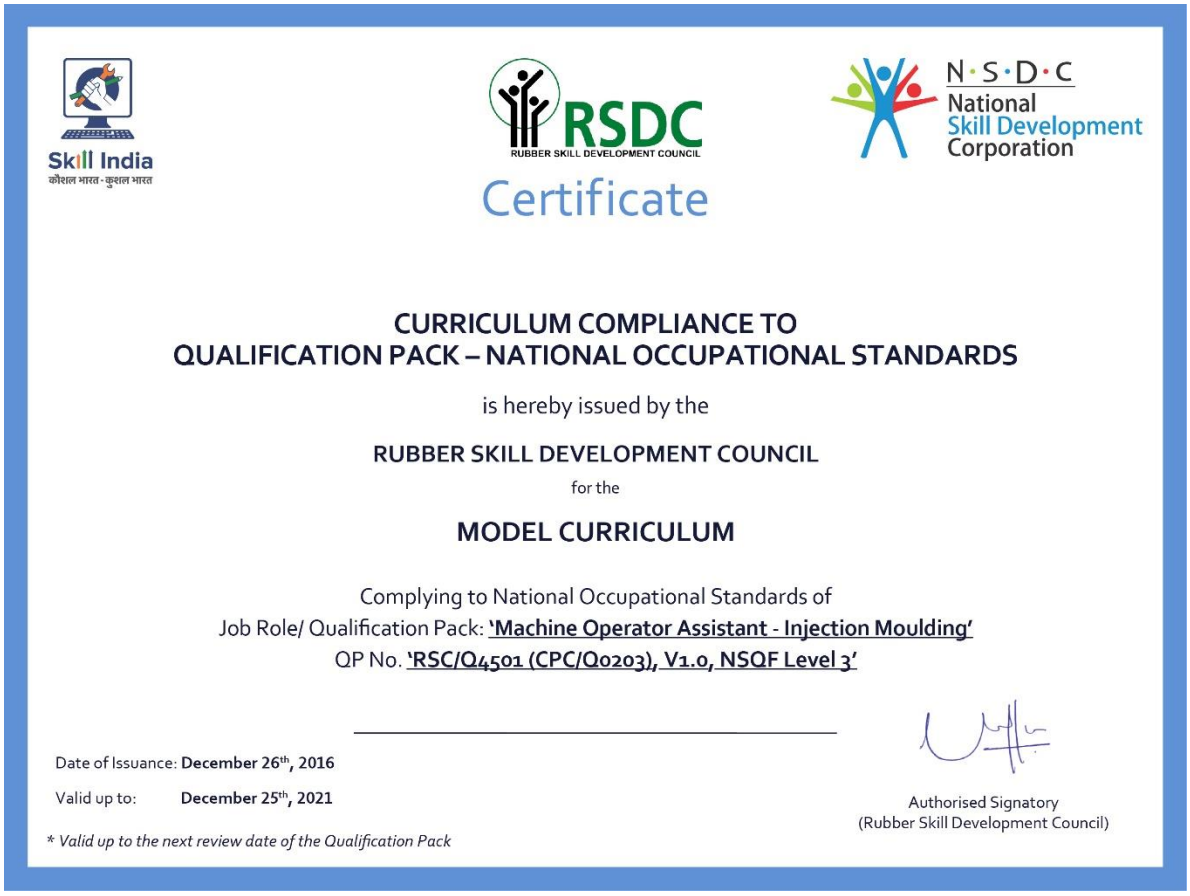
Model Curriculum

Machine Operator Assistant - Injection Moulding

SECTOR: RUBBER
SUB-SECTOR: MANUFACTURING/PLASTICS PROCESSING
OCCUPATION: INJECTION MOULDING
REF ID: RSC/Q4501 (CPC/Q0203), V 1.0
NSQF LEVEL: 3



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RSDC
RUBBER SKILL DEVELOPMENT COUNCIL

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National
Skill Development
Corporation

