

# **National Vocational Certificate level 3, in (Gems& Jewellery Sector) “GEMOLOGY”**



**National Vocational and Technical Training Commission (NAVTTTC)  
Government of Pakistan**



## TABLE OF CONTENTS

### Contents

|                                                                                                       |    |
|-------------------------------------------------------------------------------------------------------|----|
| 1. TITLE OF QUALIFICATION .....                                                                       | 3  |
| 2. INTRODUCTION.....                                                                                  | 3  |
| 3. PURPOSE OF THE QUALIFICATION .....                                                                 | 5  |
| 4. MAIN OBJECTIVES OF THE QUALIFICATION.....                                                          | 5  |
| 5. DATE OF VALIDATION .....                                                                           | 7  |
| 6. CODES OF QUALIFICATIONS.....                                                                       | 7  |
| 7. MEMBERS OF QUALIFICATIONS DEVELOPMENT COMMITTEE .....                                              | 8  |
| 8. ENTRY REQUIREMENTS .....                                                                           | 9  |
| 10. SUMMARY OF COMPETENCY STANDARDS .....                                                             | 9  |
| Competency Standard A: Assess physical properties of gemstone .....                                   | 10 |
| Competency Standard B: Assess optical properties of gemstone .....                                    | 14 |
| Competency Standard C: Differentiate between natural, treated, imitation and synthetic gemstone ..... | 17 |
| Competency Standard D: Organic gemstones.....                                                         | 20 |
| Competency Standard E: Perform color stone grading (Other than Diamond).....                          | 24 |
| Competency Standard F: Perform Diamond grading .....                                                  | 26 |

## 1. TITLE OF QUALIFICATION

National Vocational Certificate level 3, in (Gems and Jewellery Sector)

“Gemology“

## 2. INTRODUCTION

Gemology is the science dealing with natural and artificial gemstone material. It is considered a geo-science & a branch of mineralogy.

Initially education in gemology for jewelers and gemologist started in early nineteenth century. The National Association of Gold Smiths of UK (NAG) form a gemological committee in 1908 for accreditation of first qualification in Gemology. Later, this committee was restructured into the gemological association of the Great Britain (GEM-A). Now a days this association is working as an education charity and accredited awarding body of gemology with its curriculum followed worldwide.

This course of gemology enables the trainee to identify, categorize and evaluate the raw or polished gemstone. The trainee will be able to differentiate between natural and synthetic gemstone by using different gemological laboratory equipment for example gemological microscope spectrometer etc.

A gemstone can be identified on the basis of physical and optical properties. This course is designed to provide a comprehensive introduction to gemology and will increase job opportunities for the trainees; they can work as a Gemologist in industry or as self-employed. After completion of the course the trainees will not only be able to identify, evaluate and grade the gemstones using international standard equipment but also provide an opportunity to facilitate the local Gems & Jewellery sector of Pakistan.

Industry experts from the relevant industries from different geographical locations across Pakistan were consulted during the development process of these competency standards to ensure input and ownership of all the stakeholders. NAVTTC approves these competency standards on the recommendation of Industry Advisory Group (IAG) for the Gems and Jewelry sector.



The National Competency Standards could be used as a referral document for the development of curricula to be used by training institutions.

Training in the course is based on defined competency standards, which are industry oriented and the traditional role of a trainer changes and shifts towards the facilitation to trainees. 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 incorporated.
- **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.

The detail of the competency standards included in this qualification are given below:

### 3. PURPOSE OF THE QUALIFICATION

The purpose of the training is to provide skilled manpower for the improvement of the existing Gems and Jewellery sector and related industry. This will improve the abilities and accreditation of a gemologist in terms of national and international standards applicable in the field of gemology. The availability of quality gemologists in the local and international markets will ultimately bring economic benefits to the Stakeholders of gems industry.

The core purpose of this qualification is to produce employable Gemologist, who could provide advanced Services of identification grading and valuation of gemstones. In addition this qualification will prepare youth for employment in Gemstone industry or work as an entrepreneur. To prepare and train students through skill training and enabling them to earn their living either through employment in industry or to be self-employed as an gemologist.

### 4. MAIN OBJECTIVES OF THE QUALIFICATION

Gemology qualification consists of theoretical and practical details required for the identification, Valuation and grading of precious, semi-precious, and raw or polished gemstone. The main objectives of the qualification are as follows:

1. Assess Physical properties of Gemstone



2. Assess Optical Properties of Gemstone
3. Differentiate between natural, treated, imitation and synthetic gemstone
4. Organic Gemstone
5. Perform color stone grading (Other than Diamond)
6. Perform Diamond Grading



## 5. DATE OF VALIDATION

The level 3 of national vocational qualification on Gems and Jewelry Sector – Gemology has been validated by the Qualifications Development Committee (QDC) members on May 2018 and will remain in currency until May 2021.

