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GJSCI
Gem & Jewellery Skill Council of India

Participant Handbook

Sector
Gem and Jewellery

Sub-Sector
Jewellery Retailing

Occupation
Appraising and Valuation

Reference ID: **G&J/Q8502, Version 3.0**
NSQF Level 4

Jewellery Appraiser & Valuer

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"Skilling is building a better India. If we have to move India towards development then Skill Development should be our mission."

Shri Narendra Modi
The Prime Minister of India

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COMPLIANCE TO
QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

GEM & JEWELLERY SECTOR SKILL COUCIL

for

SKILLING CONTENT : PARTICIPANT HANDBOOK

Complying to National Occupational Standards of
Job Role / Qualification Pack: **'Jewellery Appraiser and Valuer'**
QP No. **'G&J/Q8502 NSQF Level 4'**

Date of Issuance: Nov 17th,2022
Valid up to*: Nov 17th,2025

*Valid up to the next review date of the Qualification Pack or the 'Valid up to' date mentioned above (whichever is earlier)

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GJSCI would like to thank all people involved for their contribution in developing this Participant Handbook. We appreciate the endless efforts of our Subject Matter Experts to maintain quality of education and skills. We sincerely thank them for inspiring and facilitating students of the Gem & Jewellery sector across India.

Sincerely,

Adil Kotwal
Chairman, GJSCI

About this Book

This Participant book is designed to impart theoretical and practical skill training to students for becoming a Jewellery Appraiser and Valuer.

This participant handbook is based on Jewellery Appraiser and Valuer Qualification Pack (G&J/Q8502) & includes the following National Occupational Standards (NOSs):

1. G&J/N8502 - Assessing Quality of Jewellery Product
2. G&J/N9901 - Coordinate with Others
3. G&J/N9902 - Maintain Health and Safety at Workplace

The Key Learning Outcomes and the skills gained by the participant are defined in their respective units.

We hope that this participant handbook will provide a sound learning support to our young friends to build an attractive career in the gem and jewellery industry.

Symbols Used

Key Learning Outcomes

Steps

Exercise

Tips

Notes

Unit Objectives

Table of Contents

It is recommended that all the trainings include the appropriate Employability Skills Module.

Content for the same is available here:
https://www.skillindiadigital.gov.in/content/list

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1. Introduction to Role of an Appraiser and Valuer

Key Learning Outcomes 

At the end of this unit, you will be able to:

1. List the roles and responsibilities of Appraiser and Valuer.
2. Identify the scope of work in the company and jewellery retailing objective of the company.
3. Identify the market trend and typical customer profile.
4. Identify the work flow involved in company's jewellery appraising process.
5. List the characteristics and differences of precious metal jewellery.
6. List the characteristics of diamond.
7. Illustrate the valuation of diamonds depending on different dimensions.
8. List the stages of the jewellery value chain.
9. Identify the usage of assessment tools and methods used for assessing the quality of jewellery.
10. Inspect the weight of jewellery.

UNIT 1.1: Role of an Appraisal and Valuer

Unit Objectives

At the end of this unit, you will be able to:

1. Identify role and responsibilities of an Appraiser and Valuer.
2. Identify scope of work in the company
3. Identify market trend and customer profile

1.1.1 Roles and Responsibilities of Appraisal and Valuer

Today, people have found it useful to pledge the gold held by them and take loans. In this way they have found a way to use their investment for their needs. This was normally done with small jewellers who often took advantage by charging high interest rates. There was often distrust between the lender and borrower. Then the banks and financial institutions stepped in. They saw a huge opportunity in giving loans against gold jewellery and artefacts. With the increase of players in this field, the market has become more competitive. Going to the bank or institution with gold jewellery and taking a loan has become almost hassle free. With the prices of gold going up the banks are in a win-win situation.

Like Sir Francis Bacon said, "A wise man will make more opportunities than he finds." But in the case of gold loan industry it may not be a wise man but on the contrary it is a criminal mind, who seeks to fraud the system and take advantage. Gold ornaments made for gold loan purpose. Scary but true. There has been a recent trend where some unscrupulous jewellers are responsible for making gold jewellery with the intention of duping banks and other financial institutions. With the increase in the gold loan business, trained persons who can identify and thereby value the product are becoming increasingly few in numbers.

Often the appraiser on whom the bank depends on is also in league with such people. appraisers conduct such appraisal in a scientific and systematic manner to avoid being duped by such criminal minds.

Appraisal of Gold

Value of gold depends on 2 factors: Weight and Purity

Weight: Gold value is higher in case weight is higher.

Purity: This is a very important factor and is measured by same standard worldwide. Gold is combined with different metals to make jewellery as it is very soft metal. Purity of gold is ratio of gold present in the product as compared to other metals.

Products that have higher weight and more purity will have higher appraisal value. But along with these factors, market conditions influence gold appraisal.

Who is an Appraiser?

Appraisers examine jewellery products to determine value and authenticity of the same. This work requires detailed knowledge and understanding of current market values and trends. Many jewellery appraisers undergo training in gemology which enable them to appraise the value of gemstones as per the following criteria:

- Gemstone color
- Clarity of the stones
- Quality of the cut

The following figure shows list of the appraised items:

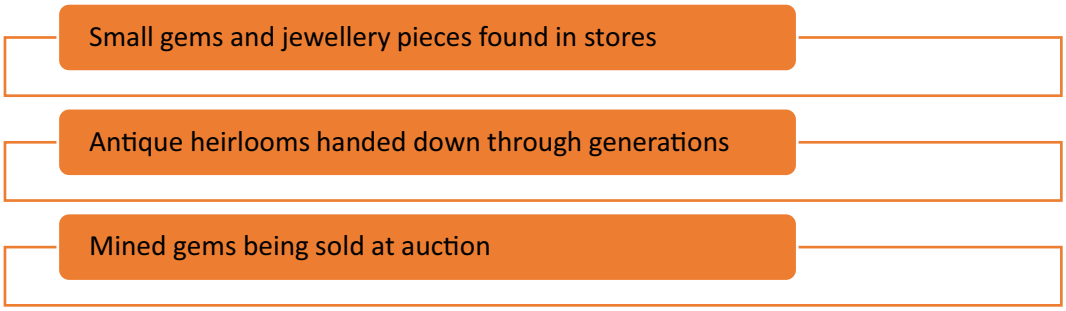

Fig 1.1.1: Appraised Items

Some jewellers also provide appraisal services along with buying and selling jewellery pieces.

Who is a Valuer?

Valuers perform assessment for land, property and assets like artwork, jewellery, etc. Valuation are required for purposes like selling, buying or insuring assets.

Valuation reports include details of jewellery ornaments like:

- Weight
- Measurement and assessments of gemstone
- Precious stones
- Gold and silver

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Diversity in Indian Jewellery

Click Here
Introduction to Precious Metal

Click Here
Material Science Chart

Skills required to be a Valuer:

Following are the skills required to be a valuer:

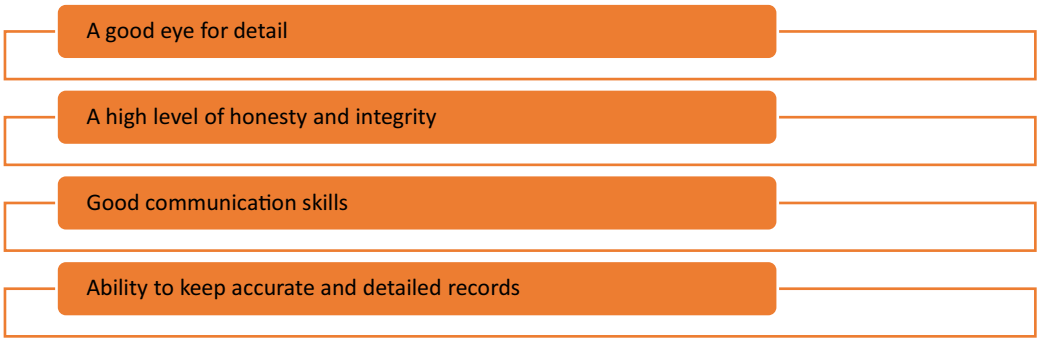

Fig 1.1.2: Skills required to be a valuer

Things to consider for jewellery valuation:

Proper inspection of jewellery pieces and gems to assign appropriate value.
Need expert staff to provide evaluation for every kind of jewellery.
Work experience consideration of staff for valuing priced possessions

Safeguards for jewellery valuation:

Protect client information and property from start to finish.
Keep stones and jewellery in a secure insured facility.
Provide detailed documents including intricate security measures to ensure product authenticity.

1.2.1 Scope of Work in the Company

Scope of work for an appraiser:

Assess the quality of jewellery product through standard assaying methods
Fixes jewellery product value
Prevent fraudulent sales
Ability to follow procedures
Ability to analyse documents and reports related to test observations/readings
Person should display integrity in dealing with precious metal jewellery

1.3.1 Market Trend and Customer Profile

Introduction to Market Trend

India is considered to be hub of global jewellery market because of:

Low cost
Highly skilled labour

Following figure shows the market trend:

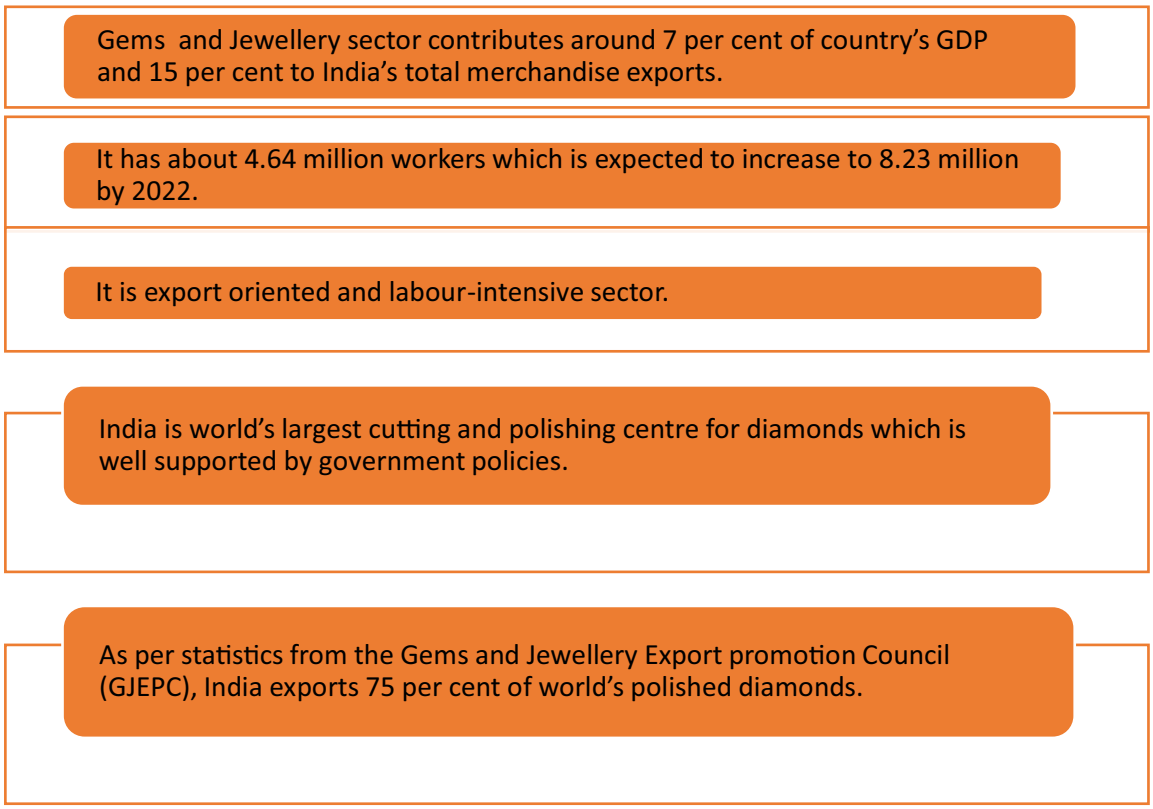

Fig 1.1.3: Market Trend

Market Development

There are changes in consumer preferences in Gems and Jewellery sector due to adoption of western lifestyle.

Increase in demand of new designs and varieties in jewellery.

There is increase in sale of jewellery due to increase in per capita income.

Government Initiatives

To ensure value check on gold jewellery, The Bureau of Indian Standards (BIS) has revised the standard on gold hallmarking in India from January 2018. The gold ornaments hallmark now carries the following:

BIS mark

Purity in carat and fitness

Unit's Identification

Jeweller's identification mark

Customer Profile

Market study can help to identify gaps in the market and target customer. Customers may be people coming specifically for jewellery shopping or who just happen to pass by the shop. So, it is very important to have a good window display of the products.

Fashion in jewellery changes quickly so one should be aware of the current trends going on. Regular discount on items or special offers are good ideas for shifting stock or encourage e xtra sales.

Target Market

Target Market refers to customers whom you want to trade your goods or facilities. Everyone situated in your business area is not suitable to buy your products but only people who fit for them.

It is very important to know your customers which can be done by effectively creating a target market strategy to achieve best results

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Gem & Jewellery industry Orientation

UNIT 1.2: Jewellery Appraising Process Workflow

Unit Objectives

At the end of this unit, you will be able to:

1. Identify the workflow involved in company's jewellery appraising process.
2. List the characteristics and differences of precious metal jewellery

1.2.1 Jewellery Appraising Process Workflow

The following figure shows jewellery appraising process workflow:

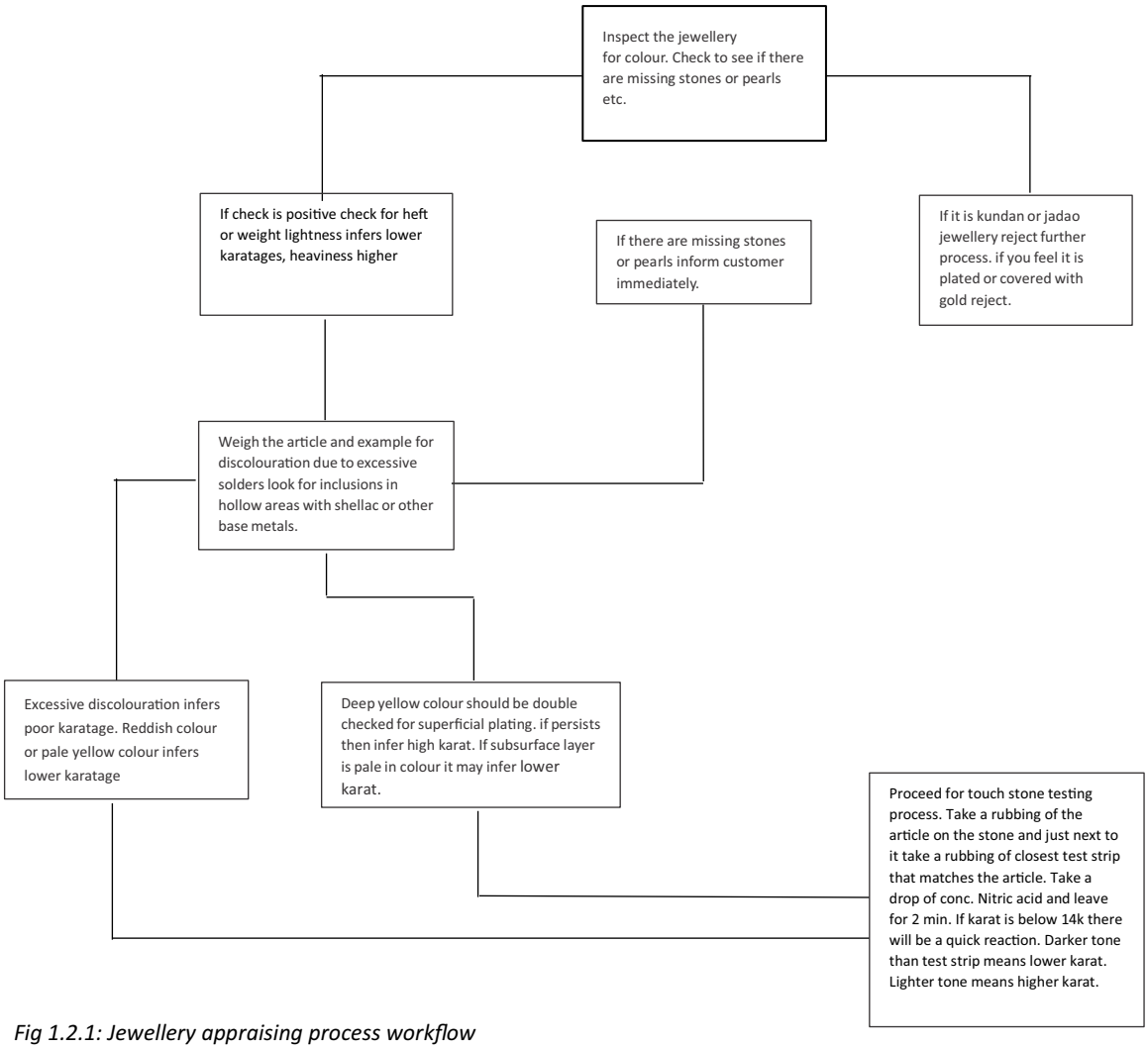


Fig 1.2.1: Jewellery appraising process workflow

1.2.2 Characteristics and Differences of Precious Metal Jewellery

Properties of Gold

Gold is a relatively inert substance strong acids don't attack with an exception of aqua -regia, since gold does not tarnish or rust away and this relative indestructibility of gold has urged the great men down the ages to display their wealth to the world, decorating their women with gold ornaments the beauty of which would never diminish.
Gold (Au-Chemical Symbol) is a soft metal with excellent malleability (its ability to be beaten into sheets) and ductility (its ability to be drawn into wires). One gram of gold can be hammered out into a thin sheet of gold a meter in area and just 230 atoms or so thick and can be drawn into a thin wire 165 meters long and just 20 micrometers thick.
It is a heavy metal with a specific gravity of 19.3gms/cu.cm. It is weighed in grams, or troy ounces, (1 troy ounce = 31.1034768 grams) Earlier in India it was weighed in tolas (1 tola = 11.6638125 grams).

