mitigation plan
28. Describe the 4Ps of Marketing-Product, Price, Place and Promotion and apply them as per

requirement

29. Create a sample business plan, for the selected business opportunity

Customer Service

Duration: 5 Hours

30. Describe the significance of analyzing different types and needs of customers
 31. Explain the significance of identifying customer needs and responding to them in a professional manner.
 32. Discuss the significance of maintaining hygiene and dressing appropriately

Getting Ready for apprenticeship & Jobs

Duration: 8 Hours

33. Create a professional Curriculum Vitae (CV)
 34. Use various offline and online job search sources such as employment exchanges, recruitment agencies, and job portals respectively
 35. Discuss the significance of maintaining hygiene and confidence during an interview
 36. Perform a mock interview
 37. List the steps for searching and registering for apprenticeship opportunities

Learning Outcome – Assessment Criteria

Module No.	Outcome	Assessment Criteria
1	Identify the roles and responsibilities of Maintenance Technician Shuttle-less Rapier Loom Weaving Machine	<p>After completion of this module students will be able to:</p> <p>1.1 Describe the historical and current context of the textile industry 1.2 Articulate the relevance of carding operations in textile manufacturing 1.3 Explain and identify various spinning processes 1.4 Identify different types of carding machine 1.5 Explain the roles and responsibilities of Maintenance Technician Shuttle Less Rapier Loom 1.6 Explain shift handover and takeover processes 1.7 Conduct a systematic check of Rapier Loom status and related materials 1.8 Identify, analyze and address issues related to the maintenance of the machine effectively</p>
2	Execute the procedure of maintenance in shuttle-less weaving looms ensuring optimal machine performance, product quality and a safe working environment	<p>After completion of this module students will be able to:</p> <p>2.1 Demonstrate various weaving loom types, including shuttle-less rapier looms 2.2 Explain the fundamental principles of shuttle less rapier looms 2.3 Identify and differentiate between different</p>

Module No.	Outcome	Assessment Criteria
		<p>types of rapier looms</p> <p>2.4 Describe driving mechanisms for different parts of the shuttle-less rapier loom</p> <p>2.5 Perform routine maintenance tasks such as lubrication, belt tensioning and replacement.</p> <p>2.6 Troubleshoot and diagnose common machine problems in rapier looms</p> <p>2.7 Describe the procedure for wiring and connection maintenance, sensor and actuator maintenance</p> <p>2.8 Perform sequential steps to replace a rapier head on a loom.</p> <p>2.9 Demonstrate to prepare a comprehensive maintenance report</p> <p>2.10 Implement waste management techniques specific to the weaving environment.</p>
3	Maintain occupational safety hazards at workplace	<p>After completion of this module students will be able to:</p> <p>4.1 Execute the routine cleaning activities in machine maintenance</p> <p>4.2 Identify potential hazards associated with inadequate cleaning on tools, machines and work areas</p> <p>4.3 Create a checklist for routine cleaning tasks</p> <p>4.4 Identify and list different types of cleaning agents and tools</p> <p>4.5 Describe the importance of PPE kit</p> <p>4.6 Demonstrate the correct use of safety gear.</p> <p>4.7 Identify electrical hazards, including power supply issues, loose cables and equipment malfunctioning</p> <p>4.8 Detect health hazards (such as untreated injuries and contagious illness/ zoonotic diseases).</p> <p>4.9 Maintain Fire safety and prevention of fire hazards in workplace[[fire extinguishers, fire Alarm, fire exits]</p> <p>4.10 Ensure use of general health and safety equipment and materials in the workplace first aid equipment</p> <p>4.11 Present proper rescue techniques applied during fire hazards and other</p>

Module No.	Outcome	Assessment Criteria
		accidental situations 4.12 identify safety features and emergency stop locations on machines
4	Formulate a comprehensive effective workplace communication strategies	<p>After completion of this module students will be able to:</p> <p>5.1 Analyze and explain the purpose or common goals of each member in the group</p> <p>5.2 Identify tasks between team members and their own processes</p> <p>5.3 Apply effective communication strategies in a practical context</p> <p>5.4 Exhibit enterprise ethical standards in workplace interactions</p> <p>5.5 Apply good communication environmental practices in practical workplace</p> <p>5.6 Simulate/Role play ethical dilemmas in the work place</p> <p>5.7 Illustrate familiarity with relevant industry standards and regulations.</p> <p>5.8 Explain the organizational policies and procedures</p> <p>5.9 Interpret machine performance data and metrics accurately</p> <p>5.10 Explain key indicators of machine health and efficiency</p> <p>5.11 Generate machine performance reports accurately</p> <p>5.12 Illustrate organizational policies and procedures accurately</p>
5	OJT	Work in a soft-floor environment of an industry with special emphasis on basic safety and hazards in this domain (OJT).
6	Employability Skills	As per guided curriculum

List of Tools, Equipment & materials needed for 30 Trainees (Practical)

SI No	Items Name	Specification	Qty
1	Simulated models or miniatures versions of shuttle loom		2
2	Simulated models or miniatures versions shuttle-less Rapier loom,		2
3	Different structures or models of belt-drive, gear-train drive		1 no each
4	Mechanical toolbox		30
5	Electrical toolbox		30
6	Computer	Latest configuration	1
7	White board	Standard 6'x4'	1
8	Marker		As required
9	Chart papers		As required
10	Projector		1
11	Aprons	Standard	30
12	Ear plugs		30
13	Eye and facial protection		30
14	Muffs		30
15	Head-wear		30
16	Hand gloves		30
17	Mesh aprons		30
18	Fire extinguishers		2
19	Fire Alarm		2
20	First aid equipment		3

Marks Distribution

Outcome	Outcome Code	Total Th marks	Total Pr marks	Total OJT marks
Identify the roles and responsibilities of Maintenance Technician Shuttle-less Rapier Loom Weaving Machine	TXT/3712/OC1	30	90	0
Execute the procedure of maintenance in shuttle-less weaving looms ensuring optimal machine performance, product quality and a safe working environment	TXT/3712/OC2	60	220	0
Maintain occupational safety hazards at work place	TXT/3712/OC3	30	170	0
Formulate a comprehensive effective workplace communication strategies	TXT/3712/OC4	30	170	0
Work in real job situation with special emphasis on basic safety and hazards in this domain (OJT).	TXT/3712/OC1	0	0	150
Employability Skills - 60 Hrs	DGT/VSQ/N0102	50	0	0

