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PLASTIC PROCESSOR

TRAINER GUIDE

National Vocational Certificate Level 3

Version 1 - September, 2018

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Introduction

Competence-based training helps to bridge the gap between what is taught in training and what tasks will be performed on the job. Training trainees to perform actual job functions helps to ensure that future front-line workers have the skills, knowledge and abilities required to perform their jobs properly, safely and effectively. In addition to competence-based training, assessment based on the performance of actual work competencies helps to ensure that:

- trainees are performing their work tasks as safely as possible
- performance gaps are recognized prior to serious incidents
- training can be implemented to improve competence.

There are significant benefits to competence-based training:

1. **Cost effectiveness**

   Since training activities and assessments in a competence-based approach are goal-oriented, trainers focus on clearly defined areas of skills, knowledge and understanding that their own industry has defined in the competence standards. At the same time, trainees are more motivated to learn when they realize the benefits of improved performance.

2. **Efficiency**

   The transfer gap between the training environment and working on the job is reduced substantially in a competence-based approach. This is because training and assessment are relevant to what needs to be done on the job. As a result, it takes less time for trainees to become competent in the required areas. This, in turn, contributes to improved efficiency where training and assessment are concerned.

3. **Increased productivity**

   When trainees become competent in the competence standards that their own industry has defined, when they know what the performance expectations are and receive recognition for their abilities through successful assessments, they are likely to be more motivated and experience higher job satisfaction. The result is improved productivity for organizations. The communication and constructive feedback between future employers and employees will improve as a result of a competence-based approach, which can also increase productivity.

4. **Reduced risk**

   Using a competence-based approach to training, development, and assessment, employers are able to create project teams of people with complementary skills. A trainee’s record of the skills, knowledge and understanding relating to the competence standards they have achieved can be used by a future employer to identify and provide further relevant training and assessment for new skills areas. Competence standards can shape employee development and promotional paths within an organization and give employees the opportunity to learn more competencies beyond their roles. It can also provide organizations with greater ability to scale and flex as needed, thereby reducing the risk they face.

5. **Increased customer satisfaction**

Employees who have been trained and assessed using a competence-based approach are, by the definition of the relevant competence standards, able to perform the required tasks associated with a job. The knock-on effect is that, in service-related industries, they are able to provide high service levels, thereby increasing customer satisfaction. In production or manufacturing industries, they are able to work closely to industry standards in a more effective and efficient way.

Lesson plans

This manual provides a series of lesson plans that will guide delivery of each module for the Plastic Processor qualification. It is important for trainers to be flexible and be ready to adapt lesson plans to suit the context of the subject and the needs of their trainees.

Good teachers acknowledge that CBT means each and every trainee in the class learns at a different speed. The good teacher is prepared to throw aside the day's lesson plan and do something different (and unplanned) for the class even if it means 'writing' a lesson plan for each trainee to match their learning pace for that day or week.

Learning by doing is different from learning theory and then applying it. To learn to do something, trainees need someone looking over their shoulder saying 'it's not quite like that, it's like this', 'you do it like this because …', or even 'tell me why you chose to do it like this?'.

In this way, trainees learn that theoretical knowledge is meaningless if it is not seen in the context of what they are doing. In other words, if a trainee doesn't know why they do something, they will not do it competently (skills underpinned by knowledge = competent performer).

This is how a Plastic Processor acquires a practical grasp of the standards expected. It's not by learning it in theory, but because those standards are acquired through correction by people who show what the standards are, and correct the trainee where they do not meet those standards, and where they repeat it correction until they have internalized those standards.

Demonstration of skill

Demonstration or modeling a skill is a powerful tool, which is used, in vocational training. The instructions for trainers for demonstration are as under:

a) Read the procedure mentioned in the Trainer Guide for the relevant Learning Unit before demonstration.
b) Arrange all tools, equipment and consumable material, which are required for demonstration of a skill.
c) Practice the skill before demonstration to trainees, if possible.
d) Introduce the skill to trainees clearly at the commencement of demonstration.
e) Explain how the skill relates to the skill(s) already acquired and describe the expected results or show the objects to trainees.
f) Carry out demonstration in a way that can be seen by all trainees.
g) Use the same tools and materials that the learner will be using.
h) Go through EACH of the steps involved in performing the skill.
i) Go SLOWLY - describe each step as it is completed.
j) Encourage the learners to move around and watch what you are doing from a number of different angles.
k) Identify critical or complex steps, or steps that involve safety precautions to be followed.

l) Explain theoretical knowledge where applicable and ask questions to trainees to test their understanding.
m) Try to involve the learners: Ask them questions about why they think the process may work that way.
n) Repeat critical steps in demonstration, if required.
o) Summarize the demonstration by asking questions to trainees.

Involvement in the process (actively seeing) is important at this stage. When you work on getting involved, getting people to participate, you make them a part of what is happening. Questions for clarification or explanation are important throughout the demonstration. It is up to the learners to ask questions about things they do not understand, but it is also important for trainers to seek out and elicit questions from learners. A trainer may need to do repeated demonstrations of difficult or complex skills.

FORMAT FOR LESSON PLAN			
Module 6: Produce Injection Moulded Plastic Parts			
Learning Unit 1: Interpret Work Order			
Methods	Key Notes	Media	Time
	Lead a discussion on Interpreting Workorders. Encourage ALL trainees to participate in the discussion. Ensure that the discussion addresses the following points: • Obtain work order • Verify production quantity available • Ensure raw material available as per work order • Ensure machine setting for production as per data sheet provided		
	Introduction		
	This session will introduce learners to the necessary set of information required to run scheduled production. The process and steps necessary for the acquisition of such information and the relevant paperwork.		
	Main Body		
	• How to obtain workorder • Different sets of information contained in a workorder • Arrangement of raw material as per workorder • Setting up of machine as per workorder		
	Conclusion		
	To conclude the session, review the tools, techniques and material used for producing injection moulded plastic parts. Give learners the opportunity to ask questions.		
	<u>Assessment</u> Question and answer, discussion groups with feedback, observation of practice skills development		
			Total time:

Overview of the program

Course: Plastic Processor Level 3	**Total Course Duration:** 6 months
Course Overview:	
Plastic Processor curriculum will prepare students to efficiently operate plastic processing machines such as injection moulding, compression, and extrusion, and to perform basic preventive maintenance on most types of plastic processing machines and equipment. Coursework includes Safety, Plastic moulding Machines operations, grades, Legal & environmental concerns & equipment maintenance. Graduates of this program may find employment with state and local government agencies and private contractors engaged in manufacturing or other plastic processing activities.	

