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GJSCI
Gem & Jewellery Skill Council of India

# Participant Handbook

Sector
**Gem and Jewellery**

Sub-Sector
**Handmade Gold and Gems-set Jewellery, Silver Smithing**

Occupation
**Component Making/Filling/Assembling**

Reference ID: **G&J/Q9101, Version 2.0**
**NSQF Level 3**

## Payal Maker

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**Published by**

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**Shri Narendra Modi**
The Prime Minister of India

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# Certificate

**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: **'Payal Maker'** QP No. **'G&J/Q9101 NSQF Level 3'**

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)

Authorised Signatory
(Gem & Jewellery Skill Council of India)

## Acknowledgements

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## About this Book

This Participant Handbook is designed to enable training for the specific Qualification Pack (QP). Each National Occupational (NOS) is covered across Unit/s.

This participant handbook is based on Payal Maker Qualification Pack (G&J/9101) & includes all the National Occupational Standards (NOSs).

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

1. G&J/N9101 - Making and assembling of payal components
2. G&J/N9901 - Coordination with others
3. G&J/N9902 - Maintaining health & safety at workplace

This book is about Payal Maker. It includes how to make and assemble payal components.

## Symbols Used


Key Learning Outcomes


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Tips


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**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. Make and Assemble Payal Components

Unit 1.1 – History of Indian Jewellery

Unit 1.2 – Gem and jewellery sector in India

Unit 1.3 – Role of Payal Maker

Unit 1.4 – Process of making silver strips or wire ready

Unit 1.5 – Use of design dies using Press machines

Unit 1.6 –Assembling and Soldering of Payal Components

Unit 1.7 –Cleaning and Analyzing Payal

G&J/N9101

## Key Learning Outcomes

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

1. Identify responsibilities of payal maker.
2. Identify list of tools and equipment used for payal making.
3. Explain process of making silver strips or wire ready for payal making.
4. Explain cutting of payal components.
5. Identify different press machines.
6. Explain setting and aligning of dies in power press machine.
7. Explain assembling of payal components using flux.
8. Explain soldering of payal components using flame torch.
9. Explain cleaning payal and analyzing its weight.
10. Prepare record of metal weight prior and after assembling.

# Unit 1.1: History of Indian Jewellery

## Unit Objectives

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

1. Understand the evolution of jewellery in India.
2. Describe how symbolism is used in Indian Traditional Jewellery.

## 1.1.1 History of Jewellery in India

India, unlike any other country, can fairly boast of a lifelong tradition of jewellery design. From the times of Ramayana and Mahabharata, Indians are known for their love of jewellery. India has a rich heritage in design and craftsmanship that is found even today.

Gold was and is considered a sacred metal - a physical expression of the Goddess Lakshmi, hence revered, respected and worshipped. Gold is representative of the Sun, which is in turn the source of life. Pure gold does not oxidise or corrode with time, which is why ancient Indians associated gold with immortality. The Indus Valley Civilization was one of the early historic societies to manufacturing jewellery which included sophisticated earrings, necklaces, and bangles. Although in ancient India most of the jewellery was worn by women, men too wore a lot of jewellery. As is the case today, even in the past, jewellery wearing was associated with social status. But jewellery adornment in the past also had rules such as - only royal people and their family along side a few others who were granted permission, could wear gold ornaments on their feet. This would customarily be considered defying the appreciation of the sacred metals as Gold was considered as Lakshmi.

Although the majority of the population wore jewellery, Maharajas and those related to royalty were popularly associated jewellery.

## 1.1.2 Symbolism in Indian Jewellery

Traditional Indian jewellery shows perfection and mature understanding of the processes involving jewellery creation such as - designing, goldsmithing/silversmithing, engraving, enameling, metal polishing, lapidary, and stone setting - all distinctly individual occupations involving long training and specialisation. The Mughal era was the most noteworthy period in relation to Indian jewellery. While Mughal jewellery largely represents the face of Indian jewellery, the Dravidian and East Indian jewellery making techniques are also very sophisticated and brilliant in their rendition.

A traditional Indian ornament is not just decorative. Each piece of jewellery is made with a purpose and meaning. Symbols used in traditional Indian jewellery convey a message from the wearer to the viewer. This symbolism of traditional Indian jewellery comes from general concepts, concerns, aspirations and fears shared by the people of India. The earliest jewellery functioned as amulets. It was meant to protect the wearer from evil influences and to enhance fertility, protect from diseases. This is the reason why we would see ancient Indian statues or cave paintings showing different parts of the body adorned with jewellery.

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Diversity in Indian Jewellery

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Gem & Jewellery industry Orientation

Click Here
Categaries of Indian Jewellery

# UNIT 1.2: Gem and Jewellery Sector in India

## Unit Objectives

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

1. Explain the importance of India in gem & jewellery sector.
2. List the important jewellery centres in India.

## 1.2.1 Significance of Gem and Jewellery Sector in India

The Gems and jewellery sector plays a major role within the Indian economy, impacting approximately 6-7 % of the country's gross domestic product (GDP). Being one of the quickest growing sectors, it's particularly export directed and labour intensive.

Based on its potential for growth and worth addition, the government of India has declared the Gems and jewellery sector as focus industry for export promotion. The government has recently undertaken various measures to boost investments and to upgrade technology and skills to market 'Brand India' (2014-15) within the international market.

India's gem and jewellery sector has been conducive in an exceedingly huge way to the country's foreign exchange earnings (FEEs). The government of India has viewed this industry as a robust area for export promotion. With a market size of just about INR 4, 54,100 crores, the industry encompasses a massive share of the gross domestic product at approximately 5.9 %, apart from large-scale employment generation and foreign exchange earnings. Market research reveals that jewellery accounts for more than a fourth of the optional spending by consumers in India. India has a calculable 229 crore women in the age group of 20 to 49. The number of working women in skilled sectors who are considered the key consumers for jewellery is rising rapidly.

- With over 300 crore individuals falling within the 25-29 age bracket in the period 2011-21, an estimated 150 crore weddings are expected to take place during this period.
- In Tier-3 zones, where landowners and moneylenders are the primary resource of monetary credit, jewellers have emerged as an alternate, providing investment choices through gold jewellery.
- The highly labor-intensive nature of the sector with large number of employees in the unorganised space, has led to job creation, employing more than 0.464 million people in the country in 2013. This is more than the population of Kolkata, the seventh highest populated city in India with a population of 4.5 crore; this indicates the high employment generation capacity of this sector.
- Every region of the country has a different unique style of jewellery. Some examples of these traditional jewellery forms include Bikaneri, Dhokra, Minakari and Filigree.
- India is a source for manufacturing all varieties of products; and its presence in the global gems and jewellery sector is of much importance.

  The gem and jewellery sector of India is categorised as:

| | | | |
|---|---|---|---|
| Processing | Manufacturing | Retailing | Diamond processing |
| Cast and diamond set jewellery | Jewellery retailing | Gemstone processing | Hand made gold and gem-set jewellery |

*Fig. 1.1.1: Classification of gem & jewellery sector*

## 1.2.2 Gem and Jewellery Centres in India

More than two-thirds of the sector work force in India are employed in the processing and manufacturing areas of the value chain. The retailing manpower extends across India ranging from major metro cities in urban areas to the smallest towns in rural areas. These workers are employed in certain zones as shown below:

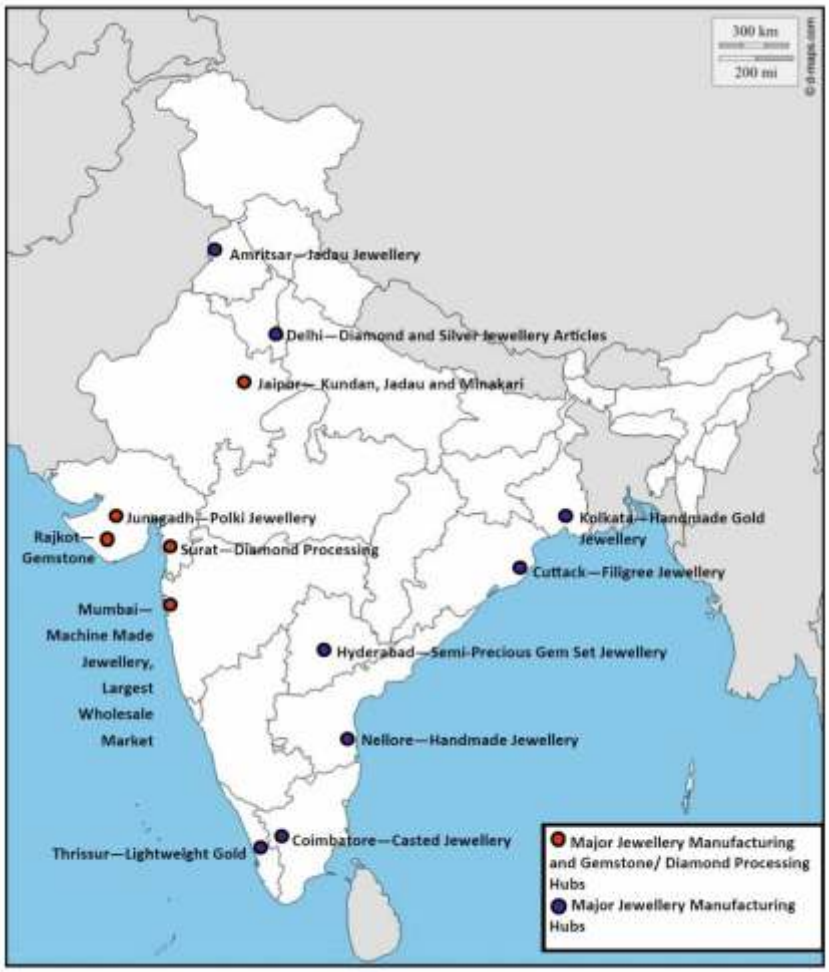



*Fig. 1.2.2: Gem and jewellery centres in India*

Employment is concentrated in the states of Rajasthan, Gujarat, Maharashtra, West Bengal, and the southern states of Kerala and Tamil Nadu. Amritsar and Jaipur are well-known for Kundan and Jadau jewellery with Minakari work, while Delhi – NCR is known for silver jewellery. Further, Jaipur is also one of the largest coloured gemstone cutting and polishing centre in the world. Surat is the world's largest diamond processing centre and processes about 85 percent of the rough diamond imports of India. Surat has a large group of workforce and is also home to the world's leading diamond institute, the Indian Diamond Institute (IDI).

Besides being the largest trading centre and wholesale market in India, Mumbai, is also a significant centre for cast and diamond set jewellery. SEEPZ in Mumbai alone accounts for almost a quarter of the jewellery exports to USA, the world's largest jewellery consuming country.

- Thrissur is a hub for lightweight plain gold jewellery, a style traditional to Kerala, while Coimbatore is known for electroformed jewellery.
- Kolkata is known for handmade gold jewellery.

Hupari village is in Kolhapur district of Maharashtra with many skilled craftsmen who give different kinds of shapes and sizes to design silver jewellery for over a century. This place is about 20 kms from the Kolhapur district and comes under Hathkanangle taluka, near to Pattankodoli, Rendal and Vasagade Villages.

Hupari is a place of many silver clusters, especially known for payal and anklet ornaments of different lengths. This place is known for protecting art and craft of India as this traditional art and craft is being passed from one generation to another making silver business as their primary source of livelihood. This place is also known for silver jewellery manufacturing units from last 100 years.

The sector at present has more than 4.64 crore employees and is planning to hire approximately 8.23 crore employees by 2022.

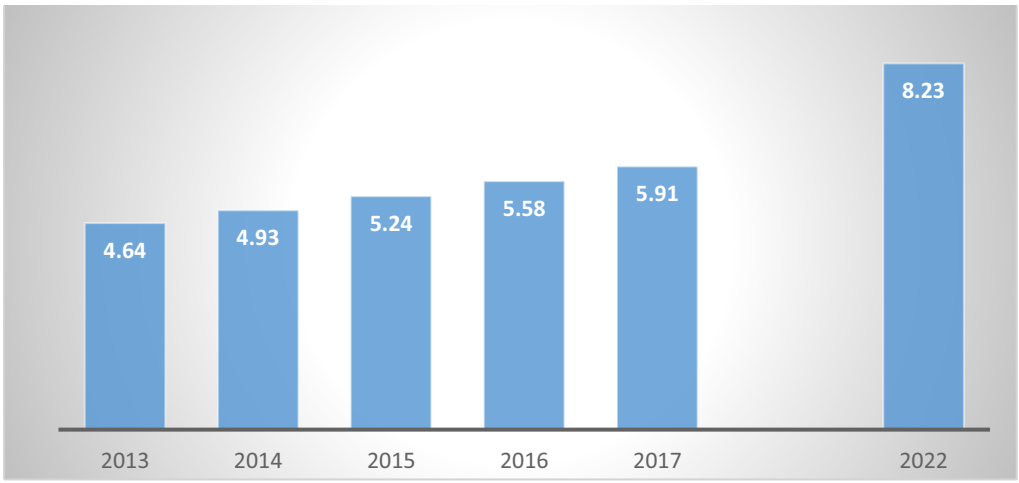



*Fig. 1.2.3: Employability of gem & jewellery sector*

# UNIT 1.3: Role of Payal Maker

## Unit Objectives

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

1. Brief an introduction to payal.
2. List the product range of payaL ornament.
3. Identify role of Payal Maker.
4. Identify tools and equipment used by payal maker.

## 1.3.1 Payal – An Introduction

Payal, which is also known as paijeb or paizeb, is worn around the ankle. It is an ornament which gets its foundation from the 'Ghoonghru.' It is an essential part of a girl's right life from the time of her birth to throughput her life in India. However, it has become a symbolic ornament in various parts of the world and is worn for different reasons. The basic foundation of payal belongs to ghoonghru which is synonymus to dance whereas payal is an ornament which is worn on the feet.

In India, different parts are famous for production of silver ornaments. One such famous place is a town named Hupari.

**Introduction**

Hupari is a town situated in Hatkangale Taluka of Kolhapur district, Maharashtra. This town is famous for the production of silver ornaments. In this town, most of the families (80%) have ancestral skill for developing silver ornaments. As per 2011 census of India, the population of this town is just 28,229.

This town has remained the epicentre of silver jewellery manufacturing since 13$^{th}$ century. These silver products were in demand during the Maharaja of Kolhapur Chhatrapati Shahu Maharaj. The regular demand of such products started form the Kolhapur royalty. During festivals of that time, elephants and horses used to clothe with silver. The skilled workers of this town used to make diferent types of silver jewellery for the Kolhapur's royal family.

The speciality of this town is in making various designs of payal or anklet. The town is also famous for the seamless silver balls known as gujrav. These silver balls are hollow and solids, which are known as rawa, and are used in making the payal's design. Many of these designs are created through the stamped-out dies.

## 1.3.2 Product Range

The people in the town of Hupari are usually indulged in making payal or pninjan (anklet) while a few are also indulged in making other forms of traditional jewellery such as kardora, kada, wale tode, toe rings, braclets, ankle bands for kids, silver vessels, waist chains etc. In the whole town, only less than 10 karigars are making oxidized jewellery in modern form along with the traditional ones.

The different varieties of payal are shown in the below images:

| | |
|---|---|
|  | Rupali Payal |
|  | Gajashri Payal |
|  | Aarzu Payal |
|  | Urmila Payal |
|  | Soniya Payal |
|  | Khushaboo Payal |
|  | Kandora/Kardora |
|  | Zalar Payal |

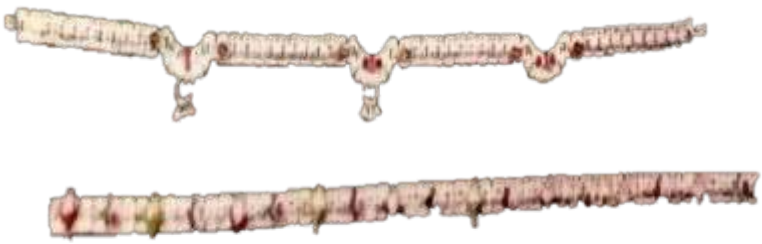
| | |
|---|---|
|  | Bombay Payal |
|  | Fancy Payal |

*Fig. 1.3.1 : Types of payal*

**Parts of Payal**

| Ghungaroo | Akoda | Kadi |
|---|---|---|

*Fig 1.3.2: Parts of payal*

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Click Here
Silver Ware Hupari (Kolhapur)

**Other Varieties of products**

Other than payal, the people of this town are also making some other varieties of products which are shown below:


*Fig. 1.3.3: Other varieties of products*

## 1.3.3 Responsibilities of Payal Maker

Payal is an ornament which is wore around ankle. Payal, also known as anklet, paijeb, is a compact version of ghungroo. In India, Rajasthani women wear heaviest payals made from silver to symbolize their tribe. It is compulsory for some women to wear payals after marriage. Different variety of payal include simple silver pair of payal, meenakari and kundan work payal, golden payal with tinkerbells at the hook, etc.

### Role of Payal Maker

Payal maker is a person who makes payal components like ghungroo s, links, balls etc. from strips or wires using hand/press power machines. Links are small loops or kadi, which are interlocked to create various designs. Tiny silver balls are placed inside the ghungroos to make that typical payal sound. He/she then performs assembling and soldering of all the components to make payal.