## 6. CODES OF QUALIFICATIONS

The International Standard Classification of Education (ISCED) is a framework for assembling, compiling and analyzing cross-nationally comparable statistics on education and training. ISCED codes for these qualifications are assigned as follows:

| ISCED Classification for Gemology |                                                                                 |
|-----------------------------------|---------------------------------------------------------------------------------|
| Code                              | Description                                                                     |
| 0214G&J4                          | National Vocational Certificate level 3 in Gems and Jewellery Sector – Gemology |

## 7. MEMBERS OF QUALIFICATIONS DEVELOPMENT COMMITTEE

The following members participated in the qualifications development and validation of these qualifications:

| Name                | Designation                  | Organization                    | Email                     | Contact     |
|---------------------|------------------------------|---------------------------------|---------------------------|-------------|
| Bashir Agha         | Principal                    | GJTMC- Quetta                   | bashiragha786@gmail.com   | 03218119120 |
| Khalid Aziz         | Ex-General Manager           | PGJDC, Karachi                  | khalidaziz1958@yahoo.com  | 03002296904 |
| Taj Muhammad        | Chairman                     | TTB- Balochistan                | Taj.mdm@gmail.com         | 03003829116 |
| Nadeem Ahmed        | Manager Trainings            | PGJDC, Karachi                  | nadeembasit@pgjdc.org     | 03332141192 |
| Farheen Agha        | Lapidary In-charge           | GJTMC-Quetta                    | farheenagha@pgjdc.org     | 0812837268  |
| M. Touqir Ali       | Lapidary In-charge           | GJTMC-AJK                       | touqir@pgjdc.org          | 03329192551 |
| Tausif Ahmed        | Instructor                   | GJTMC-Lahore                    | tausifjan@hotmail.com     | 03216601612 |
| Muhammad Shoaib     | Instructor                   | GJTMC-Lahore                    | shoaib@pgjdc.org          | 03214150608 |
| Muhammad Arif       | Instructor gemstone faceting | GJTMC-Quetta                    | marifgems@gmail.com       | 03338837772 |
| Muhammad Naseem     | Instructor- Gemstone Caving  | GJTMC-Quetta                    | m.naseembarech@gmail.com  | 03368110565 |
| Faeza Siddiqui      | Assist. Mgr Trainings        | PGJDC, Karachi                  | faeza@pgjdc.org           | 03002702933 |
| Syed Saifullah      | CEO                          | Businessman G&J sector          | Ssaif_brothers@yahoo.com  | 03008381061 |
| Jalil Ahmed         | Lecturer                     | Geology Deptt. UoB              | Jalil.barech182@gmail.com | 03327818733 |
| M. Naeem Akhtar     | Sr. Tech Advisor             | GIZ, TU                         | muhammad.akhtar@giz.de    | 03009438051 |
| Arslan Javed        | MA                           | GIZ                             | arsalan.javed@giz.de      | 03335164833 |
| Ghulam Raza Hussain | DACUM Facilitator            | B-TVETA, Quetta                 | Grhussain70@gmail.com     | 03332064233 |
| S-Sabhai            | Tech. Advisor                | GIZ/EU                          | Syed.shah@giz.de          | 03005957954 |
| Akhtar Khan         | Marketing & Job placement    | GJTMC, Quetta                   | akhtarsargarh@gmail.com   | 03138353410 |
| Muhammad Ishaq      | Proprietor                   | Universal Gems & Jewellery, Qta | micronzasallu@yahoo.com   | 03218040814 |
| Salman Khan         | Instructor Gemology          | GJTMC-Quetta                    | Salmanshai121@gmail.com   | 03138821117 |
| Imran Zafar         | Principal                    | GJTMC, AJK                      | Imran.zafar@pgjdc.org     | 03359393266 |
| Hafeezullah         | TA-TF, Balochistan           | GIZ                             | Hafeez.jogezai@giz.de     | 030-8659520 |
| Muhammad Saleem     | CEO                          | Chaghi Gems                     | Chaghigems786@gmail.com   | 03333787771 |

## 8. ENTRY REQUIREMENTS

The entry for National Vocational Certificate level 3, in (Gems and Jewellery Sector) “Gemology” is given below:

Entry for assessment for this qualification is open. However, entry into formal training institutes, based on this qualification may require skills and knowledge equivalent to Matric (Grade 10).

