Participant Handbook

Sector
Construction

Sub-Sector
Real Estate and Infrastructure Construction

Occupation
Masonry

Reference ID: **CON/Q0105, Version 1.0**
NSQF Level 3

Mason- Concrete

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

Shri Narendra Modi
Prime Minister of India

Certificate

COMPLIANCE TO
QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

CONSTRUCTION SECTOR SKILLS COUNCIL

for the

SKILLING CONTENT: PARTICIPANT HANDBOOK

Complying to National Occupational Standards of
Job Role/ Qualification Pack: 'Mason Concrete' QP No. 'CON/ Q 0105 NSQF Level 3'

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* Valid up to the next review date of the Qualification Pack

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(Construction Skill Development Council)

Acknowledgments

About this book

Construction industry is the second largest employer in India. As one of the leading avenues for employment in the country, the role played by this industry in India's economic development is pivotal. However despite its vast potential, the construction Industry faces a key challenge of shortage of skilled manpower due to expansion of the sector and increase in the quality requirements from the end users.

There is a vast difference between the required skill and available skills of workers in the industry today. To reduce the skill gap, appropriate skilling of workforce needs to be carried out. This will not only empower the worker but also benefit the construction industry in terms of quality and productivity.

This Participant book is developed to impart training for the skill and knowledge required to work as a Mason - Concrete in construction industry. It is based on Mason - Concrete Qualification Pack under the National skill qualification framework. It comprises of the following NOS/ topics.

•   Carry out IPS / Tremix flooring

•   Place, level and finish concrete in various structural elements including repair works

•   Work effectively in a team to deliver desired results at the workplace

•   Plan and organize work to meet expected outcomes

•   Work according to personal health, safety and environment protocol at construction site

This book is designed considering the lower educational background of the construction worker. Therefore special efforts have been made to explain the concept required for the job mostly through photos and illustrations.

Units and symbols used in the book have been listed below

Symbols Used

| Key Learning Outcomes | Steps | Time | Tips | Notes | Unit Objective |

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1. Introduction

Unit 1.1 – Introduction to training program

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Unit 1.3 - Mason Concrete as a job role

Key Learning Outcomes

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

1. List out the purpose of training

2. Understand National Occupation Standards and Qualification Pack

3. Explain the benefits of training

4. Explain about construction sector in India

5. Explain urban and rural construction

6. Outline modernization in construction

7. List out major occupations in the construction sector

8. List out roles and responsibilities of a mason concrete

9. Explain career progression for mason concrete

UNIT 1.1: Introduction to Training Program

Unit Objectives 🎯

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

1. Understand the purpose of training
2. Understand National Occupation Standards and Qualification Pack
3. Explain the benefits of training

1.1.1 Purpose of Training Program

This training program is developed to impart specific skills to individuals who wish to perform as a Mason Concrete. This training program is based on qualification pack for mason concrete.

In past few decades, construction industry in India has grown rapidly. Construction of new structures like residential towers, housing societies, schools, colleges, etc. has resulted in great demand of good skilled workers. There are very few skilled workers for construction works in India. The purpose of this training is to skill construction workers as per the set standards and thereby giving them good career opportunities and growth in the construction sector. The quality of construction work will greatly improve with skilled workforce.

1.1.2 Mode and duration of Training Program

The Training for the Job Role Mason concrete is provided through classroom sessions and practical sessions. The total duration of the training program as recommended in the qualification pack is 8-12 weeks.

Fig. 1.1.1. Classroom Session

Fig. 1.1.2. Practical Session

The training program will enable an individual to:

- How to use hand tools and power tools used in Concreting.
- Know about Concrete and its compositions.
- Understand about different concrete mix proportions.
- Carryout IPS and Tremix flooring.
- Carryout concreting activities like placing, screeding, compacting, troweling and vacuum de watering
- Carryout finishing as per requirement.
- Carryout repairing work in concrete structures.
- Work effectively in a team to deliver desired results at the workplace.
- Work according to personal health and safety and environment protocol at site.

After successful completion of training and passing the assessment candidate will be issued a certificate. This will this will help him in getting employment. This certificate will help the candidate to get job and earn better wages than an untrained person.

1.1.3 Introduction to QP and NOS

This programme is based on qualification pack called Mason Concrete. The Qualification Pack is also called a QP and QP code for Mason Concrete is CON/Q0105.

A QP consists of a set of National Occupational Standards (NOS). NOS specifies the standard competency a worker must achieve when carrying out a function in the workplace.

Under Mason Concrete QP there are five NOSs which details the functions to be performed at work site,

	NOS Code	Major Function/Task
1.	CON/N0114:	Carry out IPS / Tremix flooring
2.	CON/N0117:	Place, level and finish concrete in various structural elements including repair works
3.	CON/N8001:	Work effectively in a team to deliver desired results at the workplace
4.	CON/N8002:	Plan and organize work to meet expected outcomes
5.	CON/N9001:	Work according to personal health, safety and environment protocol at construction site

1.1.4 Benefits of Training Program

- After completion of this training program, trainee will undergo an assessment which will have theory and a practical test.
- On successfully passing the assessment, a certificate will be awarded by the Construction Skill Development Council (CSDCI).
- This certificate will help the trainee to get a job and earn better wages in construction sector.
- The skills acquired along with the certificate will also help the trainee to grow in his career and identify and understand the progression of career.

Fig. 1.1.3. Sample Certificate Mason Concrete

Fig. 1.1.4. Skill Card Mason Concrete

Exercise

1. Answer the following questions.

1) What does a QP consist of?

_____

2) What does a NOS specify?

_____

3) Name any two NOS under Mason Concrete QP?

_____

4) Mention any two benefits of this training program?

_____

2. Write full form of :

a. QP

b. NOS

c. CSDCI

3. State whether the following statements are true or false.

a. This certificate will help you to get a job and earn better wages in construction sector.

True ◯   False ◯

b. The skills acquired along with the certificate will also help you to grow in your career.

True ◯   False ◯

c. The assessment after the training will have only practical exam.

True ◯   False ◯

d. "Work according to personal health, safety and environment protocol at construction site" is a NOS under Mason Concrete QP.

True ◯   False ◯

Notes

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UNIT 1.2: An Overview of Construction Sector

Unit Objectives ⌖

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

1. Explain about construction sector in India
2. Differentiate between urban and rural construction
3. Explain about modernization in construction
4. List out major occupations in the construction sector

1.2.1 An Overview of Construction Sector

Construction refers to building of different types of structures. The sector comprises of many small, medium and large industries or companies that involve in many different types of projects in the construction sector creating a diverse but specific requirement of workmen.

The construction sector can be broadly classified in two sub sectors, namely:

1. Real Estate and Infrastructure construction: This sub sector comprises of all the works that are required for construction of all types of infrastructure and real estate projects. Infrastructure projects are those that directly or indirectly affect the growth of the nation e.g. Roads, airports, railway bridges, dams, power plants, metros, industries etc. The real estate projects are those which are mainly focused on providing residential and commercial workplaces to all categories of people e.g. residential towers, independent houses, malls, sports complex etc.

Fig. 1.2.1. Multi-storeyed Residential Towers

1.2.2. Flyovers

2. Rural Construction: This sub sector focuses on the constructional requirements of rural India and includes construction of rural households, warehouses, village roads etc

Fig. 1.2.3. Rural roads   *Fig. 1.2.4. School in a rural area*

1.2.2 Modernization in Construction

From the early ages to present day construction sector has not only generated employment, but also undergone extensive modernization, from raw material to use of heavy equipment. The use of modern equipment and technique has increased the speed of construction work and enhanced quality of finished structures. Further, by modernization of construction it is now possible to construct in under water as well as very high altitude, from hi-tech buildings, to atomic power generation plants.

Fig. 1.2.5. Old bridge

Fig. 1.2.6. Modern Bridge

Fig. 1.2.7. Old construction equipment

Fig. 1.2.8. Modern Construction Equipment

Construction is the second largest employment generating sector in India after agriculture. Though there are many different occupations in construction depending on nature of work, some occupations cater to the maximum number of employments and are more prominent than others. Following occupations are very common in most of the construction projects.

1. Masonry 2. Bar Bending 3. Shuttering Carpentry 4. Scaffolding 5. Painting

Brief details about these occupations are given below:

1. Masonry

Masonry occupation comprises of works in which bricks, stones, concrete blocks, concrete are used along with bonding mixture called mortar to construct components of buildings and other structures. Their basic objectives include:

• Building of structure by laying material such as bricks, blocks, tiles and other construction materials, and bonding them by mortar.

• Constructing, altering, repairing and maintaining walls, sidewalks, street curbs, floors, sink counters, partitions, manholes, and other related structures or surfaces.

• Carry out structural finishes like grit wash, cement wash, POP, plastering, stone cladding etc. on finished masonry surface to impart an aesthetic appeal to the finished structure.

Fig. 1.2.9. Placing Concrete   Fig. 1.2.10. Brickwork

Few Job Roles under masonry occupation are as follows:

    1. General Mason

    2. Mason Tiling

    3. Mason Concrete

    4 .Mason Marble, Granite, Stone

    5. Mason -Special Finishes

2. Bar bending and fixing

The job of Bar Bending and Fixing includes shifting, cutting, bending and placing the reinforcement bar in order to assemble cage/mesh according to given drawing or specifications

Fig. 1.2.11. Reinforcement bars fixed at site   *Fig. 1.2.12. Reinforcement bar during bending*

Few Job Roles under bar bending and fixing occupation are as follows:

1. Helper bar bender and steel fixer
2. Assistant bar bender and steel fixer
3. Bar bender and steel fixer
4. Reinforcement fitter
5. Foreman reinforcement

3. Shuttering Carpentry

A shuttering carpenter is a person who specializes in creating shuttering especially using wood/timber, steel or fiber elements, which are temporary structures used for casting concrete.

Fig. 1.2.13. Conventional formwork   *Fig. 1.2.14. System formwork*

Few Job Roles under Shuttering Carpentry occupation are as follows:

1. Helper Shuttering carpenter
2. Assistant Shuttering carpenter
3. Shuttering Carpenter-System
4. Shuttering carpentry-conventional

4. Scaffolding

Scaffolding is temporary support structure. The material used are bamboos, timbers or steel members. This support structure helps during construction activities. Scaffolding are made for workmen to do their work and keep their tools and materials.

Fig. 1.2.15. Scaffolding

Few Job Roles under Scaffolding occupation are as follows:

    1. Assistant Scaffolder-system

    2. Assistant scaffolder-Conventional

    3. Scaffolder conventional

    4. Scaffolder-System

5. Construction Painting

Painting is a key part of the overall finishing work of a construction project. Application of paint lends aesthetic value to a constructed structure. This may also involve a component of decorative painting basis designs and patterns.

1.2.16. Paint work by a painter

Few Job Roles under Construction Painting occupation are as follows:

    1. Assistant construction painter and decorator

    2. Construction painter and decorator

    3. Construction painter & decorator

    4. Chargehand-painting &decorating

Exercise

1. Answer the following questions.

1) Name the two subcategories in construction sector?

_____

2) What are the main objectives of Masonry?

_____

3) What does shuttering carpenter do?

_____

4) What is a scaffold?

_____

2. State whether the following statements are true or false.

a. There is huge requirement of skilled man force in construction sector.

    True ◯   False ◯

b. The use of modern equipment and technique has decreased the speed of construction work

    True ◯   False ◯

c. By modernization of construction it is now possible to construct in under water as well as very high altitude.

    True ◯   False ◯

d. Construction is the second largest employment generating sector in India after agriculture.

    True ◯   False ◯

e. Scaffolding is temporary support structure used for working at heights.

    True ◯   False ◯

f. Repairing of concrete structures is done by Mason Concrete.

    True ◯   False ◯

Notes

UNIT 1.3: Mason Concrete as a job role

Unit Objectives ⌖

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

1. Introduction to concrete structure.

2. State roles and responsibilities of a mason concrete.

3. List out the required personal and professional attributes for a mason concrete.

1.3.1 Introduction to concrete structures

Concreting is widely used in all kinds of modern construction like:

- High rise buildings
- Bridges
- Dams
- Power or Atomic Plants
- Highways

Currently, the total concrete consumption in India is about 470 million cubic meter and is expected to rise to 580 million cubic meter by 2022 as per The Indian Concrete Journal.

Fig. 1.3.1. Concrete Building

Fig. 1.3.2. Concrete Bridge
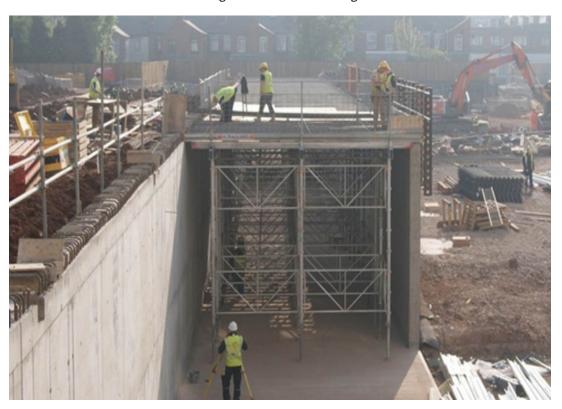
Fig. 1.3.3. Concrete Tunnel

Fig. 1.3.4. Concrete Dam

Duties of a Mason Concrete

At the construction site, a mason concrete is expected to carry out tasks as mentioned below.:

- Carry out preparatory work prior to IPS / Tremix flooring
- Check for line, level and alignment.
- Check the materials used for IPS / Tremix flooring in case of manual mixing
- Check the materials used for IPS / Tremix flooring in case of machine mixing
- Carry out IPS flooring / Tremix / VDF flooring
- Carry out preparatory work before pouring of concrete manually & by machine
- Check material used for concreting in case of manual mixing
- Place and compact concrete on PCC & RCC structural elements
- Screed and level wet concrete
- Finish and cure concrete
- Carry out concreting in pre-cast segments
- Carry out simple repair work on hardened concrete surfaces
- Interact and communicate effectively with co-workers, superiors and subordinates across different teams
- Support co-workers, superiors and sub-ordinates within the team and across interfacing teams to ensure effective execution of assigned task

Fig. 1.3.5.Batching Plant for concrete mixing

Fig. 1.3.6. Pouring Concrete

Fig. 1.3.7. Spreading Concrete

Fig. 1.3.8. Compacting Concrete using Vibrator

Fig. 1.3.9. Screeding of Concrete

Fig. 1.3.10. Curing Concrete by water spray

1.3.2 Personal Attributes of Mason Concrete

A Mason Concrete in addition to his technical skills should also possess certain soft skills and personal qualities such as:

• Good communication skill
• Ability to work in a well-organized and accurate way.
• Ability to work in a extreme /weather site conditions
• Awareness about safe working practice especially while doing highly hazardous activities
• Ability to work as part of a team
• Awareness of personal hygiene
• Be Reliable and honest
• Be hard working and dedicated
• Be courteous while interacting with coworkers

1.3.3 Career Path for Mason Concrete

The growth path represents the career progression of a Mason Concrete and also shows the requirement for progression into the next level. The minimum educational qualification required for this job role is preferably 5th standard.

Level-6	Supervisor Structure
Level-5	Foreman Concrete
Level-4	Mason – Form Finished and Special Concrete
Level-3	Mason concrete
Level-2	Assistant Mason
Level-1	Helper Mason
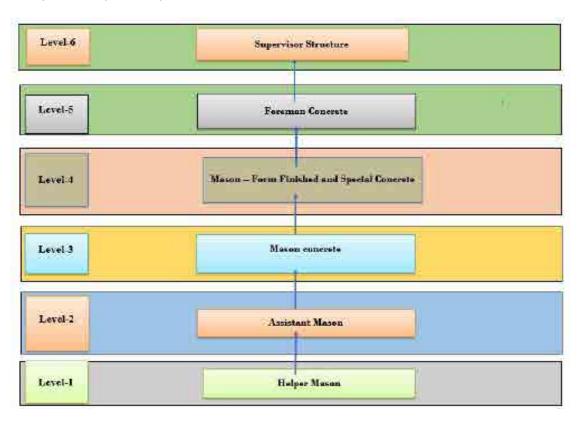
Fig. 1.3.11. Career progression of Mason Concrete

Exercise

1. Answer the following questions.

1) Name any three structures constructed with Concrete?

_____

2) Name any three tasks a mason concrete is expected to carry out at the construction site?

_____

3) Name any three personal attributes a mason concrete should possess?

_____

4) What is a growth path?

_____

2. Arrange the following in the order of a Mason Concrete growth path:

a.   Assistant Mason

b.   Foreman Concrete.

c.   Mason form finished and special concrete.

d.   Helper mason.

e.   Mason concrete.

3. State whether the following statements are true or false.

a. Pouring and spreading of concrete in the form is not the work of a Mason Concrete.

True   ◯   False   ◯

b. A helper mason can develop his skills over time and become a foreman concrete.

True   ◯   False   ◯

c. Awareness of safety issues and personal hygiene is not required for a Mason concrete.

True   ◯   False   ◯

d. Mixing and pouring concrete is a part of the Mason concrete job role.

True   ◯   False   ◯

e. Use and store masonry tools at the designed places after proper cleaning.

True   ◯   False   ◯

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Notes

2. Core / Generic Skills

Unit 2.1 – Communication Skills

Unit 2.2 – Numeracy Skills

Unit 2.3 – Systems of Measurements

Unit 2.4 – Calculating Area and Volume of Geometrical
Shapes

Key Learning Outcomes

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

1. Understand the importance of clear communication.
2. Explain different methods of communication.
3. Communicate with others in an effective way.
4. Perform basic mathematical calculation.
5. Identify the different types of geometrical shapes.
6. Calculate the area and volume of a square, rectangle, cube and cylinder.
7. List the different types of systems of measurement.
8. Perform the conversion of measurements.
9. Read a measuring tape in imperial system.
10. Read a measuring tape in metric system.

UNIT 2.1: Communication Skills

Unit Objectives 🎯

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

1. State the importance of clear communication
2. Understand different method of communication
3. Communicate with others in an effective way

2.1.1 What is Communication?

Communication has an important role in every aspect of your life, be it personal or professional. Being able to communicate well can boost your overall performance, help you build an organized working unit and build a great understanding with your colleagues.
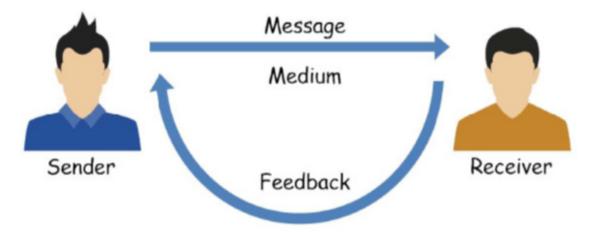
Fig. 2.1.1. Communication

Communication is the process by which people exchange information and feelings through verbal and non-verbal messages.

The act of communication requires skills such as speaking, listening, observing, questioning, processing, analyzing and evaluating.

Communication consists of two aspects

1. Verbal
2. Non-verbal

Verbal Communication

It includes all the spoken elements like, speech, conversation- face to face or telephonic, and voice chat.

Fig. 2.1.2. Telephonic conversation

Fig. 2.1.3. Speech

Fig. 2.1.4. Face to face conversation

Fig. 2.1.5. Voice chat

Non-verbal communication

It includes body language, gestures, facial expressions, eye contact, signboards, safety rules, safety tags, sketches and even photographs

Non-verbal communication also becomes a part of the communicating process as well as the written and typed modes of communications. It includes letters, Reports, newspaper, e-mails, SMS or text messages.

Fig. 2.1.6. Sign boards

Fig. 2.1.7.Email

Fig. 2.1.8.Gestures
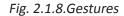
Fig. 2.1.9.Skectches

The objective of communication is achieved only when both sender and receiver understand the same information which is supposed to be conveyed.

Dos	Don't s
Smile	Avoid having an unkind expression
Keep your arms open – Shows positive body language	Do not keep hands on hip – Shows aggressive body language
Be friendly in tone of voice even while teasing your friends	Do not use challenging tone of voice
Welcome juniors	Do not show lack of courtesy in choice of words used
Speak slowly and clearly	Do not be nervous or speak fast
Be careful with your choice of words	Do not use rude words
Stand straight without leaning against the wall	Do not show stiff body language
Be genuine	Do not use over-polite language; it seems affected

Fig. 2.1.10. Dos while communicating at workplace   Fig. 2.1.11. Don't s while communicating at Workplace
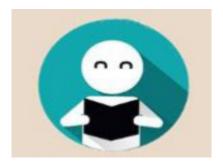
2.1.2 Oral Communication (Listening & Speaking Skills)

Mason Concrete should possess strong oral communication skills as he/she has to interact with his/her co-workers and supervisor for various routine activities. His/her prime responsibility is to listen and follow instructions given by his/her supervisor and follow the guidelines for performing his/her job role. He should also have the ability to speak in one or more language, preferably in one of the local language of the site.

Fig. 2.1.12. Oral Communication

2.1.3 Reading Skills

A Mason Concrete needs to read and interpret the work related documents. It is important for him to read instructions, guidelines, sign boards, safety rules and safety tags instructions related to exit routes during emergency at workplace.

2.1.4 Writing Skills

Mason Concrete needs to write in at least one language, preferably in the local language of the site.

Exercise

1. Answer the following questions.

1) What do you mean by communication?

_____

2) Write any three skills required for communication?

_____

3) What are the two aspects of communication?

_____

4) Why is oral communication necessary for a Mason concrete?

_____

2. Write any five Do's and Don't s of effective communication:

S No.	Dos	Don't s
1		
2		
3		
4		
5		

3. State whether the following statements are true or false.

a. Communication has an important role in every aspect of life.

True ◯   False ◯

b. Communication is successful only when both the sender and the receiver understand the same information.