The following set of images show different types of payals made by payal makers:

*Fig. 1.3.4: Different payals made by payal makers*

*Fig. 1.3.5: Payals made by Payal Maker*

*Fig. 1.3.6: Payals as final product*

Following are the attributes required to be payal maker:

- Precision and excellent craftsmanship
- Need attention to details
- Good eyesight
- Steady hands
- Ability to work for long hours in sitting position with lot of patience
- Ability to handle fine, delicate jewellery pieces
- To have integrity in dealing with precious metals

## 1.3.4 Tools and Equipment used by Payal Maker

Following is the list of tools and equipment which are used for payal making:

1. **Screwdrivers:** This is a tool used for turning screws with slotted heads.

*Fig. 1.3.7: Screwdriver*

2. **Rolling machine:** This is machine is used to convert silver rods into wires and strips.
3. **Power press machine/dye machine:** Silver sheet is cut as per designs required on payal.
4. **Design dies:** These are small square boxes used for payal designing.
5. **Cutting machine/soot machine:** Machine is used to make payal components.
6. **Wooden ash:** Wooden ash is used to absorb the access flame while soldering.
7. **Metal Tray:** This tray is used to spread wooden ash powder.

*Fig. 1.3.8: Wooden ash in a metal tray*

8. **Hammer:** Hammer is used for hitting or striking in order to stretch silver.
9. **Wrench or spanner:** This tool provides grip and applying torque to objects like nuts and bolts or keep them from turning.

*Fig. 1.3.9: Hammer & Wrench*

10. **Pliers:** Pliers can be used for twisting or cutting wires.

*Fig. 1.3.10: Pliers*

11. **Tweezers:** These are used to hold the object.

*Fig. 1.3.11: Tweezer*

12. **Flame torch:** Flame torch is used heating silver in order to harden it for soldering purpose.

*Fig. 1.3.12: Flame Torch*

13. **Soldering material (Flux):** This is used to join different payal components.

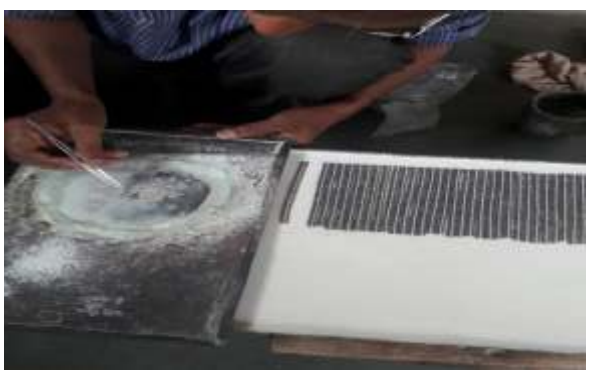

*Fig. 1.3.13: Soldering material is being used for joining different payal components*

14. **Meena color:** Meena color is applied on payal to decorate them.

*Fig. 1.3.14: Different Meena colors used for decorating payal*

15. **Vibrator:** Vibrator is used for polishing silver payals.

16. **Crucible and Teracotta pots:** These are used for heating silver metal.

*Fig. 1.3.15: Teracotta pots used for heating silver*

17. **Sulphuric acid:** This is used to wash silver components/ pieces in order to remove impurities and make them shine.
18. **Iron Rod:** This is used to segregate ornaments in order to avoid stickiness.
19. **Iron tongs:** These are used to hold crucibles during casting process to make it safe and easy to handle.
20. **Gauge Plate:** This is used to draw wires of required thickness.

21. **Silver Blocks:** These are converted into silver rods and further into silver sheets to use to payal making.
22. **Lighter:** This is used for heating silver.

*Fig. 1.3.16: Lighter*

23. **Emery paper:** This is a jewellery repair tool being used to finish a jewellery repair.

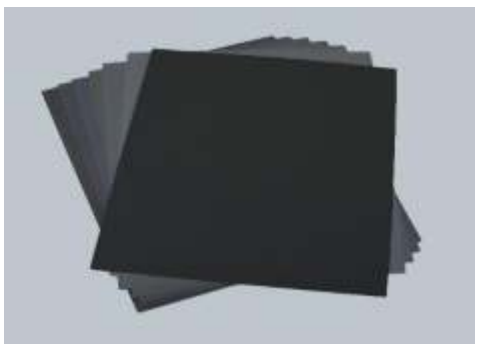

*Fig. 1.3.17: Emery Paper*

24. **Hotplate:** Hotplate is an electronic warmer which uses heating elements to control temperatures. These are generally used for heating samples in vessels and easily fit on laboratory table tops.

*Fig. 1.3.18: Hotplate*

25. **Copper wire:** Jewellery-making wire to make sturdy components or luxurious swirls, lashes, and wraps.

*Fig. 1.3.19: Copper Wire*

## Exercise

1. Which of the following tool is used for cutting or twisting wires?
   a. Pliers
   b. Tweezers
   c. Hammer
   d. Rolling machine

2. Which tool is used to heat silver for soldering purpose?
   a. Crucibles
   b. Flame Torch
   c. Vibrator
   d. Meena color

3. Name two components of payal.

   _____

   _____

4. List four attributes of a Payal Maker.

   _____

   _____

   _____

# UNIT 1.4: Process of Making Payals

## Unit Objectives

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

1. Explain making of silver strips or wire.
2. Explain annealing, cleaning, lubrication and cutting the silver strips up to desired length.
3. Explain cutting of payal components.

## 1.4.1 Making Silver Strips or Wire

Silver blocks are used for making silver strips. First, these blocks are tested for purity and further they are sent for the process of making silver strips or wire. Making of payal involves the following initial steps:

- Melting of silver
- Making Pasta from silver rods
- Process of making silver wire
- Cutting of payal components

*Fig. 1.4.1: Steps for process of making silver payals*

Following are the detailed steps followed for making silver strips or wires ready for payal designing:

1. Silver blocks of needed weight are being heated in terraco tta pots for melting.

   Following image shows silver blocks used for creating silver rods:

*Fig. 1.4.2: Silver Blocks*

2. Terracotta pots are used for smaller amount (about 30 kgs) and crucibles are used for big amount.
3. They are melted in bhatti using charcoal and coal at a certain temperature along with a mixture of copper and zinc as per requirement basis.

   Following image shows silver furnace used for melting silver:

*Fig. 1.4.3: Silver Furnace*

4. The pots are carefully taken out with molten silver and is being poured into wooden moulds. Following image shows terracotta pot with molten silver:

*Fig. 1.4.4: Teracotta pot with molten silver is taken out carefully from the furnace*

5. Molten material is set in form of rods, using casting frames that are coated with groundnut oil. Following image shows pouring molten silver in casting frames:

*Fig. 1.4.5: Molten Silver being poured in casting frames to form rods*

6. Silver rods are first immersed in water to cool them down and are then placed in rolling machine to form silver strips and wires. The flat, black wire made from silver rods is called Pasta. Payal designs are cut on Pastas. Pasta could be 20, 21, 22 geige in weight (half kg).

   Following image shows Silver strips or pasta:

*Fig. 1.4.6: Silver Stripes*

7. After this, fine silver wires are produced. Gauges are used to set wire as per diameter requirement and then wires are wounded on a roller. This method is known 'Mati' cutting.

   Following set of images show making of silver wires on roller:

*Fig. 1.4.7: Making Silver Wire on roller*

*Fig. 1.4.8: Rolling machine to convert silver rods into wires*

8. Gauge plate consists of holes ranging from 17 to 30. Wires are drawn through the holes to make it thinner as per the required diameter. Following image shows use of gauge plate:

*Fig. 1.4.9: Using Gauge Plate to draw silver wires*

9. Drawing Wire Process:
   - The gauge plate is kept on a fixture.
   - Wires are drawn as per diameter thickness requirement of the wire.
   - Annealed wire is files at one end in order to give it tapering so that same can be inserted inside the plate hole.
   - Tongs are used to hold the tip of the wire and pull it through the hole. Wires are greased or wax is being used as lubricant in order to ease the process.
   - Wire can be drawn out 3 times until next re-annealing. This is required to avoid cracking.

   Following image shows gauge plates for drawing wire:

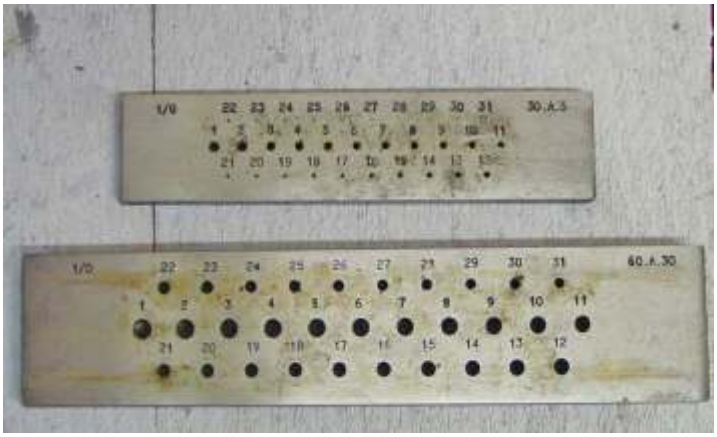

*Fig. 1.4.10: Gauge Plates*

**Note:**

**Annealing:** Annealing refers to process of heating metal and slowly let it cool down. This is done to remove any internal stresses and toughen the metal. Silver metal wires are also annealed at required temperature using flame torch and then cool down in water, in order to strengthen them.

