

ELECTRONIC HOME APPLIANCES TECHNICIAN



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CBT CURRICULUM

National Vocational Certificate Level 2

Version 1 - July 2015



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1. Introduction

Name of the course: Electronics Home Appliances

Home appliances are electrical/mechanical machines which accomplish some household functions, such as cooking or cleaning.

Home appliances can be classified into:

- Major appliances, or white goods
- Small appliances,
- Consumer electronics, or brown goods

This division is also noticeable in the maintenance and repair of these kinds of products. Brown goods usually require high technical knowledge and skills (which get more complex with time, such as going from a soldering iron to a hot-air soldering station), while white goods may need more practical skills and "brute force" to manipulate the devices and heavy tools required to repair them.

Given a broad usage, the domestic application attached to "home appliance" is tied to the definition of appliance as "An instrument or device designed for a particular use or function. More specifically, Collins dictionary defines "Home appliance" as: "devices or machines, usually electrical, that are in your home and which you use to do jobs such as cleaning or cooking. The broad usage, afforded to the definition allows for nearly any device intended for domestic use to be a home appliance, including consumer electronics as well as stoves, refrigerators, toasters, air conditioners to light bulbs and well pumps.

History

While many appliances have existed for centuries, the self-contained electric or gas powered appliances are a uniquely American innovation that emerged in the twentieth century. The development of these appliances is tied the disappearance of full-time domestic servants and to reduce the time consuming activities in pursuit of more recreational time. In the early 1900s, electric and gas appliances included clothes washers, water heaters and refrigerators and sewing machines. Post-World War II, the domestic use of dishwashers, and clothes dryers where part of a shift for convenience. As discretionary spending increased, it was reflected by a rise in miscellaneous home appliances.

In America during the 1980s, the industry shipped \$1.5 billion worth of goods each year and employed over 14,000 workers, with revenues doubling between 1982 and 1990 to \$3.3 billion. Throughout this period companies merged and acquired one another to reduce research and production costs and eliminate competitors, resulting in anti-trust legislation. The United States Department of Energy passed the National Appliance Energy Conservation Act in 1987 which set energy standards that required manufacturers to reduce the energy consumption of the appliances by 25% every five years.

In 1987, home appliances the energy efficient standards helped every household save \$2000 each or a total of \$200 billion nationwide with the National Appliance Energy Conservation Act. In the 1990s, the appliance industry was very consolidated with over 90% of the products being sold by just five companies. For example, in 1991, dishwasher manufacturing market share was split between General Electric with 40% market share, Whirlpool with 31% market share, Electrolux with 20% market share, Maytag with 8% market share and Thermador with just 1% of market share.

Major Appliances

White goods/major appliances comprise major household appliances and may include: air conditioner, dishwasher, clothes dryer, drying cabinet, freezer, refrigerator, kitchen stove, water heater, washing machine, trash compactor, microwave ovens and induction cookers. White goods were typically painted or enameled white, and many of them still are.

Small Appliances

Brown goods/small appliances are typically small household electrical entertainment appliances such as: TV sets, CD and DVD players, camcorders, still cameras, clocks, alarm clocks, video game consoles, HiFi and home cinema, telephones and answering machines. Some types of brown goods were traditionally finished with or looked like wood or Bakelite. This is now rather rare, but the name has stuck, even for goods that are unlikely ever to have been provided in a wooden case (e.g. camcorders). Another type of small appliances relate to heating and cooling such as: fans and window mounted air conditioners, and heaters such as space heaters, ceramic heaters, gas heaters, kerosene heaters, and fan heaters. Yet another category is used in the kitchen, including: juicer-mixer-grinders, food processors, electric kettles, waffle irons, coffee makers, dough makers, and electric chimneys.

Microwave ovens contain complex electronic boards (the clock and controller) but aren't repaired very often. Some brands send whole boards for replacement, and some have them repaired by such technicians.

Networking of home appliances

There is a trend of networking home appliances together, and combining their controls and key functions. For instance, energy distribution could be managed more evenly so that when a washing machine is on, an oven can go into a delayed start mode, or vice versa. Or, a washing machine and dryer could share information about load characteristics (gentle/normal, light/full), and synchronize their finish times so the wet laundry does not have to wait before being put in the dryer.

Overall objective of the Course

- Ensure Occupational Health and Safety
- Perform Basic Installation Home Appliance
- Perform repairing of home appliance
- Perform replacement components of home appliances
- Perform preventive maintenance

Competencies gained after completion of the course

At the end of the course, the trainee must be able to attain the following competencies.

- Ensure occupational safety including personal, environmental, tools and equipments
- Understand and follow the operating guidelines and procedures
- Underused the installation of electronic home appliances accordingly
- Perform test run
- Diagnose the faults of home electric appliances
- Perform repairing including mechanical and electrical
- Carryout dismantling and assembling
- Demonstrate home electric appliance
- Replacement of faulty parts
- Perform preventive maintenance

Knowledge Proficiency Details

On successful completion of course, the trainees must have acquired the following knowledge & skills:

- About the operation of electronic/electric home appliances
- About the installation of appliances
- Using Operating System
- Test running
- Diagnosing the electronic /electrical and mechanical faults
- understanding of tools and equipments

Job Opportunities available immediately and in future

After completion of the training, candidates can find the employment opportunities in the following disciplines.

Institutes & industries in which opportunities will be available:

- Governmental institutes.
- Semi Governmental Institutes.
- Private Institutes.
- Workshops
- Service centres
- Appliance production units

- Overseas employment
- Self employment

Entry Requirements

- Middle (Preferably Metric) & Age:18+

Minimum qualification of trainer

2 year certificate with 5 years work experience

OR

DAE with 3 years experience

OR

B.Sc./ BE/ B.Tech with one year work experience

Medium of Instruction

- Urdu/ Local language

Description of the Course Structure

This curriculum comprises 6 modules and 29 practicing units. Delivery of the course will be full time 6 days a week. This component of Electronics Home Appliances course will be covered in 6 months. Training providers are at liberty to develop other models of delivery, including part-time and evening delivery.

