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JEWELLERY ELECTROPLATING

CBT Curriculum

National Vocational Certificate Level 3

Version 1 - March 2020

NAVTTC

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Introduction

Industry and academic experts from different geographical locations across Pakistan were consulted during the development process of this curriculum to ensure input and ownership of all the stakeholders. The National Competency Standards are used as a reference document for the development of curricula to be used by training institutions.

This qualification shall provide skilled manpower for the value addition on Gemstone and Jewellery of the existing Gems and Jewellery sector and related industry. This will improve the abilities and accreditation of Jewellery Electroplating in terms of national and international standards applicable in the field of Gems and Jewellery. The availability of quality Jewellery Electroplating in the local and international markets will ultimately bring economic benefits to the producers and processors. In addition this qualification will prepare youth to be employee in industry or work as an entrepreneur. Main purpose is to prepare and train students through skill training and enable them to earn their living either through employment in industry or to be self-employed

Definition/ Description of the training program

Training in the course is based on defined competency standards, which are industry oriented, here the traditional role of a trainer changes and shifts towards the facilitation of training. A trainer encourages and assists trainees to learn for themselves. Trainees are likely to work in groups (pairs) and all doing something different. Some are doing practical tasks in the workshop, some writing, some not even in the classroom or workshop but in another part of the building using specialist equipment, working on computers doing research on the Internet or the library. As trainees learn at different pace they might well be at different stages in their learning, thus learning must be tailored to suit individual needs. The following facilitation methods (teaching strategies) are generally employed:

Direct Instruction Method: This might be effective when introducing a new topic to a larger group of trainees in a relative short amount of time. In most cases this method relies on one-way communication, hence there are limited opportunities to get feedback on the trainee's understanding.

Discussion Method: This allows trainees to actively participate in sharing knowledge and ideas. It will help the trainer to determine whether trainees understand the content of the topic. On the other hand, there is a possibility of straying off topic under discussion and some trainees dominating others on their views.

Small Group Method: Pairing trainees to help and learn from each other often results in faster knowledge/skill transfer than with the whole class. The physical arrangement of the classroom/workshop and individual assessment may be challenging. Analogy method should be in corporate.

Problem Solving Method: This is a very popular teaching strategy for the training. Trainees are challenged and are usually highly motivated when they gain new knowledge and skills by solving problems (Contingency skills). Trainees develop critical thinking skills and the ability to adapt to new learning situations (Transfer skills). It might be time consuming and because trainees sometimes work individually, they may not learn all the things that they are expected to learn.

Research Method: This is used for workshops and laboratory tasks, field experiments, and case studies. It encourages trainees to investigate and find answers for themselves and to critically evaluate information. It however requires a lot of time and careful planning of research projects for the trainee.

Purpose of the training programme

The core purpose of this qualification is to produce employable Jewellery Electroplating professional, who could provide advanced services in Jewellery sector. In addition this qualification will prepare youth to be employee in industry or work as an entrepreneur. Main purpose is to prepare and train students through skill training and enable them to earn their living either through employment in industry or to be self-employed.

Overall objectives of training programme

The objective of this training is to set high professional standards for Jewellery Electroplating trade. The specific objectives of developing these qualifications are as under:

- Fulfil workforce needs of Gems and Jewellery sector
- Improve the personal and professional competence
- Provide opportunities for recognition of skills attained through formal or informal pathways
- Improve the quality and effectiveness of training and assessment
- Provide opportunities to reduce unemployment ratio through aforesaid skills set

Competencies to be gained after completion of course

At the end of the course, the trainee must have attained the following competencies:

- Comply with personal health and safety guidelines
- Perform pre-treatment of jewellery article
- Perform electroplating of jewellery article
- Perform post-treatment of plated article
- Recover precious metals
- Develop entrepreneurial skills

Possible available career opportunities available immediately and later in the future

After completion of this course trainees can be employed in government / semi-government / private industrial organizations or can be self-employed as Jewellery Electroplating professional.

Trainee entry level

The entry for National Vocational Certificate level 3 in Jewellery Electroplating is Middle grade or equivalent. Entry to assessment for this qualification is open.