True ◯   False ◯

c. It is not the responsibility of Mason concrete is to listen and follow instructions given by the supervisor.

True ◯   False ◯

d. It is important for Mason concrete to read instructions, guidelines, sign boards, safety rules and safety tags instructions at workplace.

True ◯   False ◯

e. Mason Concrete is not required to know how to write.

True ◯   False ◯

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UNIT 2.2: Numeracy Skills

Unit Objectives

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

1. Perform basic mathematical calculation
2. Identify the different types of shapes
3. Calculate the perimeter of a square, rectangle, triangle and circle

2.2.1 Mathematical Calculation?

A Mason Concrete works involve the skills required to mark the dimensions of the concrete structure to be constructed, set up the temporary scaffold as per the dimensions, repair and maintain concrete structures such as buildings, bridges, heavy plant and heavy duty floorings. He must have a good knowledge of mathematical calculations and geometrical techniques. He must be able to perform basic arithmetic calculations

Basic Calculations

Addition

Vertical addition	Horizontal Addition
$\begin{array}{r} 2 \\ +\,2 \\ \hline 4 \\ \hline \end{array}$	$2 + 2 = 4$

Addition of 2 digit Numbers	Addition of 2 digit number with 2 digit number	Addition of 3 digit with 2 digit number
$\begin{array}{r} 24 \\ +\,32 \\ \hline 56 \\ \hline \end{array}$	$\begin{array}{r} 57 \\ +\,34 \\ \hline 91 \\ \hline \end{array}$	$\begin{array}{r} 156 \\ +\,37 \\ \hline 193 \\ \hline \end{array}$

Adding two 3 digit numbers with one 2 digit number	Addition with decimal point	Addition with decimal point
224 321 + 31 _____ 576	57.4 + 34.3 _____ 91.7	156.71 + 371.30 _____ 528.01

Subtraction

Subtraction of 2 digit numbers with borrowing	Subtraction of 3 digit numbers with borrowing	Subtraction of 4 digit numbers
74 - 31 ____ 43	574 - 343 _____ 231	7121 - 1130 _____ 5991

Subtraction of 3 digit number from 4 digit number	Subtraction of decimal numbers	Subtraction of decimal numbers
7456 - 314 _____ 7142	57.42 - 34.32 _____ 23.10	711.15 - 113.04 _____ 598.11

Multiplication

Multiplication of 2 digit number by 1 digit number	Multiplication of two 2 digit number by 2 digit number	Multiplication of 3 digit number by 2 digit number
24 X 3 ____ 72	27 X 13 ____ 81 +27 _____ 108	127 X 23 ____ 381 + 254 _____ 635

Multiplication of 3 digit number by 2 digit number	Multiplication of decimal numbers	Multiplication of decimal numbers
427 X 23 1281 + 854 2135	27.3 X 3 81.9	2.7 X 6.3 8.1 + 16.2 24.3

Division

Division of 3 digit number by 1 digit number	Division of 4 digit number by 2 digit number
20 5) 100 - 10 00	153 14) 2142 - 14 74 - 70 42 -42 00
Division of 5 digit number by 1 digit number	**Division of given value in decimal**
3206 6) 19236 - 18 12 - 12 36 -36 00	75.5 4) 302 - 28 22 - 20 20 -20 00

Exercise

1. Solve

1. 384 + 362	2. 57789 + 3456	3. 15676 + 3784
4. 356384 - 37862	5. 56989 - 3456	6. 15676 - 3784
7. 74 x 31	8. 687 X 63	9. 6459 X 624
10. 504 ÷ 31	11. 219798 ÷ 9	12. 824208 ÷ 24

Notes

UNIT 2.3: Systems of Measurement

Unit Objectives 🎯

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

1. List the different types of systems of measurement
2. Follow the conversion of measurements
3. Read a measuring tape in imperial system
4. Read a measuring tape in metric system

2.3.1 Systems of Measurement

Different measurements have to be used together in order to calculate complex measurements. However, the calculation will only work if all the three measurements are taken in the same system of measurement.

There are two types of systems of measurement which are currently in practice:

1. MKS or Metric System: This system uses Meter, Centimeter and Millimeter

2. FPS or Imperial system: This system uses Yard, foot and Inch

2.3.2 Conversion of Measurement

Units of Measurement for Length

Length is measured in millimeters (mm), centimeters (cm), meters (m), inch (in), and feet (ft).

Conversion from one system to another should be done based on the table below:

1 Meter (m)	100 Centimeter (cm)
1 Centimeter (cm)	10 Millimeter (mm)
1 Meter (m)	1000 Millimeter (mm)
1 Inch (in)	2.54 Centimeter (cm)
1 Foot (ft)	12 Inches (in)
1 foot (ft)	30.50 Centimeter (cm)
1 Meter (m)	39.4 Inches (in)
1 Meter (m)	3.28 Foot (ft)

2.3.3 Reading of Tape in FPS System

1. Use the big numbered marking for inches.

• The height of marking line at each 1 inch is generally long and may be half width and full width of tape depends on manufacturer and perpendicular to length direction of tape.

• The feet graduation line is generally numbered in different colour and followed by symbol Ft

• Numerals of inch graduation line repeat from 1 - 11 after graduation line at 1 feet.

• The marking line is straight and perpendicular to longitudinal direction of tape.
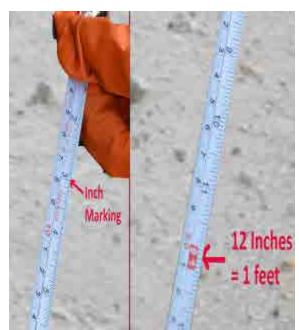
Fig. 2.3.1. Measuring in Inches

2. The graduation/marking line at 1/2 inch is longer in length than smaller increment marks like 1/4 and 1/8 inch. There are one graduation line between two inch lines which is used for measurement in terms of quarter inch.
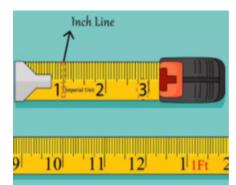
Fig. 2.3.2. Measuring in Inches

3. There are 3 graduation lines between two inch lines which is used for measurement in terms of quarter inch
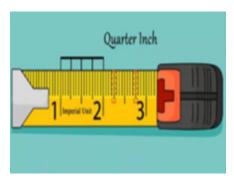
Fig. 2.3.3. Measuring in Inches

4. The height of marking line for one -eight of inch is longer than sixteenth of inch, There are 7 graduation lines between every inch lines which are used for measurement in terms of one-eighth of inch.
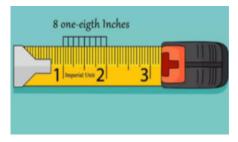
Fig. 2.3.4. Measuring in Inches

5. There are 15 graduation lines between two inch lines which are used for measurement in terms of one -six-teenth of inch.
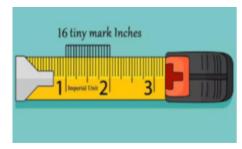
Fig. 2.3.5. Measuring in Inches

6. Finding measurement in terms of quarters of inch or one eighth

1. First mark or note down the graduation line which is matching or coinciding with end point of dimension of objects to be measured

2. For an example, in term of quarter inch measurement. The edge shall coincide with either of 3 graduation line between two inch marked line.

3. In case of one eight inch measurement, the end edge of dimension of objects shall coincide, we need to add:

1 (our inches) + 1/4 (our quarter-inches) + 1/8 (our eighth-inches).

Since there are two eighth-inches in a quarter-inch, we can rewrite this as:

1 + 1/8 + 1/8+ 1/8 = 1 3/8 inches.
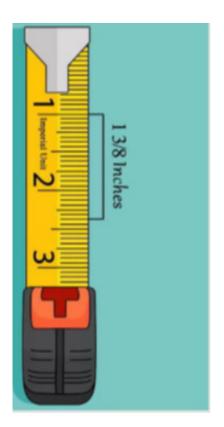
Fig. 2.3.6. Measuring Tape

2.3.4 Reading of Tape in Metric System

1. The marking line at every 1 meter is numbered and followed by abbreviation m.
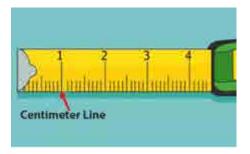
Fig. 2.3.7. Measuring in centimeter

2. The height of marking line at each centimeter is longer than millimeter graduation and may be half width and full width of tape and perpendicular to length direction of tape and size.
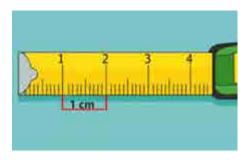
Fig. 2.3.8. Measuring in centimeter

3. There are 9 graduation lines between each centimeters line.
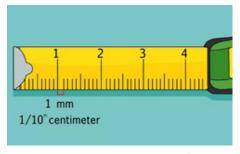
Fig. 2.3.9. Measuring in centimeter

To measure with a metric measuring tape,

1. First note down graduation line coinciding or nearly matching with end edge of dimension of objects to be measured
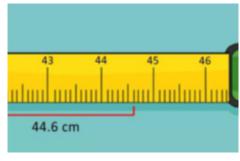
Fig. 2.3.10. Measuring in centimeter
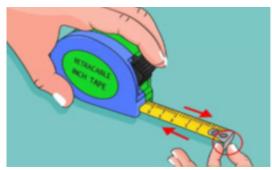
For example, see below:

- As shown in above figure 2.3.10. the graduation line is noted down which is found to be 6 th graduation line past 44 centimeter line so the reading will be = 44 +0.6 =4.6 centimeters

- To find out measurement in terms of meters, covert centimeters into meters. There are 100 centimeters into one meter.

- To find out measurement in terms of millimeters, covert centimeters into millimeters. There are 10 millimeters into one centimeters. Therefore multiply it by 10.
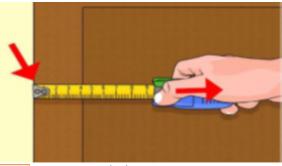
2.3.5 Taking Measurements with Metal and Cloth Tape

- Measuring tapes are used by a Mason Concrete for marking and measuring in concreting work as per the requirements and specifications. The concrete structure takes the shape as per the form constructed hence the measurements should be accurate.
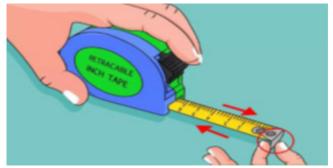
2.3.5.1 Steps to Take Measurement with Metal

Step 1: Hold the hooked end of tape and fix this to starting point of distance to be measured.
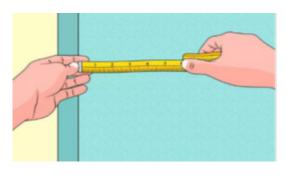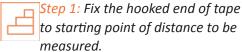
Step 2: Stretch the tape across your object
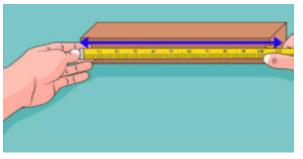
Step 3: Take the reading by noting down numerals mentioned in marking line or by calculating marking line past or before the nearest numerals marked   line
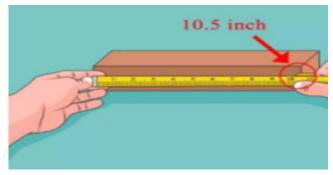
2.3.5.2 Steps to Take Measurement with Cloth Tape

Step 1: Fix the hooked end of tape to starting point of distance to be measured.

Step 2: Stretch the tape maintaining its same level and line through out the length.

Step 3: Take the reading by noting down numerals mentioned in marking line or by calculating marking line past or before the nearest numerals marked line

Exercise

1. Fill in the empty measurement conversions

Foot	Inches	Centimeters
1 foot		30.48 cms
2 foot	24 Inches	
3 foot		
4 foot		
5 foot		152.4 cms
6 foot	72 Inches	
7 foot		
8 foot		
9 foot		
10 foot	120 Inches	304.8 cms

2. State whether the following statements are true or false.

   a. A Mason Concrete works involves the skills required to mark the dimensions of the concrete structure to be constructed.

   True ○   False ○

   b. Use the bigger marks between two inch markings for half-inches.

   True   False

   c. 1 cm on a metric tape has 15 small markings for millimeter.

   True ○   False ○

   d. A rod with length 10 inches is smaller than a rod with length 10 cm.

   True ○   False ○

   e. 1meter = 100 cm.

   True ○   False ○

Notes

UNIT 2.4: Calculating Area & Volume of Geometrical Shapes

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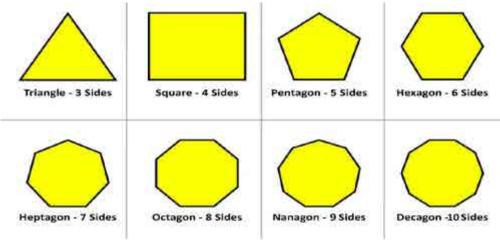
At the end of this unit, you will be able to:

1. Understand and name different types of geometrical shapes
2. Calculate area of different geometrical shapes.
3. Calculate volume of different geometrical shapes.

2.4.1 Basic Geometrical Shapes

The common shapes comprise of square ,triangle and rectangle.

Basic Shapes

Triangle - 3 Sides	Square - 4 Sides	Pentagon - 5 Sides	Hexagon - 6 Sides
Heptagon - 7 Sides	Octagon - 8 Sides	Nanagon - 9 Sides	Decagon -10 Sides

Curved Shapes

Circle

Ellipse
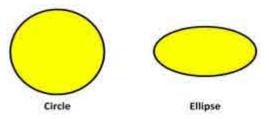
Fig. 2.4.2. Curved Shapes

Other Shapes

Rhombus

Paralleogram

Quadrilateral

Rectangle
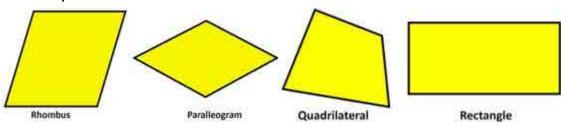
Fig. 2.4.3. Other Shapes

2.4.2 Calculation of Perimeter, Area and Volume

Perimeter

Perimeter is the total length of the boundary of a given figure.

Unit of perimeter in metric system is : meter, centimeter, millimeter

Unit of perimeter in FPS system is : inch, foot

Let us see how it is calculated.

Square

A square is a shape that has four equal sides that meet each other at right angles.

Perimeter = 4 X side

Rectangle

This figure has two adjacent sides of different lengths, and opposite sides which are equal.

The shorter side is called the breadth, and the longer side is called the length.

Perimeter = 2 X (Length + Breadth)
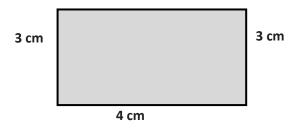
Triangle

A triangle is a shape that has three sides.
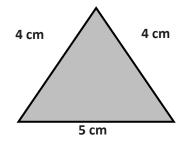
Perimeter = Sum of all the three sides

Example
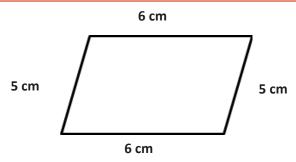
Perimeter = 2(4 + 3) =14 cm

Perimeter = 4 + 4 + 5 = 13 cm

6 cm

5 cm   **5 cm**

6 cm

Perimeter = 6 + 5 + 6 + 5 = 22 cm

Perimeter of a Circle
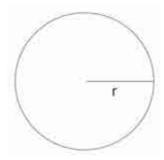
The figure shown below is a circle.

To calculate the perimeter of a circle, the following formula is used:

$2 \times \pi \times r$ where π = pi or 3.14 or 22/7

r = radius of circle (The radius is the distance from the center of the circle to its edge.)

The radius of a circle is the distance measured between the center point of the circle, and any point on the circumference.

r

Thus, the perimeter of the given circle is $2 \times \pi \times r$.
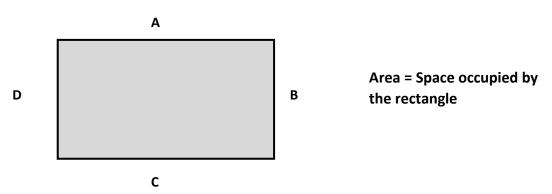
Area

Area is the total space occupied by a two dimensional object.

Unit of Area in metric system is: square meter(m^2), square centimeter(cm^2), square millimeter (mm^2)

Unit of Area in FPS system is : square inch (in^2), square foot (ft^2 / Sqft.)

Let us see how it is calculated.

A

D   **B**   **Area = Space occupied by the rectangle**

C

Square

A square is a shape that has four equal sides that meet each other at right angles.

Area = side X side

Rectangle

This figure has two adjacent sides of different lengths, and opposite sides which are equal.

The shorter side is called the breadth, and the longer side is called the length.

Area = Length x Breadth

Circle
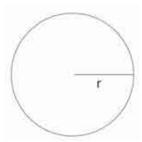
The figure shown below is a circle.

To calculate the area of a circle, the following formula is used:

π x r x r   where π = pi or 3.14 or 22/7
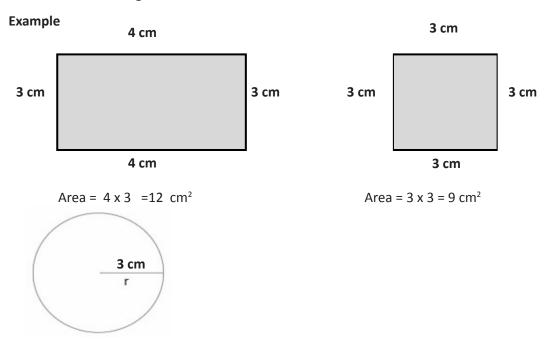
r = radius of circle

The radius of a circle is the distance measured between the center point of the circle, and any point on the circumference.

Thus, the area of the given circle is π x r x r.

Example

Area = 4 x 3 =12 cm^2

Area = 3 x 3 = 9 cm^2

Area = π x r x r = 3.14 x 3 x 3 = 28.26 cm^2
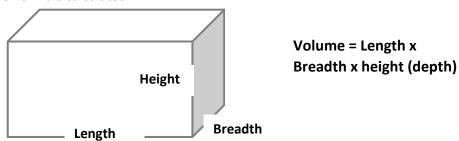
Volume

Volume is the total space occupied by a three dimensional object. It is also equal to the material required to construct a structure of a given dimension.

Unit of Volume in metric system is: Cubic meter(m^3), Cubic centimeter(cm^3), Cubic millimeter (mm^3)

Unit of Volume in FPS system is : Cubic inch (in^3), Cubic foot (ft^3)

Let us see how it is calculated.

Volume = Length x Breadth x height (depth)

Cube

A cube is a shape that has all equal sides that meet each other at right angles.

Volume = side X side x Side

Cuboid

This figure has different length, breadth and height but all the angles are at 90 degrees.

Volume = Length x Breadth x height (depth)

A concrete floor is generally cuboid in shape so the volume of the cuboid will give the amount of the concrete required for construction

Cylinder
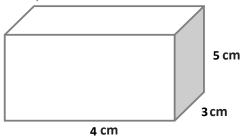
A cylinder is a three dimensional shape whose base is a circle and has a height.
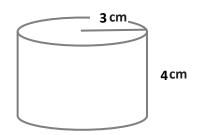
Volume = Area of Circle x height = π x r x r x height

For cylindrical structures the: Volume of concrete required = Volume of the cylinder

Example

Volume = 4 x 3 x 5 =60 cm^3

Volume = 3.14 x 3 x 3 x 4 = 113.04cm^3

Measurement Conversion

Conversion within the system and from one system to another should be done based on the table below:
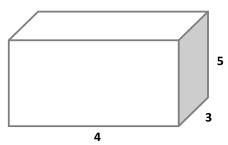
Area	
1 square meter(m^2)	10000 square centimeter(cm^2)
1 square centimeter(cm^2)	100 Square Millimeter (mm^2)
1 square meter(m^2)	10.76 square foot (Sqft.)
1 square foot (Sqft.)	144 square inch (in^2)
Volume	
1 cubic meter(m^3)	1000000 cubic centimeter(cm^3)
1 cubic centimeter(cm^3)	1000 cubic Millimeter (mm^3)
1 cubic meter(m^3)	35.3 cubic foot (ft^3)
1 cubic foot (ft^3)	1728 cubic inch (in^3)

Exercise

1. Answer the following questions.

1) What is the application of volume calculation in concreting?
_____

2) What is radius?
_____

3) Define area?
_____

4) Define volume?
_____

2. Write the formula for the following :

a. Perimeter of rectangle

b. Area of rectangle

c. Area of circle

d. Volume of cuboid

e. Volume of cylinder

3. Calculate the volume of the figure shown below?

4. Calculate the volume of concrete required to construct a concrete slab of dimensions :

width = 10 meters ; Length = 20 meters and thickness = 0.10 meters

5. Calculate the volume of concrete required to construct a cylindrical pillar of dimensions :

radius = 0.5 meters ; height = 20 meters

6. Calculate the volume of concrete required to construct a concrete floor of dimensions :

width = 15 meters ; Length = 35 meters and thickness = 0.15 meters

Notes

3. Work according to personal health, safety and environment protocol at construction site

Unit 3.1 – Introduction to Work Safety

Unit 3.2 – Personal Health and safety for Mason
Concrete

Unit 3.3 – Housekeeping and Waste Disposal

(CON/N9001)

Key Learning Outcomes

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

1. Understand the need and importance of safety.
2. Identify types of hazards at construction sites.
3. Identify types of hazards during concreting.
4. Explain the general safety guidelines and safety guidelines to be followed during concreting.
5. Explain the safety precautions to be followed at the site.
6. Select the appropriate personal protective equipment (PPE) for the task to be performed.
7. Identify safety signages and their purpose.
8. Identify type of fire and ways to put out the same.
9. Understand meaning of different safety colours and their purpose.
10. Describe the importance of mock drills and tool box talks.
11. Explain the importance of good housekeeping and waste disposal.
12. List the dos and don't s in keeping the construction site clean and in waste disposal.
13. Dispose waste safely as per environmental norms

UNIT 3.1: Introduction to Work Safety

Unit Objectives 🎯

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

1. Understand the need and importance of safety.
2. Identify types of hazards associated with concreting and at construction sites.
3. Know the general safety guidelines to be followed at the site.