2. Overview of the Curriculum for (Home Appliances)

Module Title and Aim	Learning Units	Theory hours	Workplace hours	Timeframe of modules
<p>Module 1 Ensure Occupational Health & Safety</p> <p>Aim: To ensure occupational health & safety in home appliances repair work, in accordance with the organization's approved guidelines and procedures.</p>	<p>LU1. Apply personal safety measures</p> <p>LU2. Apply Tools and equipment safety measures</p> <p>LU3. Apply environment safety measures</p> <p>LU4. Apply safety measures according to job</p>	8 hours	100 hours	108 hours
<p>Module 2 Perform Basic Installation of Home Appliances</p> <p>Aim: To initiate home appliances installation work manual according to manual, and perform test run, in home appliances repair work, the in accordance with the organization's approved guidelines and procedures.</p>	<p>LU1. Use Installation manual</p> <p>LU2. Install appliances according to manual</p> <p>LU3. Perform test run</p>	24 hours	116 hours	140 hours
<p>Module 3 Perform Repairing of Home Appliance</p> <p>Aim: To initiate repairing work on home appliances, in accordance with the organization's approved guidelines and procedures.</p>	<p>LU1. Perform test run</p> <p>LU2. Dismantle appliance</p> <p>LU3. Diagnose fault of appliances</p>	30 hours	200 hours	230 hours

Module Title and Aim	Learning Units	Theory hours	Workplace hours	Timeframe of modules
<p>You will be expected to perform, test runs, dismantle appliances, diagnose faults, repair washing machine, microwave, electrical iron, vacuum cleaner, fans, emergency light, toaster, kitchen appliances, and assemble appliances to job.</p>	<p>LU4. Repair of washing machine LU5. Repair of microwave LU6. Repair electrical Iron LU7. Repair of vacuum cleaner LU8. Repair of fans LU9. Repair of emergency light LU10. Repair of toaster LU11. Repair of kitchen appliances LU12. Assemble appliance</p>			
<p>Module 4 Perform Replacement Components of Home Appliances</p> <p>Aim: To initiate repairing work on home appliances, in accordance with the organization's approved guidelines and procedures. You will be expected to perform, identify faulty component, replace electrical, mechanical components, and modules.</p>	<p>LU1. Identify faulty component LU2. Replace electrical components LU3. Replace mechanical parts LU4. Replace module</p>	<p>8 hours</p>	<p>140 hours</p>	<p>148 hours</p>

Module Title and Aim	Learning Units	Theory hours	Workplace hours	Timeframe of modules
<p>Module 5 Perform Preventive Maintenance</p> <p>Aim: To initiate use installation home appliance preventive maintenance work, in accordance with the organization's approved guidelines and procedures. You will be expected to perform, install appliances, inspect equipment, clean equipment, lubricant mechanical parts, align equipment, ensure parts life cycle, and demonstrate equipment to job.</p>	<p>LU1. Inspect equipment</p> <p>LU2. Clean equipment</p> <p>LU3. Lubrication mechanical parts</p> <p>LU4. Align equipment</p> <p>LU5. Ensure parts life cycle</p> <p>LU6. Demonstrate equipment</p>	6 hours	44 hours	50 hours
<p>Module 6 Develop Professionalism</p> <p>Aim: To develop professional attitude & menatin professionalism at work plance enviorment.</p>	<p>LU1. Communicate with co-workers</p> <p>LU2. ManageTime</p> <p>LU3. Upgade Skills</p> <p>LU4. Keep the work place clean</p> <p>LU5. Working with the team</p>	2 hours	20 hours	22 hours

3. Teaching Learning Guidelines for “Electronics Home Appliances”

Module 1 Title: Ensure Occupational Health and Safety

Objective of the Module: To ensure occupational health & safety in home appliances repair work, in accordance with the organization’s approved guidelines and procedures.

Suggested duration: 108 hours

Theory: 8 hours

Practice: 100 hours

Learning Unit	Learning Outcome	Learning Elements	Duration (Hours)	Material Required	Learning Place
LU1: Apply personal safety measures	<p><i>Trainee will be able to:</i></p> <ul style="list-style-type: none"> • Ensure personal safety at workplace • Use PPE (Personal Protective Equipment) as per organisations’ rules. • Assess potential risks at workplace with respect to not applying PPEs • Deal with emergencies at workplace (If any) 	<ul style="list-style-type: none"> • Importance of personal safety • Importance of personal protective tools and equipment (PPE) • Utilization of personal protective components e.g. Gloves, Head Cover, Safety shoes, Safety belts, Goggles etc • Utilization of emergency contacts • Importance of personal safety • Personal safety risk assessment and risk management • Identification of hazardous components and their control 	<p>Total: 13 hours</p> <p>Theory: 1 hours</p> <p>Practical: 12 hours</p>	Multimedia, White board, marker, visual aids, Computer system, Input & output devices. Material according to exercises	Class Room / Training centre

Learning Unit	Learning Outcome	Learning Elements	Duration (Hours)	Material Required	Learning Place
		measures			
LU2: Apply Tools and equipment safety measures	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> Identify hazardous associated with tools and equipment Select the appropriate and safe tools and equipment Understand operation / procedures and safety guidelines Test safety tools and calibrate minor errors of safety tools and equipment 	<ul style="list-style-type: none"> Selection of effective safety tools Effective utilization of safety tools Understand operating procedures Maintain operational data Testing of safety tools Knowing the safety Observation of necessary safety measures during handling Precautions and guidelines Description of safety hazards and controlling instruction Control of hazardous operation Risk assessment and risk management 	<p>Total: 13 hours</p> <p>Theory: 1 hours</p> <p>Practical: 12 hours</p>	Multimedia, White board, marker, visual aids, Computer system, Input & output devices. Material according to exercises	Class Room / Training centre
LU3: Apply environment safety measures	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> Ensure worksite house keeping Ensure adequate lighting and ventilation 	<ul style="list-style-type: none"> Understanding of environmental safety and security Job site housekeeping Cleaning and sanitation 	<p>Total: 13 hours</p> <p>Theory:</p>	Multimedia, White board, marker, visual aids, Computer system, Input & output	Class Room / Training centre

Learning Unit	Learning Outcome	Learning Elements	Duration (Hours)	Material Required	Learning Place
	<ul style="list-style-type: none"> • Provision of sufficient working space • Safe stocking and dumping • Observing integrated pest management 	<ul style="list-style-type: none"> • Emergency rule statement • Safe disposal and dumping • Environmental contaminating agents and their safe control • House pests and rodents • Control of house pest through integrated management systems. 	1 hours Practical: 12 hours	devices. Material according to exercises	
LU4: Apply safety measures according to job	<p><i>Trainee will be able to:</i></p> <ul style="list-style-type: none"> • Ensure work permit/ order • Use first aid kits • Use of fire extinguisher according to hazards • Perform isolation of appliance in case of emergency 	<ul style="list-style-type: none"> • Work permits and their importance • Different hazards prevailing on work place • Risk assessment at work place • Risk management considering all three physiological, biological and mechanical hazards • The key work barricade present at jobsite • Best control of and over coming of barricades • Types of first aid tools • Utilization of first aid kit • Causes of fire in work site • Safe control of fire • Usage of different fire controlling tools and equipments like fire extinguisher, sand and others 	Total: 13 hours Theory: 1 hours Practical: 12 hours	Multimedia, White board, marker, visual aids, Computer system, Input & output devices. Material according to exercises	Class Room / Training centre