Minimum qualification of trainer

Resource person should have at least two (3) years' practical experience related to Jewellery Electroplating. Beside this the incumbent should also holds Higher Secondary Certification.

Recommended trainer: trainee ratio

Recommended trainer: trainee rations 1:20, but can be vary as per the capacity of Institute.

Medium of instruction i.e. language of instruction

Urdu

Duration of the course (Total time, Theory & Practical time)

This curriculum comprises 5 modules. The recommended delivery time is 800 hours. Delivery of the course could therefore be full time, 5 days a week, for 6 months. Training providers are at liberty to develop other models of delivery, including part-time and evening delivery.

The full structure of the course is as follow:

Module	Total hours
Module-1: Comply with personal health and safety guidelines	10
Module-2: Perform pre-treatment of jewellery article	380
Module-3: Perform electroplating of jewellery article	130
Module-4: Perform post-treatment of plated article	70
Module-5: Recover precious metals	90
Module-6: Develop entrepreneurial skills	110

Sequence of the modules

The modules shall be taught in the following sequence;

Module-1: Comply with personal health and safety guidelines
Module-2: Perform pre-treatment of jewellery article
Module-3: Perform electroplating of jewellery article

Module-4: Perform post-treatment of plated article
Module-5: Recover precious metals
Module-6: Develop entrepreneurial skills

SUMMARY – overview of the curriculum

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 1: Comply with personal health and safety guidelines. **Aim:** To ensure personal health and safety is complied with in the work Shop and the process does not create hazards on personal and environmental levels.	**LU1:** Identify personal hazards at workplace **LU2:** Apply personal protective equipment (PPE) **LU3:** Comply occupational safety and health (OSH) **LU4:** Dispose hazardous waste/ material(s) from the designated area.	8	12	20
Module 2: Perform Pre-treatment of Jewellery Article **Aim:** To ensure the parameters, apparatus and equipment is set up and prepare surface of jewellery article required prior to electroplating.	**LU1:** Assess surface quality of the Jewellery article **LU2:** Perform pressurised steam cleaning **LU3:** Perform ultrasonic cleaning **LU4:** Perform alkali cleaning **LU5:** Perform acid activation of the surface. **LU6:** Perform electrolytic cleaning **LU7:** Perform Electroless plating on complex jewellery article **LU8:** Perform masking for multi-tone plating	114	266	380

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 3: Perform Electroplating of jewellery article **Aim:** To ensure the parameters, apparatus and equipment is set up and perform electroplating of the jewellery article as per requirement.	**LU1:** Perform electroplating of jewellery article **LU2**: Perform alloy plating **LU3**: Perform pen plating	28	102	130
Module 4: Perform post-treatment of plated article **Aim:** To ensure the correct combination of materials and liquids to produce protective coating on the electroplating jewellery article.	**LU1:** Apply inorganic protective coating **LU2:** Apply organic protective coating **LU3:** Apply electrophoretic composite coating	25	45	70
Module 5: Recover precious metals **Aim:** To recover precious metals from the electroplating process waste.	**LU1:** Recover precious metals (Gold, silver, rhodium) from used electroplating solutions **LU2:** Recover precious metals (Gold, silver, rhodium) from jigs' waste.	30	60	90

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 6: Develop entrepreneurial skills **Aim:** To develop entrepreneurial skills required to establish electroplating workshop independently, gain market awareness and build communication skills.	**LU1:** Develop self against skills and attributes required for entrepreneurship **LU2:** Collect information on viable business ideas **LU3:** Collect information on various funding sources **LU4**: Finalize the business idea	40	70	110

MODULES

Module 1: COMPLY WITH PERSONAL HEALTH AND SAFETY GUIDELINES

Objective of the module: This competency standard covers the skills and knowledge required to identify personal hazards at work place, apply personal protective equipment (PPE), Comply occupational safety and health (OSH), Dispose hazardous waste/material(s) from the designated area.