Properties of Silver

Silver: Chemical Symbol – Ag

The following figure enlist the properties of silver:

- Extremely soft, ductile and malleable transition metal (less malleable than gold)
- Silver does not react with air, even at red heat, and is thus considered as noble metal along with gold.
- Silver reacts with sulphur and its compounds, and form the black silver sulphid
- Specific gravity of silver is 10.49.

Fig 1.2.2: Properties of Silver

Main use of silver is coins, jewellery manufacturing along with general-use items. For example, table cutlery as silver has antibacterial properties.

Three forms of deterioration in silver artifacts:

- Tarnishing
- Formation of silver chloride due to long term immersion in cold water
- Reaction with nitrate ions or oxygen

Fig 1.2.3: Forms of deterioration in Silver Artifacts

Properties of Platinum

Platinum: Chemical Symbol – Pt

- Platinum is heavy, soft, malleable, and ductile metal, highly unreactive, precious, silverish-white transition metal.
- It has a remarkable resistance to corrosion, even at high temperatures, and therefore is considered to be a noble metal.
- Platinum gets oxidised at 500 °C which can be easily removed thermally.
- Its resistance to tarnish and wear make it suitable to be used for fine jewellery.
- This is extremely rare metal occurring at a concentration of only 0.005 ppm in Earth's crust.
- Specific gravity of platinum is 21.45.

Fig 1.2.4: Properties of Platinum

Differences in Gold, Silver and Platinum metals:

Platinum vs Silver

Platinum is brighter and shinier and silver has duller, grey appearance.

Silver is a soft metal which wears down and tarnishes easily whereas high melting point

of platinum make it hard enough not to require any alloys.

Silver is an affordable jewellery whereas platinum is expensive jewellery metal.

Gold vs Platinum

Platinum is naturally white, and silver is naturally yellow in colour.

Gold and platinum are same in price per gram. Platinum is denser as compare to gold, so more quantity of platinum is required to make a jewellery item like ring. Hence, platinum rings are more costly.

Platinum is stronger and more durable than gold.

As platinum is denser than gold, platinum jewellery items like rings are heavier than gold.

Gold vs Silver

Silver market is much smaller than gold market.

Gold is recycled in larger amounts as compared to silver. Around 40% gold and 25% silver.

Gold is much more expensive and valuable than silver.

Due to electrical and thermal properties, 50% silver is used in industries as compared to 10% gold.

UNIT 1.3: Characteristics and Valuation of Diamonds

Unit Objectives

At the end of this unit, you will be able to:

1. List the characteristics of diamonds.
2. Illustrate the valuation of diamonds.

1.3.1 Characteristics of Diamonds

Diamonds are known as world's precious stone formed beneath the earth's surface over billions of years. The immense heat of earth's mantle and pressure transforms carbon into diamonds. The characteristics of diamond are classified as "Four C's": Color, Clarity, Cut and Carat.

Fig. 1.3.1: 4 C's of Diamond

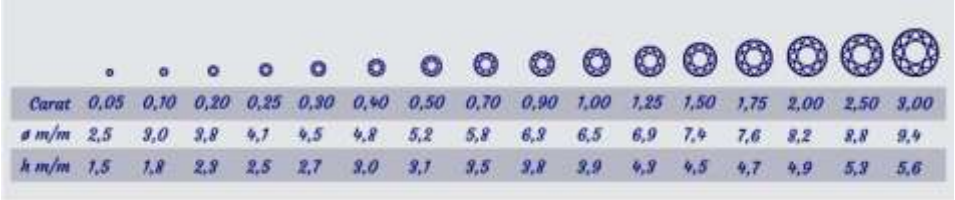
Fig. 1.3.2: Diamond nestled in a bedrock

1. **Diamond Weight:**
   Following figure shows details of diamond weight:

- The weighing unit of diamond is Carat and one carat equals to 0.20 grams.
- The term hundredths is used for diamond weighing below one carat. A diamond which is labelled as 0.25 weighs 25 hundredths or 25 points.
- The price of a diamond changes exponentially with its weight and is determined by thresholds.
- The size and the diameter of the diamond depends on the weight of a diamond.

Fig. 1.3.3: Details of diamond weight characteristics

The following figure shows examples of round diamond diameters depending on their weight:



Carat	0,05	0,10	0,20	0,25	0,30	0,40	0,50	0,70	0,90	1,00	1,25	1,50	1,75	2,00	2,50	3,00
ø m/m	2,5	3,0	3,8	4,1	4,5	4,8	5,2	5,8	6,3	6,5	6,9	7,4	7,6	8,2	8,8	9,4
h m/m	1,5	1,8	2,3	2,5	2,7	3,0	3,1	3,5	3,8	3,9	4,3	4,5	4,7	4,9	5,3	5,6

Fig. 1.3.4: Examples of round diamond diameters

Fig. 1.3.5: Diamond on the jewellery scales

Fig. 1.3.6: Loose big brilliant round diamond is being measure by mm gauge and weight estimator for size

2. **Diamond Clarity**: A diamond has slight crystallizations known as inclusions and it is important to study the position and number of inclusions in the stone for purity assessment. These defects occur within the Earth during diamond formation. This may happen because of change in temperature of pressure or contact with different material. The following figure shows various international standards established to identify clarity of diamonds:

"IF" (Pure)	•This class corresponds to the highest degree of purity. This means that in normal light when examined under a microscope, the diamond must be free of inclusions
"VVS" (Very Very Small Inclusions)	•In this case there are very very small inclusions that are difficult to detect under a microscope.
"VS" (Very Small Inclusions)	•This designation characterises stones containing very small inclusions that are difficult to see when enlarged 10 times.
"SI" (Small Inclusions)	•This is the next degree down in the scale of purity. It applies to gems whose inclusions are small, but easy to see when enlarged 10 times.
Included 1	•This category includes diamonds with inclusions, which although discernible, are barely visible to the naked eye when viewed through the crown.
Included 2	•This category applies to diamonds with inclusions, that may be in large numbers or not but are relatively large, and visible to the naked eye through the crown.
Included 3	•This category features diamonds with large inclusions, easily spotted with naked eye through the crown and in quantity that seriously affect the brilliance of the stone.

Fig. 1.3.7: International standards to identify clarity of diamonds

The following figure shows a person checking clarity in diamond:

Fig. 1.3.8: Clarity is important in diamond

3. **Diamond Colour**: The colour of diamond affects its market value. The following figure shows variation of price with change in colour of diamond:

Diamond colour varies from yellowish to bluish white.

Light brown or champagne tones have a lower value, and their price varies according to demand

Pink is highly sought after; it is usually very pale but when it is a deep pink, its value is inestimable.

Brown and yellowish diamonds are the least popular

Those of particularly bad quality are used primarily in industry.

Fig. 1.3.9: Variation of price with change in colour of diamond

The following figure shows a scale established in order to class the colour of diamonds, ranging from D (snow white) to Z (strong yellow):

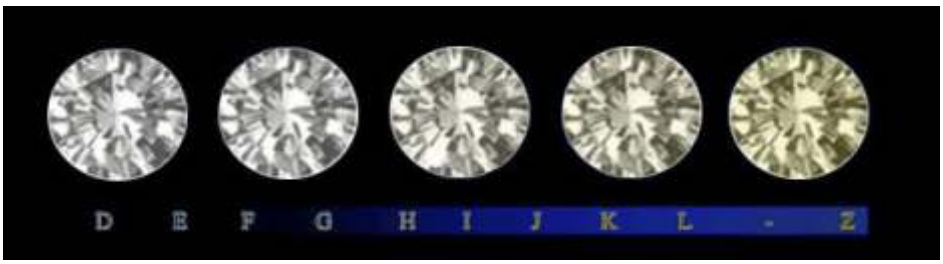


Fig. 1.3.10: Scale to class the colour of diamonds

4. **Diamond Cut**: The quality of diamond cutting refers to symmetry, proportions and polishing.

The following figure shows three effects to the overall look of the stone depends on diamond cutting:

Brightness

- Clarity created by the reflections of white light on the surface and inside of the diamond.

Fire

- The reflection of light by different colours of the rainbow.

Scintillation

The contrast between black and white caused by light reflection.

Fig. 1.3.11: Three effects to the overall look of the stone

While cutting a uneven diamond, the cutter must acquire an optimum cut, taking care of as much matter as possible. The following diagram shows different optimum cut in diamond:

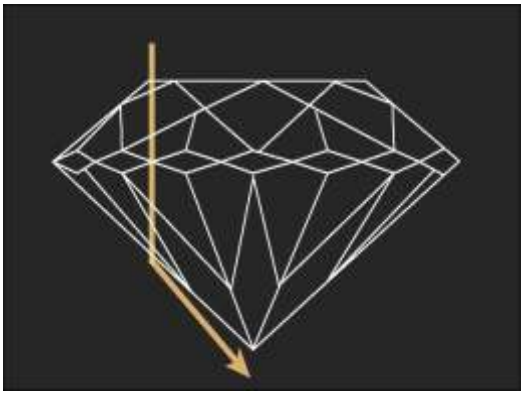


Fig. 1.3.12: Diamond cut is shallow

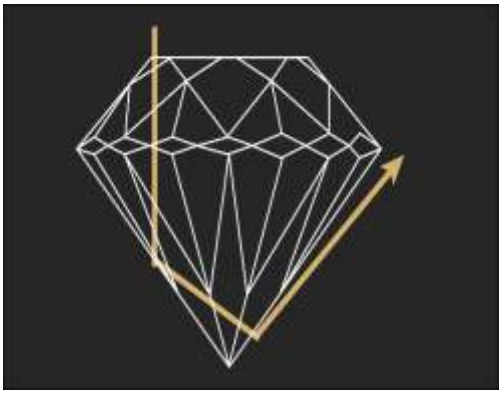


Fig. 1.3.13: Diamond cut is too deep

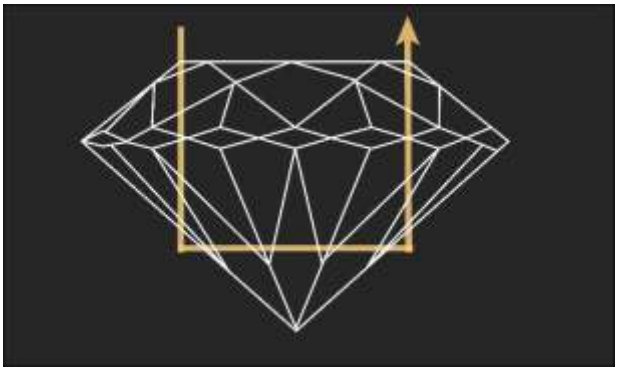


Fig. 1.3.14: Diamond cut is well-proportioned

Proportions of Cut Diamond:

Following figure shows details about proportions of cut diamond:

Proportions of diamond refer to the ratio between the size, shape and angles of each facet of the diamond.

A wide range of combinations is possible, therefore determining the way the diamond reacts to light. When light hits the diamond, approximately 20% of the light is immediately reflected off the surface of the stone.

Of the other 80%, part of it heads to the culet of the diamond (where the observer will not be able to see the effect).

Each facet on a well-proportioned diamond will be neatly placed and angled to maximize the quantity of light that the crown will reflect, therefore to the eye of the observer.
The light reflected off the diamond is perceived as scintillation, fire and brightness.

Fig. 1.3.15: Proportions of cut Diamond

The depth of a diamond:

Following figure shows details of depth of a diamond:

The depth is the distance between the culet and the table of the diamond.

The percentage depth of a diamond is calculated by dividing the depth by the width. So, if a diamond is 3 mm deep and 4.5 mm wide the depth will be 66.7%.

Fig. 1.3.16: Depth of a diamond

The following figure shows width and depth of diamond:

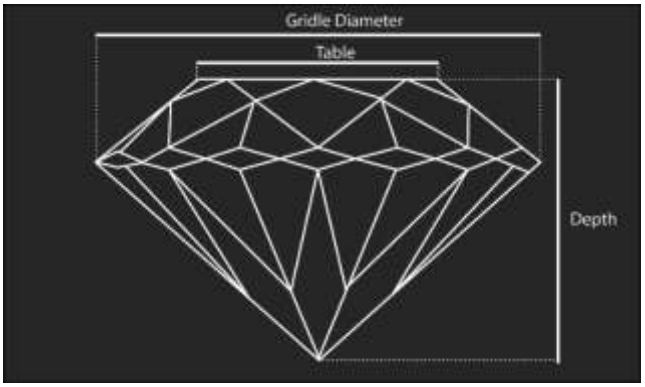


Fig. 1.3.17: Width and depth of diamond

The Diamond Table:

The following figure shows details of diamond table:

The table (%) of a diamond is calculated by dividing the width of the table as a facet by the width of the diamond.

Therefore, if the table is 2 mm and the width of the diamond is 3.5 mm, the table will be 57%.

Fig. 1.3.18: Diamond Table

The Different Qualities of Diamond Cutting:

The following figure shows different qualities of diamond cutting:

"Excellent"	•A maximum of fire and brightness. The diamond reflects practically all the light that enters into the stone creating maximum scintillation and life.
"Very Good"	•The diamond neatly reflects almost all of the light that enters the stone producing fire and very good brightness. In normal light conditions, the "Very Good" almost perfectly resembles an excellent cut with a lower price.
"Good"	•The diamond reflects most of the light that enters the stone, giving it a good overall appearance.
"Fair"	•A lot of the light that enters the stone escapes from the sides or tips of the diamond. "Fair" cuts are no longer accepted.
"Poor"	•Most of the light that enters the stone escapes from the sides or tips of the diamond. The diamond will be dull and lifeless.

Fig. 1.3.19: Different qualities of Diamond Cutting

1.3.2 Valuation of Diamonds

Diamond Appraisal: This is a procedure of monetary value assignment to a diamond for purposes like insurance, tax, divorce, etc.

Diamond Grading: This is a process of detailed valuation of diamond and its characteristics called 4 C's: **Carat, Color, Cut and Clarity.** Diamond grading is carried out by certified professionals. Market value can be assigned to the stones once the grading is done.

Diamond Grading Process: The following are the steps used for diamond grading.

1. **Cleaning**: The first step is to clean the diamond to see it clearly and polish away any artificial flaws.
2. **General Condition Overview**: This step is carried out by professionals without using any tools to verify fact like if the diamond is real or there are any grazes on diamond.
3. **Measurement of 4 C's**: In this step, attributes like carat, color, cut and clarity are measured for the stone.
4. **Description**: In the end, evaluator writes a detailed summary based on the observations and measurements, which may include estimated market value of the stone also.

Secondary Factors:

Apart from 4 C's, there are some factors which help in determining diamond value. Though these are not major, but they do affect the stone value. The following figure shows some factors which help in determining diamond value:

Culet	•Culet is bottom point of diamond. It affects the light performance of the diamond and is slightly flat or faceted. •The ideal culet should be positioned in the exact center of the bottom of the diamond and should be of a small size. Angle deviation and increase in size both adversely affect the diamond.
Girdle Thickness	•The thickness of the girdle or the edge that is formed where the top (crown) and the bottom (pavilion) of the diamond meet. •Unequal thickness of the girdle will undermine the symmetry of the diamond, which is essential for light performance.
Laser Inscription	•Laser inscription causes microscopic indentations on the surface of the diamond itself, damaging it with imperfections. •Therefore, it should have an effect on the clarity of the diamond and thus on the overall price value. •The laser inscriptions, especially those done by certification companies, are taken as validation and proof of the quality of the diamond.