10. Silver wires are cut using pliers in required length to make payal. Standard length for payal is 22cm to 25 cm (9" - 10").

## 1.4.2 Cutting the Payal Components

Generally, payal consists of 2 to 5 strings which are made up of small, large pendants with different shape beads. Shapes can be cylindrical, barrel-shaped and grooved. There can also be multi-color rings. Following are the steps for making of kadi, ghungroo and balls:

1. The coiled string with soft lustre from Mati cutting as mentioned above, is passed through cutting machine for making kadi, ghunghroo and balls.
2. Ghungroo and balls are the parts which are used to join the different parts of payal and to finally make it in single payal.
3. Chain is attached using Mati cutting.
4. Chains are made with linking up the wire from the above steps.

Following image shows cutting of payal components:

*Fig. 1.4.11: Payal components are designed using cutting machine*

5. These silver pieces are heated and further washed in sulphuric acid. This is done in order to remove any impurities and to take out the shine of the components.

   Following image shows ghungroos to be used as payal components:

*Fig. 1.4.12: Gunghroo to be used as payal component*

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Introduction to Precious Metal

## Exercise

1. Identify correct sequence of process of making silver strips ready?
   a. Pour molten silver in wooden moulds to make silver rods.
   b. Place the silver rods in rolling machine to make silver strips or wires.
   c. Melt silver blocks in terracotta pots in crucibles.
      i. a,b,c
      ii. b,c,a
      iii. c,a,b
      iv. c,b,a

2. Which equipment is used to set diameter of silver wires as per requirement?
   a. Terracotta pot
   b. Tweezer
   c. Gauge Plate
   d. Wooden moulds

3. Define annealing process.

   _____

   _____

   _____

4. Name the process used for drawing fine silver wires.

   _____

   _____

   _____

# UNIT 1.5: Use of Design Dies using Press Machines

## Unit Objectives

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

1. Identify Hand, Power and Automated press machines
2. Explain the process of setting dies in power press machine.

## 1.5.1 Press Machines

**Die:** Die is a hollow or solid metal form which is used to cut or stamp shapes, drawing bars or wires, embossing, etc. So basically, die is one type of metal form mould used to get bulk pieces of same size and shape of different designs from a metal sheet. These metal cutting dies are divided into cutting, embossing and stamping dies. Cutting dies are used by maximum peop le in jewellery cutting.

Each press working die has two sections, namely punch and die which are mounted firmly on press machines. So, any metal placed between the sections is cut into specified design. Similar like dies, the press machines also range from small to huge. Following image shows jewellery dies:

*Fig. 1.5.1: Jewellery dies*

Following are few points to be taken care of before using the dies in press machines:

- Make sure the dies are sharp and in good working condition for effective operation
- Check for any dull areas or cracks before using the dies
- Make sure dies are placed at proper height
- Make sure to provide sufficient lubrication to the dies for smooth operation

*Fig. 1.5.2: Precautions to be taken for using dies in press machines*

Following are different press machines used to stamp required designs on metals:

**Hand Press Machine:** Hand press machine allows to stamp required designs on metals. After aligning silver metal and design die, the lever needs to be pulled to create design.

Following image shows hand press machines:

*Fig. 1.5.3: Hand Press Machines*

**Power Press machine:** Power press machines are used to imprint required designs on pasta. Following image shows Power Press machine:

*Fig. 1.5.4: Power Press Machine*

**Automatic Press Machine:** These are high speed machines used for cutting dies. Following image shows automatic press machine:

*Fig. 1.5.5: Automatic Press Machine*

## 1.5.2 Setting and Aligning Design Dies

Following are the steps of setting and aligning dies for making different payal designs:

1. Dies are used for payal designing. Dies are small Square like boxes on which design is being carved. Following image shows design dies:

*Fig. 1.5.6: Design Dies*

2. Strips of silver and silver wire are used in press tool machine to create required designs.

3. Dies are being put on the machine. This way, design is automatically seen on the pasta. Following image shows using design die on pasta using press tool machine:

*Fig. 1.5.7: Dye designing on pasta using press tool machine*

4. Different patterns are imprinted on silver with the help of roller and stamping machine.
5. When the design is cut on requirement basis, the pieces are joined together by soldering process.

## Exercise

1. What is the function of power press machine?
   a. Payal designing using dies
   b. Making silver strips or wires
   c. Assembling payal components
   d. Soldering payal components

2. Match the appropriate machine image to corresponding name:

| | | | |
|---|---|---|---|
| a. | Hand Press machine | I |  |
| b. | Power Press machine | II |  |
| c. | Automatic Press machine | III |  |

3. Define a die.

   _____
   _____
   _____

4. List 3 precautions for using dies in press machines.

   _____
   _____
   _____
   _____

# UNIT 1.6: Assembling and Soldering of Payal Components

## Unit Objectives

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

1. Explain assembling of payal components.
2. Explain soldering of payal components.

## 1.6.1 Assembling of Payal Components

All materials and pieces required for payal making are collected and then assembled with the help of soldering.

### Assembling of Payal Components

1. Silver strings and beads of different shapes are placed as per the design pattern. Arrangement is done on a metal tray on a layer of wood ash.
2. The pieces are placed using tweezers above the payal.
3. Designs pieces are soaked in glue which is being used as soldering solution (flux). Glue, also called morchud is used, which is a mixture of zinc and takankhaar (this is grey white powder made from borax). This step of placing components is called Chaadi process.

   Following set of images show assembling of payal components using flux:

*Fig. 1.6.1: Assembling of payal components*

*Fig. 1.6.2: Assembling of payal components using soldering solution*

## 1.6.2 Soldering of Payal Components

**Soldering of Payal Components**

1. Soldering material and tools include boric acid, hydromax, methyl gas and soldering gun.
2. After arranging all strings and beads in the required pattern, material is being heated using flame torch at approximately 700 degrees. This process is called as Jaali process.

   Following image shows payal soldering using flame torch:

*Fig. 1.6.3: Soldering of payal components using flame torch*

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Meenakari Art (by D'Source)

Following image shows soldered payals:

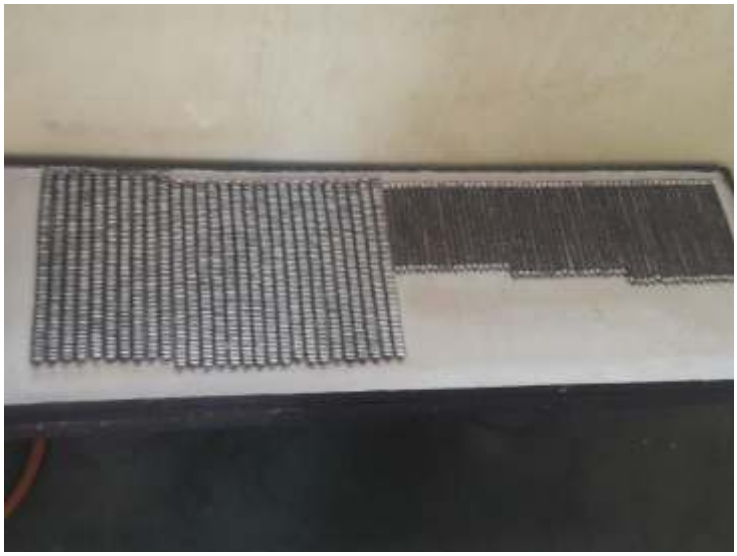

*Fig. 1.6.4: Payals after soldering*

4. A metal wire is used to hold the payal pieces together as support.
5. Small pegs are manually fixed between the pieces to join some anklets together.
6. Pegs are used to fix both ends of the payal.

Following set of images show manual fixing of hooks and pegs:

*Fig. 1.6.5: Manual fixing of pegs and hooks*

## Exercise

1. Which tool is used for assembling of different payal components?
   a. Meena color
   b. Cello tape
   c. Flux (soldering solution)
   d. Glue

2. Which tool is used for soldering of payal components?
   a. Rolling machine
   b. Flame torch
   c. Press tool machine
   d. Hammer

3. Name the step of placing payal components?

   _____
   _____

4. List the soldering materials used for soldering of payal components.

   _____
   _____
   _____
   _____

# UNIT 1.7: Cleaning, Analyzing Payal and Maintaining Record

## Unit Objectives

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

1. Explain cleaning of payal.
2. Analyse payal weight, design and shape as per order.
3. Prepare record for metal loss

## 1.7.1 Cleaning Payal

During the jaali process, silver material turns blacker. Following image shows payals after jaali process:

*Fig. 1.7.1: Silver Payal turned blacker after jaali process*

So, payals are polished in a drum which contains the selection of the following cleaning elements:

| S.No. | Name of Element | Image | Use |
|---|---|---|---|
| 1 | Soap Nut solution |  | Cleansing agent for metal jewelries |

| | | | |
|---|---|---|---|
| 2 | Fiber balls |  | Used for cleaning payals. |
| 3 | Water |  | Mixed with other cleansing agents and used to wash any residues or debris during cleaning process |

*Table 1.7.1: Payal Cleaning Elements*

Following is the process of cleaning payals with soap nut solution:

- Heat 2 glasses of water in a vessel and put off flame after water is boiled.
- Add 4-5 soap nuts into the hot water and let it cool down naturally.
- Once the water cools down, squeeze the soap nuts to loosen its pulp into water.
- Now add silver jewellery to the vessel and soak it for around 5 hours.
- After soaking, rub the nuts and jewelry and remove jewelry from the vessel.
- Rinse jewelry with water and pat dry.