Module Title and Aim	Learning Units	Timeframe of modules
Module 1: Apply Work Health and Safety Practices (WHS) **Aim:** This unit describes the skills to work with safety and participate in hazard assessment activities, follow emergency procedures and participate OHS practices in process	**LU1.** Implement safe work practices at workplace **LU2.** Participate in hazard assessment activities a workplace **LU3.** Follow emergency procedures at workplace **LU4.** Participate in OHS consultative processes	30
Module 2: Identify and Implement Workplace Policy and Procedures **Aim:** This unit describes the skills and knowledge required to develop and implement a workplace policy & procedures and to modify the policy to suit changed circumstances. It applies to individuals with managerial responsibilities who undertake work developing approaches to create, monitor and improve strategies and policies within workplaces and engage with a range of relevant stakeholders and specialists.	**LU1.** Identify workplace policy & procedures **LU2.** Implement workplace policy & procedures **LU3.** Communicate workplace policy & procedures **LU4.** Review the implementation of workplace policy & procedures	20

Module Title and Aim	Learning Units	Timeframe of modules
Module 3: Communicate at Workplace **Aim:** This unit describes the performance outcomes, skills and knowledge required to develop communication skills in the workplace. It covers gathering, conveying and receiving information, along with completing assigned written information under direct supervision.	**LU1.** Communicate within the organization **LU2.** Communicate outside the organization **LU3.** Communicate effectively in workgroup **LU4.** Communicate in writing	30
Module 4: Perform Computer Application Skills **Aim:** This unit describes the skills and knowledge required to use spreadsheet applications, prepare in page documents, develops familiarity with Word, Excel, Access, PowerPoint, email, and computer graphics basics. It applies to individuals who perform a range of routine tasks in the workplace using a fundamental knowledge of spreadsheets, Microsoft office and computer graphics in under direct supervision or with limited responsibility	**LU1.** Prepare In-page documents as per required information **LU2.** Prepare Spreadsheets as per required information **LU3.** Use MS Office as per required information **LU4.** Perform computer graphics in basic applications **LU5.** Create Email account for communications	40
Module 5: Manage Personal Finances **Aim:** This unit of competency describes the outcomes required to manage develop, implement and monitor a personal budget in order to plan regular savings and manage debt effectively.	**LU1.** Develop a personal budget **LU2.** Develop long term personal budget **LU3.** Identify ways to maximize future finances	30

Module Title and Aim	Learning Units	Timeframe of modules
Module 6: Operate Injection Moulding Machine **Aim:** This competency standard is designed to provide skills and knowledge to operate injection moulding machine in accordance with the manufacturer's manual.	**LU1:** Adjust Moulding machine parameters **LU2:** Perform Dry Run **LU3:** Perform Semi Auto Operation **LU4:** Perform Production **LU5:** Perform follow up procedure for machine production **LU6:** Submit production report **LU7:** Transport finish product to concerned department	175
Module 7: Operate Pipe Extrusion Machine Operation **Aim:** This competency standard covers specific knowledge related to operation of pipe extrusion machine and explaining parameters setting, running procedure, and reporting procedure of machine.	**LU1:** Inspect extrusion machine pre-start parameters **LU2:** Carry out operation **LU3:** Start production as per requirement **LU4:** Perform follow up procedure **LU5:** Submit Production Report **LU6:** Transport Finished Product	150
Module 8: Operate Compression Moulding Machine **Aim:** The standard covers specific knowledge related to operation of compression moulding machine and explaining parameters setting, dry run procedure, and reporting procedure of machine.	**LU1:** Adjust parameters of machine **LU2:** Perform Dry Run **LU3:** Perform Semi-auto Operation **LU4:** Perform Production **LU5:** Perform Follow up procedure for Machine Production **LU6:** Submit Production Report **LU7:** Transport Finished Product to Concerned Department	150

Module Title and Aim	Learning Units	Timeframe of modules
Module 9: Operate Blow Moulding Machine **Aim:** The standard covers specific knowledge related to operation of blow moulding machine and explaining parameters setting, dry run procedure, and reporting procedure of machine.	**LU1:** Adjust Moulding Machine parameters **LU2:** Perform Dry Run **LU3:** Perform Semi-auto Operation **LU4:** Perform Production **LU5:** Perform Follow up procedure for Machine Production **LU6:** Submit Production Report **LU7:** Transport Finished Product to Concerned Department	175

Trainer's guidelines

Module 6: 072200915 Operate Injection Moulding Machine for Production			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU1: Adjust Moulding machine parameters	Deliver an illustrated presentation on how to adjust Moulding machine parameters. Ensure you address the importance of the following points: i) Moulding cycle from feeding to ejection • Set processing parameters as per job card • Ensure desired temperatures are achieved • Ensure raw material is ready for processing (De-humidified, etc.) • Ensure all peripheral equipments are working properly (oil pump, air filter, hydraulics, motors, pneumatics, etc.) ii) Recognize screw configurations • Check shot size and speed • Check injection pressure and other parameters In the end of the presentation include some multiple-choice questions for the feedback of students	Classroom / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Injection Moulding Machine Mould Utility documentation. Service Manuals. Operational Manuals. Basic Hand tools Job card/PPS
LU2: Perform Dry Run	Deliver an illustrated presentation on how to perform dry run. Ensure you address the importance of the following points: i) Knowledge and understanding of mould and it's mechanism ii) Understanding of hydraulic and pneumatic systems	Classroom / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers

	iii) Manual operation of injection mounding machine iv) Identify runner, gate and clamping v) Identify two plate, slider mould, hot runner mould vi) Identify and set up part ejection in the mould After presentation, take the students in workshop and make them to identify different types of injection moulding machines. Demonstrate them the following key points: • How to estimate mould opening & closing position • How to injection speed Arrange a question and answer session to clarify trainees' understanding. After the practical sessions are complete, lead a feedback session. Ask learners to complete a self-assessment form on their ability to perform dry run. Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions.		Injection Moulding Machine Mould Utility documentation. Service Manuals. Operational Manuals. Basic Hand tools Job card/PPS
LU3: Perform semi-auto operation	Deliver an illustrated presentation on how to perform semi-auto operation. Ensure you address the importance of the following points: i) Recognize machine controls ii) Learn to adjust temperatures from feed zone to injection point iii) Learn to adjust injection pressure iv) Perform Dry-run v) Perform Semi-auto operation vii) Maintaining product quality as per specifications	Classroom / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Injection Moulding Machine Mould Utility documentation.