Duration: 20 Theory: 8 Practical: 12

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Identify personal hazards at workplace	The trainee will be able to: • Identify risk to personal health • Identify hygiene and safety at workplace • Identify tools, equipment and consumable • Report identified risk to health, hygiene and safety to concerned	• Understanding about Hazard, exposure and risk • Describe meaning of safety signs and symbols • Various types of hazardous materials in Jewellery Electroplating • Hazards associated to various materials • Risk reporting procedures and requirements	Total 5 Theory: 2 Practical: 3	Safety glasses, Apparel, Gloves, Long rubber shoes, First Aid Box, Fire extinguishers	Laboratory and Classroom

LU2: Apply personal protective equipment (PPE)	The trainee will be able to: • List the Personal protective equipment (PPE) • Select personal protective equipment in terms of type and quantity according to work orders. • Wear PPE according to job requirements. • Clean Personal protective equipment (PPE). • Store PPE in proper place after use.	• List personal protection and safety equipment. • Usage of different PPEs • Basics understanding of selecting PPEs • Cleaning and storage requirements of PPEs	Total 5 Theory: 2 Practical: 3	Safety Glasses, Apparel, Gloves, Long rubber shoes, First Aid Box, Fire extinguishers	Laboratory and Classroom
LU3: Comply occupational safety and health (OSH)	The trainee will be able to: • Maintain cleanliness and hygiene as per organizational policy. • Comply with health, hygiene and safety precautions before starting work. • Deal with resolvable problems according to prescribed procedures. • Report unresolved problems to concerned person.	• Personal hygiene and cleanliness • Workplace Cleanliness and hygiene requirements • Basic Problem solving techniques	Total 3 Theory: 1 Practical: 2	Safety Glasses, Apparel, Gloves, Long rubber shoes, First Aid Box, hazard charts	Laboratory and Classroom

LU4: Dispose hazardous waste/ material(s) from the designated area.	The trainee will be able to: • Identify hazardous waste materials that need to be disposed off • Segregate hazardous or non-hazardous waste carefully from the designated area as per approved procedure. • Use proper disposal hazardous containers for dispose-off hazardous waste as per procedure • Take necessary precaution like putting masks and gloves while disposing hazardous like waste/materials as per standard operating procedure	• Various types of hazardous wastes in Jewellery Electroplating • Hazards associated to various waste materials • Hazards of waste materials • Methods of segregating hazardous and non-hazardous wastes • Safe handling of hazardous waste and PPE requirements	Total 7 Theory: 3 Practical: 4	Safety Glasses, Apparel, Gloves, Long rubber shoes, First Aid Box, Fire extinguishers	Laboratory and Classroom

MODULE 2: PERFORM PRE-TREATMENT OF JEWELLERY ARTICLE

Objective of the module: This competency standard covers the skills and knowledge required to assess surface quality of the jewellery article and performing steam cleaning, ultrasonic cleaning, alkali cleaning, acidic cleaning and performing the electrolytic cleaning. The competency will also help in performing Electroless plating on complex jewellery article and perform masking for multi-tone plating.

Duration: 380 Theory: 114 Practical: 266

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Assess surface quality of the Jewellery article	The trainee will be able to: • Check for any surface defects including marks, scratches and roughness • Segregate jewellery articles according to quality • Perform buffing to polish the surface of the jewellery article • Inspect for faulty hinges and soldered joints.	• Use and functions of various parts of the buffing machine. • Types and use of polishing media as per jewellery article requirements. • Types of surface defects	Total 96 Theory: 20 Practical: 76	Eye loupes/ optivisor, Tweezers and pliers, Table lamp, buffing machine	Laboratory and Classroom
LU2: Perform pressurised	Trainee will be able to:	• Understanding of Steam cleaning process	Total	Steam cleaning unit, laminated tweezers, spot	Laboratory and Classroom