3.1.1 Safety and its Importance

Safety is the key for working at construction sites. The work in construction involves activities and situations which are hazardous and risky in nature such as deep excavation in congested area, heavy lifting and erection work, working at height. There are high chances of getting injured and sick, if appropriate safety precautions are not taken at site.

The workers at construction sites shall be well aware about hazards associated with work and safe healthy and working practices which shall be followed.

Hazards associated with concreting

Hazard is a condition that leads to accidents or sickness. Hence, extra care should be taken around hazardous objects and in hazardous situations. Fatalities and injuries continue to oc-cur in the construction industry due to negligence of workmen towards safety and hazard.

Type of Hazards while Concreting

Hazard due to height	Electrical Hazards	Hazards while using hand / power tools	Hazards while using materials	Jobsite conditions
Examples 1. Falling form height. 2. Fall of objects from height	Examples 1. Electric shock due to naked wire. 2. Fire due to short circuit.	Examples 1. Cuts and wounds from sharp tools. 2. Hazards from unsafe keeping of tools.	Examples 1. Burns due to prolonged exposure to fresh concrete. 2. Alergy due ti inhalation of cement powder.	Examples 1. Cramped / Confined projects. 2. Exposure to utility wires.

Fig. 3.1.1. Type of Hazards

Some of the hazards at construction site are listed below	
• Injury or cuts by tools and equipment	• Electric shock
• Slips and Falls by ladders or unsafe slippery workplace	• Accident resulting from not wearing PPE
• Bad Illumination	• Bites from insects or poisonous snakes at site
• Lack of proper ventilation	• Accidents involving heavy vehicles at site
• Unsafe harness	• Poor housekeeping
• Lack of maintenance of tools and equipment	• No work platform
• Unexpected atmospheric conditions	• No overhead protection
• Falling from a height	• No installation of safety net
• Sun stroke	• Incorrect ways of waste disposal
• Fire	• Unsafe excavation site
• Unsafe or damaged Scaffold	• Incorrect methods lifting, loading and transportation

Fig. 3.1.2. Unsafe Scaffold

Fig. 3.1.3. Unfastened harness
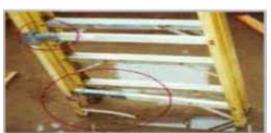
Fig. 3.1.4. Broken Ladder

Fig. 3.1.5. Risk of Falling of Debris

Fig. 3.1.6. Poor Housekeeping

Fig. 3.1.7. Unsafe Excavation without Barricading

General Safety Guidelines to be followed at Construction Site

Fig. 3.1.8. Barricade all construction sites to prevent entry of public, animals, etc.

Fig. 3.1.9. Dispose debris and materials at instructed location

Fig. 3.1.10. Consult Safety officer for guidance.

Fig. 3.1.11. Clear and organize work-site regularly

Fig. 3.1.12. Good Housekeeping practices

Fig. 3.1.13. Wear proper PPE

Fig. 3.1.14. Maintain and clean tools after use.

Fig. 3.1.15. Safe electrical Connection

UNIT 3.2: Personal Healthy and Safety for Mason Concrete

Unit Objectives 🎯

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

1. Know the safety precautions to be followed at the site.
2. Explain safety precautions and measures taken during concreting.
3. Select the appropriate personal protective equipment (PPE) for the task to be performed while concreting.
4. Identify safety signages
5. Identify type of fire and ways to put out the same
6. Understand safety colours and their purpose
7. Describe the importance of mock drills.

3.2.1 Health and Safe Working Practices

It is very important for a Mason Concrete to follow safety rules and regulations laid by the organization and report any site conditions, hazards and accidents to the supervisor. Hazards can be avoided by following healthy and safe work practices and taking proper safety precautions at the workplace.

3.2.2. Personal Protective Equipment

PPE or Personal Protective Equipment means the safety equipment which is worn by person to protect himself from hazards or risks:

PPEs to be used at Construction Site
Safety shoes & boots   Always wear safety shoes no matter where you are working.

Protective helmet Wear protective helmet when you are: • Working on the floor where there is a tendency for the objects to fall from the roof. • Working or moving in bent position. • Working at a place surrounded by electric wires.	
Reflective jacket Wear them to save your skin from wet concrete. Wear them while working in night.	
Safety gloves Wear safety gloves when you are working with wet concrete, electric wires, and power tools.	
Safety harnesses • Prevent from impact of falling from heights • Should be worn while concreting at heights or on scaffolds	
Protective goggles Wear safety goggles when you are • Cutting concrete. • Working at dusty area and intense light. • Working with wet concrete.	

- **Dust mask**

- Wear the dust mask while cutting concrete.

- Wear dust mask while opening dry cement bags.

3.2.3 Safety during Concreting

Construction work involves activities which are very hazardous and risky in nature. The hazards can be categorized into different types. Extreme care should be taken while concreting at heights and using power tools. Personal protective equipment should always be used as per the occupational guidelines.

3.2.3.1 Safety while working with fresh Concrete

The working with fresh concrete poses a possible threat to health of workers. This is very essential to wear appropriate PPEs.

PPEs to be used:

- Hand gloves

- A long-sleeved shirt

- Water proof boots

- Goggles.

- Dust mask

Do's and Dont's

- Always wear water- proof boots whose sizes shall be appropriate enough to prevent skin from coming in contact with concrete .

- Always remove wet concrete or cement paste after completion of work by washing them off from skin.

- In case of contact of concrete with eyes, immediately flush it off with water.

- Always inform your superiors for any uneasiness and discomfort during work.

- Always use dust mask while handling of cement.

Head and Eye protection

- Always ensure the electrically operated vibrators for compaction shall be placed on proper insulated surface like wooden platform to avoid electrical hazards.

- Always report immediately about hazards, accidents at working site to concerned authority.

- Always start work after safety protective equipments in case of working at height such as horizontal life line or hard barricade are fixed to avoid falling from height. if not, report to superiors.

Fig. 3.2.1. Safety Helmet   Fig. 3.2.2. Safety goggles   Fig. 3.2.3. Dust Mask

Health effects of concrete on body

The working with fresh concrete badly impact the health of person. The degree with which it affects the skin of concrete depends on contact time of body with concrete. In case of long contact , This troubles by yielding severe burns on skin. Such burns shall be medically treated.

The possible effects of fresh concrete on skin are listed below.

The cement in concrete is Highly alkaline which absorbs the tissue of skin and even enter into blood stream and causes irritation to skin.

Cement absorbs moisture when this comes into contact with body which results in dry skin followed by itching and redness in most cases.

Fig. 3.2.4. Safety Gloves

Fig. 3.2.5. Safety gumboots

3.2.3.2 Safety while using Machinery and Tools

The equipments and machineries used for construction work are highly prone to create injuries and accidents at site such as concrete batching plants, transit mixers, placing equipments like boom placer, concrete pumps and more machineries associated with concreting works. They pose a big danger while working at site.

In addition to machineries, the hand tools used in construction sites like hitting, cutting, sharpened finishing tools are also probable causes of accidents or injuries. If not properly handled and operated. Therefore, this is very important for workers to follow safe working practices.

Fig. 3.2.6. personal protective equipments while using needle vibrator

Safety Instructions

- Keep hands, feet and loose clothing away from all moving parts of the machine.
- Do not use in an unventilated space.
- Consider using rubber or leather boots when operating machine.

PPEs

The personal protective Equipments which must be worn or used while handling machinery and tools.

- Ear muffs or ear plugs
- Leather gloves
- Safety boots
- Safety goggles

Electrical Safety - Do's and Dont's

- Electrical operated equipment's shall be marked to show purpose and specifications.
- Avoid using equipment's having Non-insulated current carrying parts of equipment and precautions shall be taken to prevent direct or indirect contact.
- Lighting fittings for general construction work should be installed not less than 2.5 m above the ground
- Do not Handle Flexible cables without earthing used for electrical equipment's.
- Ensure that electrical wiring should be fixed on proper insulated support.
- Ensure that Overhead lines should be carried on support of adequate strength and at a height   to prevent person passing underneath from accidental touch.
- Electricity operated equipment and electric power supply should be done by a licensed electrician only.
- Installation of electrical equipment's and power distribution shall be as per approved code and statutory regulations.
- There shall have safeguards for dangerous parts of electrically operated Equipment like motors, transmission, electric wiring.
- Always work with electrical installations with tools like insulating mats and non-conductive shoes, gloves, etc.
- All electrical supply should be considered live and precautions should be taken unless it is checked.
- Proper warning signs should be displayed wherever live circuits exist near work area.
- Temporary electrical connections should be done only after getting written permission.

3.2.3.3 Safety precautions while using hand tools

Do's and Dont's

- Use safety goggles and gloves while working with tools

- Keep cutting tools sharp

- Drive chisel outward and away from your body

- When passing sharp tools to co-worker pass them handle first

- Check hammer heads and handles for cracks and splits.

- Ensure that hammer heads are fastened to the handle securely

- The working space shall be made free from debris and other slipping hazards.

- Do not use tools with loose or cracked handles

- Do not chisel as screwdriver

- Do not use scaffolding without wearing the safety belt and harness.

Fig. 3.2.7. personal protective equipments while concreting

3.2.3.4 Safety precautions while working at height

- Make sure that the stairways are free from debris or any material.

- Remove the tools and nails from the floor when they are not in use.

- Tag or close the holes or trenches properly to avoid falling into them.

- Lap the scaffold plank properly or otherwise secure to prevent its shifting.

- Always make sure that safety body harness shall be used along with fall arrester system at unprotected high working place.

- Do not keep any material or tools or cables on walkways.

- Do not be in a hurry while walking and carrying something at the construction site.

- Do not use defective ladders.

- Do not work on scaffolding without wearing the safety belt and harness.

Fig. 3.2.8. Safety while working at height

Lifeline for working at height
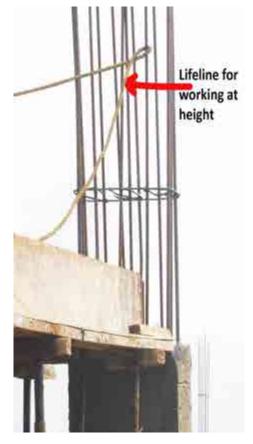
Fig. 3.2.9 Horizontal lifeline for anchoring the safety harness

3.2.3.5 Safety precautions while using Ladder

Ladders used on site are generally of the straight, wooden variety, although framed wooden or aluminium platform types are also available. The latter two types are heavier and hence more difficult to move around. If your ladder is of the common straight type, observe the following safety precautions when you use them:

- Ladder shall be inspected and checked for wear and tear and damage before use

- Ladder shall be generally positioned such that horizontal distance between top support and foot of ladder shall be equal to one -quarter length of ladder from wall.

- Defective ladders shall be properly repaired and in case of wooden ladders rungs having supported on only nails shall be replaced.

- The ladder shall be held by both the hands. The person should face towards the ladder while ascending or descending.

- Metal ladder shall be preferably used away from electrical equipments/supply to prevent it from coming in contact with current.

- Safety shoes shall be used while working on ladder to avoid slipping.
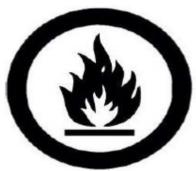
Fig. 3.2.10. Safety Rules for using Ladder

3.2.3.6 Safety precautions regarding personal Habits

- Do not consume drugs or alcohol
- Do not smoke at the construction site.
- Do not throw nails or pointed material at the construction site.
- Do not lift heavy weights without seeking the help.
- Do not forget to wear PPE

3.2.4 Fire Safety

Causes of Fire:

- Heating of metal;
- Spontaneous ignition because of combustible material;
- Electrical heating or short circuits;
- Loose fires (smoking, welding, etc.);
- Chemical fires;
- Poor housekeeping and accumulation of waste.

What should be done in case of fire outbreak?

S No.	Instruction
1	On noticing a fire, immediately start shouting "fire" at top of your voice. Do not wait for the automatic fire alarms to start ringing.
2	Take a fire extinguisher
3	Use extinguisher as per fire type : - Water and Carbon Di Oxide fire extinguishers for general fires - Foam type extinguishers for oil fires - Carbon Di Oxide fire extinguisher only for electrical fires.
4	Cut off all the power from main supply in case of electrical fires
5	Do not try to switch off electrical equipments. Cut the power from the main source.
6	Do not panic and alert the building fire department
7	Contact immediately to local fire department in case of heavy fires getting out of control
8	Immediately start operating water sprinkler system and other fire dousing equipments to minimize the impact of fire.
9	First priority should be to save people. Help others to safely get out of the floor
10	The nearby hospitals shall be alerted immediately for fast and timely treatment of serious injuries.

How to use fire extinguisher
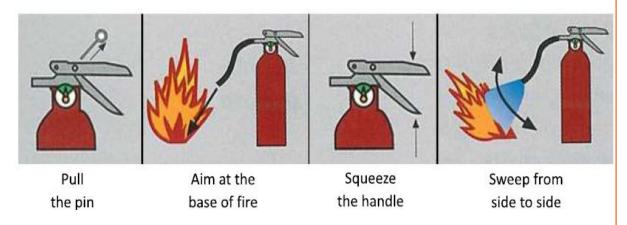
Fig. 3.2.11. Using Fire Extinguisher

Safety Rules and Regulations for Handling and Storing Reinforcement, Tools Materials and Components

- Use gloves or barrier cream while handling liquid and powder ingredients

- Provide adequate ventilation shall be provided in working areas

- Use forced air drought in confined area like vessel lining

- Solvents used for cleaning tools are generally inflammable. Keep fire away from such areas and post 'No Smoking' sign

3.2.5 Safety Signage

Color	Meaning or purpose	Instructions and information
Red	Prohibition sign	Dangerous behavior
	Danger alarm	Stop, shutdown, emergency cut out devices, evacuate
	Firefighting equipment	Identification and location
Yellow	Warning sign	Be careful, take precautions, examine
Blue	Mandatory sign	Wear personal protective equipment
Green	Emergency escape, first aid sign	Doors, exits, routes, equipment, facilities
	No danger	Return to normal

Geometrical form	Meaning
	Mandatory and prohibition sign
	Warning signs
	Emergency, information and additional signs.

Commonly used signages and meaning

Signage	Meaning
	No smoking
	Smoking and naked flames forbidden
	Not drinkable
	Do not touch
	Flammable material

	Explosive material
	Movement directions in case of emergency
	Electricity danger
	General danger
	Safety gloves must be worn
	First aid post
	Fire extinguisher
	Emergency exit
	Use stairs in case of fire

	Foot Protection must be worn
	Eye Protection must be worn

3.2.6 Mock Drills

Construction safety is a priority in order to provide a safe working environment. Efforts should be taken to reduce the scale & probability of hazards in the construction sites. However, hazards may occur. Effective action is possible due to existence of pre-planned and practiced procedure for dealing such emergencies. Mock drill is method of exercising preparedness against emergency situation. In this, there is usually announcement about emergency. This allows the workman to familiarize with the emergency situation and act according to plan. Mock drills for chemical accidents and fire fighting drills should be organized at regular intervals at the sites. At the time of emergency evacuation one must:

- Raise the alarm by smashing the glass cover of the nearest break-glass alarm unit.

- Keep calm. Turn off all electrical apparatus except lights.

- Leave the Building/site area immediately. Follow the evacuation queue.

- If it's dark and smoky, get down on your hands and knees and crawl to the nearest exit by counting the number of door. If possible, hold onto your nose with a wet towel or handkerchief.

- Be aware of the hot exit door and watch out for the thick smoke in the staircase. If the staircase is free from smoke, walk down by following the directional signs and handrails.

- Gather at the designated assembly point.

Fig. 3.2.11 Mock Drill

3.2.7 Tolbox Talks

This is a informal meeting conducted to inform and educate workers at construction site about hazards associated with activities, safety precaution to be taken while working and organizational safety rules and regulations. The workers also exchange information about hazard control and problem faced while working .

It is generally of short duration and conducted at site before starting the job or work activities.

The time interval after tool box talks is held at site depends on hazardous activities at site, nature and location of work site.

This helps in construction worker at site to know and understand the following important things which are as follows:

• Information about organizational safety rules and regulations

• Reporting procedures in case of accidents and injuries

• Effective use of appropriate Personal Protective Equipment as per nature of work.

• Emergency response and evacuation procedures.

• Hazardous working activities and sites

• Safe working practices.

Fig. 3.2.12 Toll Box Talk

Exercise

1. Fill in the blanks.

a. You must wear earplugs in areas where the noise levels are _____.

b. _____ must be worn to protect your hands.

c. _____ meetings should be run on a regular basis for 10-15 minutes.

d. _____ should be practiced at the site to prepare for emergency situation.

2. State whether the following statements are true or false.

a. A dust mask protects your lungs when you are sanding, or are engaged in dust-producing jobs_____.

b. Goggles protect your hands from chemical hazards and sharp objects_____.

3. Match the columns.

Equipment		Use	
a.	Helmet	i.	Protects the eyes
b.	Reflective jacket	ii.	Prevents inhalation of dust
c.	Goggles	iii.	Keeps the head safe
d.	Nose mask	iv.	Keeps the upper body protected

4. Pick a volunteer form the class and ask him to demonstrate how to wear Personal Protective Equipment. List of PPE to be worn includes:

a. Safety shoes

b. Protective helmet

c. Reflective jacket

d. Safety harnesses

e. Protective goggles

5. Pick two or three volunteers and ask them to demonstrate how to use the various types of fire extinguishers.

a. Sand fire extinguishers

b. Water fire extinguishers

c. Foam fire extinguishers

d. Dry Chemical Powder(DCP) fire extinguishers

e. Co2 fire extinguishers

Notes

UNIT 3.3: Housekeeping and Waste Disposal

Unit Objectives 🎯

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

1. Explain the importance of good housekeeping and waste disposal
2. List the dos and don't s in keeping the construction site clean and in waste disposal
3. Dispose waste safely as per environmental norms

3.3.1 Housekeeping Practices and Waste Disposal

Housekeeping

Housekeeping at construction site involves cleaning debris and maintaining all materials and tools in organized manner

Good Housekeeping helps in reducing hazards and creating safe,efficient and effective working environment at construction site.

When workplace is clean and orderly and housekeeping standards are followed which helps in achieving high productivity at workplace.

Fig. 3.3.1. Clean Site   *Fig. 3.3.2. Properly arranged Rebar*

Waste Disposal

- Wastes generated at site shall be   divided into hazardous and non hazardous type and then segregated into solid and liquid..
- Suitable storage areas must be selected and accordingly the wastes are stored in the containers.
- The number of segregation bins needed at the work place depends on the type of waste generated.

- The oil or chemical barrel should be closed with a lid to prevent exposure.

- Schedule the collection and removal of wastes at periodic interval.

- Affix labels to storage bins in local language or in English and place this through out the site.

- Use warm water ,soap and cleansers to clean body parts which come directly in contact while handling paints and other hazardous materials.

Fig. 3.3.3. Disposal of Waste   Fig. 3.3.4. Segregation of Waste

Dos in Housekeeping and Waste Disposal

For good housekeeping and waste disposal:

- Clear up spills immediately

- Make sure tools and equipment are kept clean and oil free

- Keep fire exits clear

- Stack bins neatly and safely

- Make sure extinguishers are easily accessible and clearly marked

- Clean all the restrooms on a daily basis.

- Put all material away when they are not in use

- Stairways, passageways and gangways should be kept free of material and obstructions.

- Remove nails from the floor immediately after the use.

- Bend all exposed nail ends.

- Sweep up any dirt on the site immediately after the completion of each construction work.

- Cover or protect the structural openings like sumps, shafts etc., adequately.

Don't s in Housekeeping and Waste Disposal

For a good housekeeping and waste disposal, follow these don't s:

- Do not keep any material or tools or wires on stair ways or walkways. If this is ignored someone may slip and get injured.

- Do not smoke at the construction site. If this is ignored, it may cause fire accident.

- Do not gather the garbage on the floor. Ignoring this can cause inconvenience to everyone.

- Do not let structures like sumps be opened. If this is ignored, someone may fall into it and get injured.

Construction Waste

The waste generated during the course of construction activities which becomes unwanted in terms of its use in work. This is produced in almost all of kind of activities such as site clearance, excavation,demolition, fabrication. Large portion of wastes are utilized in purpose such as landfilling where non reactive materials bricks, concrete are used. The materials such as concrete and asphalt can be recycled and reused.

Fig. 3.3.5. Waste Disposal Bins

Exercise

1. Answer the following questions.

  1) What do you mean by housekeeping?

    _____

  2) Write any three Do's in Housekeeping and Waste Disposal?

    _____

  3) Write any three Don't s in Housekeeping and Waste Disposal?

    _____

  4) Write down any five construction wastes?

    _____

2. State whether the following statements are true or false.

a. A dust mask protects your lungs when you are sanding, or are engaged in dust-producing jobs.

    True ◯   False ◯

b. Goggles protect your hands from chemical hazards and sharp objects.

    True ◯   False ◯

c. Dispose of any waste into storm or sanitary sewers.

    True ◯   False ◯

d. Make sure extinguishers are easily accessible and clearly marked.

    True ◯   False ◯

e. Keep stairways, passageways and gangways with unwanted material and obstructions.