Fig. 1.3.20: Secondary Factors

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Click Here
Common features & Diamond

Click Here
Types of Gemstone Setting

The following figure shows culet position of diamond and inscription on diamond:

Fig. 1.3.21: Diamond showing Culet position

Fig. 1.3.22: Diamond showing inscription

The following figure shows different attributes of diamond:

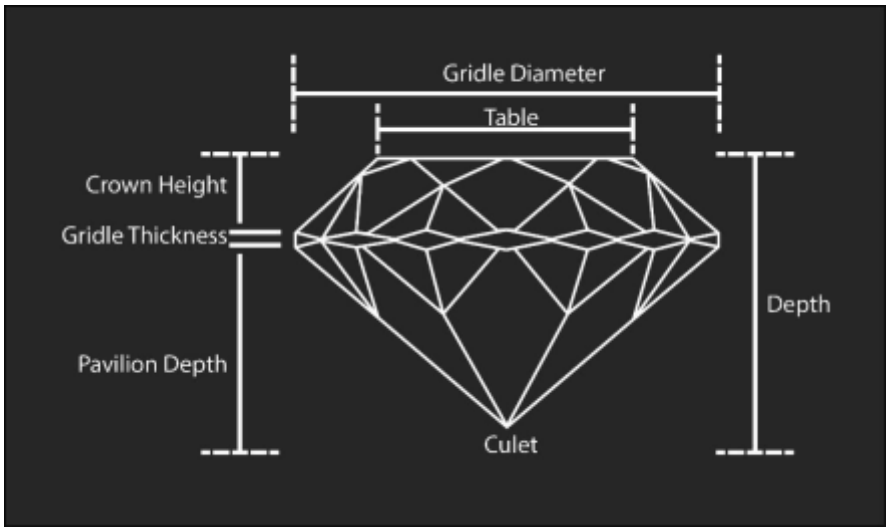

Fig. 1.3.23: Diamond showing different attribute

UNIT 1.4: Stages of the Jewellery Value Chain

Unit Objectives

At the end of this unit, you will be able to:

1. List the stages of jewellery value chain.

1.4.1 Stages of Jewellery Value Chain

The following figure lists the steps of Jewellery Value Chain:

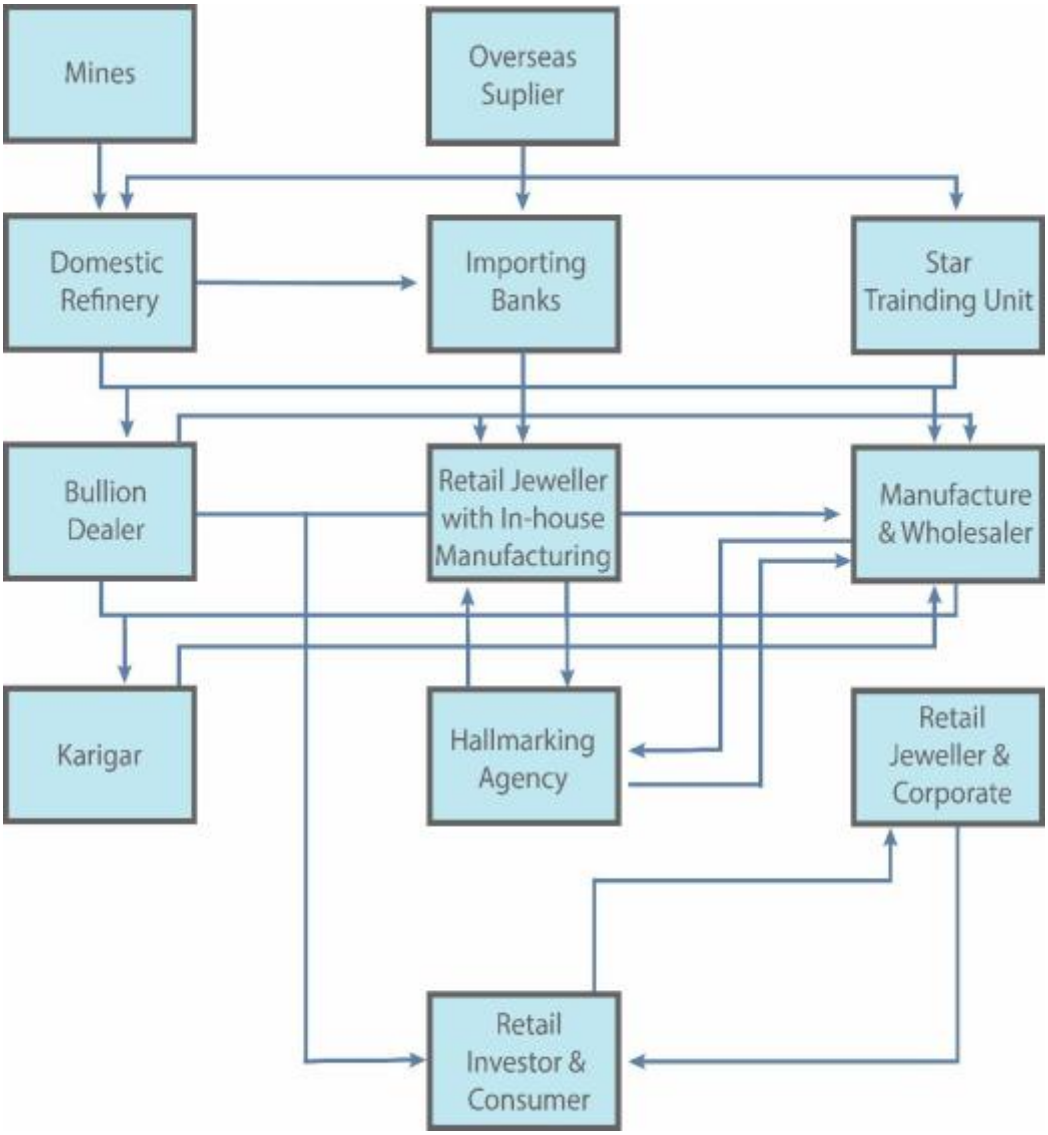

Fig. 1.4.1: Steps of Jewellery Value Chain

1. **Mining**: Gold occurs as native metal. One ton of ore produces about 3 kg of gold. Gold mines yield rough gold which are called as dore bars. These bars are about 80% pure gold. Gold extraction process needs cyanide. After the extraction, the residual product remains, which is called gold dump or the gold ore trailing (GOT). The following figure shows wagons in gold mine:

Fig. 1.4.2: Wagons in gold mine

The following figure shows pure gold ore found in mine:

Fig. 1.4.3: Pure gold ore

2. **Refining**: The extracted gold is then directed to refinery, where it is refined into gold of diverse forms and purity. Proactive monitoring is carried out for these refineries. Mining company owns gold till refinery. Ownership is transferred to bullion banks, once refining is done.

   The following figure shows gold melting process:

Fig. 1.4.4: gold melting process

Fig. 1.4.5: Molten gold being poured from a crucible into an ingot mold

3. **Bullion Dealing**: Miners may not be able to produce gold at the same time when it is needed. So, bullion banks act as middleman of gold industry, where producers can sell to bank when they want to sell, and consumers can buy from bank when they want to buy. Bullion banks provide services to entire gold industry like miners, consumers, jewellery and industrial businesses, investors, etc. These banks supply wholesale metal to primary consumer markets.
   The following figure shows bullion dealing:

Fig. 1.4.6: Bullion Dealer with gold bar

   A GST registration is needed to be a bullion dealer. Different services provided by bullion banks:
   - Spot trading
   - Forwards
   - Options
   - Vaulting

   A bullion dealer gives purchase intention to the importing agency or bank import gold. After receiving it, the importing agency or bank pick up the consignment and deposit it in authorized vaults. The consignment period is of 30 days.

4. **Manufacturers**: Manufacturers are bulk producers of jewellery industry. They sell their jewellery to retail jewelers and corporate clients rather than selling directly to retails customers. Few manufactures have showroom to sell jewellery directly to retail customers.

The process being followed by Manufacturers:

1. Manufacturers procure gold either from banks or bullion dealers. After procurement, it is being distributed to karigars to convert into jewellery. Karigars are employed on job work basis which takes usually 10-15 days to convert gold into jewellery items.
2. Quality of finished products is also checked by manufacturers as they come back from karigars. Finished jewellery products are kept in storage facility/locker as inventory.
3. Corporate clients visit the shops and choose jewellery designs as per their choice.
4. After selection of jewellery, items are hallmarked at hallmarking centers. After hallmarking, jewellery is being sent back to the manufacturers.
5. After this the corporate or retails client pay for the jewellery pur chased on the invoice generated. All manufacturers and Karigars have their own seal on a jewellery item. So, each store knows which jewellery came from which manufacturer and which karigar made that particular piece of jewellery.

The following figure shows production of jewellery in the workshop:

Fig. 1.4.7: Jewellery Production in the workshop

5. **Retailing:** Retail jewelers are considered to be main link between gold value chain and retails customers. They have showrooms to sell finished jewellery products direct to the customers.
   The following figure shows display of fashion jewellery on window shop:

Fig. 1.4.8: Fashion Jewellery on a window shop

UNIT 1.5: Tools and Methods for Jewellery Quality Assessment

Unit Objectives

At the end of this unit, you will be able to:

1. List tools necessary for Jewellery Quality Assessment.
2. List different methods for jewellery quality assessment.

1.5.1 Tools for Jewellery Quality Assessment

Jewellery Assessment Tools

The following table shows standard tools required for Jewellery Appraiser:

S.No.	Name of Tool	Description
1.	Weighing balance	To record the weight of the articles.
2.	Glass beaker or receptacle	To immerse objects in it for doing the specific gravity test, along with dental floss for tying the articles prior to immersion in water.
3.	10 x Eye Glass (Magnifying glass)	To check for solders and soldering lines, or enclosed areas.
4.	Scrapper	To look below the subsurface, such as plated articles, (Small file, Knife, or emery paper)
5.	Plain Magnet	To check if iron is embedded inside the jewellery.
6.	Diamond Templates	To estimate and deduct the weight of diamonds and other gemstones.
7.	Digital Vernier Calliper or any other scale	To measure the dimensions for estimation of volume. (Sheets, wires, coins, biscuits etc.)
8.	Specific Gravity Chart	For different karats, to compare the estimated weight with the actual weight in case of doubts of base metal filled gold objects.
9.	Gold Test Needles	Different fineness, (.916, .750, .585, .375) each of the test needles can weigh about 2 grams each in wire form which can be tagged together in a bunch. They should by hallmarked by an authorised hallmarking centre.
10.	Touch Stone	Black coloured flat stone, in rectangle shape with emery paper (Number 400) for cleaning, also castor oil to apply on the stone for conditioning after use.

11.	Concentrated Nitric Acid CP OR LR GRADE	In plastic capped bottle. (Preferable to carry copper wire to check acid for concentration as the acid should react immediately with the copper giving of dark brown fumes.) 50% diluted Aqua Regia (1 part Nitric acid and 3 parts hydrochloric acid CP OR LR GRADE which has been diluted with half quantity of water) is used to test 24k, 22k, 18k, gold.
12.	Tissues or blotting paper	To soak the acid, drop after the reaction time. Glas s or mug of water to dip the touch stone and stop the reaction.

Table.1.5.1: Standard tools required for Jewellery Appraiser

1.5.2 Methods for Jewellery Quality Assessment

The different methods for Jewellery Quality assessment are:

1. **Touchstone Testing**: The test consists of rubbing the jewellery article to be tested on the surface of a smooth, slightly abrasive hard stone – or touch stone to leave a metallic streak of the item on the stone.
   A same kind of rubbing is taken from a standa rd reference alloys (touch needle) of known karatage and colour to make a direct comparison between the two. Nitric acid of growing strengths along with other additives, for different karatage ranges, are applied (for 2 to 3 minutes) in turn to the rubbings by a dropper.
   The following image shows touchstone setting:

Fig.1.5.2: Touchstone Testing

Visual inspection of those rubbings is done. In case the test rubbing is a darker colour than that of the touch needle, this means more chemical attack, so, her e it can be assumed that the test sample is of lower karatage than that of the touch needle. The second test is then done using 50% aqua-regia (for 20 – 40 seconds). Aqua regia reacts with gold and not with other metals.

It is possible to distinguish between alloys of slightly different gold contents. A skilled person can detect differences of 10 to 20 parts per thousand. It is less accurate with high karatages and with white gold. Touchstone testing is only a reference tool and requires a lot of prior experience. The following figure shows assaying kit and needles:

Fig.1.5.3: Assaying kit and needles

2. **Fire Assaying:** Fire assaying is a process of quantitative determination. Here a metal or metals are separated from impurities by fusion processes and are being weighed. This is done in order to determine the amount present in original sample. Metals recovered, arise from the fusion of the material in an assay furnace. For example, for gold, it is generally at temperatures of about 2,000 Degrees F (10640 C).
   Cupellation is one of the phases in this analytical technique. This involves addition of lead (Pb) to the unrefined gold. Then it is heated in air to melt the metals in lead, which forms base metal oxides.
   The lead, containing the gold, being the heaviest material in the slag will be on the very bottom. The hardened slag, after cooling, is removed from the mould. Then it is tapped with a button hammer to break free the lighter material which leaves only the lead button. The lead button is positioned in a porous bone ash crucibles or clay crucible, which is called a Cupel. When lead is heated to the melting point, Cupel, which is designed in such a way, absorbs the lead. Then they are valued in grams of lead which has been absorbed. The cupels with the lead buttons are sited in an Assay or Cupellation furnace and heated to approximately 2,000 Deg. F. Cupel again absorbs lead, leaving only a small gold bead. The cupels are removed from the furnace and are cooled down. Weighing of gold bead is done. The following figure shows fire assaying:

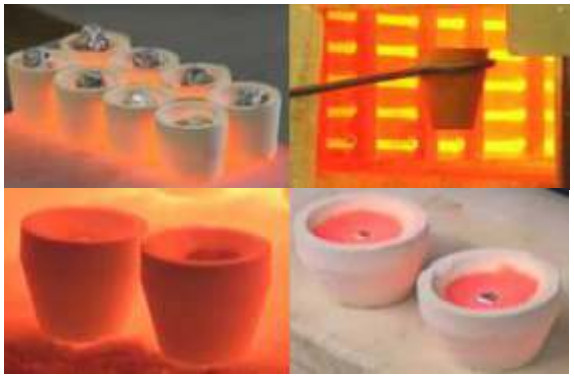

Fig. 1.5.4: Fire Assaying

   Here, any impurities are removed by absorption into porous bone ash crucibles or cupels where heating happens. Precious metals like gold, silver and platinum group metals are remain behind as a metallic bead.
   After this the silver is parted out and the gold remains behind. The gold is then weighed on a balance having an accuracy of six decimal places. On applying the empirical formula, the purity of gold is then calculated. This is by far the most important method of accurately estimating the fineness of gold. This method is the method followed worldwide, for hallmarking purpose. However, this is a destructive method and a sample size of around 200 to 250 milligrams is required for the process. Generally, the scrapings are taken from different parts of the product to do the test.

3. **Inductively Coupled Plasma (ICP) Spectrometry**: In this technique, a weighed buffered aqueous solution of the gold sample is nebulised and injected into a plasma flame and the spectral emission analysed in multi-element spectrometers, with simultaneous

measurement of Yttrium as an internal standard. The intensity of the emission is related to the quantity of metal present.
Calibration against solutions of alloy standards is required. Micro -ICP allows use of samples of about 10 – 20 mg. Accuracy is 1 part per thousand for gold. The following figure shows ICP machine:

Fig. 1.5.5: ICP machine

ICP has a number of advantages over fire assay:

- Speed of assaying is similar to fire assay
- Speed is faster than fire assay for nickel and palladium - white golds
- Smaller sample weights are required
- No interference due to platinum, rhodium and iridium
- All alloying additions analyzed simultaneously, including trace elements
- No emissions of toxic lead fumes as in case of fire assay

Fig. 1.5.6: Advantages of ICP over Fire Assay

The only major disadvantage or rather limitation of ICP is its cost. Thus, it finds use only in the laboratories of the major Assay Offices and large precious metal and jewellery companies.

4. **Density Measurement**: Density is often expressed as specific gravity (S.G.), a numerical comparison of the density of a substance to that of water. Specific Gravity method

works on the principle that density can be measured by the buoyant force acting on a body immersed in a fluid.

Gold being a heavy metal has a density of 19.32 g/cm3. Different alloying metals added in karat golds are much lighter as compared to this. Density of silver is 10.5 g/ cm3 and copper is 8.9 g/cm3. Therefore, the alloy density or specific gravity decreases as karatage is lowered.

For example, 14 kt gold has densities ranging from about 13.3 g/cc for a red gold to about 14.6 g/cc for white gold. 18 kt gold has densities in the range 15.5 – 16.0 g/cc.

Archimedes Principle

Specific Gravity = [Density of air ÷ Density of water]

Density D = Weight ÷ Vol

Density is measured in gms/cu/cm

D = M ÷ V or M = D x V

18 k gold plate density,

D = 15.5 gms/cc

L = 80 mm

B = 20 mm

H = 3 mm

divide by 10 to convert to cm.

V = L x B x H

V = 8 x 2 x 0.3 = 4.8 cc

M = 15.5 x 4.8 = 74.4 gms

If the same was sterling silver D =10.3 gms/cc, V = 4.8 cc

M = 10.3 x 4.8 = 49.44 gms.