steam cleaning	• Setup steamer for cleaning process. • Clean jewellery article with steam ensuring the articles are free of any deposits	• Time duration required for article in cleaning media. • Examine the dirt particle of the article after steam cleaning process.	13 Theory: 3 Practical: 10	light, Eye loupes/ optivisor, jigs/ hangers,	
LU3: Perform ultrasonic cleaning	Trainee will be able to: • Prepare solution for ultrasonic cleaning. • Adjust temperature and frequency parameters. • Fix the article in jig and clean jewellery article using ultrasonic machine for required time • Rinse article with water to remove cleaning media. • Inspect cleaned surface of the article.	• Understanding of ultrasonic cleaning process • Maintenance of temperature in ultrasonic cleaning • Examine the dirt article after ultrasonic cleaning process	Total 15 Theory: 5 Practical: 10	Eye loupes/ optivisor, spot light, ultrasonic cleaning unit, laminated tweezers, hanging jigs, buckets	Laboratory and Classroom
LU4: Perform alkaline cleaning	Trainee will be able to: • Prepare recipe of the alkali	• Understanding of pH value, • Understanding of alkaline	Total	laminated tweezers, hanging jigs, glass	Laboratory and Classroom

	cleaning solution as per jewellery metal. • Mix ingredients to make alkaline solution for cleaning • Label solution container mentioning the ingredients and hazards of the solution. • Fix the article in jig and clean jewellery article using alkali cleaning bath for required time • Rinse article with distilled water to remove cleaning media.	cleaning process • Understanding of chemical composition for alkaline cleaning process. • Examine the surface of article after alkaline cleaning process	20 Theory: 10 Practical: 10	beakers	
LU5: Perform electrolytic cleaning	Trainee will be able to: • Prepare electrolytic cleaning solution as per recipe. • Connect jewellery article with electrode in electrolytic cleaning apparatus. • Adjust electric current and voltage parameters. • Clean article for required time	• Understanding of pH value, • Understanding of alkaline cleaning process • Understanding of chemical composition for alkaline cleaning process. • Examine the surface of article after alkaline cleaning process	Total 60 Theory: 20 Practical: 40	Rectifier, laminated tweezers, hanging jigs, glass beakers, electric hot plate	Laboratory and Classroom

	Rinse article with distilled water to remove cleaning media.	• Understanding of anodic and cathodic current			
LU6: Perform acid activation of the surface.	Trainee will be able to: • Prepare recipe of the acidic cleaning solution as per jewellery metal. • Mix ingredients to make acidic solution for cleaning • Label solution container mentioning the ingredients and hazards of the solution. • Fix the article in jig and clean jewellery article using acidic cleaning bath for required time • Rinse article with distilled water to remove cleaning media.	• Reactivity of Acid with base metals • Understanding of acidic activation process. • Understanding of pH value	Total 13 Theory: 3 Practical: 10	Hanging wires, beakers	Laboratory and Classroom
LU7: Perform Electroless plating on complex	Trainee will be able to: • Prepare recipe of the Electroless plating solution as per jewellery metal.	• Understanding of electroless plating • Understanding of Electroless solution compositions	Total 78 Theory:	Hanging wires, beakers, electric hot plate	Laboratory and Classroom

jewellery article	• Mix ingredients to make Electroless solution for plating. • Label solution container mentioning the ingredients and hazards of the solution. • Fix the article in jig and perform Electroless plating of jewellery article as per requirement. • Rinse article with distilled water to remove cleaning media	• Understanding of process parameters (pH value, temperature, time duration and agitation)	38 Practical: 40		
LU8: Perform masking for multi-tone plating	Trainee will be able to: • Prepare masking paint as per requirement of the jewellery article. • Perform masking on required portion of jewellery article. • Hang the article for drying after masking.	• Understanding of masking materials • Understanding of multi-tone plating	Total 85 Theory: 15 Practical: 70	Masking brush, handing wires, tweezers, optivizers, hot air dryer, plier cutters	Laboratory and Classroom

Module 3: Perform Electroplating of Jewellery Article

Objective of the module: This competency standard covers the skills and knowledge required to setup electroplating workstation and performs electroplating of jewellery article.