## 10. SUMMARY OF COMPETENCY STANDARDS

| Code      | Competency Standards                                                     | Level    | Credits   | Category        |
|-----------|--------------------------------------------------------------------------|----------|-----------|-----------------|
| 0214G&J4A | Assess Physical properties of Gemstone                                   | 3        | 10        | Functional      |
| 0214G&J4B | Assess Optical Properties of Gemstone                                    | 3        | 18        | Technical       |
| 0214G&J4C | Differentiate between natural, treated, imitation and synthetic gemstone | 3        | 20        | Technical       |
| 0214G&J4D | Organic Gemstone                                                         | 3        | 8         | Functional      |
| 0214G&J4E | Perform color stone grading (Other than Diamond)                         | 3        | 12        | Functional      |
| 0214G&J4F | Perform Diamond Grading                                                  | 3        | 12        | Functional      |
|           | <b>TOTAL</b>                                                             | <b>3</b> | <b>80</b> | <b>6 months</b> |

## Competency Standard A: Assess physical properties of gemstone

**Overview:** This competency standard covers the skills and knowledge required to Identify Gemstones by observing physical properties of gemstones through conducting physical tests on gemstones

| Competency Units                           | Performance Criteria                                                                                                                                                                                                        | Knowledge & Understanding                                                                                                                                                                                                                                                                   |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>A1: Assess color of stone</b>           | <p><b>Trainee will be able to:</b></p> <p><b>P1.</b> Assess body color of stone</p> <p><b>P2.</b> Assess tone of stone</p> <p><b>P3.</b> Assess saturation of the gemstone</p> <p><b>P4.</b> Assess Hue of the gemstone</p> | <p><b>Trainee will be able to know:</b></p> <p><b>K1.</b> Definition and causes of color in gemstones,</p> <p><b>K2.</b> Idiochromatic / Allochromatic gemstones.</p> <p><b>K3.</b> Understanding of Hue, Tone and Saturation</p> <p><b>K4.</b> Physical Properties of various gemstone</p> |
| <b>A2: Assess cut of Gemstone</b>          | <p><b>Trainee will be able to:</b></p> <p><b>P1.</b> Check cutting style of the stone</p> <p><b>P2.</b> Check the symmetry of the cut</p> <p><b>P3.</b> Identify the cutting defects in the given gemstone</p>              | <p><b>Trainee will be able to know:</b></p> <p><b>K1.</b> Shapes and Types of cut</p> <p><b>K2.</b> Understanding of symmetry, proportion and polish of gemstone</p>                                                                                                                        |
| <b>A3: Assess transparency of gemstone</b> | <p><b>Trainee will be able to:</b></p> <p><b>P1.</b> Check the stone transparency type:</p> <ul style="list-style-type: none"> <li>- Transparent</li> </ul>                                                                 | <p><b>Trainee will be able to know:</b></p> <p><b>K1.</b> Nature and behavior of light and various definition</p>                                                                                                                                                                           |

|                                                                   |                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                   | <ul style="list-style-type: none"> <li>- Translucent</li> <li>- Opaque</li> </ul> <p><b>P2.</b> Record the transparency types</p>                                                                                                                                                                    | <i>related to transparency</i>                                                                                                                                                                                                                      |
| <b>A4: Assess crystal system</b>                                  | <p><b><i>Trainee will be able to:</i></b></p> <p><b>P1.</b> Check the crystal system of the gemstone with the help of dummy samples</p> <p><b>P2.</b> Record the crystal system</p>                                                                                                                  | <p><b><i>Trainee will be able to know:</i></b></p> <p><b><i>K1.</i></b> Basic Crystallography and description of various crystal systems</p>                                                                                                        |
| <b>A5: Perform Hardness test</b>                                  | <p><b><i>Trainee will be able to:</i></b></p> <p><b>P1.</b> Collect Hardness tools</p> <p><b>P2.</b> Apply hardness test on gemstone</p> <p><b>P3.</b> Record the value of hardness</p>                                                                                                              | <p><b><i>Trainee will be able to know:</i></b></p> <p><b><i>K1.</i></b> Definition of hardness,</p> <p><b><i>K2.</i></b> Mohs hardness scale</p> <p><b><i>K3.</i></b> Methods of Gemstone hardness testing</p>                                      |
| <b>A6: Perform specific gravity test with Hydrostatic balance</b> | <p><b><i>Trainee will be able to:</i></b></p> <p><b>P1.</b> Collect Hydrostatic balance and stone</p> <p><b>P2.</b> Adjust the Hydrostatic balance</p> <p><b>P3.</b> Weigh the stone in air</p> <p><b>P4.</b> Weigh the stone in water</p> <p><b>P5.</b> Calculate specific gravity of the stone</p> | <p><b><i>Trainee will be able to know:</i></b></p> <p><b><i>K1.</i></b> Definition of Specific Gravity</p> <p><b><i>K2.</i></b> Construction and uses of Hydrostatic balance</p> <p><b><i>K3.</i></b> Calculating Specific Gravity of gemstones</p> |