	• Be able to measure components for identification of dimensional defects • Usage of measurement tools is critical: Vernier caliper, micrometer gauge, scale, etc. viii) Recognize different defects and their causes • Be able to visually identify commonly occurring defects, such as gating, flashing, orange-peel, etc. ix) Gain knowledge of rectification of commonly occurring defects. After presentation, take the students in workshop and make them to identify different types of injection moulding machines. Demonstrate them the following key points: • How to estimate ideal mould temperature • How to injection pressure Arrange a question and answer session to clarify trainees' understanding. After the practical sessions are complete, lead a feedback session. Ask learners to complete a self-assessment form on their ability to perform dry run. Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions.		Service Manuals. Operational Manuals. Basic Hand tools Job card/PPS
LU4: Perform Production	Deliver an illustrated presentation about how to perform production. Ensure that the presentation focuses on the following key points: i) Machine operation in automatic mode • Be able to perform dry-run • Be able to perform semi-auto operation	Classroom / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers

	• Up on successfully obtaining required product, switching the machine to auto mode ii) Maintaining product quality as per specifications • Be able to measure components for identification of dimensional defects • Usage of measurement tools is critical: Vernier caliper, micrometer gauge, scale, etc. iii) Recognize different defects and their causes • Be able to visually identify commonly occurring defects, such as gating, flashing, orange-peel, etc. • Gain knowledge of rectification of commonly occurring defects. In the end of the presentation include some multiple-choice questions for the feedback of students After the presentation take the students to the workshop and show them what are the steps to set the machine on auto-cycle and how perform periodic quality checks. Ensure that all students can clearly observe the process and encourage them to ask the questions Ask each trainee to perform workpiece setting and continue monitor that each student has properly understood the method		Injection Moulding Machine Mould Utility documentation. Service Manuals. Operational Manuals. Basic Hand tools Job card/PPS
LU3: Perform follow-up procedure for machine production	Deliver an illustrated presentation about perform follow-up procedure for machine production. Ensure that the presentation focuses on the following key points: i) Knowledge of product packaging	Classroom / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers

	• Understand different types of packaging, e.g.; flexible packaging, packing in cartons, etc. • How to pack final product? ii) Raw material input in moulding machine • Ensure consistent raw material feed into hopper/feeder • Be able to use overhead crane or moveable lifts/ladders • Understand the importance of cutting tools in opening raw material bags. • Concept of 'clean slits' using sharp tools to ensure particles of bag don't get mixed in raw material iii) Lubrication requirements and procedure of machine • Understand the concept of lubricating moveable parts of machines • Carefully use mould lubricant sprays • Ensure spray cans are stored in a secure location after pre-shot application • Be able to identify different mould release agents as per raw material • Be able to provide first-hand feedback to maintenance department for periodic machine maintenance Ask students to observe all the process. Learners must be able to practice and develop their knowledge and skills relating to parting in an appropriate practical setting.		Utility documentation. Service Manuals. Operational Manuals. Basic Hand tools

LU4: Submit Production report	Begin this session with an illustrated presentation on submission of production report. Ensure that the presentation addresses the following points, including demonstrations of preparation and methods where appropriate: i) Production report writing • Understand the importance of reporting accurate production quantity • Be able to fill-in relevant production reports • Be able to identify waste generated along with identification of machine downtime with reasons ii) Data sharing with relevant departments • Understanding the concept of producing accurate data and benefits of the same on a larger scale Submission of production reports to production planning department or the supervisor for timely actions. Arrange a question and answer session to clarify trainee understanding.	Classroom / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Injection Moulding Machine Mould Utility documentation. Service Manuals. Operational Manuals. Basic Hand tools
LU5: Transport finished product to concerned department	Deliver an illustrated presentation on how to transport finished product to concerned department. Ensure you address the importance of the following points: i) Understand QC protocols • Understand and appreciate the importance of producing products as per specification • Be able to implement the first quality control protocol on machine to ensure elimination of defective products at sight ii) Inter-department co-ordination	Classroom / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Injection Moulding Machine Mould Utility documentation. Service Manuals.

	• Be able to co-ordinate with QC department with produced batches for relevant approvals iii) Be able to hand over final products to store • Familiarize with handing-over protocols and paperwork. Prepare either: • A flip chart • A PowerPoint slide • A handout …showing key topics. Learners need to work in small groups discussing the key topics. Each group should make notes from their discussions that identify **three main points** that related to **each key topic**. After the discussion, begin the feedback session. Ask one group to share the main points they have recorded for the first key topic. Discuss these main points briefly with the whole group. Learners should make additional notes to record additional points their group had not identified. Then ask the next group to share the main points they have recorded for the second key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. Learners must be able to practice and develop their knowledge and skills relating to product transportation and QC protocols. Ensure that learners have the opportunity to ask questions to support their understanding.		Operational Manuals. Basic Hand tools

Module 7: 072200916 Operate Pipe Extrusion Moulding Machine			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU1: Inspect extrusion machine pre-start parameters	Deliver an illustrated presentation on how to inspect extrusion machine pre-start parameters. Ensure you address the importance of the following points: i) Machine controls • Learn to input processing parameters in the machine and peripheral components ii) Peripheral equipments such as air compressors, chillers, vacuum pump, printer, dryer, etc. • Ensure working and operation of all affiliated equipment In the end of the presentation include some multiple-choice questions for the feedback of students	Classroom / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Extruder Mixer Pipe Extrusion Downstream line Extruded product samples Utility documentation. Service Manuals. Operational Manuals. Basic Hand tools Job card/PPS
LU2: Carry out operation	Deliver an illustrated presentation on how to carry out operation. Ensure you address the importance of the following points: i) Machine controls ii) Temperature adjustment from feed-zone to metering zone	Classroom / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Extruder

	iii) Usage of Purging material to ensure clean extruder and die iv) Input Raw material for production of pipe v) Ensure concentric extrudate output from die head vi) Ensure vacuum is obtain in water bath vii) Pipe dimensions as per standard viii) Ensure cutting of pipe in desired length After presentation, take the students in workshop and make them to identify different types of extrusion machines. Demonstrate them the following key points: • How to purge • How to extrude flow • How to guide the extrudate to haul off • How to check pipe concentricity • How to set up vacuum bath • How to ensure cutting pipe length as required Arrange a question and answer session to clarify trainees' understanding. After the practical sessions are complete, lead a feedback session. Ask learners to complete a self-assessment form on their ability to perform dry run. Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions.		Mixer Pipe Extrusion Downstream line Extruded product samples Utility documentation. Service Manuals. Operational Manuals. Basic Hand tools Job card/PPS
LU3: Start production as per requirement	Deliver an illustrated presentation about how to start production as per requirement. Ensure that the presentation focuses on the following key points: i) Machine controls	Classroom / Demonstration room Workshop	Multimedia Handouts Learner's guide White board