Learning Unit	Learning Outcome	Learning Elements	Duration (Hours)	Material Required	Learning Place
LU5: Perform test run	<p><i>Trainee will be able to:</i></p> <ul style="list-style-type: none"> • Ensure proper connections of equipment • Check earth leakage of equipment • Perform leakage test accordingly • Check main supply • Perform test run • Observe operating status of equipment accordingly 	<ul style="list-style-type: none"> • Electrical circuits series, parallel etc • Leakages and its reasons • Arranging the required connection and supply means. • Assessing the leakage of electricity • Assessing of water leakage • Importance of earthing system • Verification and conformation of supply source through observing the standards • Earthing test procedure for different appliances • Test run following service manual • Standard operating work and methodology • Specification of appliances • Operating methodology of appliances 	<p>Total: 13 hours</p> <p>Theory: 1 hours</p> <p>Practical: 12 hours</p>	Multimedia, White board, marker, visual aids, Computer system, Input & output devices. Material according to exercises	Class Room / Training centre
LU6: Understand requirements of workplace health, safety and security.	<p><i>Trainee will be able to:</i></p> <ul style="list-style-type: none"> • Maintain a safe working environment and safe system to work. • Use and maintaining machinery, 	<ul style="list-style-type: none"> • Requirements for a safe working environment • Maintenance procedures for machinery, equipment, appliances, tools • Handling tools and equipment 	<p>Total: 13 hours</p> <p>Theory: 1 hours</p> <p>Practical: 12 hours</p>	Whiteboard, multimedia, computer system, Health, safety and Security standards	Class room

Learning Unit	Learning Outcome	Learning Elements	Duration (Hours)	Material Required	Learning Place
	<p>equipment, appliances and tools in a safe working condition.</p> <ul style="list-style-type: none"> • Ensure that everyone is safe from injury and risks to health in emergency situations. 	<p>properly</p> <ul style="list-style-type: none"> • Ergonomics suitable for the work environment • Health, safety and security guidelines 			
LU7: Follow workplace health, safety and security procedures.	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Report hazardous situations, fatalities, injuries and illness. • Control to minimize risks to ensure that injury or illness is prevented. 	<ul style="list-style-type: none"> • Hazard Identification processes • Risk assessment and control processes • Precautionary measures and their utilisation to preventing damage to health. 	<p>Total: 13 hours</p> <p>Theory: 1 hours</p> <p>Practical: 12 hours</p>	Whiteboard, multimedia, computer system, Health, safety and Security standards	Class room
LU8: Maintain safe work area	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Handle cables related operations appropriately. • Install electronic devices at a manageable distance as per industry requirements. • Handle sharp implements or tools properly. • Maintain safe distances between 	<ul style="list-style-type: none"> • Manage cables related issues • Use and handling of electronic equipment • Precautions to minimise electrical risks. • Importance of Proper dressing • Keeping the workplace organized • Use of appropriate tools 	<p>Total: 17 hours</p> <p>Theory: 1 hours</p> <p>Practical: 16 hours</p>	Whiteboard, multimedia, computer system, Health, safety and Security standards	Class room

Learning Unit	Learning Outcome	Learning Elements	Duration (Hours)	Material Required	Learning Place
	self and machinery, and machine-to-machine. <ul style="list-style-type: none"> • Use appropriate accessories and tools. 				

Module 2 Title: Perform basic installation of Electronics Home Appliances

Objective of the Module: To initiate home appliances installation work manual according to manual, and perform test run, in home appliances repair work, the in accordance with the organization’s approved guidelines and procedures.

Suggested duration: 140 hours

Theory: 24 hours

Practice: 116 hours

Learning Unit	Learning Outcome	Learning Elements	Duration (Hours)	Material Required	Learning Place
LU1: Use Installation manual	<p><i>Trainee will be able to:</i></p> <ul style="list-style-type: none"> • Prepare tools and equipment according to instructions • Unpack equipment accordingly to the guide line and standard procedures • Read the user manual • Inspect the equipment and its accessories 	<ul style="list-style-type: none"> • Fundamental of electricity • Fundamental of electronic • Basic electrical and electronic drawings • Measurements of fundamental units • Reading of instruction manual • Safe shifting of tools and equipment at proper work place • Standards procedures, code of practices and operational guidelines • Unpacking of the tools and equipments • Arranging the tool properly and their house keeping • User manual and instruction intended for appliances • Confirmation of product type and its accessories according to checklist provided in user manual 	<p>Total: 35 hours</p> <p>Theory: 6 hours</p> <p>Practical: 29 hours</p>	Multimedia, White board, marker, visual aids, Computer system, Input & output devices. Material according to exercises	Class Room / Training centre

		<ul style="list-style-type: none"> • Understanding the drawing of equipment • Explanation of instructional manual • Equipment unpacking procedure • Understanding of installation procedure 			
LU2: Install of appliances according to manual	<p><i>Trainee will be able to:</i></p> <ul style="list-style-type: none"> • Visit the installation place of appliance • Enlist installation tools • Mark the location of equipment installation • Fix the foundation/ base according • Position the appliances safely • Attach the accessories of tools accordingly 	<ul style="list-style-type: none"> • Site specification and where about premises • Visiting the installation site for feasibility of installation • Installation tools & equipment. • Enlist of installation tools and equipment • Arranging the relevant man power for installation of appliances • Skills for handling the different manpower for installation and appliances handling • Selecting the point of installation • Marking the site for installation • Fixing the base for installation of appliances • The importance of fixing good base and installation station • Requirements of equipments • Reading and understating of tool installation drawing • Installation procedures like alignment, calibration and validation etc. • Installation procedure and measuring the units 	<p>Total: 35 hours</p> <p>Theory: 6 hours</p> <p>Practical: 29 hours</p>	Multimedia, White board, marker, visual aids, Computer system, Input & output devices. Material according to exercises	Class Room / Training centre