Duration: 130 Theory: 28 Practical: 102

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Perform electroplating of jewellery article	The trainee will be able to: • Set operating parameters (temperature, pH, voltage, and current density) as per requirement of the article. • Adjust anode/cathode surface area ratio • Connect electrodes with power supply • Immerse jewellery article in electroplating bath. • Perform electroplating (Copper, Nickel, Silver, Gold, Rhodium)	• Use and functions of various parts of the electroplating rectifier • Understanding of electrodes • Understanding of frequent water rinsing • Electrolytes and additives (levellers, brighteners) • The basic knowledge/ principles of electrochemistry and parameters (temperature, pH, voltage, and current density). • Thickness control of plating layer.	Total 6 Theory: 15 Practical: 37	Rectifier, stirrers, digital weighing balance, graduated beakers, measuring cylinders, thermometer, gravity meter, Barrel, polishing/ tumbler	Laboratory and Classroom

	• Rinse article with distilled water to remove electrolyte.				
LU2: Perform alloy plating	The trainee will be able to: • Set operating parameters (temperature, pH, voltage, and current density) as per requirement of the article. • Adjust anode/cathode surface area ratio • Connect electrodes with power supply • Immerse jewellery article in alloy plating bath. • Perform alloy plating (22K, 21K, 18K, 14K, 12K, 9K, rose red gold, pink gold, green gold, dead leaves coloured gold, and brass plating). • Rinse article with distilled water to remove electrolyte.	• Alloys and their properties • Karat and alloy electroplating bath. • Electrolytes and additives (complexing agents) • The basic knowledge/ principles of electrochemistry and parameters (temperature, pH, voltage, and current density). • Thickness control of plating layer.	Total 65 Theory: 10 Practical: 55	Rectifier, stirrers, digital weighing balance, graduated beakers, measuring cylinders, thermometer, gravity meter, Barrel, polishing/ tumbler	Laboratory and Classroom
LU3: Perform pen plating	The trainee will be able to: • Set operating parameters	• Pen plating process • Types of plating pen tips. • Parameters for pen plating.	Total:	Pen plating unit, Petri dish, plastic	Laboratory and Classroom

	(temperature, pH, voltage, and current density) as per requirement of the article. • Set operating parameters of pen plating unit. • Dip the tip of plating pen into electroplating solution. • Mark the parts of jewellery article with the help of plating pen's tip where plating is required. • Rinse article with distilled water to remove electrolyte.		13 Theory: 3 Practical: 10	bucket, insulated tweezers, plating pen tips.	

Module 4: PERFORM POST-TREATMENT OF PLATED ARTICLE

Objective of the module: This competency standard covers the skills and knowledge required to perform post-treatment of electroplated article by applying inorganic, organic and electrophoretic composite protective coating.

Duration: 70 Theory: 25 Practical: 45

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Apply inorganic protective coating	Trainee will be able to: • Remove masking by solvent and perform ultrasonic cleaning if required. • Prepare inorganic protective coating solution as per recipe • Apply protective coating when article is gold, rhodium, nickel, copper, or silver electroplated if required. • Cure protective coating by air drying / heat drying	• Understanding of water based lacquers, • Use of commercial anti-tarnish chromate conversion coating. • Understanding of curing of protective coating	Total 21 Theory: 8 Practical: 13	Hanging wire, nose pliers, cutter, beakers, hot air oven,	Laboratory and Classroom
LU2: Apply organic protective	Trainee will be able to: • Remove masking by solvent and perform ultrasonic cleaning if required.	• Understanding of organic lacquers, • Understanding of UV light curing of protective	Total 20	Hanging wire, nose pliers, cutter, beakers, hot air	Laboratory and Classroom

coating	• Prepare organic protective coating solution as per recipe • Apply protective coating when article is gold, rhodium, nickel, copper, or silver electroplated if required. • Cure protective coating by Ultra Violet/ heat drying	coating • Understanding of UV light hazards	Theory: 8 Practical: 12	oven, UV light cabin	
LU3: Apply electrophoretic composite coating	Trainee will be able to: • Remove masking by solvent and perform ultrasonic cleaning if required. • Prepare electrophoretic composite coating solution as per recipe • Setup workstation for electrophoretic composite coating • Perform electrophoretic protective coating when article is gold, rhodium, nickel, copper, or silver electroplated if required. • Cure protective coating by heat drying	• Understanding of electrophoretic composite coating • Understanding of organosiloxane polymers • Understanding of curing of protective coating	Total 29 Theory: 9 Practical: 20	Hanging wire, nose pliers, cutter, beakers, convective oven, rectifier	Laboratory and Classroom