|                                                           |                                                                                                                                                                                            |                                                                                                                                                                                  |
|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>A6: Perform specific gravity test by heavy liquids</b> | <b><i>Trainee will be able to:</i></b><br><b>P1.</b> Arrange heavy liquids<br><b>P2.</b> Perform test by using various heavy liquids<br><b>P3.</b> Record specific gravity of the gemstone | <b><i>Trainee will be able to know:</i></b><br><b>K1.</b> Different types of heavy liquids<br><b>K2.</b> Specific gravity through heavy liquids                                  |
| <b>A7: Assess cleavage of Gemstone</b>                    | <b><i>Trainee will be able to:</i></b><br><b>P1.</b> Observe the cleavage with the help of 10 X Loupe<br><b>P2.</b> Record the cleavage                                                    | <b><i>Trainee will be able to know:</i></b><br><b>K1.</b> Definition and explanation of different types of Cleavage in gemstone.<br><b>K2.</b> Different directions of cleavages |
| <b>A8: Assess clarity of Gemstone</b>                     | <b><i>Trainee will be able to:</i></b><br><b>P1.</b> Assess the type of clarity with the help of 10 X Loupe<br><b>P2.</b> Record the inclusion position and relief                         | <b><i>Trainee will be able to know:</i></b><br><b>K1.</b> Definition and explanation of different grades of Clarity in gemstone.                                                 |

### Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Note the Body color of Gemstone
- Type of Cut
- Transparency of gemstone
- Crystal System



- Hardness of gemstone comparing with moh's scale of Hardness
- Specific Gravity of Gemstone
- Observe the Clarity of Gemstone through loupe

### Tools and equipment required

- Light source
- Hardness Pencils
- Hydrostatic Balance
- Heavy Liquids
- Loupe(10x)
- Crystal Models
- Tweezers
- Samples of rough & cut gemstone

## Competency Standard B: Assess optical properties of gemstone

**Overview:** This competency standard covers the skills and knowledge required to Identify Gemstones by observing Optical properties of these gemstones through conducting Optical tests on gemstones

| Competency Units                             | Performance Criteria                                                                                                                                                                                                                | Knowledge & Understanding                                                                                                                                                                                                                          |
|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>B1: Assess Gemstone with light source</b> | <p><b>Trainee will be able to:</b></p> <p><b>P1.</b> Collect inspection lamp</p> <p><b>P2.</b> Observe the brilliancy under lamp</p> <p><b>P3.</b> Note the category of brilliance<br/>Note the dispersion rate in the gemstone</p> | <p><b>Trainee will be able to know:</b></p> <p><b>K1.</b> Definition and explanation of Brilliancy, Dispersion, Luster</p> <p><b>K2.</b> Optical Properties of various gemstones</p> <p><b>K3.</b> Origin and Occurrences of various Gemstones</p> |
| <b>B2: Assess Phenomenon in Gemstone</b>     | <p><b>Trainee will be able to:</b></p> <p><b>P1.</b> Collect inspection lamp</p> <p><b>P2.</b> Observe the phenomenon in gemstone</p> <p><b>P3.</b> Identify the phenomenon</p>                                                     | <p><b>Trainee will be able to know:</b></p> <p><b>K1.</b> Definition and explanation of various Phenomenon in gemstone</p>                                                                                                                         |
| <b>B3: Perform polarization test</b>         | <p><b>Trainee will be able to:</b></p> <p><b>P1.</b> Collect Polariscope</p> <p><b>P2.</b> Adjust the analyzer and polarizer</p> <p><b>P3.</b> Decide about single refractive, double refractive and aggregate</p>                  | <p><b>Trainee will be able to know:</b></p> <p><b>K1.</b> Definition and explanation of Polarized light</p> <p><b>K2.</b> construction and usage of Polariscope in identification of gemstone</p>                                                  |
| <b>B4: Perform pleochroism test</b>          | <p><b>Trainee will be able to:</b></p> <p><b>P1.</b> Arrange dichroscope and light source to check pleochroism in gemstone</p>                                                                                                      | <p><b>Trainee will be able to know:</b></p> <p><b>K1.</b> Definition of Pleochroism, dichroism and trichroism,</p>                                                                                                                                 |