    True ◯   False ◯

Notes

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4. Place, level and finish concrete in various structural elements including repair works

Unit 4.1 – Introduction to Concreting Work

Unit 4.2 – Tools and equipment used in Concreting

Unit 4.3 – Placing, leveling and finishing of concrete in various structural elements

Unit 4.4 – Concreting in Precast Segments

Unit 4.5 – Repair Works in Concrete

(CON/N0117)

Key Learning Outcomes

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

1. Explain concreting work.
2. Identify different hand and power tools.
3. Understand the application of different hand and power tools.
4. Have knowledge of concreting tools and equipments.
5. Have knowledge of components of Concrete and their attributes.
6. Understand use of Cement and its attributes.
7. Explain various grades of Concrete.
8. Understand the process of concrete mixing and proportioning.
9. Explain the process of Placing ,leveling,compacting and finishing of concrete in various structural elements.
10. Know about Construction and expansion joints.
11. Know about Concreting in precast segments.
12. Explain repairing work in concrete.

UNIT 4.1: Introduction to Concreting Work

Unit Objectives

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

1. Get brief overview about concreting work.
2. Define properties of Concrete.
3. Explain concrete and its composition.
4. Outline different types of cement and aggregates used in concreting.
5. Understand concreting operations.
6. Explain test performed on cement and concrete.

4.1.1 Concrete

Concrete is composed of aggregates, which is combination of sand (Fine aggregates), gravel or rocks (coarse aggregates) that is held together by cement. The cement itself, when mixed with water and admixture, serves as a paste that holds all the components of the concrete together once sets and hardens.

4.1.1.(a) Plain Cement Concrete or Cement Concrete

- It is a very versatile construction material as it is highly plastic and workable when freshly mixed and gets hardened with time. It is good in compression and weak in tension.

- In plain cement concrete , reinforcement such as steel bars , wire mesh are not used.

- This is used as leveling course for foundation ,flooring and as sub-base and base courses for various structural elements.

- Concrete is good in compression and weak in tension.

4.1.1.(b) Reinforced Cement Concrete

- To compensate for the low tensile strength property of the concrete, it is combined with steel bars having a very high tensile strength.

- The embedding of steel bars in concrete improves the load carrying capacity of the structure.

- Steel is reinforced with concrete not only to reduce tension in the structure but also to avoid cracks due to shrinkage.

- The reinforced concrete is known as Reinforced Cement Concrete (R.C.C).

- Round bars of mild steel or Tor steel of various diameters are used for reinforcing concrete.

- Concrete has very good bond with steel & thus the stresses are transferred from one material to other material.

- The coating of cement grout or paste on the surface of reinforcement protects it from corrosion.

4.1.2 Properties of Concrete

- When the constituents of concrete (aggregate, cement, water and admixture) come together, the cement and water chemically react and undergo a process called hydration which binds together the aggregates to form concrete.

- The gradual process of hardening of the concrete is called setting and approximately after two hours the hardening process (strength development) becomes irrecoverable and may result in damage during re-working.

- Setting time depends on the climatic conditions prevailing at the construction site.

- Dry and warm weather speeds the chemical reaction and thus reduces the setting time whereas low temperature and high humidity tend to increase the setting time.

- As the concrete sets, its plasticity and workability reduces, making it more difficult to com-pact and mould, however it still remains inherently weak and can be easily damaged.

- Concrete may take up to 28 days of curing to achieve its optimum strength. But it attains its strength progressively in 3, 7 & 28 days. When it attains its full strength in 28 days, approximately 70 to 75% strength is gained in 7 days.

- Segregation & bleeding are very important factors in achieving the desired strength. Collectively they are governed by water cement ratio.

- Aggregate having high specific gravity out of the concrete constituents, when itself with or without cement paste comes out of concrete called segregation. This may happen due to dropping concrete from height, poor grading of aggregates etc.

- Water with cement together when appears on top surface of concrete called bleeding. This may happen due to over compaction, high water cement ratio and poor grading of aggregates.

- Slump of concrete is also an important parameter to describe the workability of concrete which in turn influences the compressive strength of concrete.

4.1.3 Compositions in Concrete

Concrete is composed of:

- Aggregates (Fine and coarse)

- Cement

- Water

- Admixture
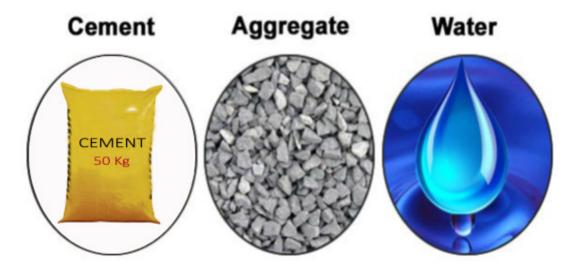
Fig. 4.1.1. Components of Concrete
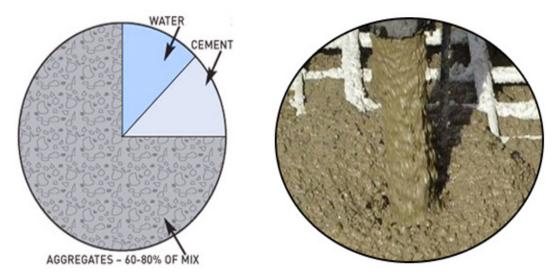
Fig. 4.1.2. Percentage of Components in Concrete by Volume

4.1.3.1 Aggregates

- Aggregates are an essential component in concrete and consist of granular materials such as sand, crushed stone or gravel and account for 60 to 70% of the total volume of the concrete.

- Natural gravel and sand are usually obtained from a pit, river, lake, or seabed and undergo processing: crushing, screening, and washing to obtain proper cleanliness and gradation.

- Crushed aggregate is obtained by crushing boulders, quarry rocks, cobbles or large-size gravel.

- After processing, the aggregates are stored to minimize degradation and prevent them from contamination.

- Quality of concrete highly depends on the quality of the aggregate used.

- To prepare a good quality concrete mix make sure that the aggregates are clean, hard and strong and are free of absorbed chemicals or coatings of clay.

Aggregates are broadly classified in two categories:

- Fine aggregates

- Coarse aggregates

Fine aggregates

Fine aggregates generally consist of natural sand or crushed stone sand with most particles passing through a 4.75 mm sieve.

Fig. 4.1.3. Sand

Coarse aggregates

Coarse aggregates constitutes of particles which are greater than 4.75 mm, but their diameter varies in the range between 9.5 and 38.1 mm. Majority of the coarse aggregate used in concrete is crushed.

Fig. 4.1.4. Stone Aggregates

4.1.3.2 Types of coarse aggregates

Natural Aggregate

Aggregates shall consists of naturally occurring (Crushed and Un crushed) stones, gravel and sand or combination thereof. They shall be hard, strong, dense, durable, clear and free from veins and adherent coatings.

Natural Aggregates are broadly classified as follows;

   a. **Uncrushed Aggregates** : which is from natural disintegration of Rocks

   b. **Crushed Aggregates:** which is from crushing of gravel or hard stone.

   c. **Partially Crushed Aggregates:** It is a product of blending of Crushed and Uncrushed

4.1.3.3 Physical properties of aggregates

Properties of the concrete depends on the characteristics of the aggregate, thus it is very important to keep a check on the characteristics of the aggregates. Basic characteristics are:

- Grading : Particle-size distribution for aggregate

- Durability : Strength of the aggregate

- Shape and surface texture of the particles in the aggregate

- Skid resistance and Abrasion resistance of the particles

- Surface moisture present in the particles in the aggregate

4.1.3.4 Effect of aggregate properties on concrete

Shape and surface texture of the aggregates affects the properties of freshly mixed concrete which results in change in the properties of hardened concrete.

More water is required to produce workable concrete if the aggregate used contains rough-textured, angular, and elongated particles, whereas less water is required if the aggregate contains smooth, rounded and compact particles. Flat and elongated particles are generally avoided or are limited to near about 15 % by weight of the total aggregate.

4.1.4. Deleterious Materials

Deleterious materials are those harmful materials which when present in the aggregates affect the strength and durability of the concrete. They may cause one of the below mentioned effects:

4.1.4.1 Effect of deleterious materials on concrete

- Reduce setting of cement
- Cause weak bond between aggregate and cement paste
- Reduce strength of concrete at early ages
- Induce disintegration of concrete

Deleterious materials generally found in aggregates, may be grouped as under

- Organic impurities
- Clay , silt & dust
- Salt contamination

4.1.5. Sieving of Aggregates

A sieve, is a device for separating wanted elements from unwanted material or for separating particles as per required sizes, typically using a woven screen such as a mesh or net or metal.

- Aggregates are sieved to separate the particles as per required size and to remove unwanted particles which may affect the quality of the concrete.

- Aggregates may contain excessive lumps of clay, silt, salts, mica and organic matter which may interfere with the bonding between the cement and the aggregate.

- Presence of clay in aggregates forms a film on the aggregate particles and prevents or reduces the adhesion of cement to the aggregates; retards the setting of cement and increases drying shrinkage.

- Clay having a greater surface area than aggregate particles increases the amount of water required for the concrete mix, and thus reduces the ultimate strength of the concrete. This will create weak points in the hardened concrete and may result in stripping, spalling, raveling and pop-outs.

- Aggregate used in drainable base or Subbase may also get affected adversely when excess amounts of friable particles or clay are present. This type of material may result in pavement failure as they tend to fill the void spaces intended for drainability.

- To maintain the quality of the concrete at its best, it becomes very important to sieve the aggregates before using.

- Different size sieves are required for obtaining grain size analysis for both Coarse aggregates and fine aggregates. The details are mentioned in table below in accordance with IS 383

IS Sieve designation	
Coarse Aggregates	Fine Aggregates
80mm, 63mm, 40mm, 20mm, 16mm, 12.5mm, 10mm, 4.75mm, 2.36mm	10mm, 4.75mm, 2.36mm, 1.18mm, 600 Micron, 300 Micron, 150 Micron
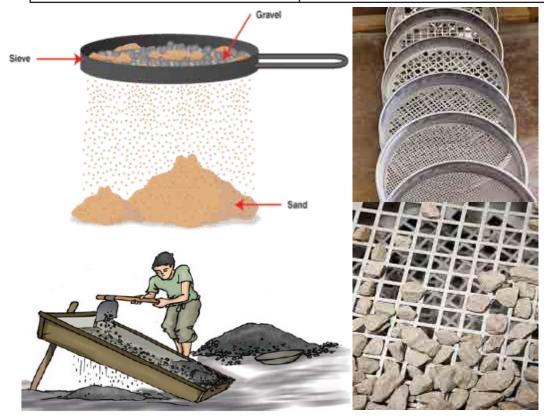
Fig. 4.1.5. Sieving of Aggregates

4.1.6. Cement

Cement is a crystalline compound of calcium silicates and other calcium compounds which have hydraulic properties. Lime and clay have been used as cementing material in constructions throughout centuries. Cements are hydraulic as they have the ability to set and harden with excess water through a chemical process called hydration.

There are different types of cement

- 33 Grade Ordinary Portland Cement(OPC)

- 43 Grade Ordinary Portland Cement (OPC)

- 53 Grade Ordinary Portland Cement (OPC)

- Portland Slag Cement (PSC)

- Portland Pozzolana Cement (fly ash based) (PPC)

- Portland Pozzolana Cement (calcined clay based)(PPC)

Grade of cement indicates the average compressive strength after 28 days in Mega pascal(N/mm^2)of 3 cubes of cement mortar made of ratio 1:3 (1 part cement:3 part sand) after 28 days.

4.1.6.1 Physical properties of cement

Cement should comply with requirement as specified in bureau of Indian standards code. The physical requirement are as explained below.

Strength: The compressive strength for OPC and PPC should achieve half of the full grade strength at after 3 days , two-third of strength after 7days and full strength after 28 days.

Setting time: The setting time for ordinary port land cement as specified by Indian standard code is minimum 30 minutes for initial setting and maximum 600 minutes for final setting.

Fineness: The fineness of cement is an important requirement for manufacturing required grade of cement as it is related with rate of strength development cement. This varies from minimum 225 m^2 for OPC cement to 320 m^2/kg for PPC cement.

Soundness: This is property of cement because of which there is no change in its volume after setting.

4.1.6.2 Test performed for cement at site

Various field tests performed at site to ascertain the quality of cement are:

Colour

The colour of cement should be uniform. Generally cement is grey in colour with a light greenish shade. The colour of cement gives an indication of excess lime or clay and the degree of burning.

Rubbing

Rubbing test is done to check the purity of cement. A pinch of cement when rubbed between fingers should feel smooth. If it feels rough, it means the cement has been adulteration with sand.

Hand Insertion

Insert hand in a cement bag. It should feel cool which indicates that cement is good for usage.

Float Test

A small quantity of cement shall be thrown in water .A good Quality cement should not float on water and should sink in water.

Smell Test

Smell a pinch of cement. If it gives an earthy smell it signifies that the cement contains too much of pounded clay and silt as an adulterant.

Presence of Lumps

Open a bag of cement , check whether there are any hard lumps in bag. Lumps indicates cement has absorbed moisture from outside.

Shape Test

Take 100 gram weight of cement,make stiff cement paste cake and immerse it in water. The shape shall be remain same while settling and able to set.

Precautions While Stacking Cement at Site

- Store cement in a damp proof, leak proof and dry shed/fumes to preserve the quality of the cement by preventing it from absorbing atmospheric moisture.

- Stack cement on wooden planks on such that it should be 150-200 mm clear above the floor. The floor may be of lean cement concrete and two brick layers thick.

- Avoid stacks higher than 10 bags to prevent the cement from possibility of lumping up under pressure and width of stack shall be not more than 3 meters.

- There should be space of 600 mm left around stack and exterior wall.

- Stack cement from different manufacturers separately.

- During rainy season or in long duration storage, the cement stack shall be covered by water-proofing membrane such as polyethylene.

- Cement bags shall be stacked close together as possible to reduce air circulation.

Fig. 4.1.6. Right way of Stacking Cement

Fig. 4.1.7. Wrong way of keeping cement

Cements are of two types:

- Water activated cements.

- Those that develop hydraulic properties when they interact with hydrated lime Ca (OH)$_2$ (Pozzolanic).

4.1.6.3 Date of Packing

As the strength of cement reduces with age, it is very important to check the date of manufacturing on the bag. A cement bag should not be more than 90 days old. Reduction in cement strength due to storage is listed in below table.

S. No	Storage Period	Reduction in Strength
1	Fresh cement	Nil
2	Three months old	20%
3	Six months old	30%
4	12 Months old	40%
5	24 Months old	50%

4.1.7. Water

The water used in concrete shall be clean, potable, free from impurities, acids, organic materials and other substances which may be harmful to concrete.

The water unsuitable for concrete can damage concrete in following ways:

- Corrode steel reinforcement

- Induce deterioration of concrete

- Increased/decreased setting time

- Reduced Concrete strength.

The bureau of Indian standards Is 456:2000 has specified permissible limits on amount of solids such as chlorides, sulphate, organic and inorganic particles water shall contain to make it satisfactory for use in concrete.

4.1.8. Grades of Concrete

The concrete mixes have been designated grades as per Indian standard code of practice IS 456:2000. The mixes are specified into 15 grades.

In this designation the letter M refers to the mix and the number to the specified 28 day 15 cm compressive strength of mix in N/mm2.

Grades of concrete is mentioned in below table as specified by Indian standard code of practice:

Group	Grade Designation	Compressive strength after 28 days
Ordinary Concrete	M-10	10
	M-15	15
	M-20	20
Standard Concrete	M-25	25
	M-30	30
	M-35	35
	M-40	40
	M-45	45
	M-50	50
High Strength Concrete	M-55	55
	M-60	60
	M-65	65
	M-70	70

4.1.9. Hydration

The hydration (hardening of the mixture) process begins as soon as the aggregates, water, and the cement are combined. During this reaction the cement particles adheres to adjacent aggregates.

Once the concrete is properly mixed and workable, it should be immediately placed in the designated forms before the mixture becomes too stiff. During placement it should be ensured that the concrete is compacted within the forms, to eliminate all possible flaws, such as air pockets and honeycombs.

4.1.10. Concrete Mix Proportions

The proportioning of concrete mixes is process of selecting ingredients of concrete and compute the amount of required ingredients to achieve required strength, workability and durability .The mix shall be economical as possible. The cement is more costlier among other constituents. So, efforts shall be made to use optimum amount of cement to produce required mix.

The basis on which selection and proportioning of ingredients are done :

a. **Strength**: The mix shall be proportioned to achieve minimum target compressive strength

b. **Workability**: The desired workability of concrete mix is an important factor around which proportioning of ingredients is done.

c. **Water cement ratio**- The ratio of water and cement should be selected in such way that it does not affect the strength and durability of concrete.

d. **Cement content**: the amount of cement in mix is elected in such a way that it does not affect the performace of concrete.
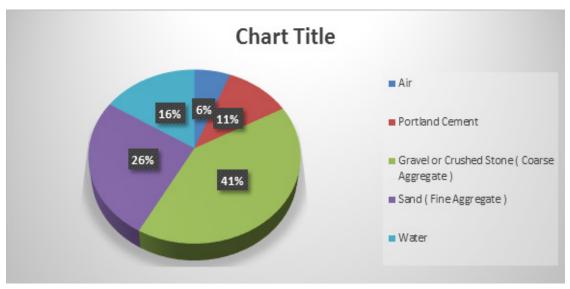
Fig. 4.1.8. Composition of Concrete by volume

4.1.10.1 Types of Concrete Mix

The mix proportions shall be selected to ensure the workability of the fresh concrete and when concrete is hardened, it shall have the required strength, durability and surface finish

Nominal Mixes

In nominal mixes, The proportion of ingredients are fixed .The mix produced may give strength above than specified. But, the varying characteristics of materials may not give definite relationship between strength and workability. Nominal mix concrete may be used for concrete of M 20 or lower.

The proportion of materials in nominal mix concrete shall be as per given table below specified by Indian standard code IS 456:2000.

Grade of Concrete	Total Quantity of dry aggregate by mass per 50 kg of cement, to be taken as the sum of individual masses of fine and coarse aggregates, Kg max	Properties of Fine Aggregate to Coarse Aggregate (By mass)	Quantity of water per 50 kg of cement, Max
M 5	800	Generally 1:2 but subject to upper limit of 1 : 1.5 and a lower limit of 1 : 2.5	60
M 7.5	625		45
M 10	480		34
M 15	330		32
M 20	250		30

Designed Mixes

In design mixes, the characteristics of materials are taken into account. The proportion of materials are selected in such way that, this gives the stipulated strength, workability and other desired properties economically. Indian standard code IS 456:200 has specified minimum requirement for producing design mix of concrete which is mentioned in below table:

4.1.11. Concreting Operation

4.1.11.1 Concrete Preparation

Concrete is prepared by mixing cement, aggregates (sand, gravel or stones), water and admixtures in a predetermined ratio. Admixtures are added in concrete to improve its properties to achieve required strength and workability. The ratio of the compositions of concrete as kept at optimum level for the best performance of the concrete. The amount of water used in mix affects the properties of fresh and hardened concrete. More water in mix makes concrete more workable but it decreases the strength and durability.

The concrete preparation operation involves two processes : Batching, Mixing and Transporting.

a. Batching

The batching involves measuring each ingredient of concrete such as cement, aggregates, water, admixtures for producing fixed proportion of concrete mix. It is done either by mass or volume.

Volume Batching:

Gauge boxes for use in volume batching shall be constructed of timber or steel, with closed bottoms. Each box shall be of such dimension which contains exactly the volume of aggregate required for one batch of any particular mix. In gauge boxes for fine aggregates allowance for bulking due to moisture contained in the aggregate stockpiles on Site.

GAUGE BOX
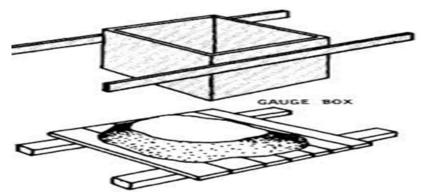
Fig.4.1.9. Gauge box used for Concrete Batching

Weigh Batching:

This is accurate method of batching. It helps in achieving uniform proportioning of concrete mixes. In this type of batching, each ingredient of concrete mix is measured by its mass.

Batching equipment fall into three categories:

i) Manual

Manual batcher shall be charged by devices which are operated manually. In such batching systems, the operator's visual observation of scale is an important factor to achieve accurate batching operation .

ii) Semi-automatic

Semi-automatic batcher shall be charged by devices, which are separately operated manually to allow the material to be weighed but when the predetermined weight of each material reaches, it is actuated automatically.

iii) Fully Automatic

Automatic batcher shall be charged by devices which start the weighing operation of each material by a single starter switch and when the weight of each material reaches to its designated value, it stops automatically. There is interlock between charging and discharging devices.

Fig. 4.1.10. Batching Plant

b. Mixing

The ingredients of concrete in predetermined ratio are mixed to produce uniform, consistent and homogeneous mix.

Methods of Mixing

Hands (using hand shovels)

In small works or in case of breakdown of mixer, the mixing by hand using shovels and spades may be allowed. This shall be done on water -tight platform.

Tilting type

It consists of revolving conical drum which has only one opening for both feeding the unmixed materials and discharging the concrete which is done by tilting the drum.

Non-Tilting type

It consists of revolving drum equipped with power loader to feed material into drums and chute for discharging concrete mix from another end.

Fig.4.1.11. Winch Machine for Concrete Mixing   Fig. 4.1.12. Manual Concrete Mixing

c. Transporting

After mixing the concrete is made available at pouring site either manually or mechanically through concrete pumps, agitator/non-agitator trucks .