Certificate

CURRICULUM COMPLIANCE TO
QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

RUBBER SKILL DEVELOPMENT COUNCIL

for the

MODEL CURRICULUM

Complying to National Occupational Standards of
Job Role/ Qualification Pack: **'Machine Operator Assistant - Injection Moulding'**
QP No. **'RSC/Q4501 (CPC/Q0203), V1.0, NSQF Level 3'**

Date of Issuance: **December 26th, 2016**
Valid up to: **December 25th, 2021**

** Valid up to the next review date of the Qualification Pack*

Authorised Signatory
(Rubber Skill Development Council)

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Machine Operator Assistant - Injection Moulding

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a "Machine Operator Assistant - Injection Moulding", in the "Rubber Skill Development Council" Sector/Industry and aims at building the following key competencies amongst the learners.

Program Name	**Machine Operator Assistant – Injection Moulding**		
Qualification Pack Name & Reference ID	RSC/Q4501 (CPC/Q0203), V 1.0		
Version No.	1.0	**Version Update Date**	29/05/2019
Pre-requisites to Training	VIII Standard		
Training Outcomes	**After completing this programme, participants will be able to:** • Explain the basic concepts of plastics • Explain the process requirements for plastics • Analyze the role and responsibilities of a machine operator assistant – injection moulding • Demonstrate assisting in the injection moulding process • Monitor process parameters and troubleshoot the process/product • Demonstrate quality check of finished products in reference to the approved product • Maintain basic health and safety practices at the workplace • Practice the basics of computer and data entry in MS office and open source software.		

This course encompasses 5 out of 5 National Occupational Standards (NOS) of "Machine Operator Assistant - Injection Moulding" Qualification Pack issued by "Rubber Skill Development Council".

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1.	**Introduction to the job role** **Theory Duration** (hh:mm) 20:00 **Practical Duration** (hh:mm) 10:00 **Corresponding NOS Code** Bridge Module	• Explain the developmental history of plastic • Describe the current industrial scenario of plastics and prospects • Identify types of plastic • List major industrial associations related to injection moulding • Identify equipment used for injection moulding • Identify the roles and responsibilities of a machine operator- injection moulding	• LCD Projector, White Board with marker and duster, charts etc. • Pen drives, computers etc. for conducting class.
2.	**Basic concept, job requirements related to injection moulding process** **Theory Duration** (hh:mm) 40:00 **Practical Duration** (hh:mm) 50:00 **Corresponding NOS Code** RSC/N4501 (CPC/N0214)	• Plan with the operator to understand and schedule daily production activities • Assemble the consumables and plastics materials in sufficient quantity, as per production planned /operators instructions • State the do's and don'ts of the manufacturing process as defined in SOPs/work instructions • Examine the availability of the personal protective equipment (PPE) like gloves, goggles etc. • Demonstrate the moulding procedure and process to be adopted for completing the work • Examine the work instruction document/SOP manual • Assemble the required material from the store before starting the process • Assemble the appropriate mould required to execute the moulding operation • Collect the mould from tool room if required • Demonstrate the process of installing the mould safely • Practise adding the raw material to the machine using material	• LCD Projector, White Board with marker and duster, charts etc. • Pen drives, computers etc. for conduct of class. • Common hand tools like Vernier calliper, micrometer, drills, tapes and dies etc • Plastics raw material like PP, HDPE, PET, PBT, PVC etc. for training on machines of Blow grade from good/reputed supplier. • Basics machines for training like hand blow moulding, semiautomatic blow moulding, Automatic blow moulding, • Pre drying system like Oven Drier, Hopper Drier, Dehumidifier, Chillers etc. • Automatic Hopper Loader, Hot air oven and Dryer, Dehumidifier, Mould Temperature Controller, Scrap Grinder, Crane, Air Compressor,