LU3: Apply environment safety measures	<p><i>Trainee will be able to:</i></p> <ul style="list-style-type: none"> • Ensure worksite house keeping • Ensure adequate lighting and ventilation • Provide sufficient working space • Protect stocking and dumping • Observe integrated pest management 	<ul style="list-style-type: none"> • Environmental safety and security • Jobsite housekeeping • Cleaning and sanitation • Emergency rule statement • Safe disposal and dumping • Environmental contaminating agents and their safe control • House pests and rodents • Control of house pest through integrated management systems. 	<p>Total: 35 hours</p> <p>Theory: 6 hours</p> <p>Practical: 29 hours</p>	<p>Multimedia, White board, marker, visual aids, Computer system, Input & output devices. Material according to exercises</p>	<p>Class Room / Training centre</p>
LU4: Apply safety measures according to job	<p><i>Trainee will be able to:</i></p> <ul style="list-style-type: none"> • Ensure compliance with instructions in the Job Card • Use first aid kit • Use of fire extinguisher according to hazards • Ensure isolation of appliance 	<ul style="list-style-type: none"> • Work permits and their importance • Different hazards prevailing on work place • Risk assessment at work place • Risk management considering all three physiological, biological and mechanical hazards • Key work barricade present at jobsite • Best control of and over coming of barricades • First aid tools • Utilization of first aid kit • Causes of fire in work site • Safe control of fire • Usage of different fire controlling tools and equipments like fire extinguisher, sand and others 	<p>Total: 35 hours</p> <p>Theory: 6 hours</p> <p>Practical: 29 hours</p>	<p>Multimedia, White board, marker, visual aids, Computer system, Input & output devices. Material according to exercises</p>	<p>Class Room / Training centre</p>

Module 3 Title: Repair of Home Appliance

Objective of the Module: To initiate repairing work on home appliances, in accordance with the organization's approved guidelines and procedures. You will be expected to perform, test runs, dismantle appliances, diagnose faults, repair washing machine, microwave, electrical iron, vacuum cleaner, fans, emergency light, toaster, kitchen appliances, and assemble appliances to job.

Suggested duration: 230 hours

Theory: 30 hours

Practice: 200 hours

Learning Unit	Learning Outcome	Learning Elements	Duration (Hours)	Material Required	Learning Place
LU1: Perform test run	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Study information requirement • Check appliances with multi-meter • Check appliances in series circuit(series board) • Connect with mains line • Perform test run as described • Note parameters of appliances 	<ul style="list-style-type: none"> • Understand information getting procedure of appliances • Electricity (voltage, current, resistance, ohm's law) • Electrical circuits(series, parallel) • Operate the multi-meter (analog, digital) to check circuits, mains supply • Operate tounge tester • Perform tests according to jobs • Compare the parameters 	<p>Total: 18.5 hours</p> <p>Theory: 2.5 hours</p> <p>Practical: 16 hours</p>	<p>Multimedia, White board, marker, visual aids, Computer system, Electrical test bench. Material according to exercises</p> <p>Home appliances</p>	<p>Class Room / workshop</p> <p>Training centre</p>
LU2: dismantle appliances	<p>Trainee will be able to:</p>	<ul style="list-style-type: none"> • Different tools of dismantling of appliances • Electrical/ electronics symbols 	<p>Total: 18.5 hours</p>		

Learning Unit	Learning Outcome	Learning Elements	Duration (Hours)	Material Required	Learning Place
	<ul style="list-style-type: none"> • Use of standard tools described in manual • Perform isolation of appliances • Apply disassembling and assembling techniques • Tag the wires of appliance connections 	<ul style="list-style-type: none"> • Mechanical drawing symbols • Layout drawings • Different type of tools, equipment functions • Tagging techniques of connections • Apply soldering and de-soldering techniques • Apply assembling techniques • Perform systemic inspection and apply specific testing procedure 	<p>Theory: 2.5 hours</p> <p>Practical: 16 hours</p>		
<p>LU3: diagnose fault of appliances</p>	<p><i>Trainee will be able to:</i></p> <ul style="list-style-type: none"> • Inspect physical condition of appliance • Check front panel of appliance • Check electrical faults if any • Check mechanical fault, if any • Apply symptom diagnoses and systematic pre-testing procedure 	<ul style="list-style-type: none"> • Fault diagnose techniques • Classification of faults • Electrical/ electronic components faults • Mechanical faults • Electrical measurement (voltage, current, resistance) • Electrical, mechanical power and measurement • Electrical test of appliances • Mechanical test 	<p>Total: 18.5 hours</p> <p>Theory: 2.5 hours</p> <p>Practical: 16 hours</p>		

Learning Unit	Learning Outcome	Learning Elements	Duration (Hours)	Material Required	Learning Place
	<ul style="list-style-type: none"> • Check magnetron rectifier • Tag faulty component/ parts 	<ul style="list-style-type: none"> • Characteristics of electrical/electronic components • Tagging of wire, components and follow standards 			
LU4: Repair of washing machine	<p><i>Trainee will be able to:</i></p> <ul style="list-style-type: none"> • Fix the rotor set of washing machine • Repair mechanical faults • Repair electrical faults • Fix control front panel • Fix leakages • Fix alignment • Fix Pressure switch • Perform test run 	<ul style="list-style-type: none"> • Washing machine working principles • Wash phenomena • Type and structure of washing machine • Rotor/ gearbox faults • Troubleshoot rotor/ gear box faults • Measurement of electrical/electronic characteristics machine • Control panel functions • Troubleshooting of control panel faults • Type of leakages • Sealing materials • Leakage removal procedures • Perform leakage removal operation • Leakage test • Pressure switch • Level indicator • Fuzzy function • Demonstrate machine operations to 	<p>Total: 18.5 hours</p> <p>Theory: 2.5 hours</p> <p>Practical: 16 hours</p>		

Learning Unit	Learning Outcome	Learning Elements	Duration (Hours)	Material Required	Learning Place
		Customer			
LU5: repair of micro wave	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Explain function of tool and testing instrument of micro wave • Fix the magnetron rectifier • Repair mechanical faults • Repair electrical faults • Fix control front panel • Fix leakages • Perform test run 	<ul style="list-style-type: none"> • Micro wave working principles • Type and structure of micro wave • Describe magnetron faults • Troubleshooting of magnetron rectifier faults • Measurement of electrical characteristics of Microwave Oven • High voltage Transformer • High voltage Capacitor • Problem of Cavity • Heat principles and transformation • Revolving motor & Hub problem • Perform measurement of temperature • Front control panel functions • Perform front control panel faults • Demonstrate Microwave Oven operations 	<p>Total: 18.5 hours</p> <p>Theory: 2.5 hours</p> <p>Practical: 16 hours</p>		
LU6: repair of electrical Iron	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Explain function of tool and testing instrument of iron 	<ul style="list-style-type: none"> • Iron working principles • Type and structure of iron • Heating element set • Perform element faults 	<p>Total: 18.5 hours</p> <p>Theory: 2.5 hours</p>		