Transit Mixer — A mixer generally mounted on a truck or some other suitable mobile haulage unit, capable of mixing ingredients of concrete and/or for agitation of already mixed/partialy mixed concrete during transit from a concrete batching plant to the point of placement of concrete.
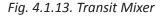
Fig. 4.1.13. Transit Mixer   Fig. 4.1.14. Concrete Pump

4.1.11.2 Placing of Concrete

Concrete can be poured in the form using wheelbarrow, or can be poured directly from the transit mixer. Concrete should not be allowed to free fall too far - preferably no more than 1.5 Meters. Whenever possible use the transit mixer chute to discharge concrete directly into the place of use. The concrete is poured in the place of use / form work either in a single layer or in layers depending upon the thickness of RCC member. But in no case the time gap between two successive layers shall be more than 1-2 hours for which after casting one layer, cement slurry to be applied before pouring the 2nd layer depending upon the time gap.

After pouring compaction of concrete is done thoroughly to exclude air from the concrete in order densify the concrete. The compaction is done manually (tampering, rodding which are known as hand compaction. Compaction is also done by mechanical means (needle vibrator, surface vibrator etc. which is said to be mechanical compaction.

Fig. 4.1.15. Placing of Concrete by wheelbarrow

Fig. 4.1.16. Placing of Concrete by chute

Fig. 4.1.17. Pouring of Concrete by pump
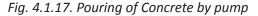
Fig. 4.1.18. Pouring of Concrete by tower crane
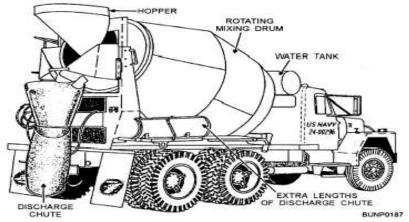
Fig. 4.1.19. Transit mixer for preparing and pouring concrete

4.1.11.3 Leveling and Finishing

Floating is the finishing process in concrete which is carried out to reduce surface imperfections and compact consolidate the concrete by tamping to achieve a leveled surface which can be given rough or smooth texture as per requirement. Floating helps in embed the aggregates and brings mortar on surface. To produce a smooth, hard and dense surface floating is followed by steel troweling. Troweling is started after sometime, when bleed water comes on surface and starts disappearing so that there is escape route for air bubbles below the top surface.

Fig. 4.1.20. Striking off concrete using straight edge

Fig. 4.1.21. Finishing concrete using bull float

Fig. 4.1.22. Finishing concrete using edging trowel

Fig. 4.1.23. Finishing concrete using concrete trowel

4.1.11.4 Curing

curing is process in which the moisture is maintained in concrete which enables it to gain strength through hydration process.

It also maintains satisfactory temperature range in concrete which is an important factor affecting rate of strength development. The uniform temperature gradient helps in eliminating cracks in concrete which impacts its durability. As per Indian standard code 456:2000, The concrete surfaces shall be constantly kept wet for 7 days for ordinary port land cement and 10 days for blended cement. This duration of curing can be extended up to 14 days in case of concrete containing mineral admixtures and blended cement

There are different methods to cure concrete. which can be divided into two categories

1.Moist curing

a. sprinkling by water,b .Moisture absorbent fabrics such as Hessian cloths,cotton mats c. Ponding

2.Memebrane curing

 a. Plastic sheetings b. Membrane curing compounds.

Fig. 4.1.24. Curing of concrete using water

4.1.11.5 Membrane Curing

Membrane curing using plastic sheeting or membrane is the most efficient method of concrete curing. It reduces the amount of water used for curing and also reduces the dependency on water for curing the concrete.

Membrane curing employs covering the concrete surface with a membrane, either plastic or chemical compound. The covering seals off the pores and retards evaporation of water from the concrete.

Two common types of membrane curing are:

Plastic Sheeting:

Immediately after finishing the exposed concrete surface is covered with a thin plastic sheet, without causing any damage to the concrete finish. The plastic sheeting when used for flat surfaces, such as slabs or pavements, is extended beyond the edges of the slab by at least twice the thickness of the slab to ensure that no area remains exposed.

Membrane-Forming Curing Compounds:

The freshly finished concrete surface is sprayed with the curing compounds and then allowed to dry. Evaporation of water present in the concrete is retarded by the impermeable membrane formed by the curing and thus the loss of moisture from the concrete is reduced.

The curing process should start shortly after the chemical reaction that hardens the concrete has started.

Fig. 4.1.25. Curing using plastic membrane

4.1.12. Various Tests on Fresh and Hardened Concrete

The quality control measures are taken at site to ensure desired performance of design mix concrete.

The various lab and field tests are performed to assure required quality. The testing for strength and workability is performed at frequency which depends on quantity of concrete.

Tests which are generally carried out at lab and field on fresh concrete:

Test for compressive strength :-The three test specimens of a concrete sample which is of cubical shapes in 150x150X150 mm size are prepared. These cubical specimens are compacted by hand or by vibration. In case of hand compaction, this is done by giving 35 strokes per layer. The specimen is then cured by submerging it into clean water for specified period. The testing is done after 28 days in compression testing machine. The testing at 7 days and 14 days may be required to find the early strength of concrete.

Fig. 4.1.26. Cube Mould   *Fig. 4.1.27.* Slump Cone

Test for workability: There are various test to check workability such as slump test, compacting factor, vee-bee consistometer. Out of these, the slump cone test is widely used Slump cone test: The apparatus for this test:

The mould is of frustum of cone shape having dimension:

Top diameter- 200 mm

Height- 100 mm

Bottom diameter-300 mm

Taping rod: This is of 16 mm diameter rounded rod generally made of steel

The mould is filled in 4 layers and given 25 strokes by tamping rod per layer. The mould then shall be removed from the concrete immediately by raising it slowly and carefully in a vertical direction. This allows the concrete to subside and the slump shall be measured immediately by determining the difference between the height of the mould and that of the highest point of the specimen being tested.

Test on hardened concrete: The core cutter and non-destructive testing such as Ultrasonic pulse velocity and rebound hammer is carried out for hardened concrete to ensure its quality.

Exercise

1. Answer the following.

a. What are the components of concrete?

_____

b. Define Setting?

_____

c. Why is sieving of aggregates important?

_____

d. What are the deleterious materials present in the aggregates?

_____

e. Define rubbing test for cement quality check

_____

State whether the following statements are true or false

a. Dry and warm weather reduces the setting time.

b. As the concrete sets, its plasticity and workability reduces.

c. Aggregates constitute about 60-70% of the total volume of concrete.

d. Coarse aggregates pass through 9.5mm sieve.

e. Shape and size of the aggregates has no effect on the strength of the concrete.

f. Presence of voids / air in concrete may reduce its strength and performance.

g. Cement giving cool feeling on hand insertion is a good quality cement.

h. There should be gap of 600 mm between cement stack and external wall all around.

i. Cement bags can be stacked higher than 10 bags without causing any harm to the cement quality.

1. Deleterious materials in concrete may result in which of the following:

a. Affect the hydration of cement

b. Weak bond between aggregates and cement paste.

c. Increase the bond strength of cement.

d. Reduce strength and durability

e. Modify setting times

f. Increase the cement requirement for the concrete mix.

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UNIT 4.2: Tools and Equipment Used in Concreting

Unit Objectives ◎

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

1. List out different concreting hand and power tools

2. Identify different concreting hand and power tools

3. Understand application of different concreting hand and power tools.

4. Store concreting tools and equipment in correct way.

4.2.1 Concreting Tools and Equipments

Tools are classified based on its purpose for which it is used. Tools and equipments are classified as under:

1. Mixing tools – concrete mixer, batching plant

2. Placing & pouring tools – wheel barrows, chutes, pumps, buckets

3. Spreading tools – Trowel, Spade, Straightedges

4. Compaction & consolidation tools – Tampering Rod, Needle & double beam screed vibrator

5. Measuring & marking tools – Plumb bob, Water level, Spirit level, Measuring tape

6. Finishing – Trowel, Float

4.2.1.1 Concreting Hand Tools

Concreting Hand Tools		
1. Square Mouth Shovel	A Shovel Is A Tool For lifting and placing wet concrete.	
2. Wheel Barrow	It is a small hand operated cart having bucket mounted on one wheel which is at its front end and two handles at rear end which is used by single person for pushing and guiding purpose .It is used to carryout small amount of construction materials from one place to another.	
3. Trowel	A hand tool having flat blade used for spreading, digging, lifting, leveling small amounts of materials.	
4. Pointing trowel	It is a smaller version of the brick trowel. It is used for filling in small cavities and repairing crumbling mortar joints.	

4.2.1.1 Concreting Hand Tools

5.Finishing Trowel	It is generally rectangular in size made of wood, steel and other materials used to smoothen ,level or create texture on top layer of hardening concrete.	
6. Step trowel/ edging trowel	It is similar to the corner trowel. It is used for shaping inside angles on concrete steps.	
7. Concrete Float	It helps in finishing the concrete surface by making it smooth and removing surface imperfections .it is used after spreading and leveling of concrete.	

9. Tamper	It is used to compact the concrete by pushing the coarse aggregates below the top surface of concrete	
10. Bull Float	It is used to level gaps,voids and smoothen the surface before troweling .It is larger in size than hand float generally 3ft to 10 ft in length and mainly used for large area where hand float is not applicable.	
11. Groover	It is used to create joints of small width and depth in concrete to avoid cracks in concrete.	

12. Moil (point) chisel	It is used for cutting through concrete and stone. It has a sharp tip rather than a sharp edge.	
13. Plugging chisel	It is used to clean out hardened mortar. The cutting end is tapered in shape which is used for deep or shallow cutting depends on its direction.	
14. Screed board or straightedges	It is a straight board made of either wood or metal. It is used to level the surface of concrete by striking off extra concrete and bring the surface as required slope. It is part of finishing operation which is carried out immediately as soon as concrete is placed and done before bleed water appears on surface.	

15. Squares	It is made of metal used to mark and measure right angles	
16. Spirit level	It consists of metal frame having sealed curved tubes filled with liquid in which air bubbles move between defined graduated line that determines level and plumb .it has either single or double vials ,latter is used for both horizontal and vertical measurement.	
17. Plumb Bob	It is used to check verticality of structures and to determine location of points	

4.2.1.2. Concreting Power Tools & Equipment

Batching Plant

A batching plant, also known as concrete plant is an equipment which combines various ingredients to form concrete. The main ingredients which are combined are Cement, aggregates, water and admixtures. It combines all the ingredients at a central location from where the concrete is transported to the required location by transit mixer and this is continuously agitated during conveying to prevent it from setting.

Fig. 4.2.1. Batching Plant

Transit Mixer

The main function of the transit mixer is to transport already mixed concrete from batching or ready mix plant to the required location where placing is to be done.

Fig. 4.2.2. Transit Mixer

Concrete Pump

A concrete pump is a machine which pumps liquid (freshly mixed) concrete to the required site. The pump is mounted on a truck or a trailer and requires steel or flexible hoses which are manually attached with the outlet of the machine. The hoses are connected together to carry the concrete to the required site.

Fig. 4.2.3. Concrete Pump

Needle Vibrator

Needle vibrator is also called immersion vibrator which comprises of steel tube called poker inside which it contains vibrating unit. This poker is connected to an electric motor. It is available in diameter sizes of 25-100 mm. Depending on the spacing between the reinforcing bars the poker diameter is determined. The duration of vibration can range from 30 seconds to 2 minutes.

Fig. 4.2.4. Needle Vibrator

Double beam screed vibrator

It comprises of two units, beam and and vibrator unit. It compacts the concrete by vibration as well as helps in achieving a leveled concrete surface. It is fixed on form work panel and pulled at end by two persons standing along it.

Fig. 4.2.5. Double Beam Screed Vibrator   Fig. 4.2.6. Screeding of newly formed Concrete Floor

Vacuum de-watering Pump

It squeezes out excess water from fresh concrete through vacuum suction process. Filter pads are laid over the wet concrete and then the top cover is spread over it. The vacuum suction pump creates the vacuum to remove the excess water from the concrete.

Fig. 4.2.7. Vacuum De-watering Machine

Floater machine

A Floater/Power Trowel is a piece of light construction equipment used to apply a smooth finish to concrete slabs. There are two types of floaters:

- Ride-on Floaters: They are used by an operator sitting on a seat upon the machinery and controlling the power trowel with the necessary buttons.

- Walk-behind Floaters: They are used by an operator walking behind the machine.

Fig. 4.2.8. Power Trowel

Fig. 4.2.9. Floating of newly formed Concrete Floor

Concrete Saw

It is a power tool used to cut concrete,bricks and other materials. It is powered electrically ,gasoline or by other sources. It consists of circular blades of diameter varying from 300mm-600 mm. For cutting concrete,diamond blades is used.

Fig. 4.2.10. Concrete Saw

Fig. 4.2.11. Cutting concrete using Concrete Saw

Exercise

1. State whether the following statements are true or false.
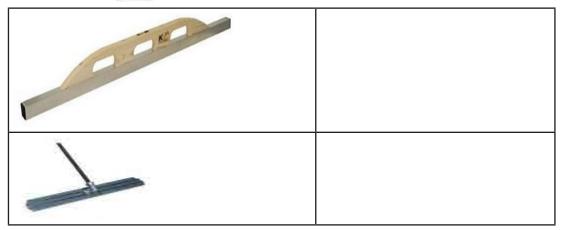
    a.   Concrete is highly plastic when dry_____.

    b.   Concrete has high compressive strength_____.

    c.   Concrete has high tensile strength _____.

    d.   Reinforcement of concrete is done with steel rebar_____.

    e.   Concrete is unable to form bond with steel_____.

    f.   Coating of concrete prevents the steel bars from rusting_____.

2. Identify the tools listed below:

Tool	Name

Exercise

3. Mention any one use of the tools listed below

Tool	Use

Notes

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UNIT 4.3: Placing, leveling and finishing of concrete in various structural elements

Unit Objectives ⊙

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

1. Explain the different stages of Reinforced Cement Concrete construction (Formwork, Reinforcing Bar, Pouring, Finishing, Curing etc) .

2. Understand concreting procedures in different structural elements such as foundation, column, tie beam, wall, beam, slab, stair, lintel, etc.

4.3.1 Reinforced Cement Concrete Construction

The Cement concrete are broadly classified in to two types, such as

    a. Plain Cement Concrete (PCC)

    b. Reinforced Cement Concrete (RCC).

a. **Plain Cement Concrete (PCC)**

It is used for providing a non-porous, firm & level space for laying RCC structure. Lean Concrete below foundation and floor, damp proof course are the main structural elements of the plain cement concrete. The mixing, pouring, placing and curing have been discussed earlier in section 4.1.

b. **Reinforced Cement Concrete (RCC)**

Reinforced concrete is a combination of cement concrete with reinforcements (steel bar). This combination is made to utilize the compressive strength of concrete and tensile strength of steel simultaneously.

Foundation, Walls, Columns, Tie Beams, Beams, Lintel, Slabs and Staircase are the main structural elements in Reinforced Cement Concreting.

4.3.2 Stages of Work in Casting of RCC Structural Members

4.3.2.1. Stages of work before concreting

Stages of work involved RCC construction as mentioned below.

a. Base Preparation

Base Preparation is very important to level and compact the soil sub-grade before casting concrete. It should also be free from standing water and debris. Carry out excavation and add a layer of gravel 100 mm thick if the sub-grade soil is of poor quality.

b. Formwork

Formwork is the term given to temporary support to the Concrete during concreting and gives a required shape and size to the structure. After hardening of the concrete the formwork shall be removed. The time required for removing of the form works is dependent upon the type of structural elements, types of cement used and weathering condition. The form work shall be strong enough to hold the weight of the concrete and the joint of the form work shall be made leakage proof so that cement slurry is not escaped out of concrete during construction during construction. Based on the Material various forms of Formwork are (among the ones mentioned below the plywood and steel formwork are commonly used) :

Fig. 4.3.1. Plywood formwork

Fig. 4.3.2. Timber form work

Fig. 4.3.3. Steel formwork

Fig. 4.3.4. Aluminium formwork

Fig. 4.3.5. Plastic formwork

Formwork used in different structural elements

Foundation formworks can be designed in various ways. Normally sheeting panels along with bracings are used in foundation form works.
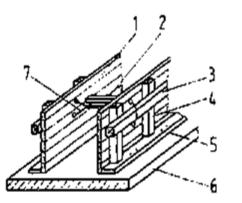
Fig. 4.3.6. Foundation formwork

Wall Formworks are generally vertically arranged sheeting boards with required supports.
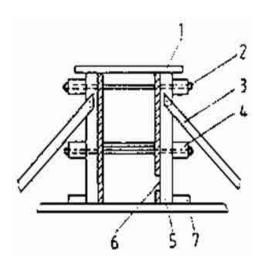
Fig. 4.3.7. Wall formwork

Ceiling Formwork is type of formwork mostly used for slabs and bottom of the beams with proper support to the horizontal surface with help of centering.
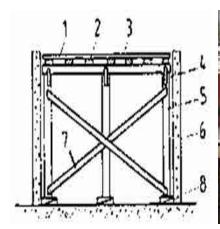
Fig. 4.3.8. Slab formwork

Beam Formworks is shuttering for bottom and side of the beam with support of centering.
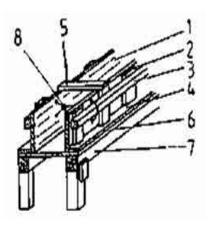
Fig. 4.3.9. Beam formwork

Column Formworks is a shuttering for side of the columns with properly plumbed.
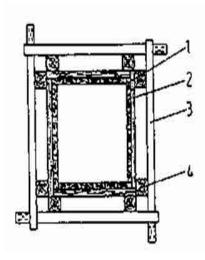
Fig. 4.3.10. Column formwork
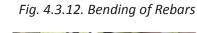
c. Reinforcement Work

The steel reinforces concrete to make it withstand the tension force which it is subjected during its service life. The surface of steel rebar is made deformed by creating ribs on its surface to increase its bond with concrete.

Fig. 4.3.11. Cutting of Rebars

Fig. 4.3.12. Bending of Rebars

Fig. 4.3.13. Placing of Rebars
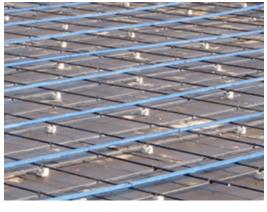
Fig. 4.3.14. Binding of Rebars

4.3.2.2. Concreting Operation

a. Pouring and Compacting of Concrete

Concrete can be poured in the form using wheelbarrow, or can be poured directly from the transit mixer. Concrete should not be allowed to free fall too far - preferably not more than 1.5 Meters. Whenever possible use the transit mixer chute to discharge concrete directly into the place of use. The concrete is poured in the place of use / form work either in a single layer or in layers depending upon the thickness of RCC member. The placing of concrete has been discussed at length in Section 4.1.11.2.

b. Leveling and Finishing

Level concrete and brings top surface to grade using straight edges and Start as soon as possible after placing concrete. After that floating and troweling is carried out. Floating helps in level undulations, bringing the cement paste to surface. The troweling is done as final finishing operation to produce hard smooth surface. This has been discussed at length in the Section 4.1.11.3.

c. Curing

Curing is the process of keeping the concrete surface moist throughout the process of hydration for gaining desired strength. It ensures that water required for hydration of cement is maintained so concrete continues to gain strength over time. It also helps in eliminating cracks in the concrete, which severely impacts its durability. This has been discussed at length in the Section 4.1.11.4.
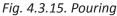
Fig. 4.3.15. Pouring   *Fig.4.3.16. Finishing*   *Fig. 4.3.17. Curing*

4.3.2.3. Stages of work after concreting

a. Removal of Formwork

Removal of the formwork is undertaken as per the type of the structure and various structural members after the concrete achieving designed compressive strength.

Fig. 4.3.18. Removal of Formwork

Surface Defect Corrections

After removing formwork and visually inspecting each concrete structure for the below mentioned defects, necessary repairs are to be carried out.

- Honeycombs
- Spalling and dusting
- Cracks
- Depressions
- Bulges
- Abrupt Irregularities

4.3.3 Cast in Situ Sequences of Reinforced Cement Concrete(RCC) Structural Elements

Mason Concrete is responsible only for performing concreting operation

4.3.3.1. RCC Concrete Column

a. Stages of work before concreting

Fig. 4.3.19. Reinforcement

Fig. 4.3.20. Formwork

b. Concreting Operation

Fig. 4.3.21. Pouring & Compacting

Fig. 4.3.22. Finishing

Fig. 4.3.23. Curing

c. Stages of work after concreting

Fig. 4.3.24. Deshuttering

Fig. 4.3.25. Cured concrete Column

4.3.3.2. RCC Concrete Wall

a. Stages of work before concreting

Fig. 4.3.26. Reinforcement

Fig. 4.3.27. Formwork

b. Concreting Operation

Fig. 4.3.28. Pouring

Fig. 4.3.29. Compacting
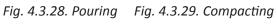
Fig. 4.3.30. Finishing

Fig. 4.3.31. Curing

c. Stages of work after concreting

Fig. 4.3.32. Deshuttering

Fig. 4.3.33. Cured Concrete Wall

4.3.3.3. RCC Concrete Foundation

a. Stages of work before concreting

Fig. 4.3.34. Reinforcement

Fig. 4.3.35. Formwork

b. Concreting Operation

Fig. 4.3.36. Pouring   *Fig. 4.3.37. Compacting*   *Fig. 4.3.38. Finishing*   *Fig. 4.3.39. Curing*

c. Stages of work after concreting

Fig. 4.3.40. Concrete foundation after Deshuttering

4.3.3.4. RCC Concrete Slab & Beam

a. Stages of work before concreting

Fig. 4.3.41. Reinforcement

Fig. 4.3.42. Formwork

b. Concreting Operation

Fig. 4.3.43. Pouring

Fig. 4.3.44. Compacting

Fig. 4.3.45. Finishing

c. Stages of work after concreting

Fig. 4.3.46. Deshuttering

Fig. 4.3.47. Cured Concrete Beam

4.3.4 Things to remember for a Mason Concrete- while concreting

4.3.4.1. During Mixing

- Cement should be batched in bags (50 kg each)

- Do not heap the sand or aggregates in the batch box. It should always be struck level, so that constant volumes are measured out.