However, density is dependent not only on gold content but also on the actual content of every other constituent in the alloy. So, it is not possible to find out the specific gravity of hollow jewellery or studded pieces. In the case of enamel or shellac filled jewellery again, this will not be applicable. Also, if the jewellery is dirty, encrusted with soap, grease or oil one may not get a true reading. Even in the case of chains and fine filigree work one may get erroneous readings as air bubbles may be entrapped in the fine meshwork of the piece. However, it is a good way to check if there is a suspicion th at the jewellery contains other metals such as copper, silver, bronze or brass filled inside.

Example and steps carried out while Density measurement:

The specific gravity or density of a jewellery piece can be found out easily by weighing the article on an electronic balance with accuracy or at least 2 decimal places.

1. Dry weight of jewellery piece is recorded using jewellers scale.
2. Then a plastic cup or beaker containing distilled water is placed on the scale.

Fig. 1.5.7: Step 1 and 2

3. Using tare function set scale to zero.

Fig. 1.5.8: Step 3

4. The jewellery piece is then tied with a thin cotton string, dental floss or wire and immersed completely in the water and the wet weight is recorded. Make sure piece does not touch the bottom or sides of the cup.
5. The reading when it becomes steady, is again recorded and then the specific gravity is calculated using below given formula.
   Specific Density = (weight in air]/ (weight in air - weight in water] = (Readings from above example) 3.5/(3.5- 3.2) = 3.5/0.3 = 11.67

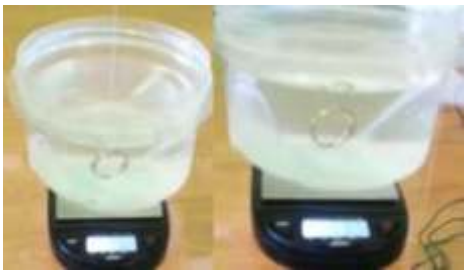

Fig. 1.5.9: Step 4,5

6. Compare piece specific gravity with the specific gravity or density range from Density table to find out the metal purity.

Nowadays specific gravity balances are available which are calibrated and can give a direct reading of the karat of gold. The technique measures the whole piece of jewellery and is non-destructive.

The cause for concern is that tungsten which has a specific gravity very close to gold (19.25 cc) can be used as a material to make jewellery and gold artefacts and then covered with a sheet or layer of gold. For this reason, people dealing with pure gold biscuits and coins have to be very careful. There have been quite a few cases where gold biscuits containing tungsten inserts have been found throughout the world. This concern has made people who deal in bullion invest in ultrasound scanners the same technique used in the medical industry to scan the bullion for tungsten inserts. However, this technique has not yet be en modified to the extent that it can check small jewellery pieces for inserts.

5. **X-Ray Fluorescence**: In this technique the jewellery is bombarded with radiation, usually from an X-ray tube source. This radiation impacts the atoms and causes electrons to move levels (orbital shells) with the emission of X-rays, hence the term Fluorescence. These are collected and measured in a spectrometer. The important point is that the X-rays excited and emitted from the surface will have a defined energy with wavelength characteristic of the atom from which it is generated. Thus, different metals emit X-rays of different wavelengths. Relative number of atoms of respective metal present decides the amount of energy emitted. If we count that energy, we can determine the amount of that metal present.

   The following figure shows X- ray fluorescence spectroscopy (XRF) machine:

Fig. 1.5.10: X-ray fluorescence spectroscopy (XRF) machine

   This method is used to measure the gold content of a thin surface layer up to 10 to 50 microns thick depending on alloy composition and the metal being measured. So, measurement accuracy is severely affected due to factors like chemical surface treatment (to enhance colour) of jewellery article or if it has been electroplated with a layer of pure gold or treatments like bombing, acid pickling, which change the surface composition.

6. **Electronic Gold Pen**: It is possible to buy cheap portable electronic instruments for measuring gold content. A probe or 'pen' is placed on the surface of the jewellery in contact with a conductive gel and the gold content reads off a meter attached to it. This type of instrument usually works on the capacitance decay principle of the surface and relating it to gold content. Whilst quick and non-destructive, it is dependent on surface composition. It measures only to the nearest 1 -2 carats and is not consistent under changing conditions of temperature and humidity.

   The following figure shows electronic gold pen:

Fig. 1.5.11: Electronic gold pen

UNIT 1.6: Jewellery Weight Inspection

Unit Objectives

At the end of this unit, you will be able to:

1. Inspection of jewellery weight assessment.

1.6.1 Stages of Jewellery Value Chain

Jewellery Scales:
These are custom digital scales used for measuring gold, gemstones and other precious metal in grams and carat.

Why jewellery weight is needed?
Jewellery weighing is a significant factor to determine its value. Commercial jewellers weigh jewellery on certified trade scales for buying or selling of products. Use of accurate scales make sure that your product prices are as per the market prices.
All components must be weighed and inspected throughout the jewellery making process to make sure that they meet the required specifications.

Jewellery Measurement:
Jewellery is generally measured in carats, grams or troy ounces.
One carat = 0.2 g(200 mg)
Gemstones are weighed in Carats.
Troy Ounce= 31.1.g
Troy ounces are used for weighing gems and precious metals in bulk such as gold and silver.

Determination of Carat Weight:

The following figure list steps in determination of carat weight:

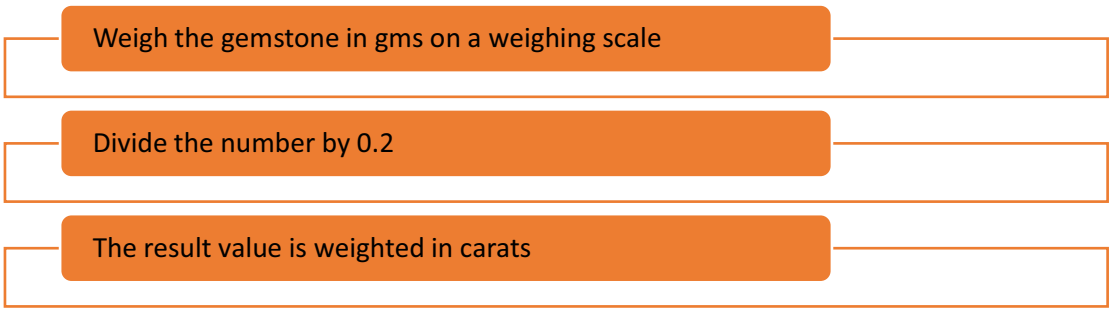

Fig. 1.6.1: Steps in determination of carat weight

Weighing with digital pocket scale

The following figure lists steps in determination of weight with digital pocket scale:

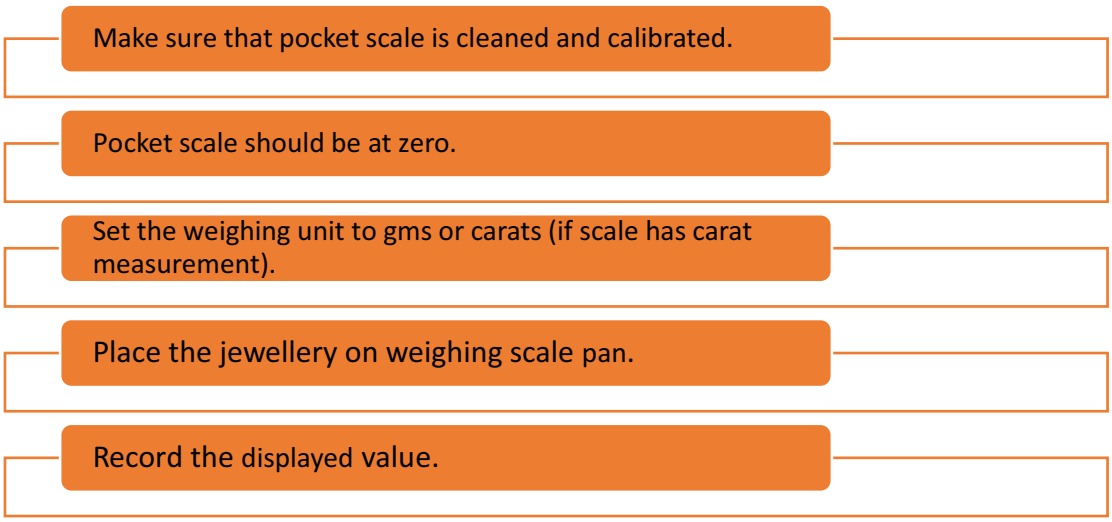

Fig. 1.6.2: Determination of weight with digital pocket scale

Jewellery Scale Calibration:

Maintaining your balance helps in reliable and accurate measuring of jewellery weight. It can result in incorrect weighing results in case the scale has not been calibrated. The following figure enlist two types of Jewellery Scale Calibration:

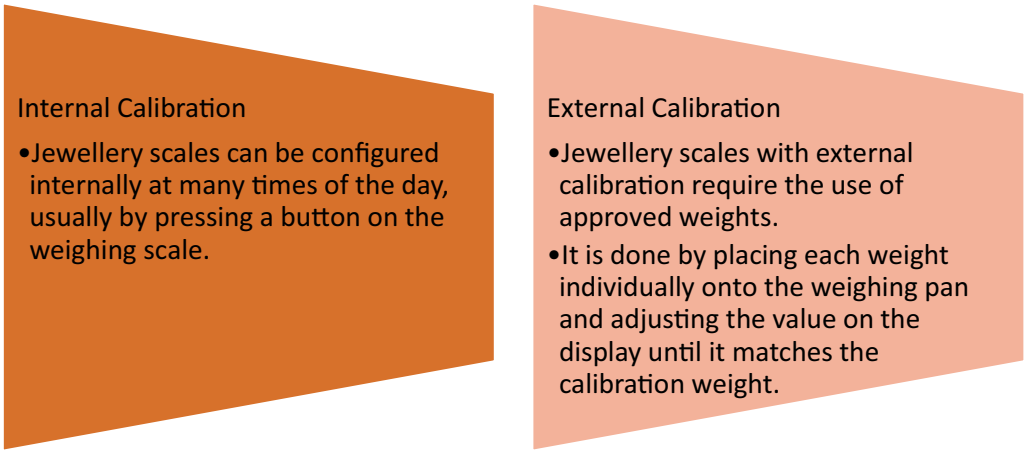

Fig. 1.6.3: Types of Jewellery Scale Calibration

Casting Process on Stone in Wax Casting:

Stones Selection:

Stone-in-wax casting involves risk of stones getting break or their appearances changes by a number of factors during the process. It is important to test the stones for their color fastness and heat tolerance.

Wax Injection:

It is important to have elasticity in wax which allow stones to click into place. It is important to inspect wax patterns for any sings of defects or blemishes.

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Exercise

1. What are the 4 C's of diamond?
   a. _____
   b. _____
   c. _____
   d. _____

2. What do the following international standards to identify clarity of diamonds mean?

Standard	Meaning
IF	
VVS	
SI	

3. List three methods for jewellery quality assessment.
   a. _____
   b. _____
   c. _____

Skill India

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GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP

N·S·D·C
National
Skill Development
Corporation
Transforming the skill landscape

GJSCi
Gem & Jewellery Skill Council of India

2. Assessing Quality of Jewellery Product

Unit 2.1 – Assess the Value of jewellery

Unit 2.2 – Visual Examination of Product Quality and Karatage

Unit 2.3 – Estimation of Value of Jewellery

Unit 2.4 – Maintenance of Productivity standards and Documentation Process

G&J/N8502

Key Learning Outcomes

At the end of this unit, you will be able to:

1. Describe jewellery value assessment using non-destructive methods.
2. Describe jewellery value assessment using destructive methods.
3. Explain performing different processes using standard procedures.
4. Explain visual examination of product quality and karatage.
5. Explain estimation of net gold in jewellery.
6. Demonstrate how to calculate value of jewellery product.
7. Explain compliance with documentation and reporting practices in an organization.
8. Explain compliance with the quality and productivity standards set by the organization.
9. Identify target number of jewellery products.

UNIT 2.1 Assess the Value of jewellery

Unit Objectives

At the end of this unit, you will be able to:

1. Assessment of Jewellery value using destructive and non-destructive methods.

2.1.1 Non-Destructive Methods

The following are non-destructive methods of Jewellery Value Assessment

1. **Density Measurement:** Density measurements is one of the oldest, fastest known Non-destructive method of assay and used sometimes for determining fineness of gold objects which cannot be assayed or analyzed by the typical dry or wet methods.
   The ancient Greek scientist Archimedes discovered this principle in response to a gold-testing problem. The story goes that, King Heiron II of Syracuse asked Archimedes if there was a way to determine, without damaging the item, like whether his new crown was made of the fine gold as per his specifications or of suspected adulterated alloy. Archimedes was confused over the problem. One day while stepping into a bath tub, he watched water overflow which made him realize that an immersed object displaces fluid depending only on its volume, regardless of its weight. Thus, volume of the crown could be found out by immersing it in a container filled completely with water, measuring the overflow. Then, comparing the volume of the overflow to the volume of an amount of pure gold which weighs precisely similar as the crown. If the crown was of pure gold, the two volumes would be the same; but if the crown were gold alloyed with a lighter metal, such as silver or copper, the same weight of alloy must have a greater volume than pure gold. Because gold is denser i.e., has a higher specific gravity, it displaces less water than an equal weight of silver or copper. The following figure shows gold testing device using specific gravity:

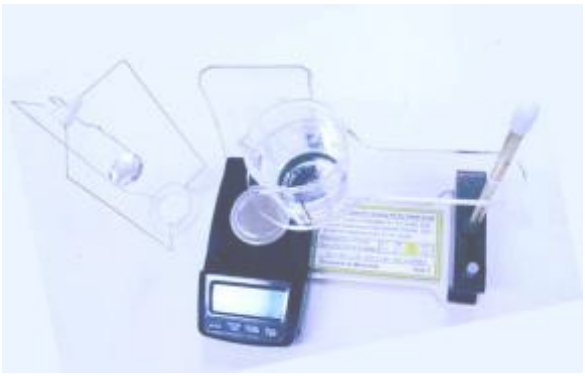


Fig. 2.1.1: Gold testing using specific gravity

2. **X-Ray Fluorescence:** X-ray fluorescence spectroscopy (XRF) is a non-destructive technique. This is appropriate for normal assaying requirements of final jewellery piece at sale in the shop. This is generally known as Karatometer in the market.

Fig. 2.1.2: Handheld X-ray fluorescence Spectrometer

3. **Electronic Gold Pen:** It is portable electronic instruments for measuring gold content.

Fig. 2.1.3: Electronic Gold Tester

2.1.2 Destructive Methods

The following are destructive methods of Jewellery Value Assessment:

1. **Touchstone Testing:** Touchstone testing is an ancient method but still very prevalent method in India. You will find most of the jewellers using this method, though most of them depend more on their personal experience rather than following a much-disciplined standard process and hence it may lead to variations at times.

The following image shows touchstone setting:

Fig. 2.1.4: Touchstone Testing

2. **Fire Assaying:** This is a most ancient and accurate technique used for Gold Assaying.

Fig.2.1.5: Fire Assaying

3. **ICP Spectrometry:** Inductively coupled plasma solution spectrometry (ICP) is a serious competitor to fire assay for assaying of carat golds. It is finding significant use in many precious metal analytical laboratories. Due to its greater element selectivity, ICP has an advantage for white golds containing nickel or palladium. Full analysis of the gold sample can be done using this technique, which is an added advantage over fire assay.

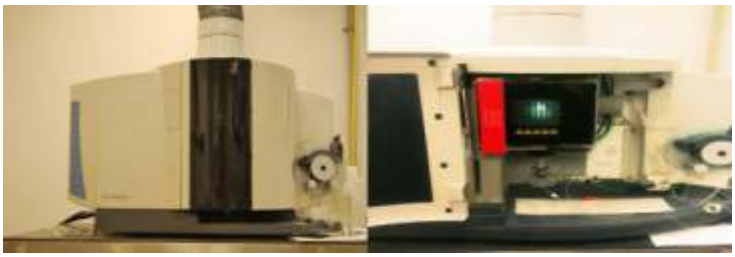


Fig.2.1.6: ICP Spectrometry

UNIT 2.2: Visual Examination of Product Quality and Karatage

Unit Objectives

At the end of this unit, you will be able to:

1. Explain product quality and karatage inspection using visual examination.
2. Perform different processes using standard procedures.