|                                                       |                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                       | <p><b>P2.</b> Adjust light and dichroscope</p> <p><b>P3.</b> Observe the gemstone for dichroism</p> <p><b>P4.</b> Note the Pleochroic color</p>                                                                                                                                                                                        | <p><b>K2.</b>Construction and usage of dichroscope</p>                                                                                                                                                                                                                                                                                            |
| <p><b>B5: Assess refractive index of Gemstone</b></p> | <p><b>Trainee will be able to:</b></p> <p><b>P1.</b> Arrange the refractometer and refractive index liquid</p> <p><b>P2.</b> Apply liquid on hemi-cylinder</p> <p><b>P3.</b> Place stone properly on hemi cylinder</p> <p><b>P4.</b> Note the SR, DR or ADR and readings</p> <p><b>P5.</b> Calculate birefringence of the gemstone</p> | <p><b>Trainee will be able to know:</b></p> <p><b>K1.</b>Definition and explanation of Refractive Index and its table.</p> <p><b>K2.</b>Construction and usage of refractometer.</p> <p><b>K3.</b> Refractive indices of various gemstones</p> <p><b>K4.</b> Calculating method birefringence of the gemstone</p> <p><b>K5.</b> SR, DR or ADR</p> |

### Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Note Brilliancy and Dispersion
- Observe and Note various Phenomenon
- Understand usage of Polari scope and separate gemstone on its bases
- Understand usage of Dichroscope and observe pleochroism
- Understand usage of Refractometer and observe Refractive Indices





## **Tools and equipment required**

- Light source
- Polariscopes
- Dichroscope
- Refractometer
- Refractive index Fluid
- Tweezers
- Loupe
- Gemstone sample

## Competency Standard C: Differentiate between natural, treated, imitation and synthetic gemstone

**Overview:** This competency standard covers the skills and knowledge required to Identify and differentiates Natural, Synthetic and Imitation gemstones by observing various Physical and Optical properties of these gemstones through conducting various physical and Optical tests on gemstones.

| Competency Units                                                        | Performance Criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Knowledge & Understanding                                                                                                                                                                                                                                |
|-------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>C1: Identification of natural gemstone on the basis of inclusion</b> | <p><b><i>Trainee will be able to:</i></b></p> <p><b>P1.</b> Arrange Gemological microscope and equipment</p> <p><b>P2.</b> Adjust Gemological microscope</p> <p><b>P3.</b> Observe the natural inclusions under different lighting techniques:</p> <ul style="list-style-type: none"> <li>- Bright field</li> <li>- Dark field</li> <li>- Reflected light</li> <li>- Diffused light</li> </ul> <p><b>P4.</b> Plot a sketch as per observations</p> <p>Note: Tally observed inclusions with reference book (Photo Atlas)</p> | <p><b><i>Trainee will be able to know:</i></b></p> <p><b>K1.</b> Construction and usage of microscope</p> <p><b>K2.</b> Types, explanation and identification of different inclusions</p>                                                                |
| <b>C2: Identify treated gemstone on the basis of inclusion</b>          | <p><b><i>Trainee will be able to:</i></b></p> <p><b>P1.</b> Arrange Gemological microscope and equipment</p> <p><b>P2.</b> Adjust Gemological microscope</p> <p><b>P3.</b> Observe the treated inclusions under different lighting techniques:</p> <ul style="list-style-type: none"> <li>- Bright field</li> <li>- Dark field</li> <li>- Reflected light</li> <li>- Diffused light</li> </ul> <p><b>P4.</b> Plot a sketch as per observations</p>                                                                          | <p><b><i>Trainee will be able to know:</i></b></p> <p><b>K1.</b> Explanation of various types methods of treatments on gemstone.</p> <p><b>K2.</b> Effects of treatment on gemstone</p> <p><b>K3.</b> Methods of identification of treated gemstones</p> |

|                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                             | Note: Tally observed inclusions with reference book (Photo Atlas)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                  |
| <b>C3: Identify imitation/assembled Gemstones on the basis of inclusion</b> | <p><b><i>Trainee will be able to:</i></b></p> <p><b>P1.</b> Arrange Gemological microscope and equipment</p> <p><b>P2.</b> Adjust Gemological microscope</p> <p><b>P3.</b> Observe the imitation inclusions under different lighting techniques:</p> <ul style="list-style-type: none"> <li>- Bright field</li> <li>- Dark field</li> <li>- Reflected light</li> <li>- Diffused light</li> </ul> <p><b>P4.</b> Plot a sketch as per observations</p> <p>Note: Tally observed inclusions with reference book (Photo Atlas)</p>                    | <p><b><i>Trainee will be able to know:</i></b></p> <p><b>K1.</b> Definition and types of Imitation gemstone,</p> <p><b>K2.</b> Methods of their production</p> <p><b>K3.</b> Techniques to identify Imitations through microscope.</p>                           |
| <b>C4: Identify synthetic gemstone on the basis of inclusions</b>           | <p><b><i>Trainee will be able to:</i></b></p> <p><b>P1.</b> Arrange Gemological microscope and equipment</p> <p><b>P2.</b> Adjust Gemological microscope</p> <p><b>P3.</b> Observe the different types of synthetic inclusions under different lighting techniques:</p> <ul style="list-style-type: none"> <li>- Bright field</li> <li>- Dark field</li> <li>- Reflected light</li> <li>- Diffused light</li> </ul> <p><b>P4.</b> Plot a sketch as per observations</p> <p>Note: Tally observed inclusions with reference book (Photo Atlas)</p> | <p><b><i>Trainee will be able to know:</i></b></p> <p><b>K1.</b> Definition and explanation of Synthetic Gemstone.</p> <p><b>K2.</b> Methods of production of synthetic gemstone</p> <p><b>K3.</b> Properties and types of inclusions in synthetic gemstone.</p> |

### Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- To identify natural gemstones



- To identify Treated gemstones
- To identify Imitation/ assembled gemstones
- To identify Synthetic gemstones

### **Tools and equipment required**

- Microscope
- Tweezers
- Gemstone samples

## Competency Standard D: Organic gemstones

**Overview:** This competency standard covers the skills and knowledge required to Identify various Organic gemstones and their Imitation by observing various Physical and Optical properties of these Organic gemstones through conducting various physical and Optical tests on Organic gemstones.

| Competency Units          | Performance Criteria                                                                                                                                                                                                                                                                                                                                                                           | Knowledge & Understanding                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>D1: Identify Pearl</b> | <p><b>Trainee will be able to:</b></p> <p><b>P1.</b> Observe color and tone of pearl</p> <p><b>P2.</b> Observe luster of Pearl</p> <p><b>P3.</b> Observe Shape and surface of Pearl</p> <p><b>P4.</b> Observe size and measurement of pearl</p> <p><b>P5.</b> Perform Grading of Pearl</p> <p><b>P6.</b> Understand different types of Pearls</p> <p><b>P7.</b> Understand Imitation Pearl</p> | <p><b>Trainee will be able to know:</b></p> <p><b>K1.</b>Defination and Explanation of Pearl</p> <p><b>K2.</b>Physical and Optical Properties of Pearl</p> <p><b>K3.</b> Process of Pearl Cultivation</p> <p><b>K4.</b> Origin and locations of Natural and cultured Pearls</p> <p><b>K5.</b>Types of Pearls</p> <p><b>K6.</b> Different Imitation of Pearls</p> <p><b>K7.</b>Parameters of Pearl grading</p> |
| <b>D2: Identify Coral</b> | <p><b>Trainee will be able to:</b></p> <p><b>P1.</b> Observe color and tone of Coral</p> <p><b>P2.</b> Observe luster of Coral</p> <p><b>P3.</b> Observe Shape and cut of Coral</p> <p><b>P4.</b> Understand Imitation Coral</p>                                                                                                                                                               | <p><b>Trainee will be able to know:</b></p> <p><b>K1.</b>Defination and Explanation of Coral</p> <p><b>K2.</b>Physical and Optical Properties of Coral</p> <p><b>K3.</b> Formation and Occurrence of Coral</p>                                                                                                                                                                                                |

|                                             |                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                             | <b>P5.</b> Perform Grading of Coral                                                                                                                                                                                                                                                                                                                           | <b>K4.</b> Parameters of Coral grading<br><b>K5.</b> Different Imitation of Corals                                                                                                                                                                                                                                                                                                                                                |
| <b>D3: Identify Amber</b>                   | <b>Trainee will be able to:</b><br><b>P1.</b> Observe color and tone of Amber<br><b>P2.</b> Observe luster of Amber<br><b>P3.</b> Observe Shape and cut of Amber<br><b>P4.</b> Understand different types of Amber<br><b>P5.</b> Understand Imitation of Amber<br><b>P5.</b> Perform Grading of Amber                                                         | <b>Trainee will be able to know:</b><br><b>K1.</b> Defination and Explanation of Amber<br><b>K2.</b> Physical and Optical Properties of Amber<br><b>K2.</b> Formation and Occurrence of Amber<br><b>K3.</b> Parameters of Amber grading<br><b>K4.</b> Different Imitation of Amber                                                                                                                                                |
| <b>D.4 Identify other Organic gemstones</b> | <b>Trainee will be able to:</b><br><b>P1.</b> Observe color and tone of Organic gemstone<br><b>P2.</b> Observe luster of Organic gemstone<br><b>P3.</b> Observe Shape and cut of Organic gemstone<br><b>P4.</b> Understand Ivory and its Imitation<br><b>P5.</b> Understand Jet and its Imitation<br><b>P6.</b> Understand Bones, Crocodile shell and fossils | <b>Trainee will be able to know:</b><br><b>K1.</b> Defination, Explanation, Origin and Occurrence of Ivory<br><b>K1.</b> Physical and Optical Properties of Ivory<br><b>K2.</b> Defination, Explanation, Origin and Occurrence of Jet<br><b>K3.</b> Physical and Optical Properties of Jet<br><b>K4.</b> Defination, Explanation, Origin and Occurrence of Bones, crocodile shell and fossils.<br><b>K5.</b> Physical and Optical |