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		loader or by manual feeding • Ensure that the moulds are clean, if not, clean with soft cotton cloth • Practise cleaning other auxiliaries tools, (if any) before initiating the moulding and trimming process • Demonstrate cleaning the area around the apparatus for any oil, grease, combustible substances etc., so as to prevent accidents • Check if the coolant in the valves are working properly • Identify the raw material like plastics granules, fillers, bonding additives etc. required for executing the activity • Escalate queries to the supervisor, if they cannot be resolved by the operator • Confirm understanding of a query.	Hot air blow Gun, Water cooling Tower, Hand Operated Blow Moulding M/C with accessories, Semi-Automatic Blow Moulding Machine, Fully Automatic Single stage Blow Moulding machine, Full Automatic Double stage Blow Moulding machine, Injection stretch Blow Moulding Machine.
3.	**Assist in performing injection moulding operations** **Theory Duration** (hh:mm) 20:00 **Practical Duration** (hh:mm) 40:00 **Corresponding NOS Code** RSC/N4502 (CPC/N0215)	• Evaluate the operation of moulding apparatus like hopper, heaters etc. as per the checklist provided • Fix the desired mould to the injection moulding machine in order to achieve the desired operation, as per the work instructions/SOPs • Apply modifications in the process parameters (by selecting the right program from the machine control system), if required • Apply alignment with the prescribed standards, as guided by the operator • Demonstrate preheating of plastic granules (in case of engineering plastics) • Apply the required operation code in the apparatus, for heaters to melt the plastic granules at the predefined temperature • Demonstrate functioning of the machine in semi-auto or automatic mode as guided by the operator	• Common hand tools like Vernier calliper, micrometer, drills, tapes and dies etc • Plastics raw material like PP, HDPE, PET, PBT, PVC etc. for training on machines of Blow grade from good/reputed supplier. • Basics machines for training like hand blow moulding, semiautomatic blow moulding, Automatic blow moulding, • Pre drying system like Oven Drier, Hopper Drier, Dehumidifier, Chillers etc.
4.	**Monitor process parameters and troubleshoot the**	• Check whether the plastic granules are mixed with additives (if any) before being fed into the	• Common hand tools like Vernier calliper, micrometer, drills, tapes