2.2.1 Gold Alloys and Karatages

For the purpose of making ornaments pure gold or 24 k gold (.999 fine) is alloyed with other metals such as silver, copper, zinc etc. Some parts in India such as the north eastern region do make ornaments with pure gold, but they are mainly tribal jewellery made for traditional trends. The composition of the alloys will vary according to the colour required and also the hardness required. As we all know pure gold cannot be used for making ornaments mainly because of its softness. This makes the articles lose shape, weak in structure, gets rapidly eroded with use. Also; it is almost impossible to tightly hold or set precious stones in pure gold jewellery. So, pure gold is alloyed using various alloys to the legal standards 22K, 18K, 14K and 9K. The following table shows decimal and percentage equivalents of karats:

KARAT	PARTS		DECIMAL EQUIVALENT	PERCENT	
	PURE GOLD	ALLOYING METALS		PURE GOLD	ALLOYING METALS
24	24	0	1000	100	0
23	23	1	0.9583	95.83	4.17
22	22	2	0.9166	91.66	8.34
21	21	3	0.8750	87.50	12.50
20	20	4	0.8333	83.33	16.67
19	19	5	0.7916	79.16	20.84
18	18	6	0.7500	75.00	25
17	17	7	0.7083	70.83	29.17
16	16	8	0.6666	66.66	33.34
15	15	9	0.6250	62.50	37.50
14	14	10	0.5833	58.33	41.67
13	13	11	0.5416	54.16	45.84
12	12	12	0.5000	50.00	50.00
11	11	13	0.4583	45.83	54.17
10	10	14	0.4166	41.66	58.34
9	9	15	0.3750	37.50	62.50

Fig 2.2.1: Decimal and percentage equivalents of karats

Often the source of much confusion, the difference between a karat and carat is fairly easy to understand but may be somewhat hard to remember. A karat is a unit of measurement which indicate the purity of a metal, usually gold. Carat is used to measure the weight of a valuable stone, especially diamonds.

The term karat is important, especially in case of gold. It must be made into an alloy due to its nature. Gold is a very soft metal in purest form, so practically it can't be used as jewellery. It would quickly become distorted and dented. Therefore, jewelry makers have to fortify the metal by mixing gold with a harder metal.

The karat is accountable for determining the relative value of the gold piece in most of the cases. The difference in price between 9k (lowest purity) and 23k (highest purity) of gold jewelry is commonly available which can be really important. Gold selected as 10 karats is less than half gold. Eighteen karat gold is considered to be 75 percent gold. Twelve karat gold is half gold and half added metal or metals. It is not of most common purity though is available for sale. The following diagram shows composition of various karatages of gold:

	Caratage	Gold (Au)	Silver (Ag)	Copper (Cu)	Zinc (Zn)	Palladium (Pd)
Yellow Gold	9k	37.5%	42.50%	20%		
Yellow Gold	10k	41.70%	52%	6.30%		
Yellow Gold	14k	58.30%	30%	11.70%		
Yellow Gold	18k	75%	15%	10%		
Yellow Gold	22k		5%	2%	1.30%	
White Gold	9k	37.5%	62.5%			
White Gold	10k	41.7%			0.9%	10%
White Gold	14k	58.30%	32.20%			9.50%
White Gold	18k					25% (or Pt)
White Gold	22k	N/A	N/A	N/A	N/A	N/A
Rose Gold	9k	37.5%	20%	42.5%		
Rose Gold	10k	41.70%	20%	38.3%		
Rose Gold	14k	58.30%	9.2%	32.5%		
Rose Gold	18k	75%	9.2%	22.2%		
Rose Gold	22k	91.7%		8.40%		

Fig 2.2.2: Composition of various karatages of gold.

2.2.2 Visual Examination of Product Quality

Hallmarking

Hallmarking is the precise determination of the proportionate content of precious metal in valuable metal articles which are being officially recorded. Therefore, Hallmarks are considered to be official marks, being used in many countries as a guarantee of purity or fineness of valuable metal articles.

The objectives of the Hallmarking Scheme:

- To protect the public against adulteration
- And to obligate manufacturers to maintain legal standards of fineness

Fig 2.2.3: Objectives of Hallmarking Scheme

At present, in India, two precious metals viz. gold and silver are brought under the purview of Hallmarking.

The BIS Hallmarking Scheme is in alignment with International criteria on hallmarking. License is approved to the jewellers by BIS under Hallmarking Scheme. BIS certified jeweller (retailer/manufacturer) has the right to register their retail shop with any of the BIS recognized Assaying and Hallmarking Centers to get their jewellery hallmarked. Assaying and Hallmarking Centre recognition is done against IS 15820:2009. BIS inspects certified jewellers in a defined period. Market scrutiny involves gathering of hallmarked gold jewellers from licensee's retail store or manufacturing sites and testing for compliance in BIS recognized Hallmarking Centre. If there is any discrepancy, jeweller's license may even be cancelled or may lead to legal implications.

The yearly consumption of gold has presently increased to over 800 tonnes from an estimated 65 tonnes in 1982. Following figure shows demand percentage:

- 80% is for jewellery fabrication (mainly 22 carat purity) for domestic demand
- 15% for investor demand
- barely 5% for industrial use

Fig 2.2.4: Gold demand

According to a FICCI study, there are 15000 players in gold processing industry having around 80 units with revenues over US $ 5 million. India has around 4,50,000 gold smiths, over 100,000 gold jewellers, along with about 6000 diamonds- processing players and 8000 diamond jewellers.

Hallmarked jewellery should bear five marks etched with laser marker.

1) BIS Mark: The following image shows a BIS mark:

Fig 2.2.5: BIS Mark

2) Purity in karat or fineness mark: Below are the codes for determining the karatage of your gold article. Each code represents a certain karatage.

958	Corresponding to 23 Carat
916	Corresponding to 22 Carat
875	Corresponding to 21 Carat
750	Corresponding to 18 Carat
708	Corresponding to 17 Carat
585	Corresponding to 14 Carat
375	Corresponding to 9 Carat

3) Assaying and hallmarking center's: The logo of BIS recognized assaying and hallmarking center's mark where the jewellery has been assayed and hallmarked. The following image shows A and H centre's logo:

Fig 2.2.6: A and H centre's logo

4) Year of marking: A code letter denotes year of marking. Letter 'A' Denotes Year 2000,'J' for 2008 'S' for 2014. The following image shows code letter:

Fig 2.2.7: Code Letter

5) Jeweller's Mark: Logo of BIS certified/ Jewellery manufacturer. The following image shows code jeweller's logo:

Fig 2.2.8: Jeweller's logo

The following figure shows five signs of hallmark that need to be kept in mind while buying jewellery:

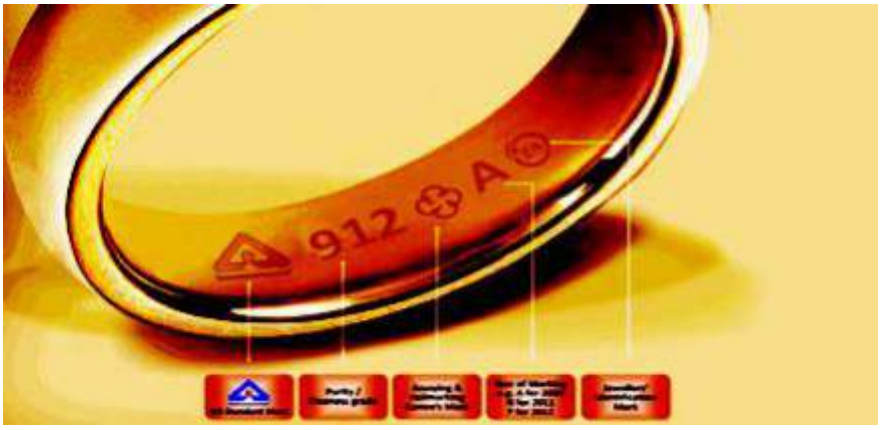


Fig 2.2.9: Signs of hallmarking

From 1 st January 2017 Hallmarking is done only for 3 levels of purity and has only four marks. Following image shows four Hallmarking marks:

- BIS Mark
- Purity in karat or fineness mark
- Assaying and hallmarking center's mark or logo
- Year of marking denoted by a code letter

Fig 2.2.10: Four Hallmarking Marks

Laser Hallmarking

Hallmarking is generally done using laser, which has many benefits like it does not require any physical contact with the finished article, a very precise fiber laser-engraving machine applies it. It does not cause any sort of bruising or distortion or metal loss. So, no subsequent refinishing is needed. It is likely to mark both even and curved surfaces; which makes it easier to mark small, delicate, hollow or complex shape jewellery or article. Laser marking are long lasting and retains excellent definition even after re-polishing.

The following images shows laser hallmarking:

Fig 2.2.11: Laser hallmarking

Scan the QR Code to open the related document or click on link

Click Here
Categaries of Indian Jewellery

Click Here
Gold Appraiser and Valuer

2.2.3 Perform Different Processes using Standard Procedures

Need to assay gold:

In jewellery the integrity of the precious metal is most critical. Basis of selling Gold jewellery is its gold content. We define jewellery with its Fineness which is in parts per thousand gold, or karatage. Here 24 carat signifies pure gold. In many countries, there are laws that administer the actual karatages of jewellery that can be sold and the permissible tolerances on the gold content.

The misrepresentation or underkarating or debased of gold content and fake jewellery has been a source of concern at all levels of the industry and which can be only determined by testing i.e. by assaying the sample. So, the knowledge of the gold assay is essential to the jewellery manufacturers, the retailer, the banks and other financial institutions who offer loans against gold jewellery and the consumers too.

Assaying is quantitative chemical analysis of a material, for one specific metal or chemical element of particular attention. It is often related with the study of ores and metals.

Assaying means determining metal content in Valuable Metals Jewellery/Artefacts in context of gold jewellery.

In many countries, the law tells that all jewellery should be tested or assayed and marked with the gold quantity. This is usually known as Hallmarking, when being done by an independent assay laboratory.

Assaying Methods:

Assaying methods used for the determination of the gold content in jewellery are broadly classified as:

1. Destructive Testing
2. Non-Destructive Testing

Destructive Testing:

Destructive testing, as the name suggests (or destructive physical analysis, DPA) are carried out to the specimen's failure, in order to know a specimen's or sample's precious metal content. Fire assay and touch stone test are the most ancient destructive testing methods used even today. There are other advanced and faster destructive tests available today. These tests are considered both suitable and economic for mass produced objects, as the cost of terminating a small number of pieces (or small part of metal) is negligible and more accurate results of metal percentage content are expected. Some modern and faster destructive testi ng are Inductively Coupled Plasma Spectroscopy (ICP), Atomic Absorption Spectrometry (AAS).

Non-Destructive Testing:

Non -Destructive testing (NDT) most suitable for Ready to sell jewellery are Density check, X-ray Fluorescence Spectroscopy (XRF) commonly known as karatometer etc.

The following table displays method for assaying gold:

	Technique	Destructive	Comment
Anclent	Fire Assay	Yes-sample taken	Weighing
	Touchstone	Yes, rubbing taken	Colour comparison
	Density	No	Archimedes method
	Parting	Yes-sample taken	Weighing
Modern	Electronic Gold Pen	No-surface only	Capacitance decay
	X-ray Fluorescence Spectrometry (XRF)		
	Atomic Absorption Spectroscopy (AAS)	Yes-sample in solution or as or as solid cathode	Atomic absorption lines measured
	Inductively Coupled Plasma Spectrometry (ICP)		Atomic emissin lines measured

Fig. 2.2.12: Assaying techniques for gold jewellery

solid cathode

Assaying method is selected based on following factors:

- Speed
- Accuracy
- Cost
- Consistency of testing
- Whether it is destructive or non-destructive
- Size of sample

Fig. 2.2.13: Factors for Selecting Assaying Method

UNIT 2.3: Estimation of Value of Jewellery

Unit Objectives

At the end of this unit, you will be able to:

1. Explain net gold estimation in jewellery after deduction of beads, gemstones.
2. Explain valuation of jewellery product

2.3.1 Net Gold Estimation

Currently there is no standard invoicing process and prices vary from jeweller to jeweller. Each city has its own jewellery association which decides gold rate every morning and declare it. Due to this, gold rate varies in different cities.

The following figure shows how to calculate final price of jewellery:

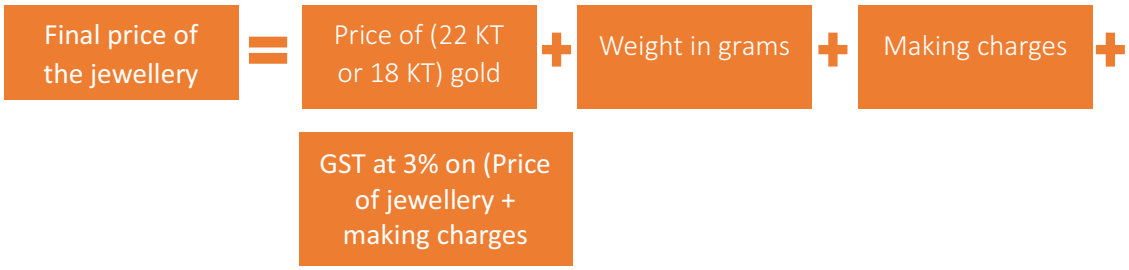


Fig. 2.3.1: Final price of jewellery

Prices vary in the following scenarios:

Studded Jewellery: At times, we purchase studded jewellery that has stone affixed on it. Some jewelers weigh the complete jewellery piece and charge it as a whole at the price of gold. In case someone wishes to exchange/sell it, stone weight and impurity is deducted from the total value.

Billing process differs for a studded product. On purchase of a studded jewellery, the stone worth is also being added to the bill. While buying, customer should know that cost of diamonds and gemstones are to be added separately.

The following figure shows studded jewellery:

Fig. 2.3.2: Studded Jewellery

2.3.2 Valuation of Jewellery Product

The following are different criterions that must be checked for jewellery valuation:

1. Determine the weight of the article by weighing preferably on an electronic balance.
2. Feel the heft or weight.
3. Determine the colour of the article.
4. Look out for open joints.
5. Look out for peeling effect by plating over a period of time.
6. Look out for the hardness of the gold. Higher karat gold will be softer compared with lower karat.
7. Look for excessive solders.
8. Look for discolouration due to oxidation.

The following figure shows some coloured stone rings:

Fig. 2.3.3: Coloured Stone rings

UNIT 2.4: Maintenance of Productivity standards and Documentation Process

Unit Objectives

At the end of this unit, you will be able to:

1. Explain complying with documentation and reporting practices followed in the organization.
2. Explain complying with quality and productivity standards
3. Explain target market

2.4.1 Documentation and Reporting in an Organization

Appraisals are carried out by certified jewellery appraisers, who provide a written Grading and Appraisal Report.

Diamond Grading Report: This is a report of diamond characteristics based on 4 C's: Cut, Colour, Clarity and Carat Weight.

Appraisal Report: Document which provides market value based on identity, composition and qualities of jewellery item.

Following may be included in the Appraisal Reports:

Purpose and use of appraisal
The value, type of value and how it was determined
Multiple photographs
Any assumptions and limiting factors
Appraisers Qualifications
Instruments used
Signed Certificate to ensure that report is legal

2.4.2 Quality and Productivity Standards

Appraisals are carried out according to recognized specialized standards such as the International Valuation Standards Council and the Uniform Standards of Professional Appraisal Practice.

Bureau of Indian Standards (BIS):

The Bureau of Indian Standards (BIS), the National Standards Body of India is a statutory organization under the Bureau of Indian Standards Act, 1986.

BIS Objectives

Following figure shows objectives of BIS:

Fig. 2.4.1: BIS Objectives

BIS has laid down specification for precious metals such as gold, platinum and their alloys. The standards for assaying of precious metals are in order to international standards. Certification of purity for gold and silver jewellery or artefacts is carried out as per IS 1417 & IS 2112.
It is important to ensure that centers should follow BIS guidelines strictly (for all operations). After ensuring, BIS provides recognition of the assaying and hallmarking centers.

International Standards

Rules for Grading Polished Diamonds has established by the International Diamond Council and it was updated in 2009. These rules have been recognized by CIBJO, and it became the point for reference for diamond terminology which is aimed at benefiting consumer.

The following figure shows revised IDC rules:

ISO/IEC 17025:2005

- It sets out general requirements for the competence to carry out tests and/or calibrations.
- It is used for laboratories in developing their management system for quality, administrative and technical operations.

CIBJO Gemological Laboratory Book

- It provides guidance for gemological laboratories in developing their management system for quality, administrative and technical operations including

CIBJO Diamond Book

- It is designed to assist all those involved in the purchase or sale of diamonds, treated diamonds, synthetic diamonds and imitations of diamond to ensure the use of proper nomenclature.

International Valuation Standards Council (IVSC)

- It develops technical and ethical standards for the conduct of valuations and applicable to appraisal.

Fig 2.4.2: Revised IDC rules

2.4.3 Target Market of Jewellery Product

The jewellery market is growing every year and becoming complex. There are consumers with different purchase behaviors and changing preferences.