Learning Unit	Learning Outcome	Learning Elements	Duration (Hours)	Material Required	Learning Place
	<ul style="list-style-type: none"> • Fix the element of iron • Repair mechanical faults • Repair electrical faults • Fix control instrument • Fix leakages • Demonstrate test run 	<ul style="list-style-type: none"> • Measurement of electrical characteristics iron • Heating principals of electrical elements • Describe control instrument functions • Perform control instrument faults • Demonstrate machine operations 	Practical: 16 hours		
LU7: repair of vacuum cleaner	<i>Trainee will be able to:</i> <ul style="list-style-type: none"> • Explain function of tool and testing instrument of vacuum cleaner • Fix the motor of vacuum cleaner • Repair mechanical faults • Repair electrical faults • Fix control front penal • Fix leakages • Demonstrate test run 	<ul style="list-style-type: none"> • Vacuum cleaner working principles • Type and structure of vacuum cleaner machine • Describe universal motor • Perform universal motor faults • Maintenance of motor • Perform measurement of electrical characteristics universal motor machines • Describe control penal functions • Perform control penal faults • Demonstrate machine operations 	Total: 18.5 hours Theory: 2.5 hours Practical: 16 hours		
LU8: repair of electrical fans	<i>Trainee will be able to:</i> <ul style="list-style-type: none"> • Explain function of tool and testing instrument of fans • Fix the motor of fans 	<ul style="list-style-type: none"> • Electrical fans working principles • Type and structure of fans • Describe parts of fans motors • Perform stator side faults • Perform measurement of electrical 	Total: 18.5 hours Theory: 2.5 hours Practical:		

Learning Unit	Learning Outcome	Learning Elements	Duration (Hours)	Material Required	Learning Place
	<ul style="list-style-type: none"> • Repair mechanical faults • Repair electrical faults • Fix control front penal • Fix leakages • Demonstrate test run 	<ul style="list-style-type: none"> characteristics fans • Perform measurement of fan speed and air throw • Describe front control penal functions • Perform front control penal faults • Demonstrate fans machine operations 	16 hours		
LU9: repair of emergency light	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Explain function of tool and testing instrument of emergency light • Repair mechanical faults • Repair electrical faults • Fix control front penal • Fix leakages • Demonstrate test run 	<ul style="list-style-type: none"> • Emergency light working principles • Type and structure of emergency light • Describe low voltage, high voltage and control side faults • Charging faults • Measurement of electrical characteristics • Describe front control penal functions • Perform front control penal faults • Demonstrate light operations 	<p>Total: 18.5 hours</p> <p>Theory: 2.5 hours</p> <p>Practical: 16 hours</p>		
LU10: Repair of electrical toaster	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Explain function of tool and testing instrument of toaster • Fix the element set of toaster • Repair mechanical faults • Repair electrical faults 	<ul style="list-style-type: none"> • Electrical toaster working principles • Type and structure of toaster • Describe electrical elements set faults • Measurement of electrical characteristics • Heat principals and transformation • Perform measurement of temperature • Describe front control penal functions 	<p>Total: 18.5 hours</p> <p>Theory: 2.5 hours</p> <p>Practical: 16 hours</p>		

Learning Unit	Learning Outcome	Learning Elements	Duration (Hours)	Material Required	Learning Place
	<ul style="list-style-type: none"> • Fix control front panel • Fix leakages • Demonstrate test run 	<ul style="list-style-type: none"> • Control panel faults • Demonstrate machine operations 			
LU11: Repair of kitchen appliance machines	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Explain function of tool and testing instrument of kitchen appliance • Fix the motor set of appliances • Repair mechanical faults • Repair electrical faults • Fix control front panel • Fix leakages • Demonstrate test run 	<ul style="list-style-type: none"> • Describe kitchen appliance working principles • Categories kitchen appliance • Type and structure of appliance • Describe appliances electrical, mechanical faults • Troubleshoot electrical motor faults removal • Troubleshoot motor mechanical faults • Perform measurement of electrical characteristics machine • Perform mechanical characteristics measurement,(speed, torque, direction) • Describe front control panel functions • Perform front control panel faults • Demonstrate machine operations 	<p>Total: 18.5 hours</p> <p>Theory: 2.5 hours</p> <p>Practical: 16 hours</p>		
LU12: Assemble appliances	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Explain function of tool and 	<ul style="list-style-type: none"> • Understand assembling principals and procedures • Explain type of assembling tools and 	<p>Total: 26.5 hours</p> <p>Theory:</p>		

Learning Unit	Learning Outcome	Learning Elements	Duration (Hours)	Material Required	Learning Place
	testing instrument of appliances <ul style="list-style-type: none"> • Describe procedure of assembling process • Assemble appliances • Assemble control front panel • Demonstrate appliances 	equipment <ul style="list-style-type: none"> • Describe appliances assembling procedures • Perform assembling procedure • Perform measurement of electrical characteristics • Perform test run of appliance • Demonstrate machine operations 	2.5 hours Practical: 24 hours		

Module 4 Title: Perform Replacement Components of Home Appliances

Objective of the Module: To initiate repairing work on home appliances, in accordance with the organization's approved guidelines and procedures. You will be expected to perform, identify faulty component, replace electrical, mechanical components, and modules.

Suggested duration: 148 hours

Theory: 8 hours

Practice: 140 hours

Learning Unit	Learning Outcome	Learning Elements	Duration (Hours)	Material Required	Learning Place
LU1: Identify faulty component/parts	<i>Trainee will be able to:</i> <ul style="list-style-type: none"> • Ensure availability of components accordingly • Prepare request of components • Inspect parts physically • Inspect parts functionality 	<ul style="list-style-type: none"> • Source and availability of components parts of the appliances • Quality and warranty formalities • Requisition raising and its specification • Inspection of components parts and specification • Testing procedures of required components. 	Total: 49 hours Theory: 3 hours Practical: 46 hours	Multimedia, White board, marker, visual aids, Computer system, Input & output devices.	Class Room / Training centre
LU2: Replace electronic/electrical components	<i>Trainee will be able to:</i> <ul style="list-style-type: none"> • Remove faulty component • Install new component • Check connections • Perform Insulation of connection 	<ul style="list-style-type: none"> • Understanding the test procedures of components • Testing of new components • Confirmation of compatibility of new components • understanding about the installation of new parts • Understanding the importance of proper connection and soldering • Knowing about the source and point of 	Total: 49 hours Theory: 3 hours Practical: 46 hours	Multimedia, White board, marker, visual aids, Computer system, Input & output devices.	Class Room / Training centre