	• Learn to input processing parameters in the machine and peripheral components ii) Machine operation in automatic mode • Be able to perform semi-auto operation • Up on successfully obtaining required product specification, switching the machine to auto mode iii) Peripheral equipments such as air compressors, chillers, vacuum pump, printer, dryer, etc. • Ensure working and operation of all affiliated equipment In the end of the presentation include some multiple-choice questions for the feedback of students After the presentation take the students to the workshop and show them what are the steps to set the extruder and how different sizes of pipes are produced Ensure that all students can clearly observe the process and encourage them to ask the questions Ask each trainee to perform workpiece setting and continue monitor that each student has properly understood the method		Board markers Extruder High speed mixer Pipe extrusion downstream line Extruded product samples Operation manual Basic Hand Tools
LU3: Perform follow up procedure	Deliver an illustrated presentation about follow-up procedures. Ensure that the presentation focuses on the following key points i) Knowledge of pipe standards (BS 3505, etc.)	Classroom / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers

	• Understand the difference in producing pipes as per multiple standards • Memorize dimensions of pipes as per commonly used standards ii) Maintaining product quality as per specifications • Be able to measure components for identification of dimensional defects • Usage of measurement tools is critical: Vernier caliper, micrometer gauge, scale, etc. iii) Raw material input in machine • Ensure consistent raw material feed into hopper/feeder • Be able to use overhead crane or moveable lifts/ladders • Understand the importance of cutting tools in opening raw material bags. • Concept of 'clean slits' using sharp tools to ensure particles of bag don't get mixed in raw material iv) Lubrication requirements and procedure of machine • Understand the concept of lubricating moveable parts of machines • Be able to provide first-hand feedback to maintenance department for periodic machine maintenance v) Recognize different defects and their causes • Be able to visually identify commonly occurring defects, such as eccentricity, burn lines, blistering, etc.		Extruder High speed mixer Pipe extrusion downstream line Extruded product samples Operation manual Basic Hand Tools

	• Gain knowledge of rectification of commonly occurring defects. In the end of the presentation include some multiple-choice questions for the feedback of students After the presentation take the students to the workshop and show them all types of extruders and their method of identification Demonstrate the extrusion process by producing a pipe to the students ensure that all students can clearly observe the process, encourage them to ask the questions.		
LU4: Submit production report	Begin this session with an illustrated presentation on submission of production report. Ensure that the presentation addresses the following points, including demonstrations of preparation and methods where appropriate: i) Production report writing • Understand the importance of reporting accurate production quantity • Be able to fill-in relevant production reports • Be able to identify waste generated along with identification of machine downtime with reasons ii) Data sharing with relevant departments • Understanding the concept of producing accurate data and benefits of the same on a larger scale Submission of production reports to production planning department or the supervisor for timely actions.	Classroom / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Extruder High speed mixer Pipe extrusion downstream line Extruded product samples Operation manual Basic Hand Tools

	Arrange a question and answer session to clarify trainee understanding.		
LU5: Transport finished product to concerned department	Deliver an illustrated presentation on how to transport finished product to concerned department. Ensure you address the importance of the following points: i) Understand QC protocols • Understand and appreciate the importance of producing products as per specification • Be able to implement the first quality control protocol on machine to ensure elimination of defective products at sight ii) Inter-department co-ordination • Be able to co-ordinate with QC department with produced batches for relevant approvals iii) Be able to hand over final products to store • Familiarize with handing-over protocols and paperwork. Prepare either: • A flip chart • A PowerPoint slide • A handout …showing key topics. Learners need to work in small groups discussing the key topics. Each group should make notes from their discussions that identify **three main points** that related to **each key topic**. After the discussion, begin the feedback session. Ask one group to share the main points they have recorded for the first key topic. Discuss these main points briefly with the whole group. Learners should	Classroom / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Extruder High speed mixer Pipe extrusion downstream line Extruded product samples Operation manual Basic Hand Tools

	make additional notes to record additional points their group had not identified. Then ask the next group to share the main points they have recorded for the second key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. Learners must be able to practice and develop their knowledge and skills relating to product transportation and QC protocols. Ensure that learners have the opportunity to ask questions to support their understanding.		

Module 8: 072200918 Operate Blow Moulding Machine			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU1: Adjust Moulding machine parameters	Deliver an illustrated presentation on how to interpret work order. Ensure you address the importance of the following points: i) Identify production cycle from feeding to de-molding of product ii) Understand the materials used for moulding iii) Difference between types of heaters, thermocouples & controllers for mould iii) Machine controls • Learn to input processing parameters in the machine and peripheral components iv) Ensure working of peripheral equipments such as air compressors, chillers, vacuum pump, printer, dryer, etc. v) Moulding cycle from feeding to ejection • Set processing parameters as per job card • Ensure desired temperatures are achieved • Ensure raw material is ready for processing (De-humidified, etc.) • Ensure all peripheral equipments are working properly (oil pump, air filter, hydraulics, motors, pneumatics, etc.) vi) Recognize screw configurations • Check shot size and speed vii) Check injection pressure and other parameters	Classroom / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Blow moulding machine Machine mould Air compressor Vacuum machine De-humidifier Chiller for cold water Utility documentation Service manual Operation manual Basic hand tools

	After presentation, take the students in workshop and make them to identify different types of blow moulding machines. Demonstrate them the following key points: • How to check raw material to set machine operation • How to turn on machine as per instruction manual Arrange a question and answer session to clarify trainees' understanding. After the practical sessions are complete, lead a feedback session. Ask learners to complete a self-assessment form on their ability to perform dry run. Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions.		
LU2: Perform Dry Run	Deliver an illustrated presentation on how to perform dry run. Ensure you address the importance of the following points: i) Knowledge and understanding of mould and it's mechanism ii) Understanding of hydraulic and pneumatic systems iii) Manual operation of injection mounding machine iv) Ensure functionality of clamping mechanism v) Identify and set up part ejection in the mould After presentation, take the students in workshop and make them to identify different types of blow moulding machines. Demonstrate them the following key points:	Classroom / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Blow moulding machine Machine mould Air compressor Vacuum machine De-humidifier Chiller for cold water Utility documentation

	vi) How to estimate mould opening & closing position vii) How to check ejector mechanism Arrange a question and answer session to clarify trainees' understanding. After the practical sessions are complete, lead a feedback session. Ask learners to complete a self-assessment form on their ability to perform dry run. Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions.		Service manual Operation manual Basic hand tools
LU3: Perform semi-auto operation	Deliver an illustrated presentation on how to perform semi-auto operation. Ensure you address the importance of the following points: i) Recognize machine controls ii) Learn to adjust temperatures from feed zone to injection point iii) Learn to adjust injection pressure iv) Perform Semi-auto operation v) Check for day-light opening After presentation, take the students in workshop and make them to identify different types of blow moulding machines. Demonstrate them the following key points: vi) How to estimate ideal mould temperature vii) How to feed material Arrange a question and answer session to clarify trainees' understanding.	Classroom / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Blow moulding machine Machine mould Air compressor Vacuum machine De-humidifier Chiller for cold water Utility documentation Service manual Operation manual Basic hand tools