- Use separate batch boxes for different grades of concrete and different aggregates.

- Mark on the box with paint the grade of concrete and type of aggregate, whether fine or coarse, over the respective boxes for easy identification. Marking also helps in avoiding use of wrong boxes.

- The size of batch boxes should be so arranged that aggregates can be batched in whole number of boxes. When slight changes are required (say for bulkage) nail marks maybe made on the boxes before batching to show the height of filling in the boxes as required.

- Place first the coarse aggregate at the bottom followed by sand and cement.

- If the sand to be used is damp, first place half the coarse aggregate in the skip, then the cement, followed by the fine aggregate and the remainder of the coarse aggregate to prevent the mount of the skip getting choked with the damp sand.

- The mixing time is generally 2 mins. this can be increased until cohesive, uniform color and free from segregation mix is achieved.

- Do not place materials in the skip unless they are to be mixed and used immediately

- The source of materials in concrete mix shall be same as used in laboratory trials.

- Admixtures: Follow admixtures recommendations from your supplier.

4.3.4.2. During Placing

- There should not be segregation, loss of part of the concrete and loss of slump.

- Do not add extra water to the concrete for the purpose of easy handling

- When using chutes for placing the chutes should be of rounded cross-section and of smooth metal to avoid sticking of concrete.

- It should be of correct slope so that concrete of the required slump will slide without flowing.

- The concrete shall not be laid until proper inspection and approval of place of concreting is done.

- Check whether the formwork has been oiled and the supports are rigid, check whether the reinforcement, cover blocks, inserts and embedded plates have been properly secured in position.

- Where concrete is to be bonded to a previous lift of concrete, clean the surface thoroughly and chip the top to a depth sufficient to expose fresh clean cut concrete without disturbing or loosening the coarse aggregate

4.3.4.3. During Compacting

- The objective of compaction is to eliminate entrapped air.

- Low slump concrete contains more entrapped air than high slump concrete so it requires more vibration or longer compared to concrete with higher slump.

- The concrete shall be placed in layers of thickness 150mm-600 mm to avoid entrapment of air inside concrete.

- The vibrator shall be not forced into concrete and it shall be positioned or inserted vertically.

- The vibration shall be carefully monitored.

- Vibration shall be stopped when mortar appears on surface and there are no more escaping of of large air bubbles.

- Over vibration of concrete, particularly if the slump exceeds 100 mm should be avoided as it causes settling of the coarse aggregate at the bottom and the accumulation of the mortar or water at the top.

- The vibrator shall not be used to move concrete horizontally.

- The vibrator shall penetrate the previous layer so that there is formation of strong bond between two layers.

- The vibrator shall not touch formwork and reinforcement so that it may not get displaced.

- It is important to operate vibrator carefully such as to avoid any holes in concrete left behind because of vibrator it shall be operated continuously and withdrawn slowly at each location.

4.3.4.4. During Finishing

- Remove off excess concrete and top surface shall be brought to desired level using straight-edges.

- Use floats to level ridges and voids left by straightedges.

- Striking off of concrete shall be started as soon as placing of concrete is done and completed before bleed water appears.

- End before bleed water appears

- The presence of bleed water while finishing causes defects in concrete such as surface crazing, delamination and dusting.

- The final finishing shall be started after all the bleed water has evaporated and concrete is firm enough to leave only ¼ inch foot prints.

- Final finishing involves floating and trowelling

- Float helps in bringing cement paste to surface

- Float shall be held flat at arm's length as possible, moving it into semicircular motion until surface becomes smooth

- Trowel only after floating, starting with a wide trowel then moving to smaller trowels on the later passes

- Float shall be held flat at arm's length as possible moving it into semicircular motion until surface becomes smooth

- Cure the concrete

Exercise

1. Answer the following.

a. What is a concrete column?

_____

b. What are the materials required for making a concrete structure?

_____

c. Why is concrete column constructed in a structure?

_____

d. How will you prepare the foundation for a concrete column?

_____

e. Why is compacting of concrete required?

_____

1. State whether the following statements are true or false

a. The placing of concrete shall be done in layers not more 600 mm thickness.

b. Compact concrete using vibrator so that the voids between the aggregate particles is minimized.

c. The mixed concrete should have excess water.

d. Floating shall be done before troweling.

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UNIT 4.4: Concreting in Precast Segments

Unit Objectives 🎯

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

1. Explain precast segments, their use and benefits.
2. Define different types of precast structures and their application.
3. Understand materials and process involved in precasting of concrete structures.

4.4.1 Precast Concrete

Precast concrete segments are produced by casting concrete in reusable molds or "forms". These segments are then cured in a controlled environment and then transported to the construction site and used as per the construction requirement

Precast concrete components have benefits over on-site casting as listed below:

- Quality and durability is enhanced as compared to concrete cast at construction site it is produced in a controlled environment (precast plant).

- Safety throughout the project is ensured as precast concrete is produced in a controlled environment.

- As the workforce available is more trained and skilled as compared to a construction site the control over material quality and workmanship gets enhanced.

- It is cheaper than on-site casting as the forms used are reused hundreds to thousands of times before being replaced.

- Speed of construction is increased.

- Reduction of on-site labor, activity, noise, disturbance and waste.

- Minimal maintenance and low life cycle cost.

Use of Precast Concrete Structures

Precast Concrete structures have very wide application, as listed below:

- Construction of Building Floors and roofs, precast architectural panels, facades or free-standing walls used for landscaping,

- Construction of water and sewage pipes, storm water drainage.

- Construction of flyovers, tunnels and bridges.
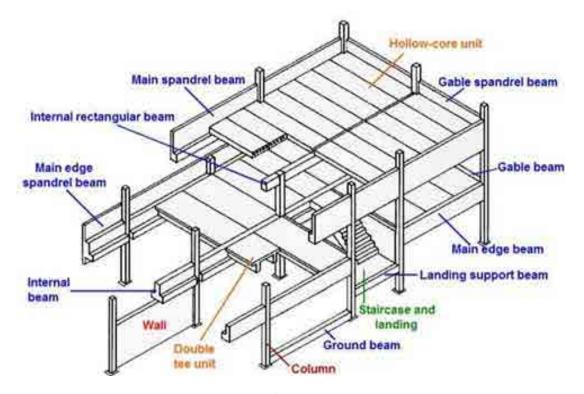
Fig. 4.4.1. Construction using Precast Segments

Fig. 4.4.2 Flyovers and Tunnels constructed from Precast Segments

Precast Concrete Slabs

Precast concrete slabs are used mainly for roof decks and floor. The planks erect quickly to re-duce on-site labor needs and are capable of spanning long open spaces to aid design flexibility.

1. Plank

2. Hollow

3. Beam and block

4. Double tee
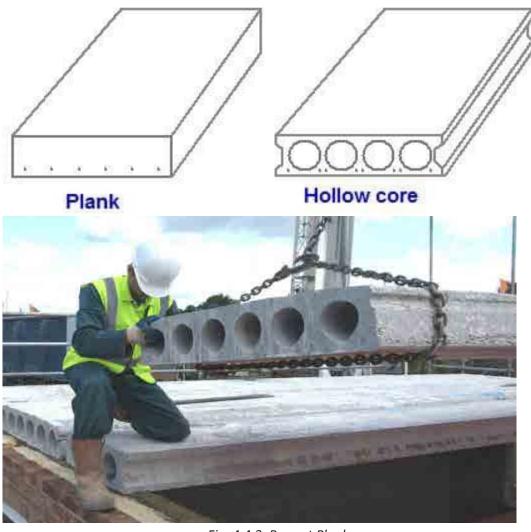
Fig. 4.4.3. Precast Planks
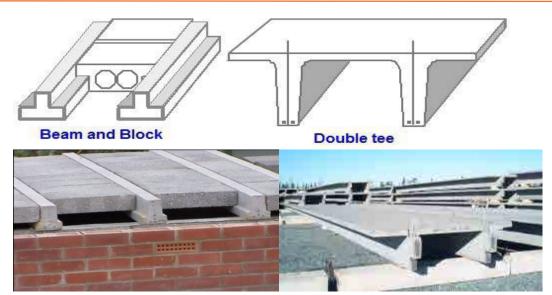
Fig. 4.4.4. Precast Beam-Block and Double tee

Precast Beams:

There are three main categories of beams:

'L' beams – L beams have slabs only on one side and are mainly used in flooring.

Inverted 'T' beams – Inverted 'T' beams are load bearing beams. The top of the t-shaped cross section serves as a flange or compression member. They are mainly used in bride structures.

Rectangular beams – These beams are used to transfer load from roof to columns.

Fig.4.4.5. Inverted T Beam   *Fig. 4.4.6. Rectangular Beam & L beam*

Precast Columns:

Precast columns help in achieving a speedy, economical construction. The quality control which is found better in controlled environment of precast process in comparison to cast in situ produces desired high strength, high dimensional adequacy and durable end products. Columns are delivered to site ready for erection and connected to foundation and beams and other structural component at site . As per design requirement, columns may be rectangular, square or circular.

Fig.4.4.7. Precast Concrete Columns

4.4.2. Materials for Making Precast Concrete Segments

Forms

The forms used for precast concrete are made of wood, steel, aluminum. The steel forms are extensively used because of its robustness and number of times it can be reused. The surface of forms shall be smooth. These are cleaned by wire-brush, scrapping, scrubbing and should be coated with releasing agent before casting.

Mould releasing agent

- Release agents are available in oil form.

- This helps in achieving a stain free concrete surfaces

- This facilitates easy and smooth stripping and improved reuse of form-work.

- This coats the form materials so that bond is not formed to concrete.

Admixtures

Admixtures can be divided into four main groups:

- Accelerating admixtures

- Retarding admixtures

- Water-reducing admixtures

- Air-entraining admixtures

- Superplasticizing admixtures

- Admixture is added at time of mixing to change properties of fresh and hardened con-crete.

- Accelerators are used to decrease the setting time of concrete whereas retarders used for increasing the setting time.

- Water reducing admixtures increase the workability without increasing water content.

- Air entraining admixtures used to make concrete more resistible to freezing and thawing action.

- Super plasticizers help concrete to achieve high workability without adding water into it.

Reinforcement

- The precast concrete elements are reinforced in many ways such as by placing steel bars, welded wire mesh, pretensioning and post tensioning cables in concrete.

- The reinforcement helps concrete in achieving required tensile strength.

- Steel re-bars of different sizes and grades as per design requirements are widely used in precast elements.

- The welded steel wire mesh is suitable for use in thin walled section because of thin wires at close spacing.

- The high strength steel cables called tendons are used in structural elements and then stressed before concreting or post concreting.

- Pretension and post tension cables are generally used to achieve economical thiner section of structural member as it eliminates the use steel Rebars or other reinforcements to achieve required strength.

Fiber reinforced polymer (FRP)

- The use of Fiber reinforcement improves the crack control characteristics of concrete which leads to high durability of concrete product.

- Fibers are made of different materials such as steel, carbon, glass, polymer which are generally found in different sections such as round, oval, triangular depend on manufacturing process.

Colour Pigments

- Pigments are generally used to make colour an integral part of concrete. This is added at time of mixing concrete in mixer.

- The pigments are available in powder, granular and liquid form. The amount of pigment added varies from 1% to 5 % by weight of cement.

Sandblasting

- Sandblasting is done to produce a coarse texture surface in cured precast elements. It varies from just exposing coarse aggregates to deep cuts in members.

4.4.3. Process in Making Precast Concrete Segments

Assemble Mould

• The mould is assembled as per the segment to be casted.

• Level and flatness of the base mould is checked before assembling the mould for casting.

• Dimensions of mould is checked to ensure they are within specified tolerances.

• Shape and the angles are checked in the mould forms.

Fig.4.4.8. Assembling Mould

Mould Cleaning and Preparation

• Mould is cleaned to ensure that it is free from debris and old mortars.

• Oil or mould release agents are applied evenly on the mould surface.

- Joints and edges of the mould, stoppers, bolts, side props, tie rods and rubber seal are checked to ensure that they are intact and are properly secured.

Fig.4.4.9. Cleaning Mould and applying the oil/mould release agents

Reinforcement / fixing of Rebars

- Check to ensure that the Rebars are used as per the specifications.

- Check to ensure that the cast in items, rebars, ecesses, lifting hooks, corrugated sleeve pipes, and inserts are correctly positioned and properly secured.

- Check to ensure that tack weld is carried out wherever required.

- Sufficient number of spacers with correct size should be properly placed and secured to achieve the required concrete covering during casting.

Fig.4.4.10. Adding Rebars to the Mould
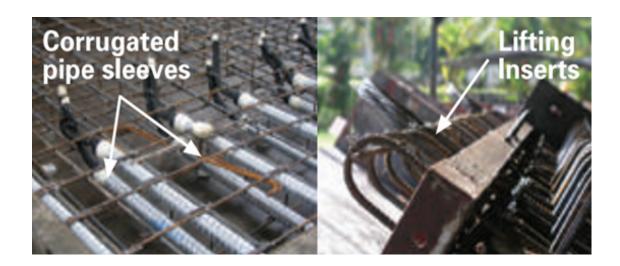
Fig.4.4.11. Adding Pipe sleeves and lifting inserts

Fig.4.4.12. Adding Electrical Conduits

Inspection before casting

- Check and verify that all the details are as per the specifications mentioned in the drawings.

- Check the mould fitting conditions.

- Ensure that the mould is as per measurements required.

- Check the mould level before casting as other activities on the site can shift the mould

Fig.4.4.13. Inspecting the Mould before concreting

Concreting

- Prepare the concrete as per the mix ratio specified.

- Pour the concrete in the mould.

- The drop height of concrete should not be more than 1 mtrs.

- Carry out compacting of the concrete using vibrator. Form vibrator is used for thin elements.

- Spread and level the concrete after initial setting.

- Use screeder to maintain the required level and thickness.

- Use power trowel for surface finishing.

Fig.4.4.14. Pouring concrete in the Mould and compacting

Fig.4.4.15. Screeding of poured Concrete

Curing

- Cure the concrete for an adequate curing time and as per the environment.

- Use the curing technique as per the factory standards.

Demoulding

- Depending on the anchor length of the inserts and type of precast elements the minimum concrete strength required may be higher to overcome the sectional and frictional force during Demoulding.

- Loosen and remove all bolts & pins and end and side mould forms before lifting.

- Ensure that no damage is caused to the form and the concrete structure during the Demoulding process.

Inspection

- Check the condition of the finished product

- Verify critical dimensions. They should be within the specified tolerances.

- Check that the elements have achieved required concrete strength before delivering to construction site.

Fig.4.4.16. Inspecting the precast structure for defects and measurement corrections

Exercise

1. Answer the following.

a. What is a precast concrete structure?

_____

b. What are the benefits of using precast concrete structures?

_____

c. Name the materials required in precasting?

_____

d. Why is oil used in a casting mould?

_____

e. Why is it necessary to check the measurements before concreting?

_____

2. **State whether the following statements are true or false**

a.   Defect in the mould results in defect in the finished structure.

b.   Electrical conduits are added after concreting.

c.   Casting of concrete at construction site is cheaper than precast segments.

d.   Sandblasting is done before curing of precast elements.

e.   Color pigments are added at time of mixing of concrete to make colored concrete .

f.   Steel mold are generally used as forms in casting of precast elements

Notes

UNIT 4.5: Repair Works in Concrete

Unit Objectives 🎯

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

1. Define the different types of concrete defects and their cause.
2. Define the Materials and tools involved in repairing of concrete defects.
3. Define the process involved in repairing concrete defects.

4.5.1. Defects in Concrete?

There are various factors which are responsible for defects in concrete. The poor workmanship, quality control and faults in design which result into defects and produce undesirable surface in concrete structural members. The degree of defects varies from just surface imperfections to serious structural damages:

- Honey combing and surface voids

- Form work offsets & Streaks

- Dimensional Deviations

- Various types of cracks such as thermal, shrinkage, subsidence

- Delaminations or blisters.

Fig.4.5.1. Defect in concrete structure due to honeycombing

- Honeycomb is caused when cement mortar fails to ingress the space between aggregates. This is produced because of congested reinforcement, poor vibration and lower fine materials.

- Form streaks are formed as a result of leakage of mortar from joints or holes in joints while placing of concrete. This is mainly caused due to over vibration of concrete and high sump concrete.

- Form offsets are caused due to inadequate anchorage of formwork leaving into bulging of concrete surface .

- The poor support system in shoring and form work to take ultimate load of concrete structural member during placing results into dimensional deviation.

- Cracks around reinforcement steel or near the form. Cracks are produced due to restraint in thermal expansion and contraction of concrete. Restraint to shrinkage provided by reinforcement or other part of structure produces shrinkage cracks.

- De lamination and blisters are developed when air bubbles and bleed water entrapped inside the mortar surface. This separates 3-6 mm of layer of mortar from concrete surface.

- Scaling of concrete is result of not adopting standard finishing methodology. This results into formation of thin weak layer called laitance which can be easily rubbed off.

Fig.4.5.2. Defect in concrete structure

4.5.2. Repairing Concrete Defects

Even after, precautions and efforts are taken during finishing to produce a good quality concrete surface. It is very hard to achieve defect free surface. Before patching, make sure that the concrete is structurally sound. It is better to treat the cause than just address a symptom. Sometimes surface defects are a clue that there is a bigger problem at hand. Discuss with your supervisor before starting the repair work.

Steps involved in repair of concrete works:

1. **Determine the scope of the problem.**

Identify the problem, its probable cause and the related issues which could become more serious in the lifecycle of the concrete structure. Some of the main defects in a concrete work are:

- Expansion or contraction cracks. Properly installed concrete should have joints that prevent this unsightly cracking. For a 4-inch thick slab, joints should be spaced 8 to 12 feet apart. If jointing is not sufficient, or improperly placed, cracks can occur. Typically these cracks are not structural and only need to be repaired for aesthetic purposes.

- Debris like piece of wood and steel rod when removed off from plastic concrete.

- Defects created due to use of concrete surface before it sets or hardens.

- Surface scaling caused by improper finishing or freezing temperatures during curing. Scaling is when parts of the concrete surface flake away.

2. **Measure the dimensions of the surface to be repaired**

- Measure the area of the defect which may include bumps, depressions or ridges.

- Small areas of very shallow surface irregularities may be concealed with floor leveling compounds.

3. **Chipping**

- The surface to be repaired is chipped off to remove the loose materials and creating a rough surface for bonding with mixture.

- For large repairs,the electric chipping hammer or jack hammer is used which helps in chipping out large area in less time.

- Ensure that the dust and debris of chipped surface is removed before applying repairing mix.

- A wire brush is the best suitable tool for cleaning.

- A stiff bristled broom or paintbrush can also be used for very small defects.

- Depending on the age and condition of the concrete chemical cleaning may be required. Consult your supervisor in case of critical defects.

Fig.4.5.3. Chipping tools and chipping using a chisel and power drill

1. **Preparing the Repair Mix**

   - Prepare the repair mix by mixing ingredients by hand tool or small mechanical mixer as per quantum of work.

   - The batching and proportionating of ingredients shall be carefully done as this can affects the nature and strength of mix.

   - Use bonding agents to develop good bond between old concrete surface and the mixture to be used for repairing.

   - Add suitable bonding agent to surface to be repaired before applying the mix.

2. **Wet the area to be repaired**

   - The surface to be repaired shall be throughly wetted with water.

   - Ensure the surface is damp only, excess wetting may affect the mix proportioning of mixture to be applied.

   - The moist surface is required so that the moisture of mix is not drawn out by the dry surface which will cause shrinkage and cracks.

1. **Applying the Repair Mix**

Mark the patch location,the mixture is placed into it with pressure applied on trowel to ensure no air bubbles inside the area to be repaired.

The surplus mixture is then strike off and leveled by trowel. The settling and shrinkage of cementitious materials are taken care of while leveling the mixture.

The Mixture is then allowed to be dry and stiff.

After laying of mixture, the troweling with steel trowel can be started after which is done intermittently 2or 3 times to bring the mortar to surface and close any pores in surface.

The final troweling is done after the paste become stiff so that repaired surface get the same appearance as the adjacent finished surface.

The mixture which spreads on adjacent finished surface is removed off by using trowel.

Fig.4.5.4. Applying the mix over the area to be repaired

Fig.4.5.5. Spreading the mix evenly over the area to be repaired.

Fig.4.5.6. Repaired floor corner

Fig.4.5.7. Repairing defects in the foundation

Exercise

1. Answer the following.

a. Name some major concrete defects?

_____

b. What are main causes of concrete defects?

_____

c. What are the tools required for repairing a defect I concrete structure?

_____

d. Why is it necessary to wet the surface to be repaired before applying the paste?

_____

e. Mentions the steps involved in applying the repair mix?

_____

2. **State whether the following statements are true or false**

a. Defects in concrete structures can be due to poor construction practices.

b. Poor workmanship is one of the reasons behind defects in concrete.

c. Dimensional deviation as a defect in concrete caused due to poor shoring and formwork system.

d. A wire brush should not be used for cleaning the area to be repaired.

e. Honeycombing is formed because of congested reinforcement and poor vibration of concrete.

f. It is important to identify the problem, its probable cause and the related issues as it could become more serious in the lifecycle of the concrete structure.