		<p>the connection</p> <ul style="list-style-type: none"> • Confirmation of required connection • Understanding about the importance of insulation • Knowing about the insulation methodology and insulator types • Knowing about the hazards of short circuit • Understanding the procedure of replacement 			
<p>LU3: Replace mechanical parts</p>	<p><i>Trainee will be able to:</i></p> <ul style="list-style-type: none"> • Remove faulty parts • Install new parts • Adjust new components • Perform lubrication accordingly 	<ul style="list-style-type: none"> • Identification of faulty part • Disposition and dumping of faulty part • Arrangement of new part • Checking and confirmation of new part • Arrange tools and equipment required for replacement • Technical installation of new part • Inspection and fixation Fixing and inserting part properly • Describe procedure of replacement • Explain adjustment procedure • Explain lubrication procedure 	<p>Total: 50 hours</p> <p>Theory: 2 hours</p> <p>Practical: 48 hours</p>	<p>Multimedia, White board, marker, visual aids, Computer system, Input & output devices.</p>	<p>Class Room / Training centre</p>

Module 5 Title: Perform Preventive Maintenance

Objective of the Module: To initiate use installation home appliance preventive maintenance work, in accordance with the organization's approved guidelines and procedures. You will be expected to perform, install appliances, inspect equipment, clean equipment, lubricant mechanical parts, align equipment, ensure parts life cycle, and demonstrate equipment to job.

Suggested duration: 50 hours

Theory: 6 hours

Practice: 44 hours

Learning Unit	Learning Outcome	Learning Elements	Duration (Hours)	Material Required	Learning Place
LU1: Inspect equipment	<i>Trainee will be able to:</i> <ul style="list-style-type: none"> • Inspect physical condition • Check electronic electrical parts as per industry standard • Check mechanical components as per industry standard • Fill checklist for preventive maintenance 	<ul style="list-style-type: none"> • Physical and mechanical condition of appliances • Importance of inspection of appliance • Types of inspection • Preventive maintenance schedule • Installation of learning guidance charts and animations • Prioritisation of different parts and components of the appliance • Specification of different parts • Functionality of all parts of each appliance • Life cycle of each parts • understanding the checklist of different appliances 	Total: 8 hours Theory: 1 hours Practical: 7 hours	Multimedia, White board, marker, visual aids, Computer system, Input & output devices.	Class Room / Training centre
LU2: Clean	<i>Trainee will be able to:</i>	<ul style="list-style-type: none"> • Importance of cleanliness • Cleaning agents and their efficacy 	Total: 8 hours	Multimedia, White board, marker,	Class Room / Training

equipment	<ul style="list-style-type: none"> • Arrange cleaning agent as per requirements • Clean parts physically • Clean filters • Clean electrical components/connections 	<ul style="list-style-type: none"> • Arranging sources of cleaning agents • Different types of cleanliness • Cleanliness and Explain cleaning schedule • Importance of clean filter • Different types of filers • Disadvantages of Carbon in electrical connection • Methodology of cleaning of electrical connection / equipments • Life of components use in equipment • Cleaning parameters of parts 	Theory: 1 hours Practical: 7 hours	visual aids, Computer system, Input & output devices.	centre
LU3: Lubrication of mechanical parts	<i>Trainee will be able to:</i> <ul style="list-style-type: none"> • Arrange lubrication agent • Clean moving parts • Apply lubricant accordingly 	<ul style="list-style-type: none"> • Understanding the importance of lubrication • Methods of lubrication • Types of different lubricants • Identification of moving parts • Functionality of different parts • Time period of lubrication • Lubrication formalities like cleaning • Standard methodology of lubrication of different moving parts 	Total: 8 hours Theory: 1 hours Practical: 7 hours	Multimedia, White board, marker, visual aids, Computer system, Input & output devices.	Class Room / Training centre
LU4: Align equipment	<i>Trainee will be able to:</i>	<ul style="list-style-type: none"> • Importance of alignment • Phenomenon of alignment 	Total: 8 hours		

	<ul style="list-style-type: none"> • Arrange alignment tools and equipment • Perform alignment of parts • Check noise level 	<ul style="list-style-type: none"> • Alignment tools • Enlist alignment tools • Basic principle of alignment • Procedure of alignment • Disadvantage of high noise in appliances • Test procedure of noise procedure 	Theory: 1 hours Practical: 7 hours		
LU5: Ensure parts life cycle	<i>Trainee will be able to:</i> <ul style="list-style-type: none"> • Check output ratio • Check physical condition 	<ul style="list-style-type: none"> • Understanding the relevant performance of parts • Knowing the optimization of tentative output • Knowing about the mechanical specification of different parts of appliances • Understanding the intended working of different parts • Knowing about the performance life of component • Understanding the different attributes of appliances parts 	Total: 8 hours Theory: 1 hours Practical: 7 hours	Multimedia, White board, marker, visual aids, Computer system, Input & output devices.	Class Room / Training centre
LU6: Demonstrate equipment	<i>Trainee will be able to:</i> <ul style="list-style-type: none"> • Arrange power supply • Attach accessories according to requirements • Perform test run 	<ul style="list-style-type: none"> • Understanding about different power sources • Efficacy and importance of different power sources • Tentative arrangements of power sources 	Total: 10 hours Theory: 1 hours	Multimedia, White board, marker, visual aids, Computer system, Input & output	Class Room / Training centre

	<ul style="list-style-type: none"> • Demonstrate to the customer/client 	<ul style="list-style-type: none"> • Realizing the importance of power back up and alternate means • The necessary accessories of subject appliance • Arrangement of different accessories to avoid any delay or misuse • Benefits of test running • Methodology of test running • Performance of test running • specification of appliances • Functionality of parts • Compliance of customers quarries • Understanding of work order, job card and completion reports 	<p>Practical: 9 hours</p>	<p>devices.</p>	
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Module 6: Develop Professionalism

Objective of the Module: To develop professional attitude and maintain professionalism at workplace environment.