|                           |                                                                                                                                                                                                                                          |                                                                                                                                                                                                                           |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                           |                                                                                                                                                                                                                                          | <p><i>Properties of Bones, crocodile shell and fossils</i></p> <p><b>K6.</b><i>Parameters of Bones, crocodile shell and fossils</i></p> <p><b>K7.</b><i>Different Imitation of Bones, crocodile shell and fossils</i></p> |
| <b>D4: Identify Cut</b>   | <p><b><i>Trainee will be able to:</i></b></p> <p><b>P1.</b> Arrange 10X loupe and tweezers</p> <p><b>P2.</b> Observe the cutting style</p> <p><b>P3.</b> Check polish quality of the gemstone</p> <p><b>P4.</b> Record the cut grade</p> | <p><b><i>Trainee will be able to know:</i></b></p> <p><b>K1.</b><i>Various types of gemstone shapes</i></p> <p><b>K2.</b> <i>Various cut of gemstone.</i></p> <p><b>K3.</b><i>Symmetry and polish of gemstone.</i></p>    |
| <b>D5: Perform weight</b> | <p><b><i>Trainee will be able to:</i></b></p> <p><b>P1.</b> Arrange weighing balance and tweezers</p> <p><b>P2.</b> Adjust weighing balance</p> <p><b>P3.</b> Take weight</p> <p><b>P4.</b> Record the weight</p>                        | <p><b><i>Trainee will be able to know:</i></b></p> <p><b>K1.</b><i>Definition and explanation of weighing units.</i></p> <p><b>K2.</b><i>Importance of weight in grading</i></p>                                          |

### Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Identify and Grade Pearl.
- Identify and Grade Coral
- Identify and Grade Amber
- Identify and Grade Other Organic Gemstones



## Tools and equipment required

- Tweezers
- Loupe
- Light source
- Polariscope
- Refractometer
- Microscope
- Weighing Balance
- Gemstone (Pearl, Coral, Amber)

## Competency Standard E: Perform color stone grading (Other than Diamond)

**Overview:** This competency standard covers the skills and knowledge required to Grade various gemstones by observing Color, Clarity, Cut and Carat Weight

| Competency Units                   | Performance Criteria                                                                                                                                                                                                                                                                                                            | Knowledge & Understanding                                                                                                                                                                                                  |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>D1: Perform Color grading</b>   | <p><b><i>Trainee will be able to:</i></b></p> <p><b>P1.</b> Observe gemstone under light source and examine the:</p> <p><b>P2.</b> Judge the basic color of Gemstone</p> <p><b>P3.</b> Judge the tone of Gemstone</p> <p><b>P4.</b> Observe the saturation of color in gemstone</p> <p><b>P5.</b> Record the gemstone color</p> | <p><b><i>Trainee will be able to know:</i></b></p> <p><b>K1.</b> Definition and explanation of Grading of gemstone.</p> <p><b>K2.</b> Definition of Hue, tone and saturation</p>                                           |
| <b>D2: Perform Clarity grading</b> | <p><b><i>Trainee will be able to:</i></b></p> <p><b>P1.</b> Arrange 10X loupe and tweezers</p> <p><b>P2.</b> Observe the inclusion on the basis of:</p> <ul style="list-style-type: none"> <li>- Size</li> <li>- Position</li> <li>- Relief</li> </ul> <p><b>P3.</b> Record the clarity type</p>                                | <p><b><i>Trainee will be able to know:</i></b></p> <p><b>K1.</b> Definition of Clarity</p> <p><b>K2.</b> Position and relief of inclusion in gemstone</p> <p><b>K3.</b> grading of gemstone as per clarity</p>             |
| <b>D3: Perform Cut grading</b>     | <p><b><i>Trainee will be able to:</i></b></p> <p><b>P1.</b> Arrange 10X loupe and tweezers</p> <p><b>P2.</b> Observe the cutting style</p> <p><b>P3.</b> Observe the cut symmetry</p> <p><b>P4.</b> Observe proportion</p> <p><b>P5.</b> Check facets</p> <p><b>P6.</b> Check polish quality of the</p>                         | <p><b><i>Trainee will be able to know:</i></b></p> <p><b>K1.</b> Various types of gemstone shapes</p> <p><b>K2.</b> Various cut of gemstone.</p> <p><b>K3.</b> Symmetry, blemishes, proportion and polish of gemstone.</p> |