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	process/product **Theory Duration** (hh:mm) 20:00 **Practical Duration** (hh:mm) 50:00 **Corresponding NOS Code** RSC/N4502 (CPC/N0215)	hopper • Conduct a test process to produce a sample output as per the requirement • Check whether the dimensions of the output product are as per the process given in the work instructions • Practise the process required for production as per the instructions given by the operator • Apply the check-list of the procedure to be followed to ensure the quality of final product	and dies etc • Plastics raw material like PP, HDPE, PET, PBT, PVC etc. for training on machines of Blow grade from good/reputed supplier. • Basics machines for training like hand blow moulding, semiautomatic blow moulding, automatic blow moulding.
5.	**Conduct quality checks of the finished products** **Theory Duration** (hh:mm) 20:00 **Practical Duration** (hh:mm) 40:00 **Corresponding NOS Code** RSC/N4503 (CPC/N0216)	• Compare texture, colour, surface properties, hardness and strength etc. with the approved product • Check minor defects like dimension variation, thickness variation etc. by applying parameter for controlling the process etc. • Apply rectification methods for the minor defects observed and keep the operator informed • Deliver first and last output from each batch to the lab, for quality check of its composition, properties etc. • Plan clearance for the entire batch from the lab and submit it to the operator.	• Plastics raw material like PP, HDPE, PET, PBT, PVC etc for training on machines of Blow grade from good/reputed supplier. • Basics machines for training like hand blow moulding, semiautomatic blow moulding, Automatic blow moulding, • Pre drying system like Oven Drier, Hopper Drier, Dehumidifier, Chillers etc.
6.	**Computer basics and data entry in MS office/open source suite software** **Theory Duration** (hh.mm) 20:00 **Practical Duration** (hh.mm) 50:00 **Corresponding NOS**	• Demonstrate the online process for receiving, processing or tracking data by entering data from source documents (such as trial report, process sheet etc.) • Explain the importance of scanning source documents in accordance to the specific instructions • Check for compliance in data entered and rectify all typographical errors or repeated data • Maintain files of the source document or other information related to the data entered	• LCD Projector, White Board with marker and duster, charts etc • Pen drives, computers etc for conduct of class.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	Code RSC/N4504 (CPC/N0219)	• Evaluate data that lacks clarity, before entering. Generate reports of the data entered. • Demonstrate how to store the files at designated locations, for backup. • Organise database updation to reflect the most current source of information • Identify requests for information to access the relevant files.	
7.	**Maintain basic health and safety practices at the workplace** **Theory Duration** (hh:mm) 40:00 **Practical Duration** (hh:mm) 60:00 **Corresponding NOS Code** RSC/N4101 (CPC/N0411)	• State the importance of wearing protective clothing/equipment for specific tasks and work conditions • Demonstrate safe working practices while dealing with hazards to ensure the safety of self and others • Demonstrate good housekeeping standards at all times • Apply appropriate fire extinguishers on different types of fires • Demonstrate rescue techniques applied during fire hazard • Demonstrate the correct use of a fire extinguisher • Identify potential injury through sharp objects, burns, fall, electricity, gas leakages, radiation, poisonous fumes, chemicals, loud noise, and • Conduct regular checks of the machines with the support of the maintenance team to identify potential hazards • Inform the concerned authorities on the potential risks identified in the processes, workplace area/ layout, materials used etc. • Inform the concerned authorities about machine breakdowns, damages which can potentially harm man/ machine during operations • Demonstrate awareness amongst others by sharing information on the identified risks	• LCD Projector, White Board with marker and duster, charts etc • Pen drives, computers etc for conduct of class. • Common hand tools like Vernier calliper, micrometer, drills, tapes and dies etc • Automatic Hopper Loader, Hot air oven and Dryer, Dehumidifier, Mould Temperature Controller, Scrap Grinder, Crane, Air Compressor, Hot air blow Gun, Water cooling Tower, Hand Operated Blow Moulding M/C with accessories, Semi-Automatic Blow Moulding Machine, Fully Automatic Single stage Blow Moulding machine, Full Automatic Double stage Blow Moulding machine, Injection stretch Blow Moulding Machine

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		• Practise the sorting process and check if the tools, fixtures and jigs that are lying on workstations are the ones in use and unnecessary items are not cluttering the workbenches or work surfaces. • Practise segregation of waste in hazardous/non-hazardous category • Demonstrate the technique of waste disposal and waste storage in the proper bins as per SOP • Segregate the items labelled as red tag for the process area and keep them in the designated places • Demonstrate sorting tools/equipment/fasteners/spare parts as per specifications/utility into proper trays, cabinets, lockers as mentioned in the 5S guidelines/ work instructions • Practise stacking the various types of boxes and containers properly as per the size/utility to avoid any spillage of the items/breakage and also enable easy sorting when required • Assemble extra material and tools to the designated sections and make sure that no additional material/tool is lying near the work area • Identify the floor markings/area markings used for demarcating the various sections in the plant as per the prescribed instructions and standards • Identify and follow the proper labelling mechanism of instruments/boxes/containers and maintaining reference files/documents with the codes and the lists • Comply with the given instructions and check for labelling of fluids, oils, lubricants, solvents, chemicals etc. and proper storage of the same to avoid spillage,	