Duration: 22 hours

Theory: 2hours

Practice: 20 hours

Learning Unit	Learning Outcome	Learning Elements	Duration (Hours)	Material Required	Learning Place
LU1: Communicate with co-worker	<p><i>Trainee will be able to:</i></p> <ul style="list-style-type: none"> • Communicate within a department. • Communicate with other departments. • Deal with vendors. • Interact with other organisations. • Use various media to communicate effectively. 	<ul style="list-style-type: none"> • Communication Tools • Communication ethics • Dealing with vendors and other organisations. • Appropriate use of electronic and relative media when required • Effective communication with Junior staff and Co workers • Communication within the department and interaction with other departments 	<p>Total: 4.5 hours</p> <p>Theory: 0.5 hours</p> <p>Practical: 4 hours</p>	Whiteboard, multimedia, computer system.	Class room/ workshop
LU2: Manage time	<p><i>Trainee will be able to:</i></p> <ul style="list-style-type: none"> • Manage time to complete the assigned work. • Manage workload as per task. • Check own work regularly to ensure accuracy • Handle time division with co- 	<ul style="list-style-type: none"> • Importance of Punctuality • Maintain task calendars • Importance of multitasking • Checking of work (self / supervisors) • Importance of managing time according to task priorities, involving management and co-workers. 	<p>Total: 4.5 hours</p> <p>Theory: 0.5 hours</p> <p>Practical: 4 hours</p>	Whiteboard, multimedia, computer system, Workplace Procedure Guidelines	Class room/workshop

Learning Unit	Learning Outcome	Learning Elements	Duration (Hours)	Material Required	Learning Place
	workers.				
LU3: Upgrade skills	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> Participate in skill tests Attend seminars / workshops. Participate in competitions time to time. Aware upcoming market trends. 	<ul style="list-style-type: none"> Importance of staying up-to-date Development of personal skills and efficiency Improvement of skill sets over time by way of seminars, workshops and competitions. Importance of trends and market research to work role 	<p>Total: 4.5 hours</p> <p>Theory: 0.5 hours</p> <p>Practical: 4 hours</p>	Whiteboard, multimedia, computer system and Workplace Procedure Guidelines	Class room/workshop
LU4: Keep the workplace clean	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> Keep the workplace organised. Ensure clean working environment. 	<ul style="list-style-type: none"> Requirements of a clean and organised workplace Effective and efficient organisation of work area Importance of observing hygiene 	<p>Total: 4.5 hours</p> <p>Theory: 0.5 hours</p> <p>Practical: 4 hours</p>	Whiteboard, multimedia, computer system, Workplace Procedure Guidelines	Class room/workshop
LU5: Working within a team	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> Showing good team skills. Taking an appropriate appearance. Showing comfort and tolerance. 	<ul style="list-style-type: none"> Skills required to successfully participate in teams Workplace standards for professional appearance as a Interpersonal skills required to work within teams 	<p>Total: 4.5 hours</p> <p>Theory: 0.5 hours</p> <p>Practical: 4 hours</p>	Whiteboard, multimedia, computer system, Workplace Procedure Guidelines	Class room/workshop

Learning Unit	Learning Outcome	Learning Elements	Duration (Hours)	Material Required	Learning Place
	<ul style="list-style-type: none"> Presenting and observing good work ethics. 	<ul style="list-style-type: none"> Requirements for work ethics for r role. 			

4. ASSESSMENT GUIDANCE:

Assessment is the process of collecting evidence and making judgments on whether competence has been achieved. This confirms that an individual can perform to the standard expected in the workplace as expressed in the nationally endorsed competency standards (where they exist), Good assessment practices should be adopted for developmental and final assessments. Such practices by vocational training providers during developmental and final assessments will form the basis of qualifying the trainees.

4.1 Differences between developmental and final assessments

Developmental assessment shall be on an all-time basis. Its purpose is to provide feedback on what students are learning:

- To the student: It will identify achievement and areas for further teaching and its level.
- To the teacher: It will evaluate the effectiveness of teaching, and guide to determine the future plan.

Assessors need to advise developmental assessments for each competency standard. Guidance is provided in the assessment strategy.

Final assessment is the assessment, usually carried out on completion of a course. This determines whether or not the student has "passed". It is - or should be - undertaken with reference to all the objectives or outcomes of the course, and is formal. Considerations of security - ensuring that the student who gets the credit is the person who did the work - assume considerable importance in final assessment.

4.2 Methods of assessment

For lessons with a high quantity of theory, written or oral tests related to learning outcomes and/ or learning content can be conducted. For work place lessons, assessment will focus on the quality of planning and executing the related process along with the quality of the product and/or evaluation of the process.

Direct assessment:

Direct assessment is the most desirable form of assessment. For this, evidence shall be obtained by directly observing the student's performance.

Examples for direct assessment of a Machinist will include:

- Work performances, such as the application of correct and appropriate sawing techniques to a workpiece
- Demonstrations, for example correctly demonstrating the appropriate method of drilling using a drill machine.
- Direct questioning, where the assessor will ask the student the reasons they selected a tool for step turning
- Paper-based tests, such as multiple choice or short answer questions on entrepreneurship, hygiene and safety issues, communicating and working with others, and types of milling machine, etc.

4.2.2 Indirect assessment

Indirect assessment shall be used where the performance could not be observed and evidence is gained indirectly.

Examples for indirect assessment of a Machinist will include:

- Portfolio of evidence, such as compilation of all work produced during the course
- Working safely every day
- Reports from third parties, such as internship workplace employer or supervisor
- Indirect assessment should only be a second choice. (In some cases, it may not even be guaranteed that the work produced by the person being assessed).

4.3 Principles of assessment

All assessments should be valid, reliable, fair and flexible:

Fairness means that there should be no advantages or disadvantages for any assessed person. For example, it should not happen that one student gets prior information about the type of work performance that will be assessed, while another candidate does not get any prior information. Provide all learners with an equal opportunity for and access to assessment

Validity means that a valid assessment assesses what it claims to assess. For example, for the competency of cutting a specific gear, the assessment should involve performance criteria that are directly related to gear cutting techniques. An interview about setting of milling machines would not meet this principle.

Reliability means that the assessment is consistent and reproducible. For example, if the preparation procedure of workplace/services area has been assessed, another assessor (e.g. the future employer) should be able to see the same work performance and witness the same level of achievement.

Flexibility means that the assessor has to be flexible concerning the assessment approach. For example, if there is a power failure during the assessment, the assessor should re-schedule to ensure the loss of power does not disadvantage the students.

4.5 Suggestions for developmental assessment

- The developmental assessment shall only be used to determine the learning progress of students.
- The development assessment can be undertaken at regular intervals through the delivery of a competency standard to inform teachers of any learning gaps that need to be addressed promptly
- No marks are given in any developmental assessment.
- The developmental assessment, undertaken at the end of the delivery of a competency standard, should be recorded for quality assurance purposes

4.6 Suggestions of final assessment

Final assessment shall be in two parts:

- Knowledge assessment

The final knowledge assessment shall consist of multiple choice and short answer questions, covering all modules. It is a national assessment document supplied by NAVTTC.

- Practical assessment.

The final practical assessment shall consist of a series of tasks designed to provide evidence of competence across all competency standards of the qualification. It is a national assessment document supplied by NAVTTC.