Selling of jewellery products can be targeted based on direct marketing. This provides audience selection benefits like:

- Target exactly the right individual
- The ability to test at low volumes with a low initial financial investment
- Option to roll out at high volumes if a given set of messaging, creative and audience is working

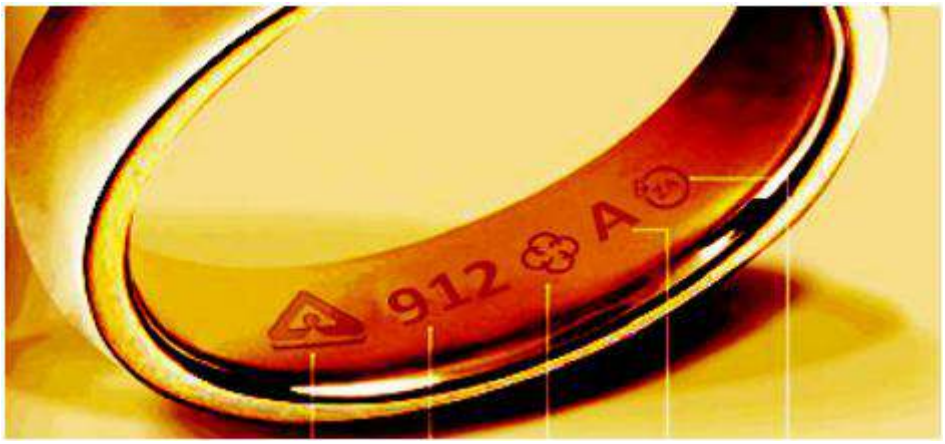
Fig 2.4.3: Audience selection benefits

Targets can be set based purchasing done by customers in past and what they indicated to purchase in future.

Exercise

1. What are three non-destructive methods of Jewellery Value Assessment?
   a. _____
   b. _____
   c. _____
   d. _____

2. Identify the different signs of hallmarking.



1 2 3 4 5

1

3. How is the final price of gold jewellery calculated.
   Final price of the jewellery = _____

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Corporation
Transforming the skill landscape

GJSCi
Gem & Jewellery Skill Council of India

3. Coordinate with Others

Unit 3.1 – Effective Communication

Unit 3.2 –Coordination with Supervisor and Colleagues

Unit 3.3 –Comply with Company Policies

G&J/N9901

Key Learning Outcomes 

At the end of this unit, you will be able to:

1. Discuss the importance of effective communication.
2. Explain the components of effective communication.
3. Identify the need for interpersonal relationships.
4. Explain coordination with supervisor and colleagues.
5. Discuss about the need to follow company's policies.

UNIT 3.1: Effective Communication

Unit Objectives

At the end of this unit, you will be able to:

1. Explain need of effective communication
2. Explain components of effective communication
3. List the importance of listening skills

3.1.1 Need for Effective Communication

All around the world people, animals and trees communicate in their own unique way. Presenting oneself and one's abilities is equally important for any profession today. Also, it is beneficial at any work place, as it helps to communicate one's ideas and t hought process in a better way within his team or outside. Effective communication benefits everyone at all levels whether it is inter departmental, intra departmental or personal.

Inter Department Communication is a process by which an individual exchange ideas, thoughts and information with other department in organization. It is very important for any professional to communicate with other departments to complete his task efficiently.

Intra Department Communication is a process by which any professional exchanges ideas, thoughts and information with his superiors and subordinates within his department. It is very important that he communicates within his departments to complete his task efficiently.

The following figure shows communication between employees:

Fig. 3.1.1: Effective communication make jobs easy

3.1.2 Process of Communication

The process of information transfer from the sender to the receiver, who understands and shares feedback, is known as communication. Every act of communication whether it is speaking, writing, listening or reading is more than a single isolated action.

It is a chain of events which has certain characteristics:

It is a two-way process
It has a sender and a receiver
A message is sent across
It is effective only when it gets the desired response from the receiver
Constant feedback ensures effective communic ation

The three primary steps in communication are:

Thought: Information first resides in a sender's mind in the form of an idea, feeling, knowledge or concept.
Encoding: Next, the message is communicated to the receiver in a mutually understandable code, symbols or words.
Decoding: Lastly, the encoded message received by the receiver is again translated into a concept or words that he can understand.

Any individual demonstrate communication in his personal as well as professional life, few examples are:

While interacting with family / friends
Applying for a job (Interviews)
Product demonstration
Responding to a message
Giving instructions to working partners, contractors
Listening
Developing a new relationship

3.1.3 Types of Communication

There are multiple forms of verbal and non-verbal communications. These could be body language, eye contact, sign language, haptic communication and chromatics.

Types of communication

Verbal communication: Language plays a significant role in verbal communication. In order to describe events, ideas or products, a person needs words and symbols that represent thoughts in a meaningful pattern. These are arranged as per the grammar rules of a language, put in a proper sequence.

Following are the ways to improve verbal communication:

- Use positive words
- Ask the right questions
- Think and prepare before speaking

- Reduce usage of verbal pauses
- Avoid careless language

Written Communication: Written communication is important because a written message can be used as a record. A written document is referred in the absence of the person and therefore it must be foolproof. One can explain the product benefits to a buyer in a one-to-one conversation but in the absence of the salesperson, written communication is the basis for discussion, thus making it as a prime form of communication. In business written communication can be in the form of a letter, memo and report. Following are the ways to effective written communication:

- Clear, coherent, concise
- Correct with courtesy and confidence

Non-Verbal Communication: This is the most common and basic form of communication. Anthropologists believe that long before mankind started using words as means of communication, our ancestors used various parts of the body to communicate with each other. For example, gritting teeth was to express anger, smiling or touching each other was for affection. As per a popular research 7 percent impact is through verbal communication, 38 percent is through the tone of our voice and 55 percent is given to the expression we have/use while communicating, thus making expression or nonverbal communication the most important aspect. Communication without words i.e. non-Verbal communication consist of following clues:

- Body language
- Emotion of the sender and receiver
- Perceptions due to prior interactions

WHAT you say is not nearly as important as HOW you say it! “So Let Us Implement”.

3.1.3 Listening Skills

No matter where a person may be, he/she does not only want to be heard but, wants to be truly understood. Therefore, active listening plays a vital role in life, especially in the service industry. This skill can be developed with practice and patience.

In a layman’s term, listening means paying attention. It means full concentration, engagement in and absorption of what the other person is trying to convey. It includes expressing and giving responses by:

Shaking the head (expressing denial/no)
Nodding the head (expressing agreement/yes)
Asking questions to clarify and understand the customer requirements better
Making/maintaining eye contact to show confidence

Why is listening important?

There are three major reasons as to why listening is essential. The following figure lists the three major reasons:

Shows respect for peers and earns their trust

- Given the amount of pressure and stress at a workplace, people like to have understanding and supportive peers.
- A person's value increases when they show understanding and reach out.

Helps understand issues and provide solutions

- An active listener gains a better insight to any of the peer's concerns.
- A deeper understanding to problem results in providing better and accurate solutions.

Helps to diffuse conflict

- A workplace brimming with ideas is subject to conflict of interests.
- A person's openness to opinions and different perceptions revolving around a situation help in diffusion of conflicts.

Fig. 3.1.2: Importance of listening

How does listening improve workplace performance?

One can notice benefits if there is emphasis laid on effective listening at work. It results in better productivity, timely achievement of goals and a better coordination between employees.

UNIT 3.2: Coordination with Supervisor and Colleagues

Unit Objectives

At the end of this unit, you will be able to:

1. Discuss how to coordinate with supervisor
2. Identify the importance of coordination with colleagues
3. Explain importance of teamwork.

3.2.1 Coordination with Supervisor

The supervisor can guide an employee to work efficiently. The employee must be able to communicate with the supervisor in a proper way. The following figure highlights the points for which an appraiser must interact with the supervisor:

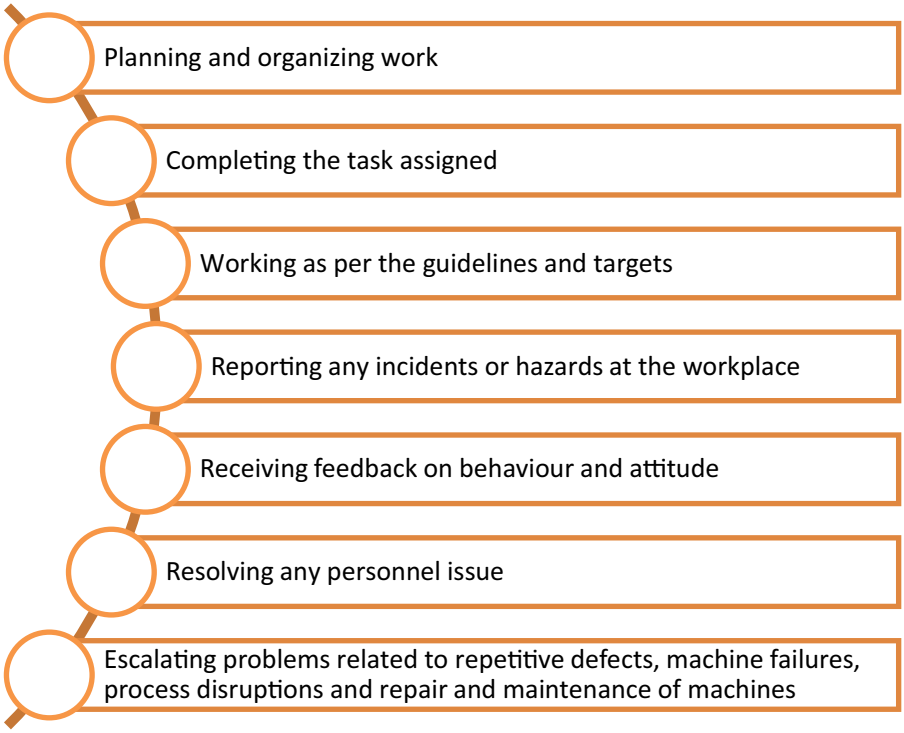

Fig 3.2.1: Interaction with Superior

An appraiser needs to understand the work requirements, the instructions of the supervisor and the standard working procedures to carry out the work efficiently.

Work ethics means differentiating between the right and the wrong way of doing a job and adopting the right conduct. Work ethics involve certain principles as shown in the following figure:

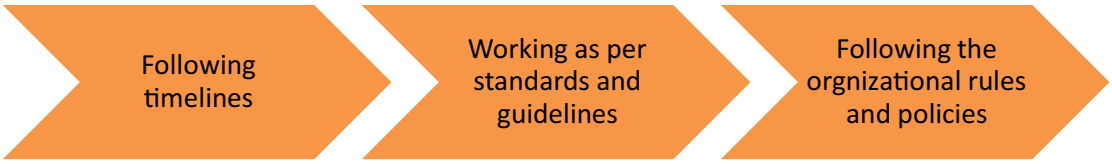

Fig. 3.2.2: Work ethics

3.2.1 Coordination with Colleagues/Team Members

A team is formed when a group of people work together with an objective to achieve the goals and targets. Working as a team helps to understand the work and also have a better co-ordination at work.

The following figure lists the key points to consider while interacting with colleagues:

Fig. 3.2.3: Key points while interacting with colleagues

The following figure lists some practices to be followed by an appraiser while working in a team:

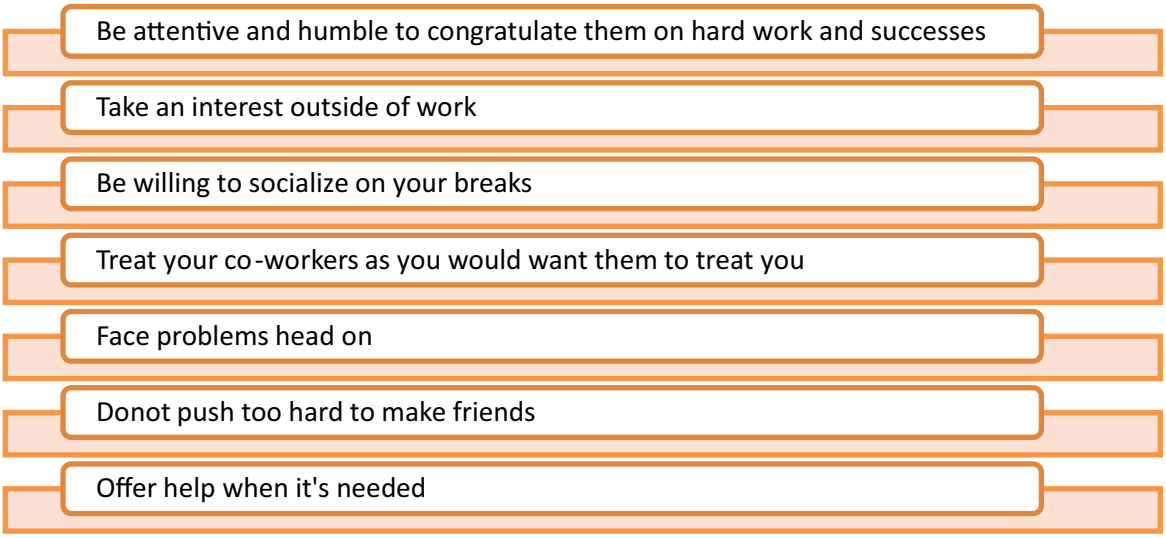

Fig. 3.2.4: Practices to be followed for working in a team

To maintain a healthy interpersonal relationship, it is important to adhere to the p oints shown in the following figure:

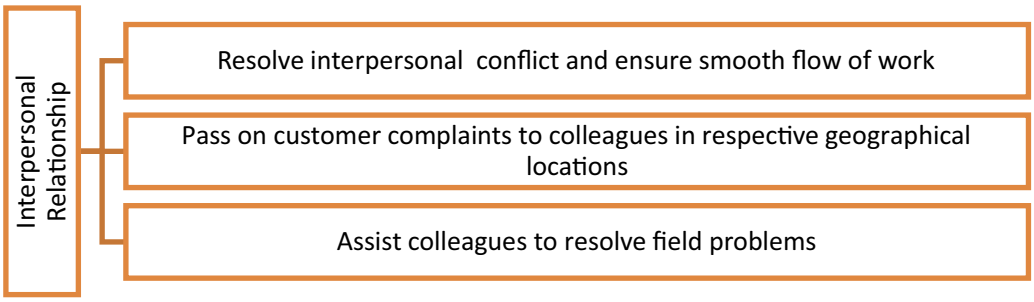

Fig 3.2.5: Managing interpersonal relationship

UNIT 3.3: Comply Company Policies

Unit Objectives

At the end of this unit, you will be able to:

1. Explain the importance of company policies.

3.3.1 Code of Conduct Policies

In an organization, the code of conduct means the core values, ethics, responsibilities, commitments and virtues that every employee of that organization needs to comply with. It lays down the general guidelines that the organization expects from its employees in specific situations. Thus, it is necessary to follow a proper code of conduct in terms of behaviour and work output delivered.

3.3.2 Organization Culture

Organizational culture is defined as the shared values, beliefs and norms within an organization and the demands of a job role. The following figure represents the characteristics of organizational culture which an appraiser should reflect:

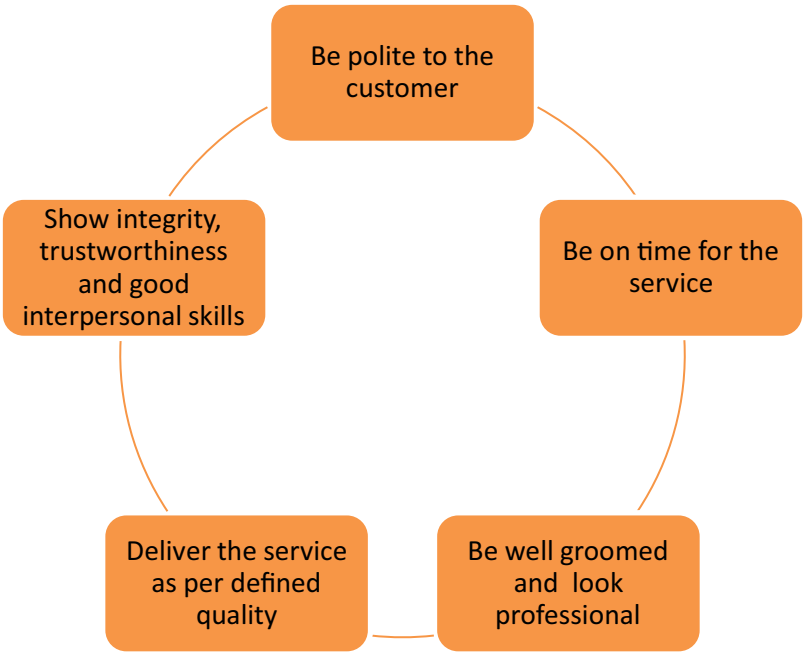

Fig. 3.3.1: Characteristics of organizational culture

Company's Policies and Rules

If a company's policies and rules are not defined clearly, then the employees may not comply with the disciplinary standards wholeheartedly. The following figure lists a few examples of a company's policies:

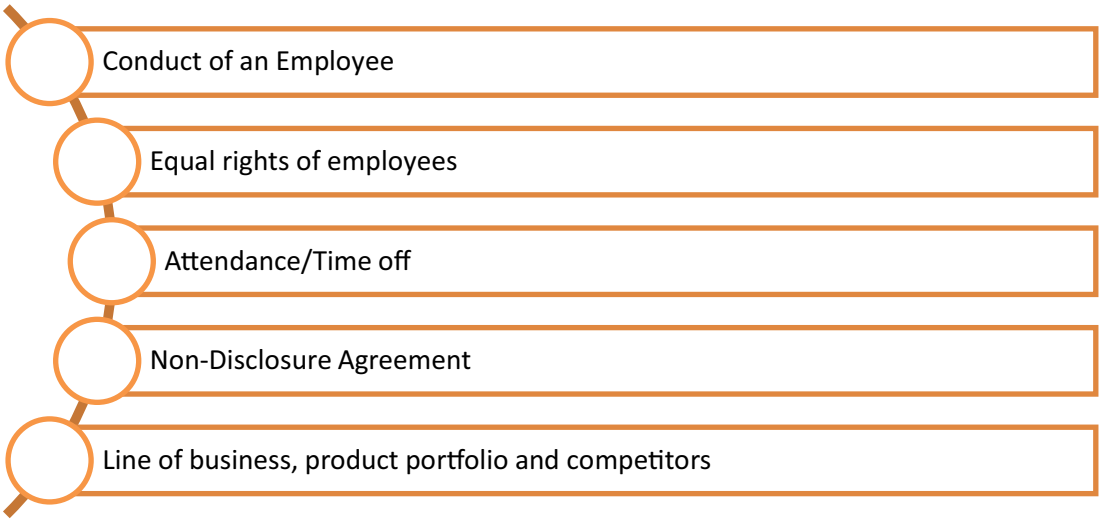

Fig. 3.3.2: A company's common policies

Reporting Structure

There are set rules and regulations within an organization which an employee needs to follow. These outline responsibilities of both the employers and the employees.