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		leakage, fire etc.	
	Total Duration **Theory Duration** **180:00** **Practical Duration** **300:00**	**Unique Equipment Required:** **1. Class Room equipment:** LCD Projector/Screen, Computer, charts, Black / White board and duster. **2. Measuring equipment:** Steel Ruler, Micrometer, Vernier Caliper, Radius gauge, Feeler gage, Steel measuring tape, Weighing Balance (1 No.) **3. Hand Tools:** Hammer, screw driver set with Multiple heads, **4.** Allen key hexagonal, File triangular, Hacksaw, adjustable, Spanner set double side, Adjustable spanner **5. Personal Protective equipment:** Safety Goggles, Rubber Gloves, Asbestos gloves, Fire Extinguisher, Apron, Helmet, First Aid Box with Medicines **6. Plastics raw material:** PP, HDPE, Blow moulding grade. **7.** Mould: Hand mould, Blow Mould **8. Auxiliaries equipment:** Automatic Hopper Loader, Hot air oven and Dryer, Dehumidifier, Mould Temperature Controller, Scrap Grinder, Crane, Air Compressor, Hot air blow Gun, Water cooling Tower, Hand Operated Blow Moulding M/C with accessories, Semi-Automatic Blow Moulding Machine, Fully Automatic Single stage Blow Moulding machine, Full Automatic Double stage Blow Moulding machine, Injection stretch Blow Moulding Machine	

Grand Total Course Duration: **480 Hours 0 Minutes**

(This syllabus/ curriculum has been approved by ***Rubber Skill Development Council)***

Trainer Prerequisites for Job role: "Machine Operator Assistant - Injection Moulding" mapped to Qualification Pack: "RSC/Q4501 (CPC/Q0203)" Version 1.0

Sr. No.	Area	Details
1	**Description**	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack "RSC/Q4501 (CPC/Q0203), V 1.0".
2	**Personal Attributes**	A Trainer should be free from socio-economic preferences and prejudice. He/ she should be safety conscious and proficient in handling and use security/ safety equipment. Besides being knowledgeable, he/ she should be energetic, motivating, innovative and good at communication. The trainer should be able to establish rapport with the trainees and employ innovative methods to impart instructions.
3	**Minimum Educational Qualification**	VIII Standard
4a	**Domain Certification**	Certified for Job Role "Machine Operator Assistant - Injection Moulding" mapped to the Qualification Pack "RSC/Q4501 (CPC/Q0203), V 1.0" issued by RSDC
4b	**Platform Certification**	Recommended that the Trainer is certified for the Job Role: "Trainer", mapped to the Qualification Pack: "MEP/Q2601" with scoring of minimum 80%.
5	**Experience**	As per the standards set by relevant SSC to practice in different industry sectors.

Annexure: Assessment Criteria

CRITERIA FOR ASSESSMENT OF TRAINEES
Job Role: Machine Operator Assistant - Injection Moulding **Qualification Pack Code: RSC/Q4501 (CPC/Q0203), V 1.0** **Sector Skill Council: Rubber Skill Development Council**

Guidelines for Assessment

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also laydown proportion of marks for Theory and Skills Practical for each PC.
2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training centre (as per assessment criteria below).
4. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training centre based on these criteria.
5. To pass the Qualification Pack, every trainee should score a minimum of 70% in every NOS.
6. In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack.

Assessable outcome		Marks Allocation		
NOS	**Performance Criteria**	**Total**	**Theory**	**Practical**
RSC/N4501 (CPC/N0214) Understand basic concept, job requirements and basics knowhow related to the Injection moulding process	PC1. To interact with the operator in order to understand the production schedule	6	4	2
	PC2. To help in planning the day's production activities based on the operator's instructions	6	4	2
	PC3. To ensure availability of consumables and plastics materials for production in sufficient quantity as per production plan/operators instructions.	6	4	2
	PC4. Clearly understanding the does and don'ts of the manufacturing process as defined in SOPs/ Work Instructions or defined by operator.	4	3	1
	PC5. Check availability of the personal protective equipment (PPE) like Gloves, Goggles etc.	4	3	1
	PC6. Understand the molding procedure and process to be adopted for completing the work order from the operator by referring the Work Instruction document/ SOP manual.	4	3	1
	PC7. Ensure that the required material is procured from the store before starting the process	3.5	2.5	1
	PC8. Understand the Mould required for executing the required operation and ensure that the same is available for operation.	3.5	2.5	1
	PC9. Collect the mould from tool room If mould is not available.	3.5	2.5	1
	PC10. Install and bolt the mould in place and slide the safety door shut.	3.5	2.5	1
	PC11. Add the raw material in the machine using material loader or by manual feeding.	3.5	2.5	1
	PC12. Ensure moulds are clean if not clean with soft cotton cloth.	3.5	2.5	1
	PC13. Ensure cleaning of the other auxiliaries tools, (if any) before the initiation of the moulding and trimming process	3.5	2.5	1
	PC14. Ensure cleaning of the area around the apparatus for any oil, grease, combustible substances etc. so as to	3.5	2.5	1