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5. Carry out IPS/ Tremix flooring

Unit 5.1 – Cement Concrete Flooring

Unit 5.2 – IPS Flooring

Unit 5.3 – Tremix Flooring

(CON/N0114)

Key Learning Outcomes

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

1. Explain about IPS flooring and Tremix Flooring.
2. Identify the Tools and Materials required for IPS and tremix flooring.
3. Understand the use of machines used in IPS and tremix flooring
4. Understand the IPS and tremix flooring methodology
5. Understand the process involved in preparing the sub base and base
6. Explain use of reinforcement as per requirement.
7. Understand the correct pouring process
8. Carryout various processes like
   - Screeding
   - Compacting
   - Troweling
   - De-watering
9. Identify the finishes used in tremix flooring
10. Understand the de-watering process used in tremix flooring.
11. Outline the benefits of vacuum de-watering.

UNIT 5.1: Cement Concrete Flooring

Unit Objectives 🎯

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

1. Know about Cement Concrete Flooring and its benefits.

2. Explain about procedures involved in Cement Concrete flooring

3. Explain about hand and power tools required for Cement Concrete flooring

5.1.1 Cement Concrete Flooring

Cement concrete flooring is widely used which is very economical and durable .This is used in residential as well as industrial buildings.

The sequences of steps for laying this kind of flooring are :

- Preparation of sub base and base course.

- Fix the forms to acquire necessary thickness.

- Laying and spreading specified grade of concrete.

- Vibrate and level the poured concrete.

- Sprinkle hardener as per requirement

- Finish the surface by floats/trowels.

- Curing for 15 days.

- Provide the specified joints with groove cutting.

- Joints to be filled with specified material.

Merits of cement concrete flooring:
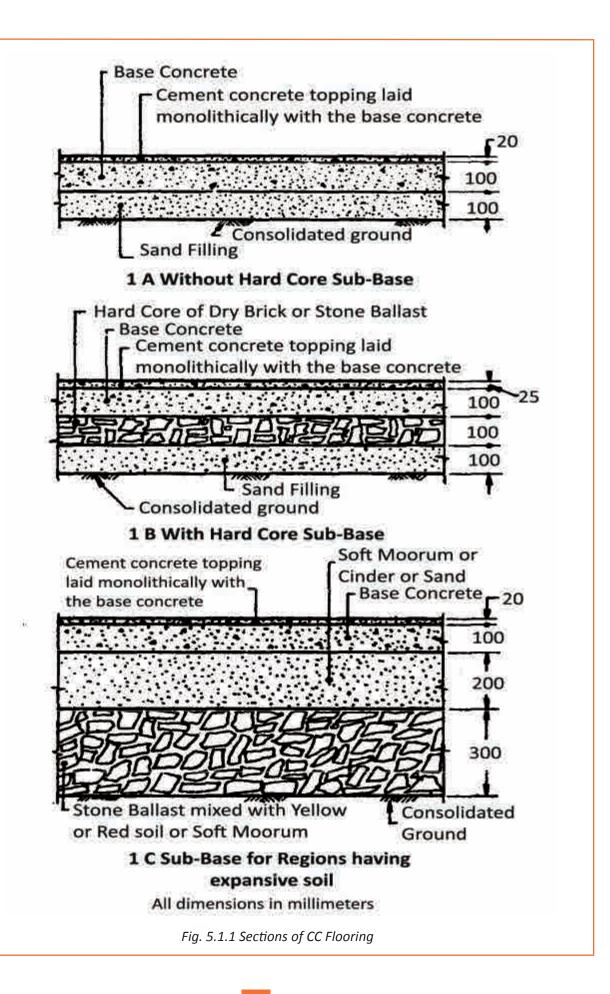
- This type of flooring is durable and requires less maintenance.

- It has high resistance against wear and tear.

- It has high temperature resistance and also fire proof.

Demerits of cement concrete flooring:

- Defects in concrete once floor is laid or fixed is difficult to rectify and proves costly.

- The difficulty in achieving fully non-porous concrete leads to water seepage if exposed to water for long time.

There are two types of cement concrete flooring which are widely used :

1. IPS flooring

2. Tremix flooring

Fig. 5.1.1 Sections of CC Flooring

5.1.2 Preparing Sub Base

Subbase is the surface prepared to take base concrete. Soil can also be used as Subbase only if it is well compacted and highly stable. For preparing Subbase clear all the unwanted objects or materials like rocks, grass, shrubs, trees, and even old concrete that may interfere in the pouring process.

- Subgrade is the soil underneath the Subbase and the strength of the final concrete depends on the strength of the subgrade. If the subgrade moves, shifts or craters it will result in the cracking or cratering of the concretes so ensure that the subgrade is properly compacted and stabilized.

- Subbase is generally prepared by using Open-grade stone or closed graded fine-grade stone. Open-grade stones are less expensive and contain very less quantity of smaller stones and provide a way for water to pass through. Due to large size of stones they do not compact well as compared to finer-grade stone. Finer-grade stones are highly compactable.

- To prepare the Subbase lay a 4–8 inch (10.2–20.3 cm) thick Subbase with the designated material, and then compact it with a hand tamper or a plate compactor.

Fig. 5.1.2 Soil used as Subgrade

Fig. 5.1.3 Ramming of soil before Subbase

Fig. 5.1.4 Open grade stone used as Subbase

Fig. 5.1.5 Ramming of Subbase

5.1.3. Forming

Form work is a temporary shuttering structure for holding the freshly-poured concrete. Existing features, such as Kerbs, walls, edgings can also be a part of the form. For constructing vertical structural concrete members, the construction of the formwork becomes quite complicated and is undertaken by formwork carpenters or formwork erectors. Ground slabs are less complicated and require only the simplest of formwork. The good quality of forms helps in making concrete free from surface defect and achieving better finish.

Steel Formwork

The steel form is durable and more economical as this can be reused more number of times than timber or plywood shutters. This is mainly consists of thin section of steel plate supported by angles along edges and side opposite to face of shutters. This is easy to erect and dismantle leading to high speed of construction.

Fig. 5.1.6 Steel Formwork

Timber shuttering

There are some situations where use of Roadform is not feasible, so the more traditional timber shuttering is used. As the timber shuttering is 'knocked-up' on site it can be made to accommodate any size, depth, odd shapes and situation. Timber shuttering used in conjunction with modular steel bracing elements is preferred for vertical concrete work.

Form lining: It is the part of the shutter in contact with the concrete.

- Hardboard or exterior grade MDF (Medium Density Fibreboard) are also used in some cases.

- 15mm or 18mm Plywood is generally used as form lining.

- As plywood used in form lining is highly vulnerable to rots and disintegration as it is in contact with different climatic and temperature conditions for long period of time.

Horizontal Waler: A horizontal timber or beam used to brace or support the sheeting.

- 50 mm x 50 mm hard wood is generally used

- The load or pressure exerted by concrete on form-work is deciding factor in selection of spacing and size of studs and walers.
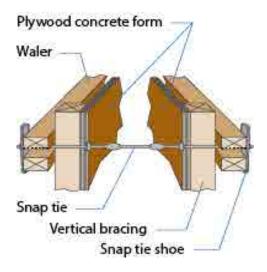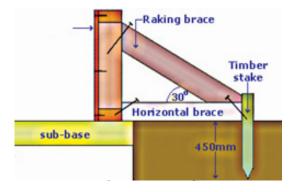
Fig. 5.1.7 Horizontal Waler

Bracing: is the support timber to the waler or formwork so that there is no movement during concreting operation. The support timbers are collectively known as bracings and consists of horizontal walers and vertical noggins.

The size of timbers used for the bracing depend upon the size of the formwork.

- 50 x 50 mm timber can be used to form the walers and noggins for a simple 300mm high, ground slab shutter.

- Straight and true timber are used for bracings and are always used end on as it is the deepest way, to give maximum possible support.

- Raked Brace is in between 30^0 to 60^0 as shown below:

- The spacing between walers and between noggins is generally 300-600mm but may vary depending on the size of the shutter.

- Nails are used to fasten the brace members to the formwork as they are easiest to withdraw on completion of the work.

- Fastening is essential as the pressure of the wet concrete and finishing equipment may result in 'springing' (flying loose) of the braces.

Sole Plates: A spreader board is required to be fixed behind peg on soft ground as the weight of the concrete may force the peg back into the ground. A "sole plate", usually is a plank that can be used to support several pegs and help in spreading the load more evenly. The horizontal braces and the raking are nailed to the sole plate.

Ground pegs are those that hold the sole plates firmly to the ground and should be driven at least into a depth of 300 mm to 450 mm.

5.1.4. Reinforcement in Cement Concrete Flooring

The floor is generally unreinforced or nominally reinforced. The reinforcement is used to control crack width. In floor slab, the reinforcement is placed at the 1/3 of slab and 50mm below top surface to avoid crack. In some cases, there is top and bottom layer of reinforcement to increase load carrying capacity. The most popular way of concrete reinforcement is to use steel mesh. It offers less strength as compared to rebar but it is sufficient to provide sufficient strength to enhance the strength of wall, columns and sidewalks. Steel mesh is easier to use as compared to rebar due to its flexibility. Installing rebar in concrete is a slightly difficult and time taking process but it necessary for heavy duty flooring.

The advantages and disadvantages of Wire mesh and Rebar's are:

Wire mesh: It offers stability (wire mesh is welded, where rebar is often tied together) and prevents small cracks growing and spreading. The drawback of wire mesh over Rebar is that it is not very good at providing structural integrity. The diameter of the wire shall vary from 3.0 mm to 12.5 mm.

Fig. 5.1.10 Wire mesh used for reinforcement

Rebar: It offers better structural integrity and is suitable for higher load-bearing surfaces and it is also effective in minimizing and controlling cracks. The spacing of the rebar shall vary from 50 mm x 50 mm to 400 mm x 400 mm depending upon the design requirement. The diameter of the rebar's shall be 8 mm to 12 mm depending upon the floor use.

Fig. 5.1.11 Rebar used for reinforcement

5.1.5. Compaction

Compaction method adopted in cement concrete flooring

The compaction is done by needle or poker vibrator near the form panels. This results in proper compaction of the concrete and hence elimination of voids and entrapped air. Compacting is generally completed when air bubble stops rising to the surface and the noise of poker stops changing. Therefore, the poker vibration is followed by surface vibration using screed vibrator to get a uniform compacted concrete with a leveled surface. The surface vibrator is guided on steel channel used as formwork for flooring.
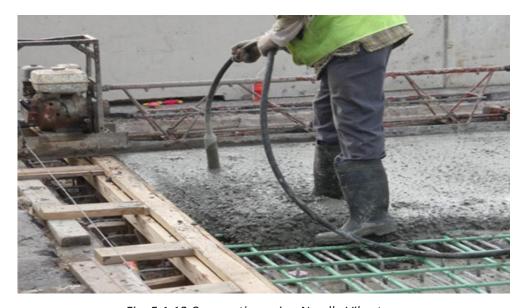
Fig. 5.1.12 Compacting using Needle Vibrator

Fig. 5.1.13 Compacting using double beam screed vibrator

5.1.6. Finishing

The finishing of concrete involves application of hand tools and power tools as per requirement. After the concrete is placed in forms, the initial finishing is started by striking off the concrete by straightedges .The voids and undulations left behind are made leveled by float .The final finishing is done by manual or power trowel as per requirement, when bleed water evaporates and surface becomes hard enough to not give any impressions.

5.1.7. Joints in Cement Concrete Flooring

Common types of joints in concrete constructions are:

1. **Construction Joints**

    This is provided where the works stops. These are full depth joints. Construction should be so planned that day's construction activity may end at the location of contraction/expansion joint.

2. **Expansion Joints**

    Such a joint provides the space into which pavement can expand thus relieving compressive stresses due to expansion and inhibiting any tendency towards buckling of concrete slabs.

3. **Contraction Joints**

    This is a joint which helps concrete in relieving tensile stresses in the and prevents formation of irregular cracks due to restraint in free contraction of concrete due to its natural shrinkage. These joints also relieve stresses due to warping.

    Dos and Donts

    • Number of construction joints should be minimum as possible.

    • Keep joints as straight as possible.

    • Roughen the hardened concrete surface, cleaned with brush, make wet with water and apply cement slurry before starting the fresh concrete at location of joint.

    • The contraction joint is not less than 3 mm wide and having a depth equal to one-fourth to one-third the depth of concrete slab.

    • The groove is formed preferably by a joint cutting saw and filled by appropriate sealent.

    • Deviations of the filler board in the case of expansion joints from the intended line of the joint shall not be greater than ±10 mm.

- The best fit straight line through the joint grooves shall not be more than 25 mm from the intended line of the joint.

- Always Ensure that grooves are dry and clean and free from foreign object or loose material before sealing is done
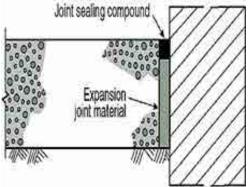
Fig. 5.1.14 Saw cut Contraction joint

Fig. 5.1.15 Expansion joint

UNIT 5.2: IPS Flooring

Unit Objectives 🎯

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

1. Understand use and benefits of IPS Flooring
2. Explain the procedures involved in IPS flooring
3. Explain about the Hand tools and Power tools required for IPS flooring

5.2.1 What is IPS Flooring?

- Indian Patent Stone Flooring is a basic type of cement concrete flooring which is good against wear and tear.

- It can be used for industrial, commercial or residential purposes.

- Indian Patent Stone flooring when has red oxide as topping is called red oxide flooring.

5.2.2 Preparation of sub base and base course for IPS flooring

- The earth filling or sub grade shall be properly compacted to ensure that no loose packets are left. Depends on design requirement, sand of 100 mm thickness or stone soling of thickness 150-200 mm is generally used as sub-base course.

- The Slope of flooring shall be provided and maintained in base course before laying of topping layer.

- Base concrete is generally plain cement concrete of nominal mix of 1.4.8 or design mix of m-7.5.

5.2.3 IPS Flooring Methodology

- The concrete mix generally used in topping layer generally varies from nominal mix of 1:2:4 to 1:1.5:3 or design mix of M15 to M20 depends on design requirements.

- The thickness of concrete in topping layer is generally 25-50mm depends on type and design requirement of flooring.

- Mark reference level and transfer this to location of flooring area.

- Mark the thickness level of flooring.

- The glass and aluminum strips are fixed over base concrete dividing the area into suitable panels with their top at proper levels and required slope.

- The strips are fixed in cement mortar with their tops at required level. The dimensions of panel shall not exceed more than 2 meters.

- Provide dummy dots to ensure required level of flooring .

- The predetermined concrete mix is then placed into panel, throughly compacted and leveled by screed board.

- The concrete shall be trowel led at regular intervals to produce desired hard surface.

- The finishing operation is done in period from 1 to 6 hrs depending on atmospheric conditions and temperature.

- The final trowel ling shall be carried out before concrete becomes firm enough to extent that any impression on surface requires considerable pressure.

- No dry cement should be allowed to spread on freshly laid concrete to cater excess water which comes on surface due to floating.

- Cure the flooring for 15 days by different curing methods as per suitability such as ponding and wet hessian cloths.

The sequence of processes involved in IPS flooring is depicted in figures below:

Fig. 5.2.1. Straightening of Brass/Glass strip

Fig. 5.2.2. Transferring levels

Fig. 5.2.3. Positioning of Brass/Glass strip

Fig. 5.2.4. Laying of Brass/Glass strip

Fig. 5.2.5. Temporary support for Brass/Glass Strip

Fig. 5.2.6. Placing of Concrete

Fig. 5.2.7. Finishing of Concrete

Fig. 5.2.8. IPS floor with Brass/Glass Strip

5.2.4 Advantages of IPS Flooring

- Water sloping finish is achieved at an economical cost.

- No power tools are required which makes it the best suited flooring methodology for rural areas.

- IPS floor has good wearing properties.

- It can be used for residential, industrial or commercial purposes.

- IPS finish can be used for interior areas.

UNIT 5.3: Tremix Flooring

Unit Objectives ⌖

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

1. Know about Tremix Flooring and its benefits.

2. Know about procedures involved in tremix flooring

3. List out hand and power tools required for tremix flooring

5.3.1 What is Tremix Flooring?

This is high performance concrete flooring having improved properties such as compressive strength, wear and tear resistance, shrinkage,water permeability. The TREMIX method, pioneered by TREMIX AB, SWEDEN and introduced by Aquarius in India in 1987, (The Vacuum De-watering System) is used for laying high quality concrete floors at an economical cost.

This process involves power tools and equipments.
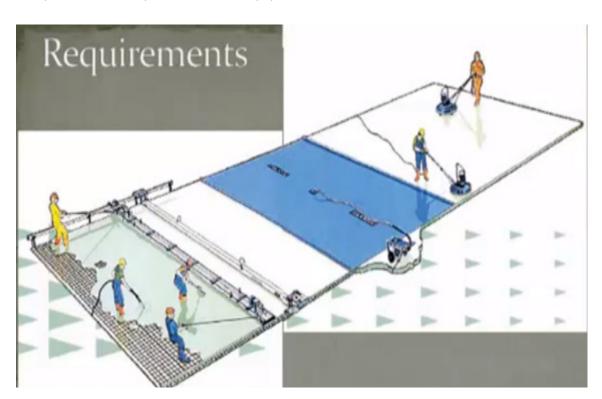
Fig. 5.3.1. Tremix Flooring

5.3.2. Tremix Flooring Methodology

- Preparation of sub base and base course.

- Fix the forms to acquire necessary thickness

- Laying spreading specified grade of concrete into alternate panels.

- Vibrate and level the poured concrete by double beam vibrator.

- Vacuum de-watering treatment to remove excess water from concrete.

- Sprinkle hardener as per requirement.

- Float the surface with power floater.

- Final troweling as per requirement and hardener is sprinkled with final troweling when concrete hardens and bleeding water has evaporated.

- Curing for 15 days.

- Provide the specified joints with groove cutting.

- Joints to be filled with specified material.

5.3.3. Tools and Materials Required

Tools and equipments required for performing de-watering process are as follows:

1. Vacuum de-watering Pump with hose

2. Suction mat with filter pad

3. Double beam vibrator

4. Power floater/trowel

Fig. 5.3.2. Power tools for Tremix Flooring

5.3.4. Preparation of Sub-base and Base Course for Tremix Concrete Flooring

The earth filling shall be properly compacted to ensure that no loose packets are left. Depends on design requirement, sand of 100 mm thickness or stone soling of thickness 150-200 mm is generally used as sub-base course. The settlement of sub-base may cause cracking of whole floor.

The concrete which is generally used in base course is plain cement concrete of nominal mix 1:3:6 or design mix of M10.The thickness of base concrete is 100-200mm.

5.3.5. Forming

Steel forms are generally used as form work in tremix flooring. These forms are MS Channels spaced at 3.5 to 4 meters apart. These forms are also used for support of the double beam vibrator and act as guide on which it is pulled.
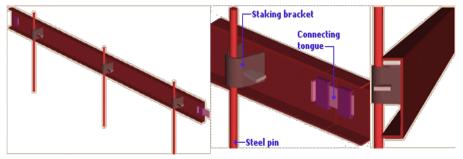
Fig. 5.3.3 Steel Forms used in Tremix Flooring
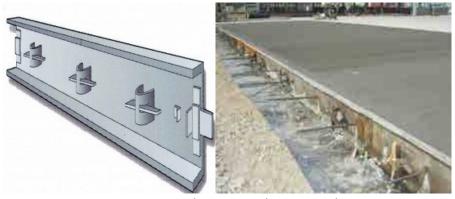
Fig. 5.3.4 Steel Forms used in tremix Flooring

5.3.6. Concrete Mix for topping

Tremix flooring is mostly being done in the industrial sector where rigid surface is required for machine foundation, movement of vehicles and cranes as it results in increase in the compressive strength of the concrete floor and also provides better resistance against wear and tear.

Concrete of nominal ratio 1:1.5:3 (1 cement: 1.5 sand and: 3 stone aggregates) or design mix of M-20 grade is generally used for topping concrete.

For better wear and tear design mix of M-25 is preferred.

5.3.7. Vacuum De-watering

This is a process in which excess water is removed off from concrete surface after it is laid and vibrated. This is done in following steps:

- After compaction by screed vibrator,and leveling of concrete using screed-board

- Lay the suction mat which comprises of large single PVC sheet in size of 5 x 7 M underneath which honey combed plastic cloth acts as very fine filter

- Top mat is provided with Junction box and hose pipe

- Top mat is connected to vacuum pump through hose pipe

- When pump starts, vacuum is created between filter pad and top mat which squeezes out surplus water from concrete.
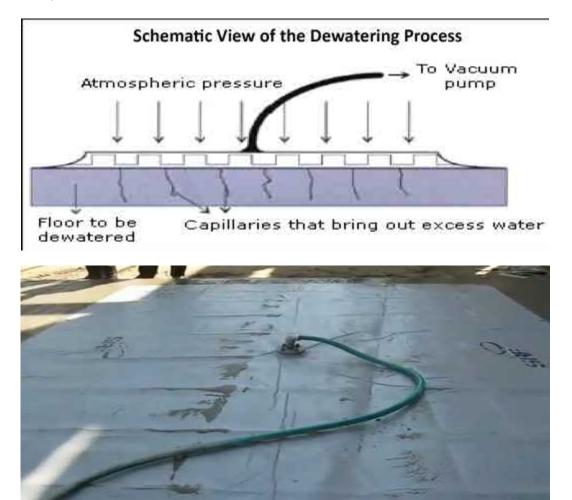
Fig. 5.3.5. Vacuum de-watering for Tremix flooring

5.3.8. Troweling / Floating

• Power trowel cum floater in used for floating and troweling in a Tremix floor.

• The power floater is fitted with rotating disks for the floating process and is fitted with rotating blades for the troweling process.

• Floating is done immediately after the de-watering process whereas trowelling is done after 30 minutes to 3 hours.

• Trowelling produces very smooth surface so this process is not carried out for floors where rough surface is required like parking lots, sidewalks,etc.