The following figure lists the key points of the reporting and documentation process which needs to be ensured while working in an organization:

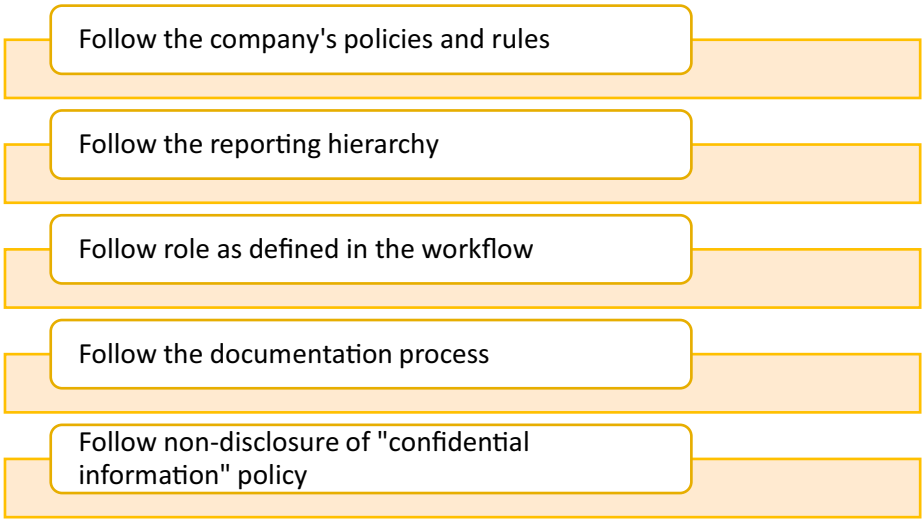

Fig. 3.3.3: Reporting and documentation process

Exercise

1. List the three types of communication.
   a. _____
   b. _____
   c. _____
2. Write three principles of work ethics.

   a. _____
   b. _____
   c. _____

3. Write three examples of company policies that an employee must follow.

   d. _____
   e. _____
   _____

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Corporation
Transforming the skill landscape

GJSCi
Gem & Jewellery Skill Council of India

4. Maintain Health and Safety at Workplace

Unit 4.1 – Potential Hazards and Causes of Accidents

Unit 4.2 – Comply with Safety Guidelines

G&J/N9902

Key Learning Outcomes

At the end of this unit, you will be able to:

1. Identify potential hazards and potential causes of risks/accidents.
2. Explain incident reporting procedure.
3. Explain implementation of safety precautions.
4. Explain electrical safety guidelines.
5. Explain use of appropriate equipment and clothing.
6. Explain process in fire drills.
7. Explain safety rules.

UNIT 4.1: Potential Hazards and Causes of Accidents

Unit Objectives

At the end of this unit, you will be able to:

1. Demonstrate how to communicate potential hazards/risks
2. List the type of hazards involved

4.1.1 Communicate Potential Hazards/Risks

An organization is supposed to provide protection to its employees. The primary responsibility of an organization is to ensure health and safety of the employees. However, it cannot guarantee an accident free arena to work in. Hence, it is the responsibility of both the employer and the employee to follow the safety norms. The following figure explains how an employee must contribute towards maintaining health and safety in an organization:

Fig 4.1.1: Steps to maintain health and safety

The following figure represents five types of risks:

Fig. 4.1.2: Types of risks

4.1.2 Potential Hazards

The following diagram shows potential hazards associated with workplace:

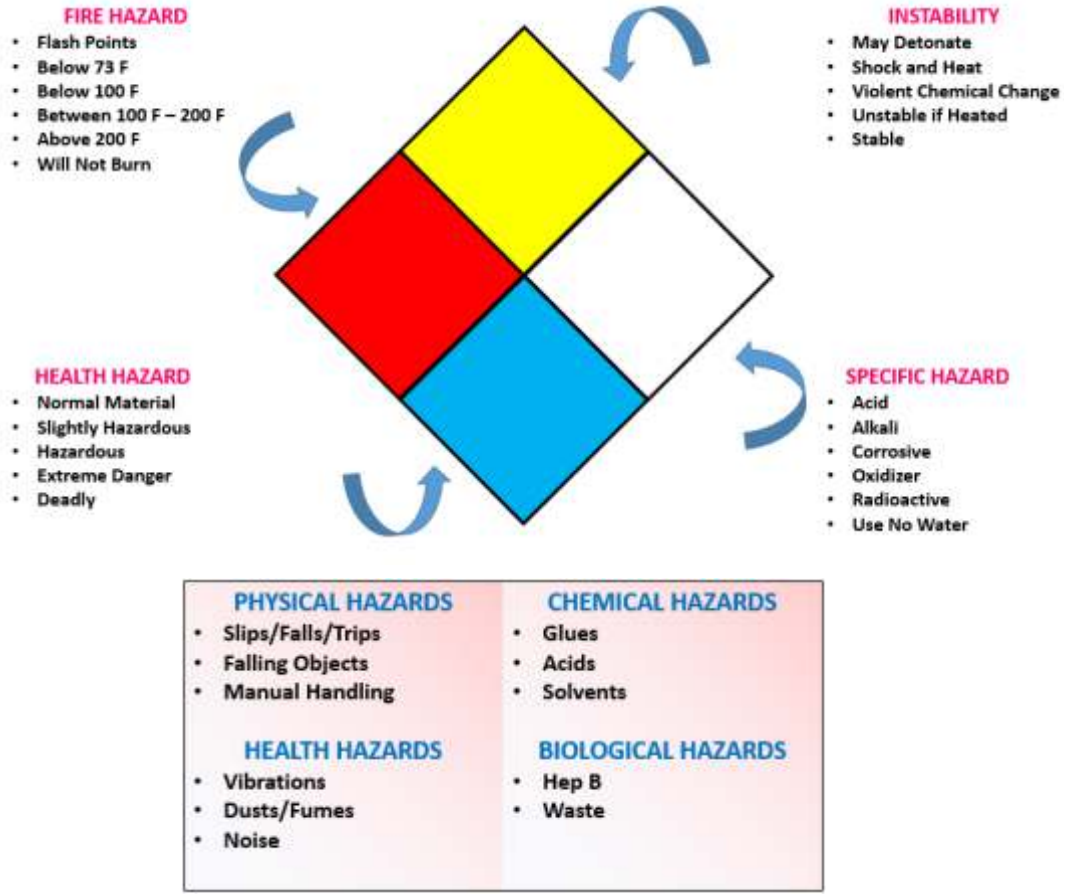


Fig 4.1.3: Potential Hazards

Potential Source of Accidents:

Follow Procedures:

Identifying and reporting potential hazards on time.

Following company guidelines, policies and rules regarding hazard materials.

Handling equipment and tools with care.

Avoiding accidents while using dangerous chemicals, gases and sharp tools and hazards from machines involving exposure to possible injuries such as cuts, bites, stings, minor burns and so on.

Types of Hazards

1. Safety Hazards
2. Biological Hazards
3. Physical Hazards
4. Ergonomics Hazards
5. Chemical Hazards

Safety Hazards: Death or any type of illness or injury caused due to unsafe conditions are categorized under safety hazards. The following figure lists some instances of safety hazards:

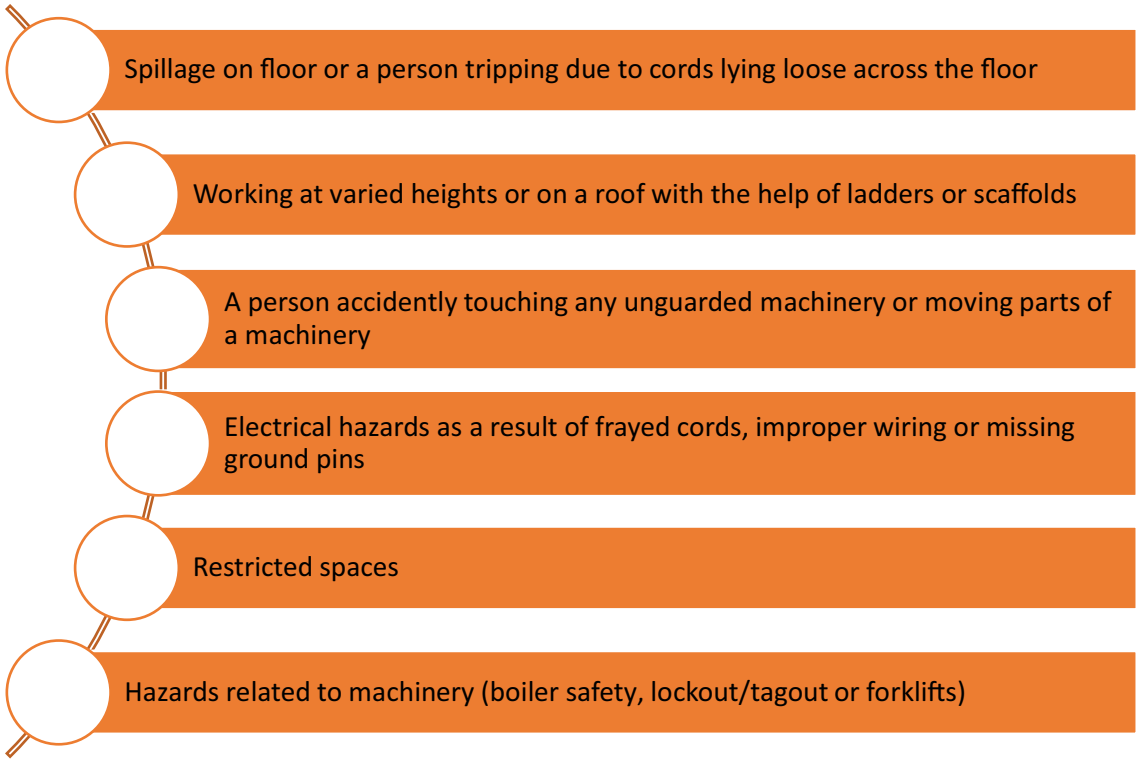


Fig 4.1.4: Safety Hazards

Biological Hazards

Any biological substance that may threaten health of humans as a result of toxins or viruses are known as biological hazards. A person may be exposed to biological hazards in the following cases:

Schools, colleges and universities

Day care facilities,

Hospitals, laboratories and nursing homes

Outdoor occupations

The following figure lists the types of ill- health effects caused by biological hazards:

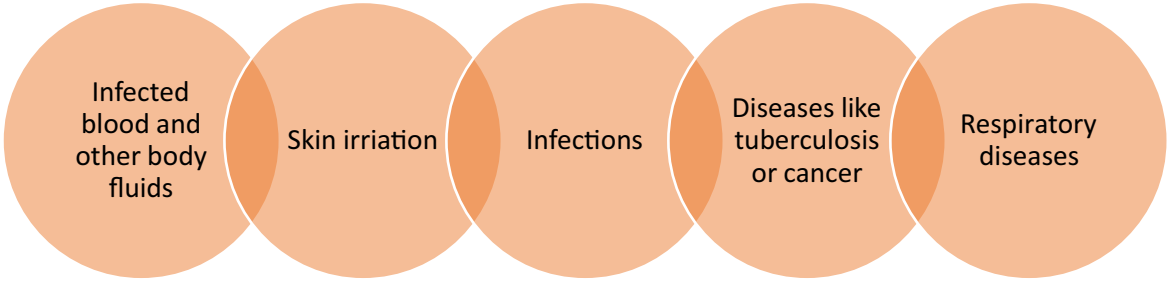


Fig 4.1.5: Biological Hazards.

Physical Hazards: An occupational hazard caused by environmental factors is termed as a physical hazard. It includes hazards such as:

Radiation caused by radio waves, microwaves or EMFs

Sunlight/ultraviolet rays exposure

Extreme temperatures, be it hot or cold

Noise pollution

Ergonomic Hazards: Ergonomic hazards occur due to single/multiple factors within the working environment that pose a threat to the musculoskeletal system of an individual. An uncomfortable workstation leading to wrong sitting postures, repetitive movement of a body part causing sprain or strain, muscle sores, etc., are categorized under ergonomic hazards. The following figure lists some instances that may cause ergonomic hazards:

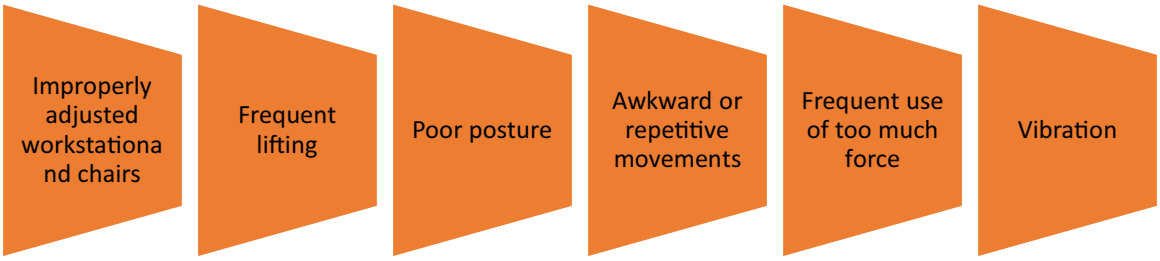


Fig 4.1.6: Ergonomic Hazards

Chemical Hazards: Exposure to chemicals at a workplace is the main cause of chemical hazards. Exposure to chemicals can be due to working around items that involve chemical preparations in any state solid, liquid or gas. Not all chemicals pose a threat, but there may be workers who are sensitive to even the mildest or non-toxic forms of chemical that is termed healthy. A person can be exposed to chemicals by inhalation of fumes, ingestion or poisoning. The following figure lists some chemicals that one should be aware of:

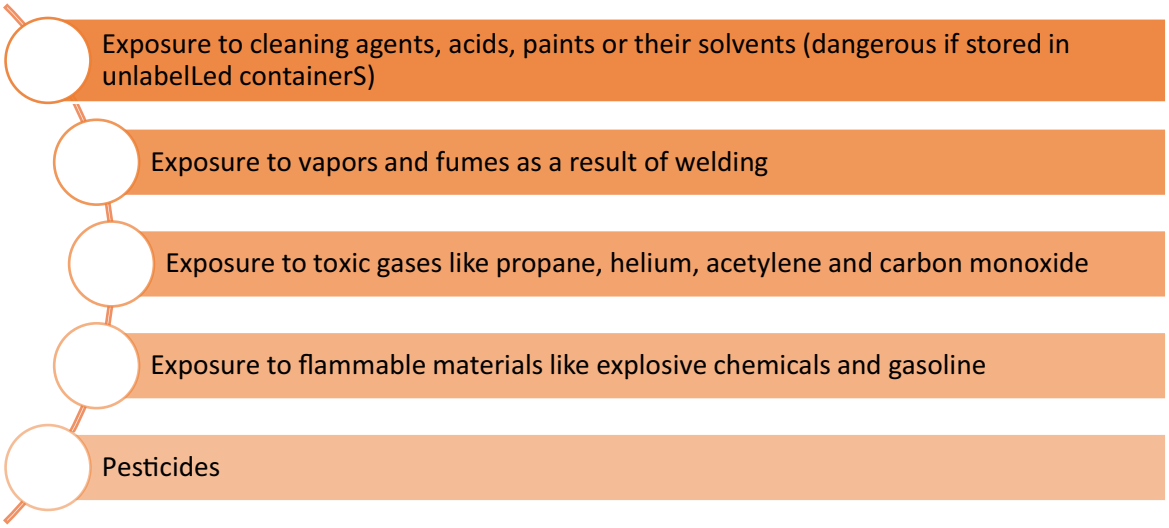


Fig 4.1.7: Chemicals that one should be aware of

UNIT 4.2: Comply with Safety Guidelines

Unit Objectives

At the end of this unit, you will be able to:

1. List the fire safety guidelines.
2. Explain Electrical Safety Guidelines.
3. Identify safety rules.

4.2.1 Fire Safety

It is essential to ensure safety from fire whether a professional is working onsite or offsite.