	After the practical sessions are complete, lead a feedback session. Ask learners to complete a self-assessment form on their ability to perform dry run. Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions.		
LU4: Perform Production	Deliver an illustrated presentation about how to perform production. Ensure that the presentation focuses on the following key points: i) Maintaining product quality as per specifications • Be able to measure components for identification of dimensional defects • Usage of measurement tools is critical: Vernier caliper, micrometer gauge, scale, etc. ii) Recognize different defects and their causes • Be able to visually identify commonly occurring defects, such as flashing, pin-holes, short-shots, etc. • Gain knowledge of rectification of commonly occurring defects. In the end of the presentation include some multiple-choice questions for the feedback of students After the presentation take the students to the workshop and show them what are the steps to set the machine on auto-cycle and how perform periodic quality checks. Ensure that all students can clearly observe the process and encourage them to ask the questions	Classroom / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Blow moulding machine Machine mould Air compressor Vacuum machine De-humidifier Chiller for cold water Utility documentation Service manual Operation manual Basic hand tools

	Ask each trainee to perform workpiece setting and continue monitor that each student has properly understood the method		
LU5: Perform follow up procedure	Deliver an illustrated presentation about follow-up procedures. Ensure that the presentation focuses on the following key points i) Knowledge of product packaging • Understand different types of packaging, e.g.; flexible packaging, packing in cartons, etc. • How to pack final product? ii) Raw material input in moulding machine • Ensure consistent raw material feed into hopper/feeder • Be able to use overhead crane or moveable lifts/ladders • Understand the importance of cutting tools in opening raw material bags. • Concept of 'clean slits' using sharp tools to ensure particles of bag don't get mixed in raw material iii) Lubrication requirements and procedure of machine • Understand the concept of lubricating moveable parts of machines • Carefully use mould lubricant sprays • Ensure spray cans are stored in a secure location after pre-shot application • Be able to identify different mould release agents as per raw material	Classroom / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Blow moulding machine Machine mould Air compressor Vacuum machine De-humidifier Chiller for cold water Utility documentation Service manual Operation manual Basic hand tools

	• Be able to provide first-hand feedback to maintenance department for periodic machine maintenance In the end of the presentation include some multiple-choice questions for the feedback of students After the presentation take the students to the workshop and show them all types of blow moulding machines and their method of identification Demonstrate the blowing process by producing a sample to the students ensure that all students can clearly observe the process, encourage them to ask the questions.		
LU6: Submit production report	Begin this session with an illustrated presentation on submission of production report. Ensure that the presentation addresses the following points, including demonstrations of preparation and methods where appropriate: iii) Production report writing • Understand the importance of reporting accurate production quantity • Be able to fill-in relevant production reports • Be able to identify waste generated along with identification of machine downtime with reasons iv) Data sharing with relevant departments • Understanding the concept of producing accurate data and benefits of the same on a larger scale Submission of production reports to production planning department or the supervisor for timely actions.	Classroom / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Blow moulding machine Machine mould Air compressor Vacuum machine De-humidifier Chiller for cold water Utility documentation Service manual Operation manual Basic hand tools

	Arrange a question and answer session to clarify trainee understanding.		
LU7: Transport finished product to concerned department	Deliver an illustrated presentation on how to transport finished product to concerned department. Ensure you address the importance of the following points: iv) Understand QC protocols • Understand and appreciate the importance of producing products as per specification • Be able to implement the first quality control protocol on machine to ensure elimination of defective products at sight v) Inter-department co-ordination • Be able to co-ordinate with QC department with produced batches for relevant approvals vi) Be able to hand over final products to store • Familiarize with handing-over protocols and paperwork. Prepare either: • A flip chart • A PowerPoint slide • A handout …showing key topics. Learners need to work in small groups discussing the key topics. Each group should make notes from their discussions that identify **three main points** that related to **each key topic**. After the discussion, begin the feedback session. Ask one group to share the main points they have recorded for the first key topic. Discuss these main points briefly with the whole group. Learners should	Classroom / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Blow moulding machine Machine mould Air compressor Vacuum machine De-humidifier Chiller for cold water Utility documentation Service manual Operation manual Basic hand tools

	make additional notes to record additional points their group had not identified. Then ask the next group to share the main points they have recorded for the second key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. Learners must be able to practice and develop their knowledge and skills relating to product transportation and QC protocols. Ensure that learners have the opportunity to ask questions to support their understanding.		

Module 9: 072200917 Operate Compression Moulding Machine			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU1: Adjust Moulding machine parameters	Deliver an illustrated presentation on how to interpret work order. Ensure you address the importance of the following points: iv) Identify production cycle from feeding to de-molding of product v) Understand the materials used for moulding vi) Difference between types of heaters, thermocouples & controllers for mould vi) Machine controls • Learn to input processing parameters in the machine and peripheral components vii) Ensure working of peripheral equipments such as air compressors, chillers, vacuum pump, printer, dryer, etc. viii) Moulding cycle from feeding to ejection • Set processing parameters as per job card • Ensure desired temperatures are achieved • Ensure raw material is ready for processing (De-humidified, etc.) • Ensure all peripheral equipments are working properly (oil pump, air filter, hydraulics, motors, pneumatics, etc.) vii) Recognize screw configurations • Check shot size and speed viii) Check injection pressure and other parameters	Classroom / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Compression moulding machine & mould Weighing scale Plastic raw material Product samples Machine manual Job card