|                                   |                                                                                                                                                                                                                        |                                                                                                                                                           |
|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                   | gemstone<br><br><b>P7.</b> Check blemishes<br><br><b>P8.</b> Record the cut grade                                                                                                                                      |                                                                                                                                                           |
| <b>D4: Perform weight grading</b> | <b><i>Trainee will be able to:</i></b><br><b>P1.</b> Arrange weighing balance and tweezers<br><br><b>P2.</b> Adjust weighing balance<br><br><b>P3.</b> Take weight in carats<br><br><b>P4.</b> Record the carat weight | <b><i>Trainee will be able to know:</i></b><br><b>K1.</b> Definition and explanation of weighing units.<br><br><b>K2.</b> Importance of weight in grading |

### Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- To grade the gemstone

### Tools and equipment required

- Tweezers
- Loupe
- Light source
- Weighing balance
- Gemstone sample

## Competency Standard F: Perform Diamond grading

**Overview:** This competency standard covers the skills and knowledge required to Grade Diamond by observing Color, Clarity, Cut and Carat Weight

| Competency Units                   | Performance Criteria                                                                                                                                                                                                                                                                                                           | Knowledge & Understanding                                                                                                                                                                                                                                                                            |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>E1: Perform Color grading</b>   | <p><b><i>Trainee will be able to:</i></b></p> <p><b>P1.</b> Observe Diamond under day light source</p> <p><b>P2.</b> Compare it with a master samples according to the international standard.</p> <p><b>P3.</b> observe color in Diamond according to the international standard</p> <p><b>P4.</b> Record the color grade</p> | <p><b><i>Trainee will be able to know:</i></b></p> <p><b>K1.</b> Definition and explanation of color grading of Diamond.</p> <p><b>K2.</b> Methods and tools used in grading color of diamond.</p>                                                                                                   |
| <b>E2: Perform Clarity grading</b> | <p><b><i>Trainee will be able to:</i></b></p> <p><b>P1.</b> Arrange 10X loupe and tweezers</p> <p><b>P2.</b> Observe the inclusion on the basis of :<br/>Size<br/>Position<br/>Relief</p> <p><b>P3.</b> Record the clarity type (Grade the clarity as per result)</p>                                                          | <p><b><i>Trainee will be able to know:</i></b></p> <p><b>K1.</b> Definition and explanation of Clarity of Diamond.</p> <p><b>K2.</b> Methods and tools used in Diamond grading.</p> <p><b>K3.</b> Types of Inclusions and Blemishes.</p> <p><b>K4.</b> Explanation of various Grades of Diamonds</p> |



|                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>E3: Perform Cut grading</b>    | <p><b><i>Trainee will be able to:</i></b></p> <p><b>P1.</b> Arrange 10X loupe and light source and tweezers</p> <p><b>P2.</b> Observe the cutting style</p> <p><b>P3.</b> Observe the cut symmetry</p> <p><b>P4.</b> Observe girdle thickness</p> <p><b>P5.</b> Estimate culet size</p> <p><b>P6.</b> Estimate table percentage</p> <p><b>P7.</b> Estimate Crown percentage</p> <p><b>P8.</b> Estimate pavilion depth</p> <p><b>P9.</b> Grade the proportion</p> <p><b>P10.</b> Check facets</p> <p><b>P11.</b> Check polish quality</p> <p><b>P12.</b> Check blemishes</p> <p><b>P13.</b> Record the cut grade according to the international standard</p> | <p><b><i>Trainee will be able to know:</i></b></p> <p><b>K1.</b> Definition and Explanation of various shapes and cuts in Diamond.</p> <p><b>K2.</b> Description of Proportion, Symmetry and polish,</p> <p><b>K3.</b> Explanation of cut grading as per international standard.</p> <p><b>K4.</b> Usage of different instrument for cut grade</p> |
| <b>E4: Perform weight grading</b> | <p><b><i>Trainee will be able to:</i></b></p> <p><b>P1.</b> Arrange weighing balance and tweezers</p> <p><b>P2.</b> Take weight in carat</p> <p><b>P3.</b> Record the carat weight</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <p><b><i>Trainee will be able to know:</i></b></p> <p><b>K1.</b> Definition and explanation of weighing unit.</p> <p><b>K2.</b> Estimation of Diamond weight through measurements.</p>                                                                                                                                                             |

### Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:



- Color Grade Diamond
- Clarity Grade
- Cut Grade
- Carat weight of Diamond

### Tools and equipment required

- Tweezers
- Loupe
- Microscope
- Weighing balance
- Master Color samples