*Fig. 1.7.2: Process of cleaning payals with soap nut solution*

The required parts of payal are then coloured with enamel, locally called as Meena colour. After colour application, it is dried completely in Bhatti. Bhatti drying in carried out using electric bulbs. After that next colour is applied and dried again.

Following image shows application of Meena color:

*Fig. 1.7.3: Meena color to be applied on payal for decoration*

Following image shows Electric bulbs Bhatti:

*Fig. 1.7.4: Electric bulbs bhatti for drying meena color of payal*

The silver payals are further send for electroplating in order to clean them. Following image electroplating vibrator:

*Fig. 1.7.5: Electroplating Vibrator to final polishing of payal*

The dried material is finally polished in vibrator where fibre balls are being used. The payals are then rinsed thoroughly with water.

## 1.7.2 Analysing Payal Details

Analysis of payal is carried out before final packing. Analysis includes measuring payal weight and length as per requirements and order basis.

Following image shows payal weighing using weighing scale:

*Fig. 1.7.6: Analysing payal weight*

Following image shows payal packing:

*Fig. 1.7.7: Payal Packing*

Following details are marked on the packings of payal:

- Payal Length
- Payal Weight

Following image shows final packing with details:

*Fig. 1.6.8: Final payal packing with details*

## 1.7.3 Maintaining Record for Metal Loss

The payal maker makes payal after assembling different components. In this process, the raw material goes through many hands and also passes through various machines. At different stages of payal making, some or the other kind of loss occurs in the material. It is very important to keep track of this loss and maintain a record for it.

This record is really helpful to reduce the metal loss in the future. If a payal maker records the weight of the jewellery at every stage of the process, he will be able to find out that at which stage he is suffering the maximum loss. After analysing all the records, he can look for some types of improvements that he can bring at this stage which will help him to minimise the loss which occurs at the making of metal.

This record is really helpful for any company in long run as if implemented by all workers, it will bring down the loss faced by payal maker company in making payals.

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## Exercise

1. Which equipment is used for drying meena color?
   a. Fan
   b. Electric bulbs bhatti
   c. Electroplating Vibrator
   d. Air
2. Which details are mentioned on payal packing?
   a. Type of payal
   b. Payal designer
   c. Payal length and weight
   d. Color
3. List cleaning elements used after jaali process.

   _____
   _____
   _____

4. What is the local name of enamel used for payal coloring?

   _____
   _____
   _____

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# 2. Coordinate with Others

Unit 2.1 – Importance of Interaction and Coordination

Unit 2.2 - Coordination in Work Area

G&J/N9901

## Key Learning Outcomes

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

1. Explain importance of Interaction and Coordination
2. Explain coordination with Supervisor
3. Explain coordination with Colleagues
4. Explain interpersonal relationships in an organization

# UNIT 2.1: Importance of Interaction and Coordination

## Unit Objectives

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

1. Explain the importance of interaction and coordination

## 2.1.1 Answer these Questions (Exercise)

| S. No. | Question | Tick the Answer as per your opinion |
|---|---|---|
| 1 | How often do people in your team or department speak with you about the job work or process? | o Never<br>o Sometimes<br>o Always |
| 2 | How much time do people in your team or department take to solve an issue or give new information to you about the job work or process? | o Never on time<br>o Sometimes on time<br>o Always on time |
| 3 | How precise is their communication with you about the issue or the new information given to you? | o Never precise<br>o Sometimes precise<br>o Always precise |
| 4 | When there is a problem, do people in your department or team blame each other? | o Never<br>o Sometimes<br>o Always |
| 5 | How many of the people in your team or department<br>Share the same goals as you regarding the progress of the company? | o None<br>o Some<br>o All |
| 6 | How many of the people in your team or department know what your job work actually is? | o None<br>o Some<br>o All |
| 7 | Do these people respect you for the work you are doing? | o Never<br>o Sometimes<br>o Always |

## 2.1.2 Solving the Gap Areas

If 'Never', 'None', 'Sometimes' or 'Some' has been ticked in most of the questions, that means the gap areas need to be solved.

To solve the gap areas, do the following:

- Provide honest opinions
- Report problems early
- Focus on defect prevention than detection
- Give appropriate feedback
- Respect oneself, others and their opinions
- Be friendly and a team player
- Be problem-solving
- Have determination
- Have the willingness to learn and volunteer
- Be accountable and take responsibility for own mistakes
- Deliver work on time
- Work well under pressure
- Meet deadlines
- Be open to ideas and suggestions
- Keep personal information personal
- Restrict oneself from giving out company information to others
- Focus on the quality and quantity of work
- Create a clear-cut division between personal and professional life
- Communicate differences respectfully and in an appropriate manner

## 2.1.3 Importance of Interaction and Coordination

In any organisation, interaction and coordination are essential for a smooth workflow. Their importance is shown in the following figure:


*Fig.2.1.1: Importance of interaction and coordination*

# UNIT 2.2: Coordination in Work Area

## Unit Objectives

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

1. Explain coordination with Supervisor.
2. Explain coordination with Colleagues.
3. Explain how to manage inter/intra-departmental conflicts.

## 2.2.1 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:

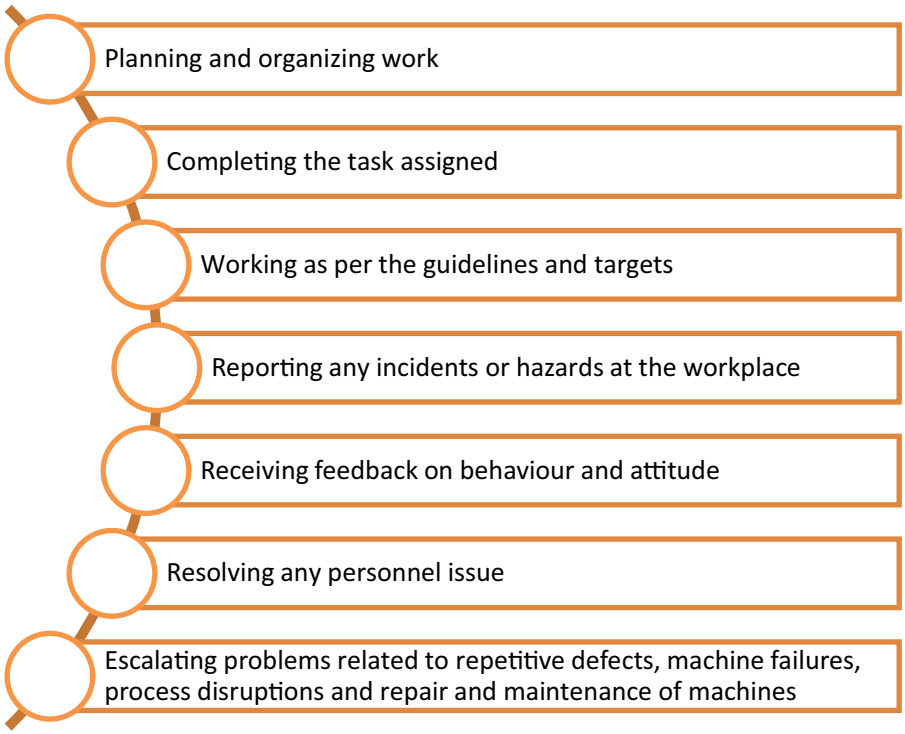


*Fig. 2.2.1: Interacting with a supervisor*

A payal maker 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:

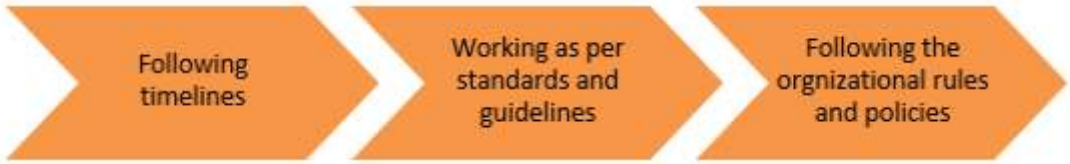


*Fig. 2.2.2: Work ethics*

### 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. 2.2.3: 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. 2.2.4: Reporting and documentation process*