	After presentation, take the students in workshop and make them to identify different types of compression moulding machines. Demonstrate them the following key points: • How to check raw material to set machine operation • How to turn on machine as per instruction manual Arrange a question and answer session to clarify trainees' understanding. After the practical sessions are complete, lead a feedback session. Ask learners to complete a self-assessment form on their ability to perform dry run. Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions.		
LU2: Perform Dry Run	Deliver an illustrated presentation on how to perform dry run. Ensure you address the importance of the following points: i) Knowledge and understanding of mould and it's mechanism ii) Understanding of hydraulic and pneumatic systems iii) Manual operation of injection mounding machine iv) Ensure functionality of clamping mechanism v) Identify and set up part ejection in the mould After presentation, take the students in workshop and make them to identify different types of compression moulding machines. Demonstrate them the following key points:	Classroom / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Compression moulding machine & mould Weighing scale Plastic raw material Product samples Machine manual Job card

	• How to estimate mould opening & closing position • How to check ejector mechanism Arrange a question and answer session to clarify trainees' understanding. After the practical sessions are complete, lead a feedback session. Ask learners to complete a self-assessment form on their ability to perform dry run. Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions.		
LU3: Perform semi-auto operation	Deliver an illustrated presentation on how to perform semi-auto operation. Ensure you address the importance of the following points: i) Recognize machine controls ii) Learn to adjust temperatures from feed zone to injection point iii) Learn to adjust injection pressure iv) Perform Semi-auto operation v) Check for day-light opening After presentation, take the students in workshop and make them to identify different types of compression moulding machines. Demonstrate them the following key points: • How to estimate ideal mould temperature • How to feed material Arrange a question and answer session to clarify trainees' understanding.	Classroom / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Compression moulding machine & mould Weighing scale Plastic raw material Product samples Machine manual Job card

	After the practical sessions are complete, lead a feedback session. Ask learners to complete a self-assessment form on their ability to perform dry run. Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions.		
LU4: Perform Production	Deliver an illustrated presentation about how to perform production. Ensure that the presentation focuses on the following key points: i) Machine operation in automatic mode • Be able to perform dry-run • Be able to perform semi-auto operation • Up on successfully obtaining required product, switching the machine to auto mode ii) Maintaining product quality as per specifications • Be able to measure components for identification of dimensional defects • Usage of measurement tools is critical: Vernier caliper, micrometer gauge, scale, etc. iii) Recognize different defects and their causes • Be able to visually identify commonly occurring defects, such as gating, flashing, orange-peel, etc. • Gain knowledge of rectification of commonly occurring defects. In the end of the presentation include some multiple-choice questions for the feedback of students After the presentation take the students to the workshop and show them what are the steps to set	Classroom / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Compression moulding machine & mould Weighing scale Plastic raw material Product samples Machine manual Job card

	the machine on auto-cycle and how perform periodic quality checks. Ensure that all students can clearly observe the process and encourage them to ask the questions Ask each trainee to perform workpiece setting and continue monitor that each student has properly understood the method		
LU5: Perform follow up procedure	Deliver an illustrated presentation about follow-up procedures. Ensure that the presentation focuses on the following key points iv) Knowledge of product packaging • Understand different types of packaging, e.g.; flexible packaging, packing in cartons, etc. • How to pack final product? v) Raw material input in moulding machine • Ensure consistent raw material feed into hopper/feeder • Be able to use overhead crane or moveable lifts/ladders • Understand the importance of cutting tools in opening raw material bags. • Concept of 'clean slits' using sharp tools to ensure particles of bag don't get mixed in raw material vi) Lubrication requirements and procedure of machine • Understand the concept of lubricating moveable parts of machines • Carefully use mould lubricant sprays	Classroom / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Compression moulding machine & mould Weighing scale Plastic raw material Product samples Machine manual Job card

	• Ensure spray cans are stored in a secure location after pre-shot application • Be able to identify different mould release agents as per raw material • Be able to provide first-hand feedback to maintenance department for periodic machine maintenance In the end of the presentation include some multiple-choice questions for the feedback of students After the presentation take the students to the workshop and show them all types of compression moulding machines and their method of identification Demonstrate the compression process by producing a sample to the students ensure that all students can clearly observe the process, encourage them to ask the questions.		
LU6: Submit production report	Begin this session with an illustrated presentation on submission of production report. Ensure that the presentation addresses the following points, including demonstrations of preparation and methods where appropriate: v) Production report writing • Understand the importance of reporting accurate production quantity • Be able to fill-in relevant production reports • Be able to identify waste generated along with identification of machine downtime with reasons vi) Data sharing with relevant departments	Classroom / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Compression moulding machine & mould Weighing scale Plastic raw material Product samples Machine manual Job card

	• Understanding the concept of producing accurate data and benefits of the same on a larger scale Submission of production reports to production planning department or the supervisor for timely actions. Arrange a question and answer session to clarify trainee understanding.		
LU7: Transport finished product to concerned department	Deliver an illustrated presentation on how to transport finished product to concerned department. Ensure you address the importance of the following points: vii) Understand QC protocols • Understand and appreciate the importance of producing products as per specification • Be able to implement the first quality control protocol on machine to ensure elimination of defective products at sight viii) Inter-department co-ordination • Be able to co-ordinate with QC department with produced batches for relevant approvals ix) Be able to hand over final products to store • Familiarize with handing-over protocols and paperwork. Prepare either: • A flip chart • A PowerPoint slide • A handout …showing key topics. Learners need to work in small groups discussing the key topics. Each group should	Classroom / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Compression moulding machine & mould Weighing scale Plastic raw material Product samples Machine manual Job card

	make notes from their discussions that identify **three main points** that related to **each key topic**. After the discussion, begin the feedback session. Ask one group to share the main points they have recorded for the first key topic. Discuss these main points briefly with the whole group. Learners should make additional notes to record additional points their group had not identified. Then ask the next group to share the main points they have recorded for the second key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. Learners must be able to practice and develop their knowledge and skills relating to product transportation and QC protocols. Ensure that learners have the opportunity to ask questions to support their understanding.		