Module 1: Ensure Occupational Health and Safety

Learning Unit	Recommended formative assessment	Recommended methodology	Theory Hrs	Workplace Hrs	Scheduled Dates
1: Apply personal safety measures			1 hrs	12 hrs	
2: Apply Tools and equipment safety measures			1 hrs	12 hrs	
3: Apply environment safety measures			1 hrs	12 hrs	
4: Apply safety measures according to job			1 hrs	12 hrs	
5: Perform test run			1 hrs	12 hrs	
6: Understand requirements of workplace health, safety			1 hrs	12 hrs	

Learning Unit	Recommended formative assessment	Recommended methodology	Theory Hrs	Workplace Hrs	Scheduled Dates
and security.					
7: Follow workplace health, safety and security procedures.			1 hrs	12 hrs	
8: Maintain safe work area			1 hrs	16 hrs	

Module 2 Title: Perform basic installation of Electronics Home Appliances

Learning Unit	Recommended formative assessment	Recommended methodology	Theory Hrs	Workplace Hrs	Scheduled Dates
1: Use Installation manual			6 hours	29 hours	
2: Install of appliances according to manual			6 hours	29 hours	
3: Apply environment safety measures			6 hours	29 hours	
4: Apply safety measures according to job			6 hours	29 hours	

Module 3 Title: Repair of Home Appliance

Learning Unit	Recommended formative assessment	Recommended methodology	Theory Hrs	Workplace Hrs	Scheduled Dates
1: Perform test run			2.5 hours	16 hours	
3: diagnose fault of appliances			2.5 hours	16 hours	
4: Repair of washing machine			2.5 hours	16 hours	
5: repair of micro wave			2.5 hours	16 hours	
6: repair of electrical Iron			2.5 hours	16 hours	
7: repair of vacuum cleaner			2.5 hours	16 hours	

Learning Unit	Recommended formative assessment	Recommended methodology	Theory Hrs	Workplace Hrs	Scheduled Dates
8: repair of electrical fans			2.5 hours	16 hours	
9: repair of emergency light			2.5 hours	16 hours	
10: Repair of electrical toaster			2.5 hours	16 hours	
11: Repair of kitchen appliance machines			2.5 hours	16 hours	
12: Assemble appliances			2.5 hours	24 hours	

Module 4 Title: Perform Replacement Components of Home Appliances

Learning Unit	Recommended formative assessment	Recommended methodology	Theory Hrs	Workplace Hrs	Scheduled Dates
1: Identify faulty component/parts			3 hours	46 hours	
2: Replace electronic/electrical components			3 hours	46 hours	
3: Replace mechanical parts			2 hours	48 hours	

Module 5 Title: Perform Preventive Maintenance

Learning Unit	Recommended formative assessment	Recommended methodology	Theory Hrs	Workplace Hrs	Scheduled Dates
1:Inspect equipment			1 hours	7 hours	
2:Clean equipment			1 hours	7 hours	
3:Lubrication of mechanical parts			1 hours	7 hours	
4:Align equipment			1 hours	7 hours	
5:Ensure parts life cycle			1 hours	7 hours	
6:Demonstrate equipment			1 hours	9 hours	

Module 6: Develop Professionalism

Learning Unit	Recommended formative assessment	Recommended methodology	Theory Hrs	Workplace Hrs	Scheduled Dates
1: Communicate with co-worker			0.5 hours	4 hours	
2: Manage time			0.5 hours	4 hours	
3: Upgrade skills			0.5 hours	4 hours	
4: Keep the workplace clean			0.5 hours	4 hours	
5: Working within a team			0.5 hours	4 hours	

List of Machines, tools and equipment

S. No.	Description	Quantity
1.	Combination spanner set	20 nos
2.	Allen key set	20 nos
3.	Hammer 100g	20 nos
4.	Copper hammer	20 nos
5.	Wooden hammer	20 nos
6.	Files set	20 nos
7.	Screw driver set (flat)	20 nos
8.	Screw driver set (Philips)	20 nos
9.	Combination plier 6"	20 nos
10.	Nose plier 6"	20 nos
11.	Crow bar	20 nos
12.	Hand Hacksaw	20 nos
13.	socket set (1.6- 24M)	20 nos
14.	Punch set (A-Z)	20 nos
15.	Number punch (0-9)	20 nos
16.	Impact wrench manual set	08 set
17.	Pipe wrench 8"	08 nos
18.	Adjustable screw wrench 8"	20 nos
19.	Chain wrench 12"	20 nos
20.	Grip plier 6"	20 nos
21.	Inspection mirror	08 set
22.	Magnify glass 4"	20 nos
23.	Packing puller ¼"-1"	20 nos
24.	Measuring tape 6m	20 nos
25.	Scriber 4"	20 nos
26.	Gauges (filler, universal, thread, angular, radius, depth, height, slip, bore, telescope, go /not go,	08 each
27.	Dial indicator (digital, analog) (0.001") with stand	08 nos
28.	Micrometer (1"-0.00005") analog, digital	8 nos each
29.	Venire clipper	
30.	Tachometer (analog, digital) (0.5-30,000) rpm	08 nos
31.	Stethoscope dual head 22"	08 nos

32.	dB meter (30 to 130)	08 nos
33	Soldering and de soldering tools	25 nos
34	Multi Meter digital and analog	20 nos
35	Clamp meter digital AC and DC	20 nos
36	Screw drivers different type and tips	25 nos
37	Babule level sprit level	05 nos
38	Table lamp	25 nos

Personal Protective Equipment (PPEs)

S. No.	Hand Tools	Quantity
1	Coveralls	20 pair
2	Safety helmet	20 pair
3	Hand gloves	20 pair
4	Ear plug (Ear protection)	20 pair
5	Safety goggles	20 pair
6	Safety shoes	20 pair
7	Safety face shield	20 pair
8	Splash goggles	20 pair
9	Full face gas mask	20 pair
10	Apron (Acid suit)	20 pair
11	Breathing apparatus	20 pair
12	Dust mask	20 pair
13	Face shield	20 pair
14	Gloves against heat	20 pair

Documents, policies and guidelines

S. No.	Description
01	Kinds of seals and packing
02	Type of Lubricating oils and greases
03	Types of bearing
04	Types of coupling
05	Type of gears
06	Types of valves
07	Combination Spanner set

List of consumable material

S. No.	Consumable Material
1	Cotton waste
2	Anti-seized compound
3	Anti-corrosion spray
4	Lapping paste (Amery paste)
5	Emery paper
6	Grinding disk
7	Cutting disk
8	Lapping stone
9	Cotton gloves
10	Silicon
11	Teflon tape
12	Wire brush
13	Painting brush
14	Disposable coverall
15	Lock tight
16	Emery flower wheel
17	Alignment shims
18	Grease
19	Kerosene oil