## 2.2.2 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. 2.2.5: Interaction with colleagues*

The following figure lists some practices to be followed by a payal-maker while working in a team:

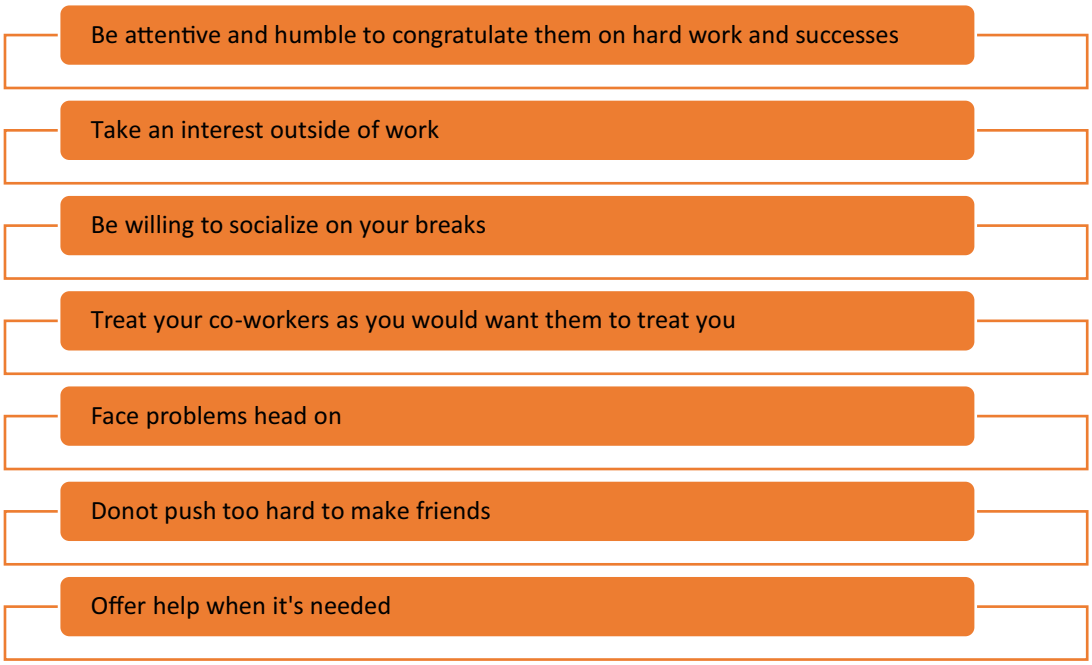


*Fig. 2.2.6: Practices to be followed for working in a team*

## 2.2.3 Managing Interpersonal Relationship

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

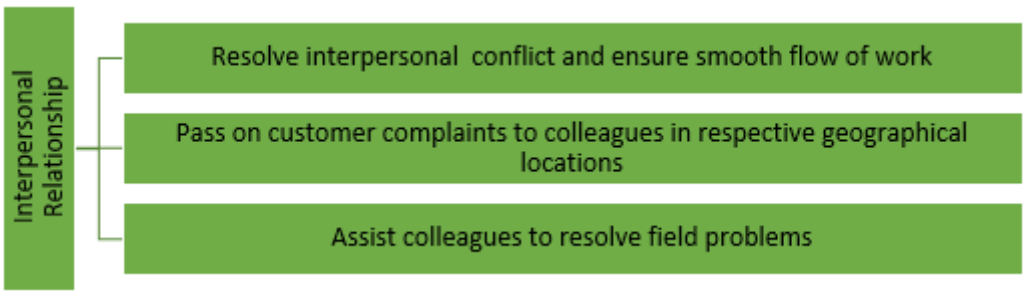


*Fig. 2.2.7: Managing interpersonal relationship*

## 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.

   a. _____
   b. _____
   c. _____

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# 3. Maintain Health and Safety at Workplace

Unit 3.1 – Potential Hazards

Unit 3.2 –Comply with Safety Guidelines

G&J/N9902

## Key Learning Outcomes 

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

1. Identify potential hazards.
2. Explain precautionary methods to prevent fire.
3. Explain implementation of first aid procedures in emergencies.
4. Identify use of safety gears.

# UNIT 3.1: Potential Hazards

## Unit Objectives

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

1. Explain potential hazards/risks.

## 3.1.1 Communicate Potential Hazards

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 organizatio n:


*Fig. 3.1.1: Steps to maintain health and safety*

### Potential Hazards

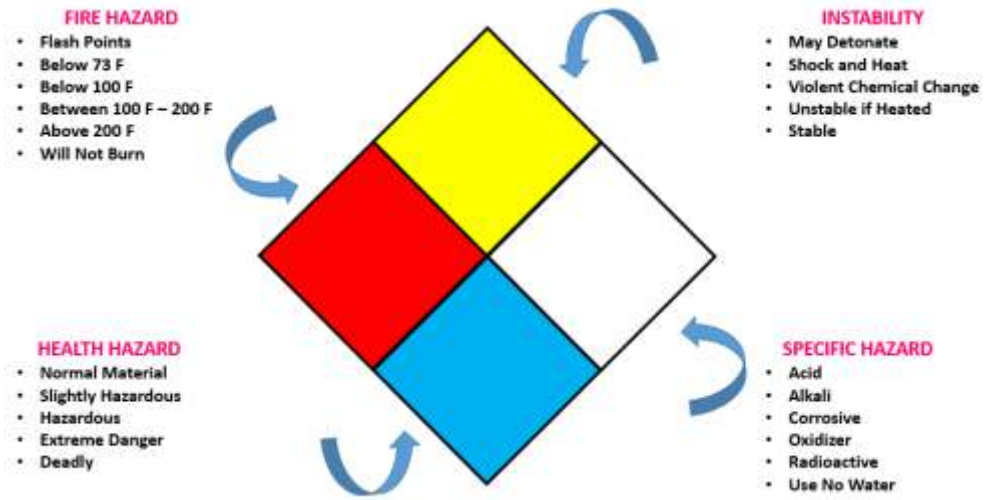




*Fig. 3.1.2: Potential Hazards*

## 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:

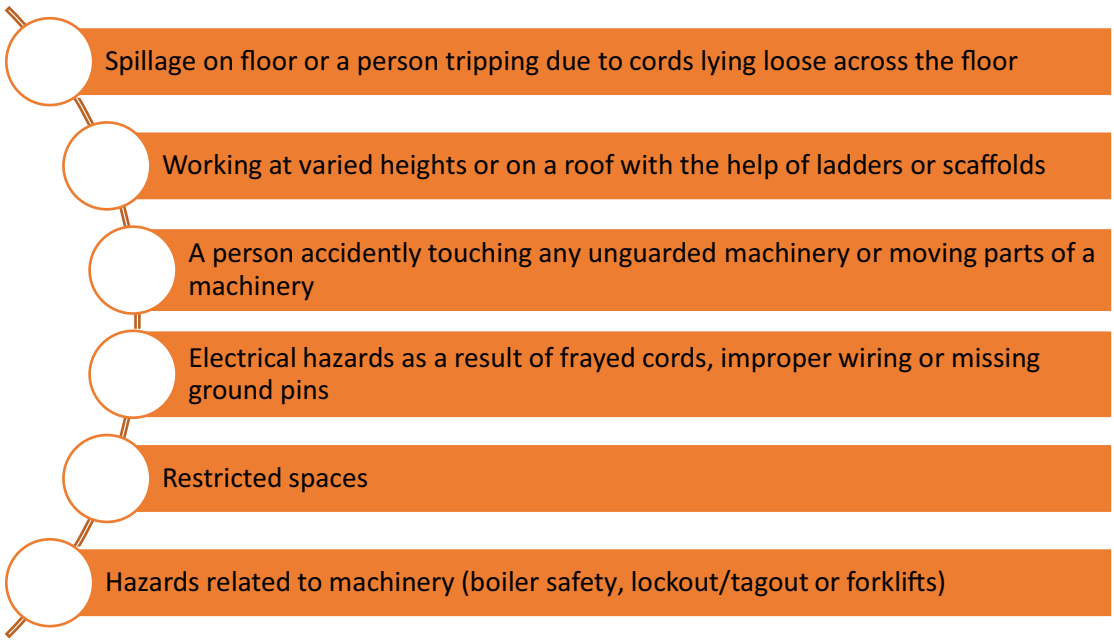



*Fig. 3.1.3: Safety Hazards*

**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:

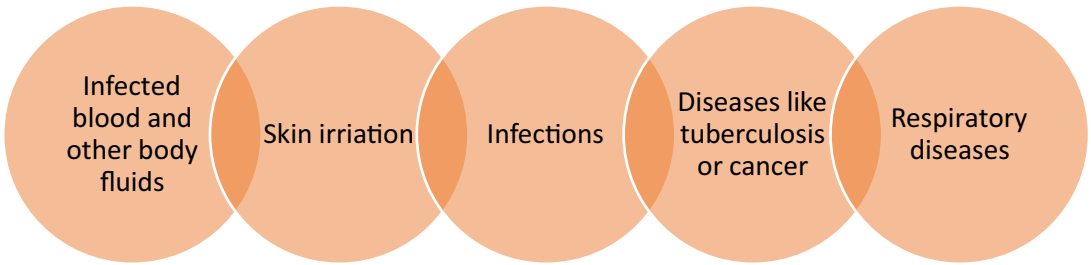



*Fig. 3.1.4: Biological Hazards.*

**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 move ment 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:

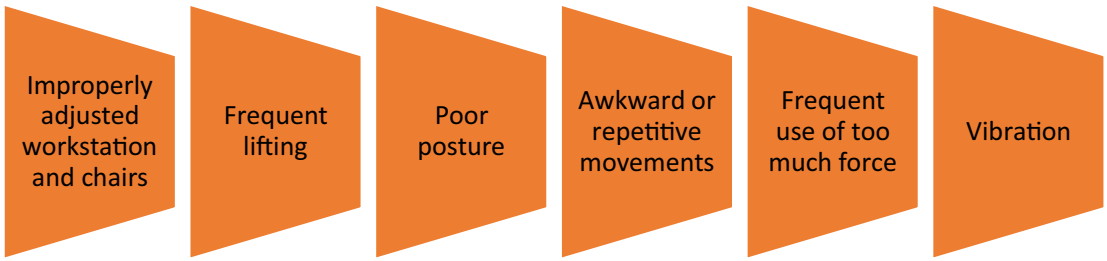



*Fig. 3.1.5: Ergonomic Hazards*

**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:

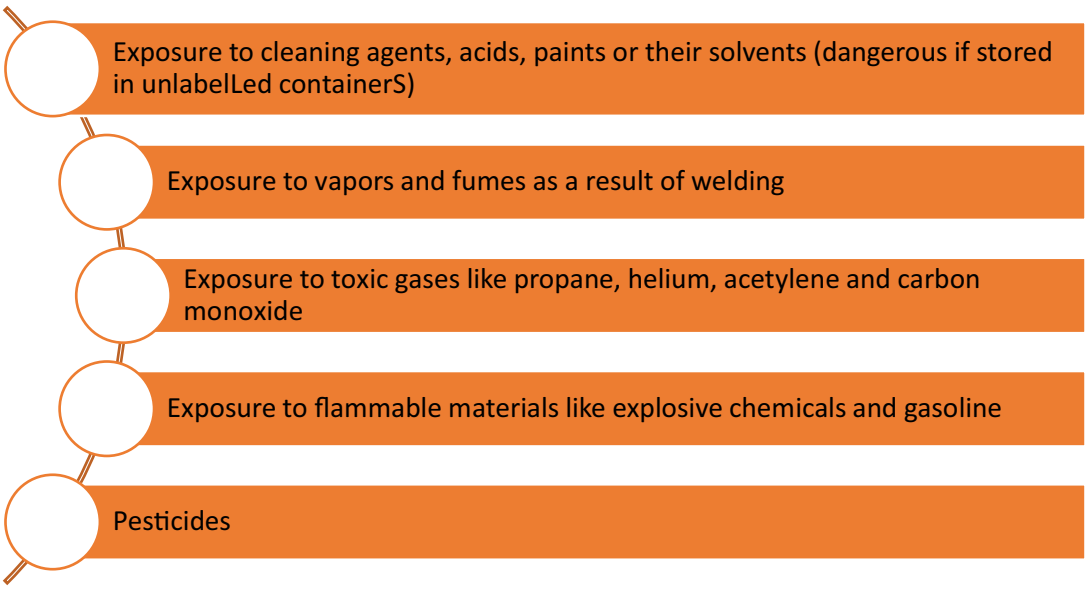



*Fig. 3.1.6: Chemicals that one should be aware of*

# UNIT 3.2: Comply with Safety Guidelines

## Unit Objectives

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

1. Explain fire safety guidelines.
2. Explain safety rules to be followed in work area.
3. Explain safety while handling tools.

## 3.2.1 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 off fire.
- 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. 3.2.1: 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:

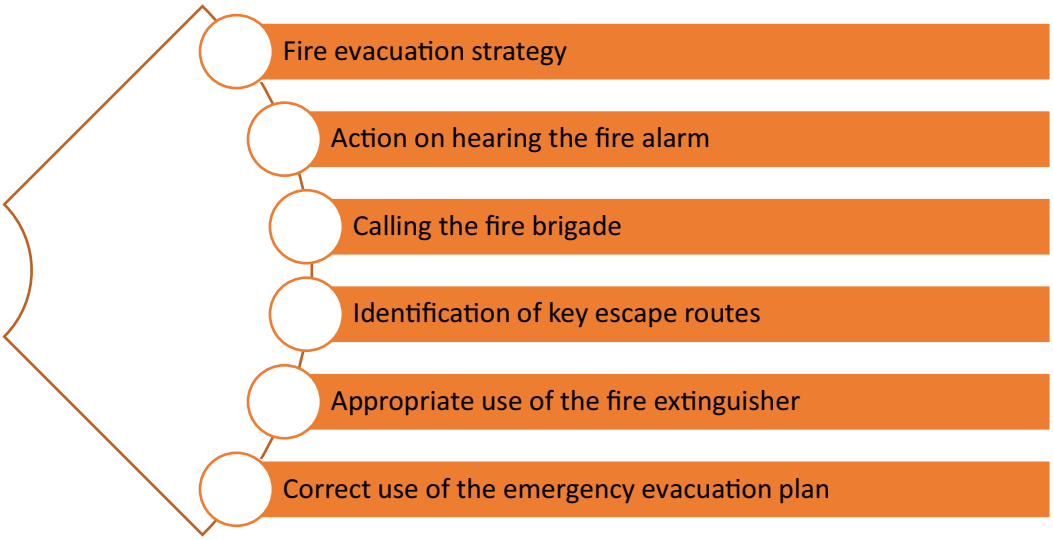



*Fig. 3.2.2: Points while conducting a fire drill.*

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.

## 3.2.2 Safety Rules

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

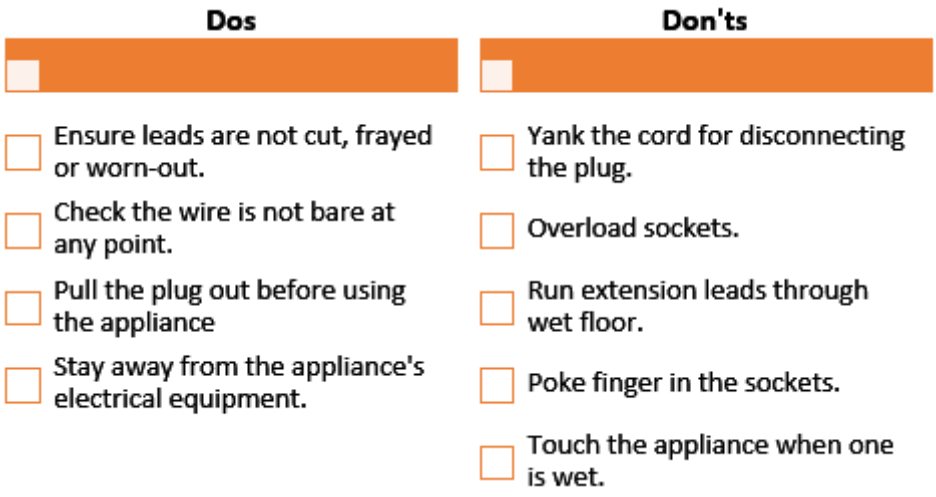



*Fig. 3.2.3: Safety rules*

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


*Fig. 3.2.4: 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:

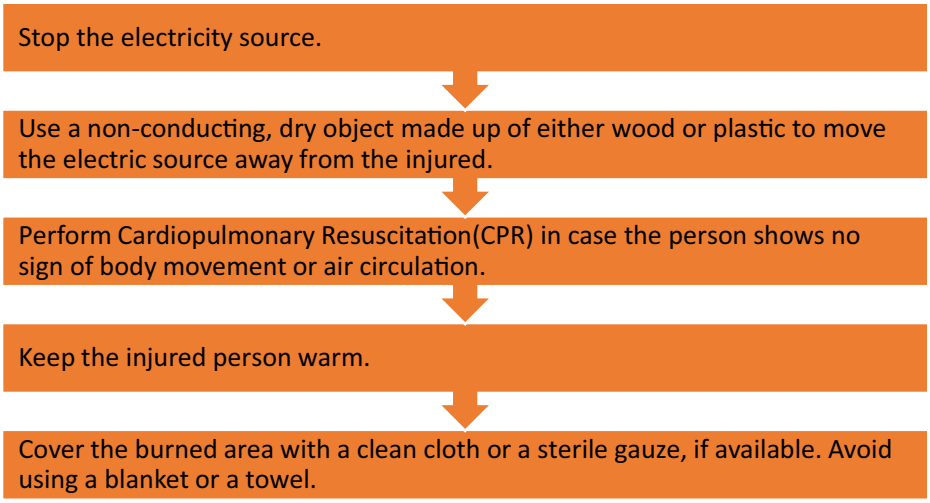



*Fig. 3.2.5: First-aid in case of an electric shock*

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

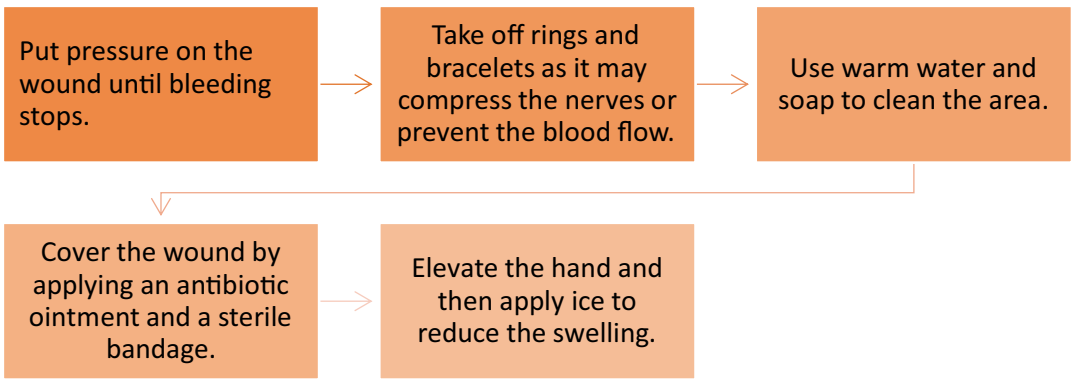



*Fig. 3.2.6: First-aid in case of cuts*

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

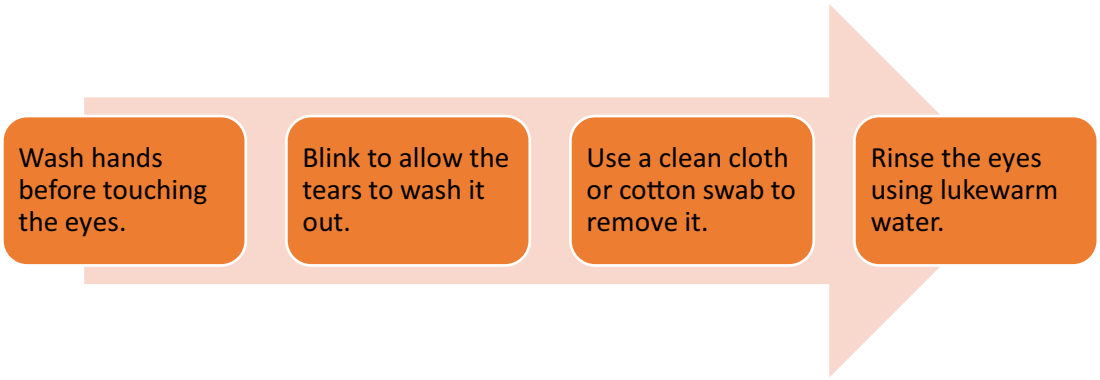



*Fig. 3.2.7: First-aid in case an object falls in the eye*

## 3.2.3 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. 3.2.8: 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 shou ld 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.

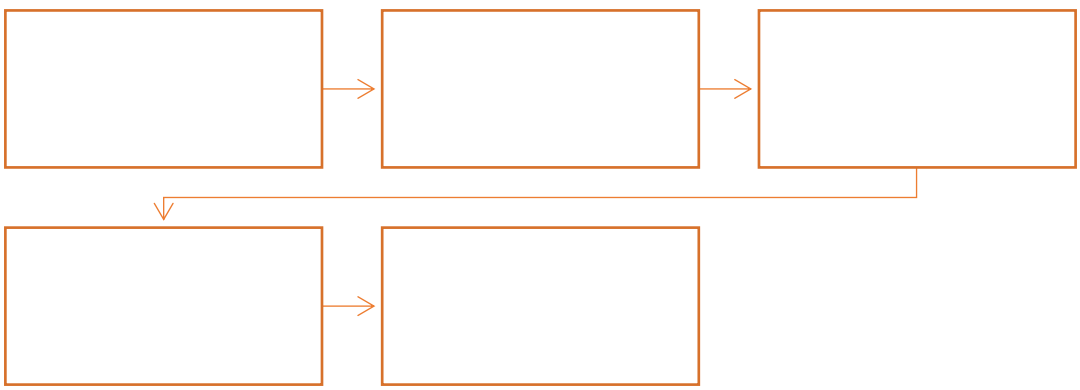
## Exercise

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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# 4. Annexure

Annexures 1 - QR codes - Video Link

## Annexure: Chapter wise QR codes

| Chapter No. | Unit No. | Topic Name | Page No. | Url | QR code (s) |
|---|---|---|---|---|---|
| Chapter 1 Make and Assemble Payal Components | Unit 1.1 - History of Indian Jewellery | 1.1.2 Symbolism in Indian Jewellery | 3 | https://drive.google.com/file/d/1Reg-5FCnxLzJkTj9NFecrL8EYnNNv6nA/view?usp=sharing | Diversity in Indian Jewellery |
| Chapter 1 Make and Assemble Payal Components | Unit 1.1 - History of Indian Jewellery | 1.1.2 Symbolism in Indian Jewellery | 3 | https://www.youtube.com/watch?v=nKY1AbPz668&t=1s | Gem & Jewellery industry Orientation |
| Chapter 1 Make and Assemble Payal Components | Unit 1.1 - History of Indian Jewellery | 1.1.2 Symbolism in Indian Jewellery | 3 | https://drive.google.com/file/d/1szE3LWEmzgSt1xGopymE3shRhDCwpLqf/view?usp=sharing | Categaries of Indian Jewellery |
| Chapter 1 Make and Assemble Payal Components | Unit 1.3 - Role of Payal Maker | 1.3.1 Payal – An Introduction | 9 | https://docplayer.net/62712236-Silver-ware-hupari-kolhapur.html | Silver Ware Hupari (Kolhapur) |
| Chapter 1 Make and Assemble Payal Components | Unit 1.4 - Process of making Silver strips or Wire Ready | 1.4.2 Cutting the Payal Components | 24 | https://drive.google.com/file/d/1eWzT-AO66CBSbpcdkpl6clY8qXMseP25/view?usp=sharing | Introduction to Precious Metal |

| Chapter No. | Unit No. | Topic Name | Page No. | Url | QR code (s) |
|---|---|---|---|---|---|
| Chapter 1 Make and Assemble Payal Components | Unit 1.6 - Assembling and Soldering of Payal Components | 1.6.2 Soldering of Payal Component | 32 | https://drive.google.com/file/d/1SXuDEJMxQ3XSE16ClZAG81AYpOktJaOd/view?usp=sharing | Meenakari Art (by D'Source) |
| Chapter 1 Make and Assemble Payal Components | Unit 1.7 - Cleaning, Analyzing Payal and Maintaining Record | 1.7.3 Maintaining Record for Metal Loss | 39 | https://youtu.be/orrfokjuzTs | Improvement through KAIZEN |
| Chapter 1 Make and Assemble Payal Components | Unit 1.7 - Cleaning, Analyzing Payal and Maintaining Record | 1.7.3 Maintaining Record for Metal Loss | 40 | https://youtu.be/XEn-Cq2pDLc | Indian Heritage & Crafts in Global Market 1 |
| Chapter 1 Make and Assemble Payal Components | Unit 1.7 - Cleaning, Analyzing Payal and Maintaining Record | 1.7.3 Maintaining Record for Metal Loss | 40 | https://youtu.be/1NZ-1Gxpos4 | Indian Heritage & Crafts in Global Market 2 |
| Chapter 1 Make and Assemble Payal Components | Unit 1.7 - Cleaning, Analyzing Payal and Maintaining Record | 1.7.3 Maintaining Record for Metal Loss | 41 | https://www.youtube.com/watch?v=NyUENhGuFqw | Salem Silver Anklet |

| Chapter No. | Unit No. | Topic Name | Page No. | Url | QR code (s) |
|---|---|---|---|---|---|
| Chapter 1 Make and Assemble Payal Components | Unit 1.7 - Cleaning, Analyzing Payal and Maintaining Record | 1.7.3 Maintaining Record for Metal Loss | 41 | https://www.youtube.com/watch?v=r0wjksF-PUg | Silver Ornaments - Kolhapur from D'Source |
| Employability Skills | | | | https://www.skillindiadigital.gov.in/content/list | Employability Skills |

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