Frequently Asked Questions

1. What is Competency Based Training (CBT) and how is it different from currently offered trainings in institutes?	Competency-based training (CBT) is an approach to vocational education and training that places emphasis on what a person can do in the workplace as a result of completing a program of training. Compared to conventional programs, the competency based training is not primarily content based; it rather focuses on the competence requirement of the envisaged job role. The whole qualification refers to certain industry standard criterion and is modularized in nature rather than being course oriented.
2. What is the passing criterion for CBT certificate?	You shall be required to be declared "Competent" in the summative assessment to attain the certificate.
3. How can I progress in my educational career after attaining this certificate?	You shall be eligible to take admission in the National Vocational Certificate Level-3 in Plastic Processor. You shall be able to progress further to National Vocational Certificate Level-4 in Plastic Processor; and take admission in a level-5, DAE or equivalent course. In certain case, you may be required to attain an equivalence certificate from The Inter Board Committee of Chairmen (IBCC).
4. What is the importance of this certificate in National and International job market?	This certificate is based on the nationally standardized and notified competency standards by National Vocational and Technical Training Commission (NAVTTC). These standards are also recognized worldwide as all the standards are coded using international methodology and are accessible to the employers worldwide through NAVTTC website.
5. Which jobs can I get after attaining this certificate? Are there job for this certificate in public sector as well?	Plastic Processors are employed in the manufacturing engineering and production sector especially in automobile, household goods, electrical and electronics appliances etc. Experienced Plastic Processor may advance through promotions with the same employer or by moving to more advanced positions with other employers. They can become: • Process Operator

	• Process Technician • Process/Machine Tool Setter/Fitter
6. What are possible career progressions in industry after attaining this certificate?	You shall be able to progress up to the level of supervisor after attaining sufficient experience, knowledge and skills during the job. Attaining additional relevant qualifications may aid your career advancement to even higher levels. Some experienced Plastic Processor achieve a highly respected level of salaries. There are good prospects for travel both within Pakistan and abroad. The employment outlook in this occupation will be influenced by a wide variety of factors including: • Trends and events affecting overall employment (especially in the manufacturing industry) • Location in Pakistan • Employment turnover (work opportunities generated by people leaving existing positions) • Occupational growth (work opportunities resulting from the creation of new positions that never existed before) • Size of the industry • Flexibility of the applicant (concerning location and schedule of work)
7. Is this certificate recognized by any competent authority in Pakistan?	This certificate is based on the nationally standardized and notified competency standards by National Vocational and Technical Training Commission (NAVTTC). The official certificates shall be awarded by the relevant certificate awarding body.
8. Is on-the-job training mandatory for this certificate? If yes, what is the duration of on-the-job training?	On-the-job training is not a requirement for final / summative assessment of this certificate. However, taking up on-the-job training after or during the course work may add your chances to get a job afterwards.

9. What is the examination / assessment system in this program?	Competency based assessments are organized by training institutes during the course which serve the purpose of assessing the progress and preparedness of each student. Final / summative assessments are organized by the relevant qualification awarding bodies at the end of the certificate program. You shall be required to be declared "Competent" in the summative assessment to attain the certificate.
10. Does this certificate enable me to work as freelancer?	You can start your small business as a Plastic Processor. You may need additional skills on entrepreneurship to support your initiative.

Short Questions/Answers

Q1. Which plastics are used in injection molding?	Thermoplastics
Q2. What types of polymeric materials (plastics and elastomers) are there?	Amorphous and Semi-crystalline
Q3. What is the difference between parallel and conical twin screw extruders?	Conical twin screws are used for better throughput and parallel twin screws are used for better mixing.
Q4. Complex shape of parts or components cannot be formed by the injection moulding process.	False
Q5. Components from injection moulding process are made very expensive due to the application of very costly equipment.	False
Q6. The moulding directions in injection moulding can affect the cost of equipments used in the process.	True
Q7. The flow of plastic in the mould cavity is more proper and smooth if the thickness of the component made is very small.	False
Q8. Shrinkage of the plastic parts in mould cavity can results in generation of sink holes in the plastic.	True
Q9. A heavy surface finishing is always required for components made in injection moulding machine.	False
Q10. In injection moulding process, ribs are generally provided for the reinforcement to avoid sink marks from the component.	True
Q11. The barrel is used for opening and closing of the mold.	False

Q12. There is a varied pressure provided in the solidification unit of injection molding process.	False
Q13. Calendering is mostly suited for making PVC	True
Q14. Tubes having U shape cannot be manufactured by polymer extrusion process.	False
Q15. Extrusion is a process which uses an electric system for processing various polymers.	False
Q16. Thermosetting polymers can be processed by extrusion process by forming cross-linking in the extruder.	True
Q17. In processing polymers, injection moulding process is almost similar to extrusion process except for the screw operation.	True
Q18. Extruder is a device used for the finishing of processed polymer products in the extrusion process.	False
Q19. Continuous type of extruder is generally equipped with rotating parts in the extrusion process.	True
Q20. Multiple screw extruders are mostly preferred than the single screw extruders in the extrusion process.	False
Q21. In the extrusion process, a cast type barrel is mainly used for the heating of polymer material.	False
Q22. Extruder die is a machine part that gives final shape to the polymer material used in the extrusion process.	True

Q23. In the extrusion process, a water-cooling system is used which automatically controlled by a sensor.	True
Q24. Speed of production in transfer molding is higher than that of compression molding?	True
Q25. Thermosetting materials are the polymeric materials which get soften on heating with or without pressure.	False
Q26. Thermosetting plastics are generally used for making products of high strength and rigidness.	True
Q27. Polyurethanes plastics can be made in flexible foams even after belonging to thermosetting polymers.	True
Q28. Polyethylene, polypropylene and polyvinyl chloride (PVC) are the main example of thermosetting polymers.	False
Q29. Thermosetting plastics like epoxies can be used for filament wound rocket motor casings in missiles by combining with glass fibers.	True
Q30. Polyurethane plastics are highly reactive to chemical compounds due to lack of elasticity in this plastics.	False
Q31. Phenolic plastics can also be used as binder for holding plies of wood in making of plywood.	True
Q32. Thermosetting plastics can be used for manufacturing of windshield for airplane.	False

Q33. Mechanical properties of any plastics are mainly dependent on the temperature, force and time of load applied.	True
Q34. The heater in vacuum forming process is heated up to 90°C.	True
Q35. The initial cost in blow molding is low.	True
Q36. Blow moulding is a very slow process, however economical for producing products with better quality.	False
Q37. In extrusion blow moulding process, it is very difficult to trim away excess of plastics	True
Q38. Single stage stretch blow moulding is always preferred than two stage stretch blow moulding for increase in production rate.	False
Q39. Single stage stretch blow moulding process is mostly used for small level production.	True
Q40. Thermoforming process involves injecting of molten plastic into a mould cavity by application of compressed air.	False
Q41. In thermoforming process, it is very difficult to control thickness of moulded parts or sheets.	True
Q42. In thermoforming, it is very easy to mould the plastic materials which are of crystalline nature.	False
Q43. Thermoforming is basically a cheap process as compared to injection and blow moulding process.	True

Q44. Which material is mostly used for making of thermoforming moulds?	Aluminum

Test Yourself (Multiple Choice Questions)

MODULE	6		
Question	**1**	Three overall classes of plastics are distinguished from one another. They include thermosets, thermoplastics and _____	A Monomers B Synthesis C Elastomers D Fibers
Question	**2**	Thermoplastics are soluble and _____	A Densely cross-linked B Fusible C Non-fusible D Crystalline

Question 3 Amorphous thermoplastics are _____ when they are not combined with fillers or similar additives.