Module 5: RECOVER PRECIOUS METALS

Objective of the module: This competency standard covers the skills and knowledge required to recover precious metals (gold, silver and rhodium) from used electroplating solutions and recover precious metals (gold, silver and rhodium) from used electroplating solutions

Duration: 90 Theory: 30 Practical: 60

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Recover precious metals (Gold, silver, rhodium) from used electroplating solutions	The trainee will be able to: • Neutralize waste solution • Perform metal precipitation • Filter and dry metal residue • Perform melting of metal residue • Submit ingot for refining	• Acid/Base neutralisation. • Understanding of metal precipitants • Melting fluxes, crucibles, melting furnace	Total 55 Theory: 20 Practical: 35	Beakers, conical flask, Buchner funnel, stirrer, hot plate with magnetic stirrer, electric vacuum pump, spray wash bottle, tongs, ingot mould, melting furnace	Laboratory and Classroom

LU2: Recover precious metals (Gold, silver, rhodium) from jigs' waste.	Trainee will be able to: • Perform melting of jigs' waste into single metallic bar/ingot • Submit metallic bar for refining	• Understanding of different melting point of metals and alloys • Melting fluxes, crucibles, melting furnace	Total 35 Theory: 10 Practical: 25	Tongs, ingot mould, melting furnace , drying oven	Laboratory and Classroom

Module 6: DEVELOP ENTREPRENEURIAL SKILLS

Objective of the module: This Competency Standard identifies the competencies required to Develop Entrepreneurial Skills. This section is crafted to develop knowledge and skills required to Develop Entrepreneurial Skills and present the business ideas to potential support providers. The content will be useful for learners who intend to start a business, become self-employed or want to get prerequisite knowledge before starting a business.

Duration: 110 Theory: 40 Practical: 70

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Develop personal skills and attributes required for entrepreneurship	The trainee will be able to: • Set personal objectives for pursuing entrepreneurship • Document gaps in self for skills and attributes required for an entrepreneur • Take appropriate actions to cover identified gaps	• The fundamentals of entrepreneurship. • The characteristics, skills and attributes possessed by successful entrepreneurs. • Risks and rewards for an entrepreneur. • Identifying personal strengths and weaknesses • Techniques to conduct self-assessment for entrepreneurial skills • Deming cycle (Plan do check act).	Total 15 Theory: 10 Practical: 5	Computer and printer, Internet services, white board	Laboratory and Classroom

LU2: Collect information on viable business ideas	The trainee will be able to: • Conduct an elementary market survey to collect basic information on business ideas relevant to own interests • Compile the information collected through the market survey • Gather customer needs for identified business ideas • Shortlist the best option in terms of cost, service, quality, sales, profit margin, overall expenses	• Concept of the business value chain. • Developing an action plan • Elementary market survey techniques and their constituents e.g. a. Customer /demand b. Tools, equipment, machinery and furniture with rates c. Raw material d. Supplier e. Credit / funding sources f. Market trends g. Overall expenses	Total 40 Theory: 10 Practical: 30	Computer and printer,	Laboratory and Classroom
LU3: Collect information on various funding sources	The trainee will be able to: • Identify the available funding sources based on their terms and conditions, maximum loan limit, payback time, interest rate • Choose the best available	• Incorporation of business entity • Understanding of income and general sales taxation • Basics of accounting • Calculation of internal rate of return	Total 40 Theory: 10 Practical:	Computer and printer, Internet services,	Laboratory and Classroom

	option according to investment requirement		30		
LU4: Finalize the business idea	The trainee will be able to: • Estimate the available resources • Identify relevant customer segments and their needs • Identify existing solutions in the market • Devise the business idea for specific customer needs • Identify key resources required for execution of business idea	• Business Communication • Effective presentation techniques • Basics of market segmentation • Leadership skills	Total 15 Theory: 10 Practical: 5	Computer and printer, Internet services,	Laboratory and Classroom

GENERAL ASSESSMENT GUIDANCE for the Jewellery Electroplating

Each module/ competency standard will be assessed through a combination formative assessment at the completion of each module as an internal assessment and a final summative assessments on the completion of the qualification by the Qualification Awarding Body though a qualified assessors.