Assessable outcome		Marks Allocation		
NOS	**Performance Criteria**	**Total**	**Theory**	**Practical**
	prevent any accident			
	PC15. Ensure availability of the coolant and working of valves to circulate the coolant to cool and solidify plastic	3.5	2.5	1
	PC16. Understand the raw material like plastics granules, fillers, bonding additives etc. required for executing the activity	3.5	1.5	2
	PC17. Refer the queries to supervisor if they cannot be resolved by the operator	3.5	1.5	2
	PC18. Confirm self - understanding to the operator once the query is resolved so that all doubts & queries can be resolved before the actual process execution	3.5	1.5	2
	Subtotal	**72**	**48**	**24**
RSC/N4502 (CPC/N0215) Assist in performing the Injection molding related operations, monitor process parameters and troubleshoot the process/product	PC1. Check for operation of molding apparatus like hopper, heaters etc. as per the checklist provided	15	5	10
	PC2. Fix the desired Mould to the injection moulding machine in order to achieve the desired operation as per the Work Instructions/ SOPs	20	10	10
	PC3. Make modifications in the process parameters (by selecting the right program from the machine control system) if required and ensure alignment with the prescribed standards as guided by Operator.	30	10	20
	PC4. Perform preheating of plastic granules (In case of Engineering plastics) PC5. Ensure that the plastic granules are mixed with additives (if any) before being fed into the hopper	20	10	10
	PC6. Conduct a test process and produce a sample output as per the required	20	10	10
	PC7. Ensure that the dimensions of the output product are measured as per the process given in the Work Instructions/ SOP under guidance of operator.	30	15	15
	PC8. Start the production process as instructed by Operator.	25	15	10
	PC9. Feed the required operation code in the	35	15	20

Assessable outcome		Marks Allocation		
NOS	**Performance Criteria**	**Total**	**Theory**	**Practical**
	apparatus for heaters to melt the plastic granules at the predefined temperature			
	PC10. Run the machine in Semi-Auto or Automatic mode of operation as guided by the operator.	20	5	15
	PC11. Check-list procedure to ensure quality of final product	15	5	10
	Subtotal	**230**	**100**	**130**
RSC/N4503 (CPC/N0216) Conduct basic quality checks of the finished products with reference to the approved product	PC1. Compare texture, colour, surface properties, hardness and strength etc. with the given approved product.	8	2	6
	PC2. Rectify minor defects like dimension variation, thickness variation etc. by control process parameters etc. and informing operator.	12	6	6
	PC3. Provide first and last output from each batch to the lab for quality check on its composition, properties etc.	8	2	6
	PC4. Obtain clearance for the entire batch from the lab and submit the operator.	8	2	6
	Subtotal	**36**	**12**	**24**
RSC/N4101 (CPC/N 0411): Maintain basic health and safety practices at the workplace, 5S	PC1. Wear protective clothing/equipment for specific tasks and work conditions	2.5	0.5	2
	PC2. Carry out safe working practices while dealing with hazards to ensure the safety of self and others.	2.5	0.5	2
	PC3. Apply good housekeeping practices at all times	2.5	0.5	2
	PC4. Use the various appropriate fire extinguishers on different types of fires correctly	2.5	0.5	2
	PC5. Demonstrate rescue techniques applied during fire hazard, demonstrate good housekeeping in order to prevent fire hazards, demonstrate the correct use of a fire extinguisher.	2.5	0.5	2
	PC6. Identify activities which can cause potential injury through sharp objects, burns, fall, electricity, gas leakages, radiation, poisonous fumes, chemicals, loud noise, and Identify areas in the plant which are potentially	2.5	0.5	2