To ensure fire safety, an appraiser should do the following:

- In case of fire, break the glass of the nearest manual call point and try to alert persons in the immediate area of danger.
- Dial the emergency phone number and inform other persons about the location of the fire and/or use the fire bell.
- Attempt to extinguish the fire using the nearest suitable fire fighting equipment, without exposing yourself to undue risk.
- If you are familiar with the plant machinery or equipment affected by fire, isolate it for containment and to avoid further spread of the fire.
- If the fire is from electrical power, do not use water until the main supply is switched off.
- Nobody is allowed to get water from hose reel and hydrants except to put o fffire.
- Strictly obey "No Smoking" instructions.
- A fire drill is normally carried out every six months. Educate and expertise every person in fire fighting by nominating them in these drills.

Fig 4.2.1: Essentials to ensure safety from fire

A fire drill is a practice of the procedure of evacuating a building in case of an emergency. The following points should be kept in focus while conducting a fire drill:

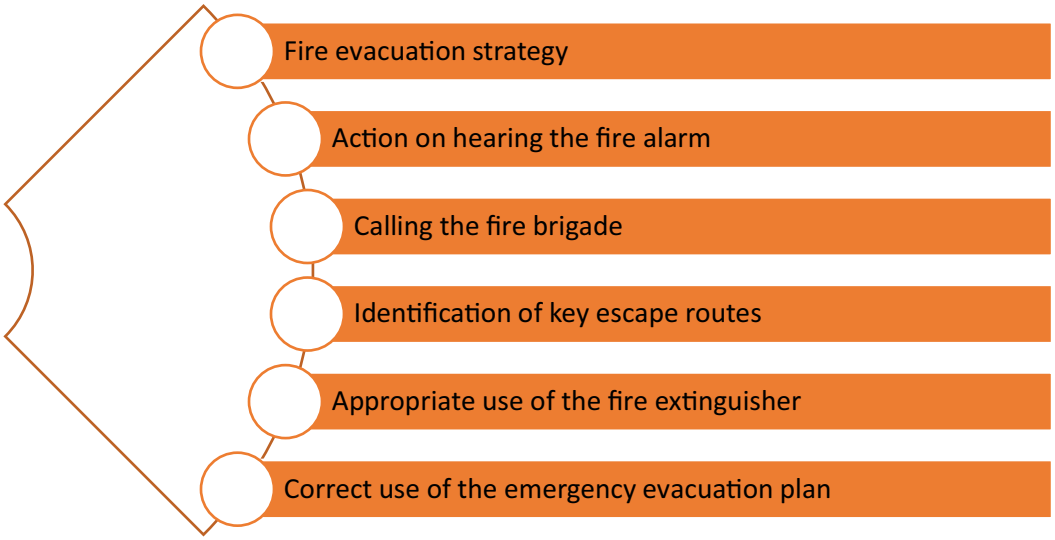


Fig 4.2.2: Points while conducting a fire drill.

After completion of the drill, one should:

Record the total evacuation time.

Silence the alarms.

Bring the fire alarm system back to its normal operating condition.

Re-evaluate and discuss concerns arising during the fire drill.

Keep records and notes of the fire drill and update the evacuation checklist report.

4.2.2 Types of Fire

Fire class refers to the type of fire based on the kind of combustion materials. The extinguishing of fire is dependent on the class of fire. The following image lists the different types of fire:

Fig 4.2.3: Types of fire

Class A

The sources of Class A fire are common flammable materials such as paper, plastic, wood, fabric and so on.

Class B

The sources of Class B fire are flammable liquids with flash point lower than 100 °F, gases such as gasoline, kerosene and oils and paints that contain petroleum.

Class C

The sources of Class C fire are flammable gases such as natural gas.

Class D

The sources of Class D fire are flammable metals.

Class E

The sources of Class E fire are overloaded electrical materials and short circuit of equipment. Class E fire can cause severe hazards such as an electric shock to a person using water, as electricity is carried through the water.

Class K

The sources of Class K fire are flammable cooking oils and fats with larger flash points.

The following image shows the type of fire extinguishers to be used for different classes of fire:

Fig. 4.2.4: Fire extinguishers to be used for different classes of fire

4.2.3 Potential Hazards

One of the most potential causes of an accident may be an electric shock for working professionals on site. Electrical safety involves following points to be ensured:

- Adequate wiring
- Appropriate electrical equipment used along with its correct label and capacity
- Working and good condition of equipment
- Listing of current breaks for the circuit breaker
- Unexposed electrical parts
- Overhead power-lines to be out of contact range from work area
- Proper insulation of wires
- Double insulated or grounded electrical systems and tools
- No overloaded circuits
- Removal of damaged power tools/equipment
- Usage of appropriate PPE by employees
- Usage of appropriate tools by employees
- Labelled and correct usage of chemicals
- Ladders do not conduct electricity
- Dry area without any standing water
- Securely installed equipment
- Equipment is not exposed to possible overheating due to poor air circulation or covering of the ventilation device.

Fig 4.2.5: Ensuring electric safety.

4.2.4 Safety Rules

The following figure lists the safety rules that should be followed while working with an electrical appliance:

Dos	Don'ts
Ensure leads are not cut, frayed or worn-out.	Yank the cord for disconnecting the plug.
Check the wire is not bare at any point.	Overload sockets.
Pull the plug out before using the appliance	Run extension leads through wet floor.
Stay away from the appliance's electrical equipment.	Poke finger in the sockets.
	Touch the appliance when one is wet.

Fig. 4.2.6: Safety rules

The following figure shows some of the injuries that can happen while working with an electrical appliance:

Electric shock

Cuts

Objects falling in the eye

Fig 4.2.7: Types of injuries

To overcome these injuries, we must provide first-aid as per the injury.

The following figure lists the steps of first-aid in case of an electric shock:

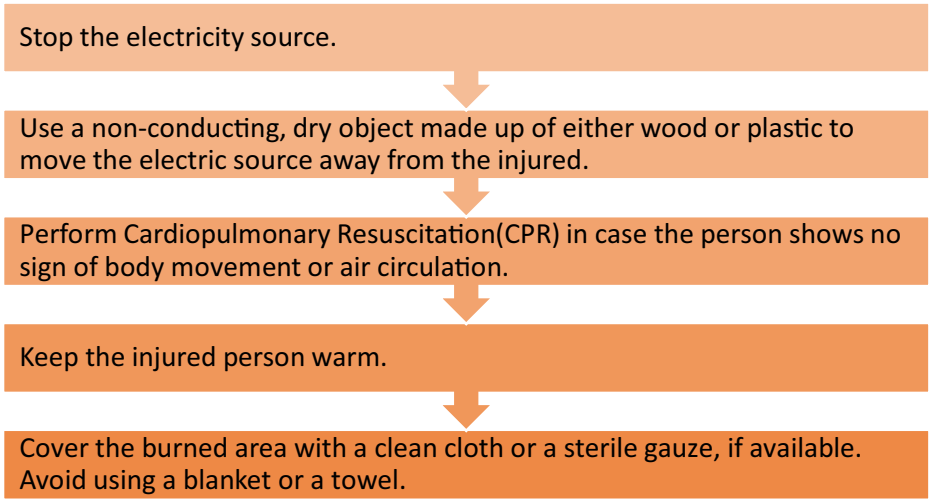


Fig. 4.2.8: First-aid in case of an electric shock

The following figure lists the steps of first-aid in case of cuts:

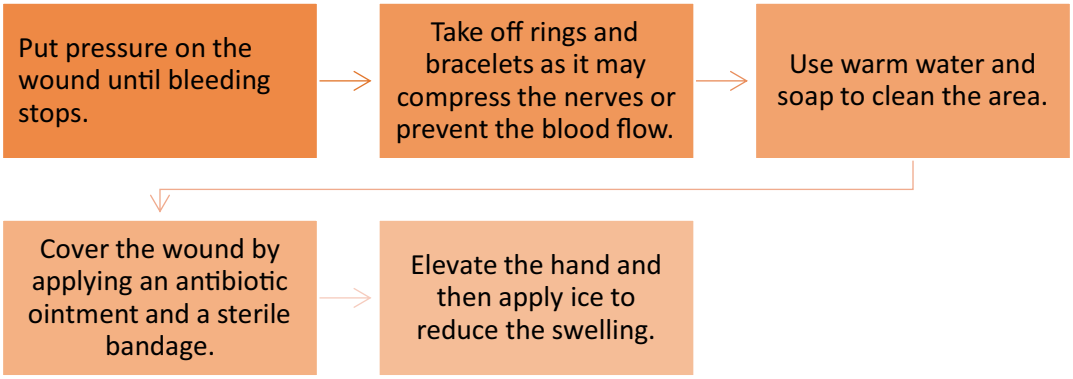


Fig. 4.2.9: First-aid in case of cuts

The following figure lists the steps of first-aid in case an object fall in the eye:

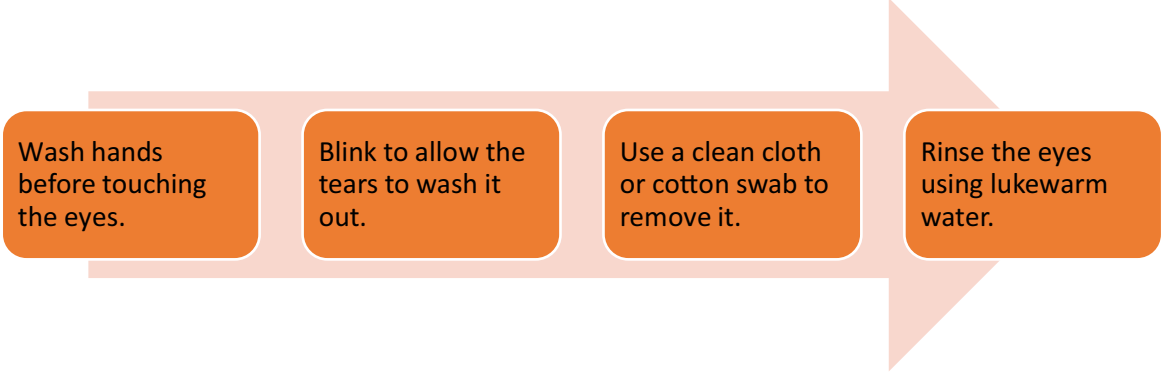


Fig. 4.2.10: First-aid in case an object falls in the eye

4.2.5 Safety while Handling Tools

The tools selected for a particular set of job should be specifically suitable for the job. The tool should have proper handle grip so as to avoid slipping of the tool while working. The tools should be used only for the purpose they are made for and not any other purpose.
The tools should be used under the safe working limits as per the design specification of the tool.

A technician should always wear personal protective wear such as safety gloves, safety helmet, safety goggles, safety shoes, ear protecting plugs and safety mask. The following are the images of personal protective equipment's:

Fig. 4.2.11: Personal protective equipment (PPE)

The tools should be carried in proper toolbox in managed and organized way. The tools should be kept at the secure place to avoid any unauthorized access and accident from the tools. Before working, check the workpiece to prevent any damage to the tool to be used on the workpiece.

While working at heights, tools should be tied or put in safe place to avoid any slipping and dropping of the tool. The tools should be operated in a correct position with proper strength for holding and operating the tool effectively. While using tools, correct procedure should be followed as per the manufacturer's instruction to operate the tool. While using sharp edged tools, ensure that the direction of movement of the tool should be away from the body. After completion of work put the tools in the appropriate place securely.

First Aid

While working on the site and handling tools and equipment's a person might suffer some injury. So, to handle such situation the technician should carry a first aid kit which can help provide the first aid necessary. The first aid box may contain:

- Instructions to provide first aid.
- Sterile and antiseptic liquids.
- Bandages of appropriate sizes and cotton.
- Scissors, clippers and tweezers.
- Cold pads.
- Disposable gloves.

The technician should also have a basic knowledge to provide first aid. Also, in case of any accident contact emergency services as soon as possible via communication methods.

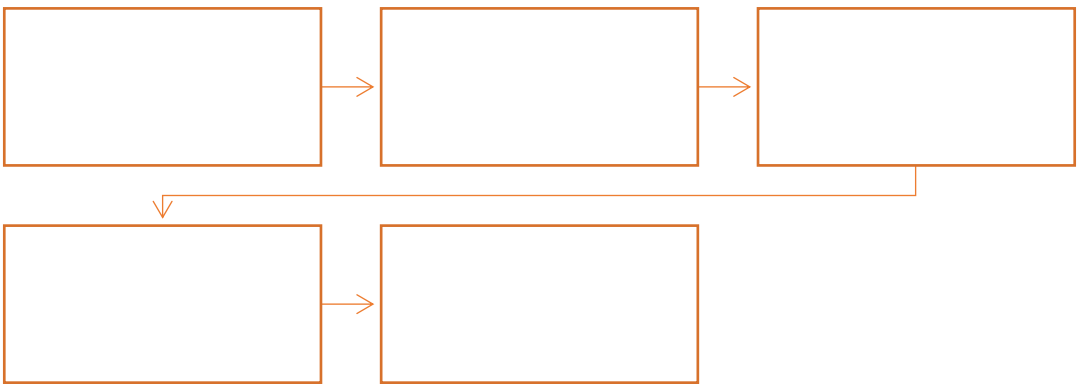
Exercise

1. List the different types of potential hazards.
   a. _____
   b. _____
   c. _____
   d. _____

2. Identify the different classes of fire.

Signs	Classes of Fire
	
	
	

3. List the steps of first-aid in case of cuts.



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5. Annexure

Annexures 1 - QR codes - Video Link

Annexure: Chapter wise QR codes

Chapter No.	Unit No.	Topic Name	Page No.	Url	QR code (s)
1. Introduction to Role of an Appraiser and Valuer	UNIT 1.1: Role of an Appraisal and Valuer	1.1.1 Roles and Responsibilities of Appraiser and Valuer	13	https://drive.google.com/file/d/1Reg-5FCnxLzJkTj9NFecrL8EYnNNv6nA/view?usp=sharing	Diversity in Indian Jewellery
1. Introduction to Role of an Appraiser and Valuer	UNIT 1.1: Role of an Appraisal and Valuer	1.1.1 Roles and Responsibilities of Appraiser and Valuer	13	https://drive.google.com/file/d/1eWzT-AO66CBSbpcdkpl6clY8qXMseP25/view?usp=sharing	Introduction to Precious Metal
1. Introduction to Role of an Appraiser and Valuer	UNIT 1.1: Role of an Appraisal and Valuer	1.1.1 Roles and Responsibilities of Appraiser and Valuer	13	https://drive.google.com/file/d/1pJxVngQAL_XstGb7kB_R7PylDv65Wi-_/view?usp=share_link	Material Science Chart
1. Introduction to Role of an Appraiser and Valuer	UNIT 1.3: Characteristics and Valuation of Diamonds	1.3.1 Market Trend and Customer Profile	16	https://www.youtube.com/watch?v=nKY1AbPz668&t=1s	Gem & Jewellery industry Orientation
1. Introduction to Role of an Appraiser and Valuer	UNIT 1.3: Characteristics and Valuation of Diamonds	1.3.2 Vauation of Diamonds	27	https://drive.google.com/file/d/1hu_XQdhI02jklckOyMfPuV2VweuUCIfX/view?usp=sharing	Common features & Diamond

Chapter No.	Unit No.	Topic Name	Page No.	Url	QR code (s)
1. Introduction to Role of an Appraiser and Valuer	UNIT 1.3: Characteristics and Valuation of Diamonds	1.3.2 Vauation of Diamonds	27	https://drive.google.com/file/d/1_2XPTcEapET9ICY4n0IJ_BaRTmWX1c3q/view?usp=sharing	Types of Gemstone Setting
1. Introduction to Role of an Appraiser and Valuer	UNIT 1.6: Jewellery Weight Inspection	1.6.1 Stages of Jewellery Value Chain	42	https://youtu.be/XEn-Cq2pDLc	Indian Heritage & Crafts in Global Market 1
1. Introduction to Role of an Appraiser and Valuer	UNIT 1.6: Jewellery Weight Inspection	1.6.1 Stages of Jewellery Value Chain	42	https://youtu.be/1NZ-1Gxpos4	Indian Heritage & Crafts in Global Market 2
2. Assessing Quality of Jewellery Product	Unit 3.2: Visual Examination of Product Quality and Karatage	2.2.2 Visual Examination of Product Quality	55	https://drive.google.com/file/d/1szE3LWEmzgSt1xGopymE3shRhDCwpLqf/view?usp=sharing	Categaries of Indian Jewellery
2. Assessing Quality of Jewellery Product	Unit 3.2: Visual Examination of Product Quality and Karatage	2.2.2 Visual Examination of Product Quality	55	https://youtu.be/rzB7lnchcSs	Gold Appraiser and Valuer

Employability Skills	https://www.skillindiadigital.gov.in/content/list	Employability Skills

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