A Transparent

B Milky opaque

C Translucent

D Black

Question 4 Polycarbonate (PC), from which Compact Disks are molded, is a(n) _____ thermoplastic.

A Amorphous

B Semi-crystalline

C Liquid Crystal

D Immiscible

Question 5 _____ cannot be fused or dissolved but can be swelled.

A Thermoplastics

B Elastomers

C Thermosets

D Composites

Question 6 Thermosets are non-fusible and _____

A Soft

B Densely cross-linked

C Dense

D Irregular shaped

Question 7 The intermolecular forces which operate in the crystalline state are considerably _____ than those in the amorphous state.

A Weaker

B Stronger

C Complex

D Diverse

Question 8 The abbreviation for polyamide, as specified by IS0 1043, is _____

A PS

B PA

C PC

D PVA

Question 9 Processing temperatures are _____ for thermoplastics than for metals.

A Higher

B Lower

C Left

D Right

Question 10 Viscosity is a measure of the _____ of a melt.

A Hardness

B Flow properties

C Density

D Visco-elasticity

Question 11 As temperature decreases, the viscosity of the melt _____

A Increases

B Decreases

C Varies

Question 12 The injection Moulding process can be divided into the following phases: injection, holding pressure, cooling, feeding and _____.

A Locking

B Removal

C Cleaning

D Closing

Question 13 The nozzle is _____ during the injection phase.

A Closed

B Open

C Perforated

D Ejected

Question 14 The screw moves towards the _____ during the injection phase.

A Hopper

B Nozzle

C Pump

D Motor

Question 15 Compensation for shrinkage occurs during the _____ phase.

A Injection

B Holding pressure

C Feed

D Metering

Question 16 The point at which no more melt can be forced into the molded part is called the _____.

A Melting point

B Holding point

C Sealing point

D Melting point

Question 17 The holding pressure is generally _____ than the injection pressure.

A Lower

B Double

C Equal

D Higher

Question 18 A _____ amount of material is conveyed into the cavity during the holding pressure phase.

A Large

B Small

C Equal

D Twice

Question 19 The cycle time _____ be determined by the plasticating time.

A Must

B Must not

Question	**20**	The _____ phase runs concurrently with the feed phase.	A	Cooling
			B	Injection
			C	Holding pressure
			D	Metering
MODULE	**7**			
Question	**21**	Which of the following material is not used in extrusion?	A	Wax
			B	Granules
			C	Powder
			D	Pellets
Question	**22**	In extrusion process, extra shearing occurs in which part of the system?	A	Feed section
			B	Pumping section
			C	Collapse section
			D	Transition section

Question 23 Melting section is another name for which section?

A Feed Section

B Transition section

C Transition section

D Collapse section

Question 24 How are extruded materials cooled?

A Water

B Contact with chilled surface

C Air

D Oil

Question 25 Which of the following is not an important factor of cooling in extrusion?

A Reduction in shrinkage

B Reduction in distortion

C Ease of adding colors

D Rate of cooling

Question 26 Which of the following is not an application of polymer extrusion?

A Door insulation

B Chewing gums

C Cables

D Circuit boards

Question 27 Film extrusion process, best involves film having thickness below what length?

A 0.2mm

B 0.3mm

C 0.4mm

D 0.5mm

Question	**28**	In cable extrusion process, what is the speed of product winding?	A	40m/s
			B	50m/s
			C	60m/s
			D	70m/s
Question	**29**	Which of the following equipment is used for controlling the temperature of polymer material in the extrusion process?	A	Thermoresister
			B	Thermometer
			C	Thermocouple
			D	Glasstube
MODULE	**8**			
Question	**30**	In blow molding, to inflate soft plastic, which medium is used?	A	Air
			B	Water

C Oil

D Alcohol

Question 31 Which of the following plastics is not used in blow molding?

A Terephthalate

B Polypropylene

C Polyethylene

D PVC

Question 32 What is the minimum air pressure required in blow molding process?

A 350KPa

B 400KPa

C 450KPa

D 500KPa

Question 33 What can be the maximum pressure to be given to a plastic for blow molding process?

A 700KPa

B 750KPa

C 800KPa

D 850KPa

Question 34 Which of the following is not a type of blow molding process?

A Injection blow moulding

B Extrusion blow moulding

C Multi-smaller blow moulding

D Multi-larger blow moulding

Question 35 Which of the following is not an application of blow molding process?

A Toy bodies

B Door liners

C Bottles

D Pipes

Question 36 What is the maximum thickness that can be allowed for a plastics sheet in vacuum forming process?

A 3mm

B 3.1mm

C 3.2mm

D 3.3mm

Question	**37**	What is the minimum thickness required by the plastic for vacuum forming?	A	0.125mm
			B	0.25mm
			C	0.375mm
			D	0.5mm
MODULE	**9**			
Question	**38**	What is the minimum pressure required in a compression molding process?	A	0.5MPa
			B	1MPa
			C	1.5MPa
			D	2MPa

Question 39 What is the minimum temperature required in a compression molding process?

A 120°C

B 125°C

C 130°C

D 135°C

Question 40 What is the maximum pressure required in a compression molding process?

A 35MPa

B 40MPa

C 45MPa

D 50MPa

Question 41 What is the maximum temperature required in a compression molding process?

A 240°C

B 245°C

C 250°C

D 255°C

Question 42 In compression molding, the curing time does not depend on which of the following factors?

A Material

B Curing temperature

C Geometry

D Thickness

Multiple Choice Questions Answer scheme

Module 6:

Q1: C
Q2: B
Q3: B
Q4: B
Q5: C
Q6: B
Q7: B
Q8: B
Q9: B
Q10: B
Q11: A
Q12: B
Q13: B
Q14: B
Q15: B
Q16: C
Q17: D
Q18: B
Q19: B
Q20: A

Module 7:

Q21: A

Q22: B
Q23: B
Q24: B
Q25: C
Q26: B
Q27: D
Q28: B
Q29: C

Module 8

Q30: A
Q31: A
Q32: B
Q33: C
Q34: C
Q35: D
Q36: C
Q37: A

Module 9

Q38: A
Q39: B
Q40: D
Q41: C
Q42: B

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