Formative assessment: the institute conducts formative assessments on the completion of each module as an internal assessment by the resource person. Its purpose is to provide feedback to the trainees on real time environment:

- To the trainee: to identify achievement and areas for further improvements
- To the trainer: to evaluate the effectiveness of transfer of skill and knowledge and plan for further.

Summative assessment: On completion of the qualification the Qualification Awarding Body (QAB) conducts a formal summative assessment where the qualified national assessor declares a candidate “Competent” or “Not Yet Competent” with a detailed feed back to the trainees on the performing of the activities as per modules.

Methods of assessment

During assessment a direct observation during performance by the trainee is conducted while collecting solid evidence based on each module.

Examples for direct assessment of a Jewellery Electroplating expert include:

- Work performances: performing the tasks in lab for each assignment as prescribed in the modules.
- Demonstrations: performing and presenting the final out comes of the completion of each module.

- Direct questioning, where the assessor would ask the trainees questions related to their learning outcomes.
- Paper-based tests: if required the assessor will use some paper based test to know the understanding of the trainees during the leaning phase.
- Indirect assessment is the method used where the performance could not be watched and evidence is gained indirectly. Indirect assessment will only be a second choice.

Principles of assessment

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

- Fairness refers that each trainee should get to equal chance for performing the duties during the assessment process.
- Validity means that an assessment is conducted for what it claims to assess.
- Reliability refers to consistency in outcomes based on performance or demonstration.
- Flexibility means that the assessor has to be flexible concerning the assessment approach in evaluating the trainees for its competence.

LIST OF TOOLS AND EQUIPMENT

Sr#	Name of Item/ Equipment/ Tools	Quantity
01	First Aid Box	
02	Fire extinguishers	
03	Eye loupes/ optivisor	
04	Table lamp	
05	Buffing machine	
06	Steam cleaning unit	
07	Laminated tweezers	
08	Spot light	
09	Ultrasonic cleaning unit	
10	Hanging jigs	
11	Rectifier	
12	Electric hot plate	
13	Hot air dryer	
14	Plier cutters, nose pliers	

15	Stirrers	
16	Digital weighing balance	
17	Graduated beakers	
18	Measuring cylinders	
19	Thermometer	
20	Gravity meter	
21	Polishing/ tumbler	
22	UV light cabin	
23	Convective oven	
24	Conical flask	
25	Buchner funnel	
26	Electric vacuum pump	
27	Hot plate with magnetic stirrer	
28	Spray wash bottle	
29	Tongs	
30	Ingot mould	

31	Melting furnace	
32	Drying oven	
33	Computer	
34	White board	
35	Printer	

LIST OF CONSUMABLE SUPPLIES

Sr#	Name of Consumable Supplies
01	Buffing wheels
02	Apron
03	Gloves
04	Cleaning agents,
05	Mask
06	Mineral acids
07	Chemicals for required electroless plating
08	Masking tape

09	Masking paint
10	Masking paint remover
11	Towel
12	Chemicals required for inorganic protective coating
13	Chemicals required for organic protective coating
14	Rectifier
15	Filter paper
16	Melting crucible,
17	Carbon rods,
18	Melting flux
19	Melting crucible,
20	Carbon rods (stirrers),
21	Melting flux
22	Printing paper,
23	Notepad, Erasable marker,
24	Pen

25	Long rubber shoes
26	Safety Glasses
27	hazard charts
28	Buckets
29	glass beakers
30	Hanging wires
31	Masking brush
32	stirrer

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