Assessable outcome		Marks Allocation		
NOS	Performance Criteria	Total	Theory	Practical
	hazardous/unhygienic in nature. Conduct regular checks with support of the maintenance team on machine health to identify potential hazards due to wear and tear of machine.			
	PC7. Inform the concerned authorities on the potential risks identified in the processes, workplace area/ layout, materials used etc, Inform the concerned authorities about machine breakdowns, damages which can potentially harm man/ machine during operations.	2.5	0.5	2
	PC8. Create awareness amongst other by sharing information on the identified risks.	2.5	0.5	2
	PC9. Follow the sorting process and check that the tools, fixtures & jigs that are lying on workstations are the ones in use and un- necessary items are not cluttering the workbenches or work surfaces.	2.5	0.5	2
	PC10. Ensure segregation of waste in hazardous/ non Hazardous waste as per the sorting work instructions	2.5	0.5	2
	PC11. Follow the technique of waste disposal and waste storage in the proper bins as per SOP	1.5	0.5	1
	PC12. Segregate the items which are labeled as red tag items for the process area and keep them in the correct places	1.5	0.5	1
	PC13. Sort the tools/ equipment/ fasteners/ spare parts as per specifications/ utility into proper trays, cabinets, lockers as mentioned in the 5S guidelines/work instructions	1.5	0.5	1
	PC14. Ensure that areas of material storage areas are not overflowing PC15. Properly stack the various types of boxes and containers as per the size/ utility to avoid any fall of items/ breakage and also enable easy sorting when required	1.5	0.5	1
	PC16. Return the extra material and tools to	1.5	0.5	1

Assessable outcome		Marks Allocation		
NOS	Performance Criteria	Total	Theory	Practical
	the designated sections and make sure that no additional material/ tool is lying near the work area			
	PC17. Follow the floor markings/ area markings used for demarcating the various sections in the plant as per the prescribed instructions and standards.	1.5	0.5	1
	PC18. Follow the proper labelling mechanism of instruments/ boxes/ containers and maintaining reference files/ documents with the codes and the Lists	1.5	0.5	1
	PC19. Check that the items in the respective areas have been identified as broken or damaged	1.5	0.5	1
	PC20. Follow the given instructions and check for levelling of fluids, oils, lubricants, solvents, chemicals etc. and proper storage of the same To avoid spillage, leakage, fire etc.	1.5	0.5	1
	PC21. Make sure that all material and tools are stored in the designated places and in the manner indicated in the 5S instructions.	1.5	0.5	1
	Subtotal	**40**	**10**	**30**
RSC/N4504 (CPC/N0219) Basics of computer and data entry in MS OFFICE/office Open source suite Software	PC1. Fill and process mandated forms for receiving, processing, or tracking data enter data from source documents (such as trial report, process sheet etc.) into Computer application having MS OFFICE software.	3	2	1
	PC2. Scan source documents in accordance with specific instructions.	3	2	1
	PC3. Verify data entered with source documents, checks for compliance and corrects all typographical errors and missing or repeated data.	3	2	1
	PC4. Maintain files of source documents or other information related to data entered.	3	2	1
	PC5. Investigate and confirm data that is	3	2	1

Assessable outcome		Marks Allocation		
NOS	**Performance Criteria**	**Total**	**Theory**	**Practical**
	unclear before entering, generate reports of data entry, store completed work in designated locations and perform backup operations.			
	PC6. Update database information to reflect most current source information	2	1	1
	PC7. Assist in the filing and storage of security and back up data files	3	2	1
	PC8. Respond to requests for information and access relevant files	2	1	1
	Subtotal	**22**	**14**	**8**
	Total	**400**	**184**	**216**