Fig. 5.3.6. Power trowel for floating of wet concrete after de-watering

Fig. 5.3.7. Power trowel for trowelling of hardened concrete for smooth finish

	The sequence of processes involved in tremix flooring is depicted in below figures.	
1. Pouring Concrete in the form		
2. Spreading concrete		
3. Compacting using double beam vibrator		

4. Laying the filter pads for de-watering	
5. Placing the top cover over the filter pads	
6. Spreading the top cover for de-watering	

7. De-watering using the vacuum de-watering system	
8. Troweling using troweling blades	

Hardener

In many cases,The hardener is added to floor to increase its resistance against wear and tear. It is available in both powder and liquid form.

5.3.9. Advantages of Tremix Flooring

1. The lower water cement ratio considerably increases the compressive strength

2. Power troweling produces a high wear and tear concrete surface.

3. Vaccum De-watering resulting into low water permeability which ultimately improves durability of flooring.

4. low water cement ratio leads to less shrinkage cracks

5. No of strip joints required in this flooring is less which enables it suitable for flooring of large area.

Exercise

1. Answer the following.

a. What is Tremix flooring?

_____

b. Name the machines required in Tremix flooring?

_____

c. Why is form prepared before Flooring?

_____

d. What are the advantages of using reinforcement in flooring?

_____

e. What are the advantages of Tremix Flooring?

_____

2.   **State whether the following statements are true or false**

 a.   Tremix Flooring increases the compressive strength of the floor by up to 60%.

 b.   Tremix Flooring increases the Abrasion resistance of the floor by up to 60%.

 c.   Tremix Flooring decreases the impact strength of the floor.

 d.   Tremix Flooring requires more time for curing.

 e.   Vacuum de-watering of concrete increases its resistance to long term chemical corrosion.

 f.   Screed is a thin layer of cement paste and sand/ fine aggregates, laid on to a concrete floor.

 g.   After pouring the concrete in the form it should be immediately spread out with shovels.

 h.   Higher water cement ratio in concrete mix increases the strength of concrete.

 i.   Rust on rebars has no effect on the concrete structures.

3.   **Arrange the below mentioned flooring process in the correct sequence of the operation:**

   a.   Vacuum De-watering.

   b.   Compacting.

   c.   Preparing Subbase.

   d.   Preparing the form.

   e.   Screeding.

   f.   Troweling.

   g.   Adding reinforcement.

Notes

6. Work effectively in a team to deliver desired results at the workplace

Unit 6.1 – Reporting issues to Supervisor / Site In-charge

Unit 6.2 – Team communication

Unit 6.3 – Team Work

(CON/N8001)

Key Learning Outcomes

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

1. Understand the benefits of reporting issues to seniors.
2. List out important issues that need immediate reporting.
3. Understand the importance of communication relevant information with the team.
4. Outline benefits of communicating information with the team members
5. Understand the importance team work.
6. Explain benefits of working in a team.

UNIT 6.1: Reporting issues to Supervisor / Site Incharge

Unit Objectives 🎯

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

1. Understand the benefits of reporting issues to seniors.
2. Explain important issues that need immediate reporting.

6.1.1 What types of issues shall be reported?

It is very important to report to the supervisor / Site Engineer of all the issues that may affect work or quality. Immediate reporting of issues helps the supervisors/site engineers to get them resolved before they effect the work quality or before any damage is caused to the site / workers.

Immediately report to your supervisor If:

- Materials are not available on time.

- Tools / machines are not available on time.

- Machines are not working properly.

- Materials do not meet the quality standards.

- PPE are not available.

- An employee is not using PPE.

- If you find that someone is doing an operation in wrong way.

- There is some short coming at the work site that may affect the final quality.

- You have any doubt regarding the material / procedure.

- If your operation is taking more than expected time and affecting the deadline to be met.

- Tools and tackles are not stored properly by the co-workers.

- Electrical fittings are not properly connected and insulated.

- Hazardous materials are not kept at designated place with proper marking.

Problems in your work should not affect others productivity, and problems in others work should not affect your productivity.

UNIT 6.2: Team communication

Unit Objectives ◎

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

1. Understand the importance of communication relevant information with the team.
2. Benefits of communicating information with the team members.

6.2.1 Types of Information to be Communicated With the Team

It is very important to share information with the team members to avoid delays in the work and to prevent processes going wrong. Information should be shared within team members and to other teams who are directly or indirectly involved in the work.

E.g. A Mason Concrete is not involved in barbending but if the barbending and reinforcement work is not carried out properly it will affect the quality of the structure being constructed by the mason concrete. It thus becomes essential for the mason concrete to share information with the barbending team to get the work done correctly.

Information that need to be shared within a team consist of:

- List of materials required and their availability.

- List of tools and machines required and their availability.

- Quality of the materials available.

- Process details should be shared with team members.

- Share process information with the team members if they are going wrong.

- Communicate use of appropriate work technique and method.

- Seek advice whenever required.

- Communicate issues that may affect the quality of the work and find a solution for it.

Right way of communication and communicating at right time is the key to build healthy team relationship and to get the tasks completed on time.

There should be effective communication between the team members.

For effective communication, the following things shall be kept in mind which as follows:

- One has to be clear and as specific as possible in all verbal communications and especially when they are asking someone to carry out a task for them

- Eye contact should be maintained with those to whom one is talking. Their cultural background should also be kept in mind.

- If there is uncertainty that communication will be not understandable by people, then they should either summarize what they have said in different words, or ask them to summarize their message in their own words

- To keep people's attention, voice should be modulated. Speaking more loudly or softly, more quickly or slowly increases interest in what is being said.

- Where necessary, seeking constructive clarification and asking supportive questions focused on what, where, how and why issues

- Being flexible enough to take on others' suggestions and to build on others' ideas

UNIT 6.3: Team Work

Unit Objectives 🎯

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

1. Understand the importance team work.
2. Benefits of working in a team.

6.3.1 Team Work

What is teamwork?

Team is a collective group of individual team members who works together to achieve one set objective. The desired output from a team is summation of efforts of each individual team members .The team over and above is a combination of all the member's strengths and weaknesses.

Fig. 6.3.1. Team Work

The benefits of successful teams

- A successful team which is well co-ordinated and support each other helps an organization in achieving its objective within stipulated time with better productivity.

- Team work helps in build better understanding of strength and weakness of co-workers

- This makes possible effective allocation of work to sub-ordinates based on expertise because of proper interaction and communication

- The Better productivity of work can be expected only from   efficient team,which takes less time to complete the task allocated to them resulting into saving of time and money.

- Team members can help each other improve their performance and achieving desirable skill-sets

- A team brings more ideas which can be probable solutions of problems.

Risks of failures in team work

Following are the most common mistakes that lead to, or contribute to, the failure of work

- Failure to understand the purpose of work affects the performance of team

- Lack of clear defined roles and responsibilities result in confusion and error.

- Appropriate training leads to low productivity

- Failure in planning and organizing resources

- Failure to manage management or customer expectations

- Failure to establish clear ownership of decisions or the process by which key decisions will be made results in indecision and confusion.

Exercise

1) What are the benefits of team work?

_____

2) What should team members do to make the team more productive?

_____

3) Why should issues be reported to supervisor?

_____

4) Write some major issues which should be immediately repoterd?

_____

5) What are the benefits of communicating information with the team members?

_____

6) What are the information that should be communicated with the team members?

_____

Notes

_____

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7. Plan and organize work to meet expected outcomes

Unit 7.1 – Targets & Timelines

Unit 7.2 – Material Planning

Unit 7.3 – Work Planning

(CON/N8002)

Key Learning Outcomes

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

1. Understand the necessity of meeting target deadline.
2. Outline dependency of activities on each other
3. Explain material planning.
4. Outline benefits of material planning
5. Understand work Planning.
6. Understand the benefits of work planning

UNIT 7.1: Targets & Timelines

Unit Objectives

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

1. Define the necessity of meeting target deadline.
2. Explain dependency of activities on each other.

7.1.1 Benefits of Achieving Targets & Timelines

The activities involved in construction work is alloted a definite completion time line. The delay in completing the activities on scheduled time adds up to total construction cost. All the activities at the construction site are interrelated due to which delay in one task will result in delay in the entire process.

A Mason concrete can begin his work only if:

- The materials are available on time.

- Machinery is available and working properly.

- Subbase has been prepared.

- Compacting of the ground has been done.

- Reinforcement has been done by the barbenders.

All the above mentioned activities involve different teams and delay by any one of them result in delay in the concreting process and will create additional pressure on the mason concrete to complete his work in lesser time.

The activities dependent on mason concrete are:

- Laying of tiles if required.
- Construction of structures on the concrete floor.
- Construction of structures on the concrete columns.
- Finishing of the structure.

As for most of the buildings the base structures is made of concrete the delay in concreting work result in delay in the entire project.

It is very necessary to complete each and every activity on/before time which will require:

- Proper Material planning.
- Proper work planning

UNIT 7.2: Material Planning

Unit Objectives 🎯

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

1. Define material planning.
2. Benefits of material planning

7.2.1 Benefits of Material Planning

Material planning involves checking the availability of all the raw materials that would be required in the concreting process and to ensure that they are available as and when required. The basic materials required in concreting work are:

- Cement
- Aggregates
- Water
- Reinforcement bars

The mason concrete should check with his supervisor that all these are available on the site in the required quantity.

The quality of the materials is as per the standards.

They are located at comfortable distance from the site so that transportation does not cause unnecessary delay.

They are stored as per the correct stacking and storing guidelines.

In case there is shortage of material the mason concrete should immediately report it to his supervisor well in advance and get them sourced before the work begins.

Proper material planning helps in:

- Proper utilization of manpower as they will not have to sit ideal due to unavailability of materials.
- Reducing the project cost by minimizing delay.
- Helps in achieving the deadlines.
- Reduces the wastage of material due to unavailability of other necessary material.

UNIT 7.3: Work Planning

Unit Objectives ◎

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

1. Define work Planning.
2. Understand the benefits of work planning

7.3.1 Benefits of Work Planning

Work planning involves scheduling and dividing the work among the team members so as to achieve maximum productivity form each individual and also the team as a whole. Before work planning, it is very essential to do material planning and to ensure the availability of all the tools and equipments, that will be required in the process.

Work Planning

- Divide the work among the team members

- Distribute the work as per individual capability and skills.

- Ensure sufficient number of manpower is allocated to each task so that the work gets completes as planned.

- Allot all the necessary tools and equipments to the members.

- Organize work output such that no process causes delay for the other.

- Provide guidance to the team members as and when required.

- Plan your individual works as per the tasks involved the process.

Exercise

1) What is material planning?

_____

2) What are the benefits of material planning?

_____

3) What is work planning?

_____

4) What are the benefits of work planning?

_____

5) Why is it important to meet the target deadlines?

_____

Notes

8. Employability & Entrepreneurship Skills

Key Learning Outcomes

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

1. Explain the meaning of health
2. List common health issues
3. Discuss tips to prevent common health issues
4. Explain the meaning of hygiene
5. Understand the purpose of Swacch Bharat Abhiyan
6. Explain the meaning of habit
7. Discuss ways to set up a safe work environment
8. Discuss critical safety habits to be followed by employees
9. Explain the importance of self-analysis
10. Understand motivation with the help of Maslow's Hierarchy of Needs
11. Discuss the meaning of achievement motivation
12. List the characteristics of entrepreneurs with achievement motivation
13. List the different factors that motivate you
14. Discuss the role of attitude in self-analysis
15. Discuss how to maintain a positive attitude
16. List your strengths and weaknesses
17. Discuss the qualities of honest people
18. Describe the importance of honesty in entrepreneurs
19. Discuss the elements of a strong work ethic
20. Discuss how to foster a good work ethic
21. List the characteristics of highly creative people
22. List the characteristics of highly innovative people
23. Discuss the benefits of time management
24. List the traits of effective time managers
25. Describe effective time management technique
26. Discuss the importance of anger management
27. Describe anger management strategies
28. Discuss tips for anger management
29. Discuss the causes of stress
30. Discuss the symptoms of stress
31. Discuss tips for stress management
32. Identify the basic parts of a computer
33. Identify the basic parts of a keyboard
34. Recall basic computer terminology
35. Recall basic computer terminology

36. Recall the functions of basic computer keys

37. Discuss the main applications of MS Office

38. Discuss the benefits of Microsoft Outlook

39. Discuss the different types of e-commerce

40. List the benefits of e-commerce for retailers and customers

41. Discuss how the Digital India campaign will help boost e-commerce in India

42. Describe Explain how you will sell a product or service on an e-commerce platform

43. Discuss the importance of saving money

44. Discuss the benefits of saving money

45. Discuss the main types of bank accounts

46. Describe the process of opening a bank account

47. Differentiate between fixed and variable costs

48. Describe the main types of investment options

49. Describe the different types of insurance products

50. Describe the different types of taxes

51. Discuss the uses of online banking

52. Discuss the main types of electronic funds transfers

53. Discuss the steps to prepare for an interview

54. Discuss the steps to create an effective Resume

55. Discuss the most frequently asked interview questions

56. Discuss how to answer the most frequently asked interview questions

57. Discuss basic workplace terminology

58. Discuss the concept of entrepreneurship

59. Discuss the importance of entrepreneurship

60. Describe the characteristics of an entrepreneur

61. Describe the different types of enterprises

62. List the qualities of an effective leader

63. Discuss the benefits of effective leadership

64. List the traits of an effective team

65. Discuss the importance of listening effectively

66. Discuss how to listen effectively

67. Discuss the importance of speaking effectively

68. Discuss how to speak effectively

69. Discuss how to solve problems

70. List important problem solving traits

71. Discuss ways to assess problem solving skills

72. Discuss the importance of negotiation

73. Discuss how to negotiate

74. Discuss how to identify new business opportunities

75. Discuss how to identify business opportunities within your business

76. Understand the meaning of entrepreneur

77. Describe the different types of entrepreneurs

78. List the characteristics of entrepreneurs

79. Recall entrepreneur success stories

80. Discuss the entrepreneurial process

81. Describe the entrepreneurship ecosystem

82. Discuss the government's role in the entrepreneurship ecosystem

83. Discuss the current entrepreneurship ecosystem in India

84. Understand the purpose of the Make in India campaign

85. Discuss the relationship between entrepreneurship and risk appetite

86. Discuss the relationship between entrepreneurship and resilience

87. Describe the characteristics of a resilient entrepreneur

88. Discuss how to deal with failure

89. Discuss how market research is carried out

90. Describe the 4 Ps of marketing

91. Discuss the importance of idea generation

92. Recall basic business terminology

93. Discuss the need for CRM

94. Discuss the benefits of CRM

95. Discuss the need for networking

96. Discuss the benefits of networking

97. Understand the importance of setting goals

98. Differentiate between short-term, medium-term and long-term goals

99. Discuss how to write a business plan

100. Explain the financial planning process

101. Discuss ways to manage your risk

102. Describe the procedure and formalities for applying for bank finance

103. Discuss how to manage your own enterprise

104. List important questions that every entrepreneur should ask before starting an enterprise

UNIT 8.1: Personal Strengths & Value Systems

Unit Objectives ◎

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

- Explain the meaning of health
- List common health issues
- Discuss tips to prevent common health issues
- Explain the meaning of hygiene
- Understand the purpose of Swacch Bharat Abhiyan
- Explain the meaning of habit
- Discuss ways to set up a safe work environment
- Discuss critical safety habits to be followed by employees
- Explain the importance of self-analysis
- Understand motivation with the help of Maslow's Hierarchy of Needs
- Discuss the meaning of achievement motivation
- List the characteristics of entrepreneurs with achievement motivation
- List the different factors that motivate you
- Discuss the role of attitude in self-analysis
- Discuss how to maintain a positive attitude
- List your strengths and weaknesses
- Discuss the qualities of honest people
- Describe the importance of honesty in entrepreneurs
- Discuss the elements of a strong work ethic
- Discuss how to foster a good work ethic
- List the characteristics of highly creative people
- List the characteristics of highly innovative people
- Discuss the benefits of time management
- List the traits of effective time managers
- Describe effective time management technique
- Discuss the importance of anger management
- Describe anger management strategies
- Discuss tips for anger management
- Discuss the causes of stress
- Discuss the symptoms of stress
- Discuss tips for stress management

8.1.1 Health, Habits, Hygiene: What is Health

As per the World Health Organization (WHO), health is a "State of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity." This means being healthy does not simply mean not being unhealthy – it also means you need to be at peace emotionally, and feel fit physically. For example, you cannot say you are healthy simply because you do not have any physical ailments like a cold or cough. You also need to think about whether you are feeling calm, relaxed and happy.

Common Health Issues

Some common health issues are:

- Allergies
- Asthma
- Skin Disorders
- Depression and Anxiety
- Diabetes
- Cough, Cold, Sore Throat
- Difficulty Sleeping
- Obesity

Tips to Prevent Health Issues

Taking measures to prevent ill health is always better than curing a disease or sickness. You can stay healthy by:

- Eating healthy foods like fruits, vegetables and nuts
- Cutting back on unhealthy and sugary foods
- Drinking enough water everyday
- Not smoking or drinking alcohol
- Exercising for at least 30 minutes a day, 4-5 times a week
- Taking vaccinations when required
- Practicing yoga exercises and meditation

How many of these health standards do you follow? Tick the ones that apply to you.

1. Get minimum 7-8 hours of sleep every night. ☐
2. Avoid checking email first thing in the morning and right before you go to bed at night. ☐
3. Don't skip meals – eat regular meals at correct meal times. ☐
4. Read a little bit every single day. ☐
5. Eat more home cooked food than junk food. ☐

6. Stand more than you sit. ☐

7. Drink a glass of water first thing in the morning and have at least 8 glasses of water through the day. ☐

8. Go to the doctor and dentist for regular checkups. ☐

9. Exercise for 30 minutes at least 5 days a week. ☐

10. Avoid consuming lots of aerated beverages. ☐

What is Hygiene?

As per the World Health Organization (WHO), "Hygiene refers to conditions and practices that help to maintain health and prevent the spread of diseases." In other words, hygiene means ensuring that you do whatever is required to keep your surroundings clean, so that you reduce the chances of spreading germs and diseases.

For instance, think about the kitchen in your home. Good hygiene means ensuring that the kitchen is always spick and span, the food is put away, dishes are washed and dustbins are not overflowing with garbage. Doing all this will reduce the chances of attracting pests like rats or cockroaches, and prevent the growth of fungus and other bacteria, which could spread disease.

How many of these health standards do you follow? Tick the ones that apply to you.

1. Have a bath or shower every day with soap – and wash your hair with shampoo 2-3 times a week. ☐

2. Wear a fresh pair of clean undergarments every day. ☐

3. Brush your teeth in the morning and before going to bed. ☐

4. Cut your fingernails and toenails regularly. ☐

5. Wash your hands with soap after going to the toilet. ☐

6. Use an anti-perspirant deodorant on your underarms if you sweat a lot. ☐

7. Wash your hands with soap before cooking or eating. ☐

8. Stay home when you are sick, so other people don't catch what you have. ☐

9. Wash dirty clothes with laundry soap before wearing them again. ☐

10. Cover your nose with a tissue/your hand when coughing or sneezing. ☐

See how healthy and hygienic you are, by giving yourself 1 point for every ticked statement! Then take a look at what your score means.

Your Score

0-7/20: You need to work a lot harder to stay fit and fine! Make it a point to practice good habits daily and see how much better you feel!

7-14/20: Not bad, but there is scope for improvement! Try and add a few more good habits to your daily routine.

14-20/20: Great job! Keep up the good work! Your body and mind thank you!

Swachh Bharat Abhiyan

We have already discussed the importance of following good hygiene and health practices for ourselves. But, it is not enough for us to be healthy and hygienic. We must also extend this standard to our homes, our immediate surroundings and to our country as a whole.

The 'Swachh Bharat Abhiyan' (Clean India Mission) launched by Prime Minister Shri Narendra Modi on 2nd October 2014, believes in doing exactly this. The aim of this mission is to clean the streets and roads of India and raise the overall level of cleanliness. Currently this mission covers 4,041 cities and towns across the country. Millions of our people have taken the pledge for a clean India. You should take the pledge too, and do everything possible to keep our country clean!

What are Habits?

A habit is a behaviour that is repeated frequently. All of us have good habits and bad habits. Keep in mind the phrase by John Dryden: "We first make our habits, and then our habits make us." This is why it is so important that you make good habits a way of life, and consciously avoid practicing bad habits.

Some good habits that you should make part of your daily routine are:

- Always having a positive attitude
- Making exercise a part of your daily routine
- Reading motivational and inspirational stories
- Smiling! Make it a habit to smile as often as possible
- Making time for family and friends
- Going to bed early and waking up early

Some bad habits that you should quit immediately are:

- Skipping breakfast
- Snacking frequently even when you are not hungry
- Eating too much fattening and sugary food
- Smoking, drinking alcohol and doing drugs
- Spending more money than you can afford
- Worrying about unimportant issues
- Staying up late and waking up late

Tips

- Following healthy and hygienic practices every day will make you feel good mentally and physically.
- Hygiene is two-thirds of health – so good hygiene will help you stay strong and healthy!

8.1.2: Safety: Tips to Design a Safe Workplace

Every employer is obligated to ensure that his workplace follows the highest possible safety protocol. When setting up a business, owners must make it a point to:

- Use ergonomically designed furniture and equipment to avoid stooping and twisting
- Provide mechanical aids to avoid lifting or carrying heavy objects
- Have protective equipment on hand for hazardous jobs
- Designate emergency exits and ensure they are easily accessible
- Set down health codes and ensure they are implemented
- Follow the practice of regular safety inspections in and around the workplace
- Ensure regular building inspections are conducted
- Get expert advice on workplace safety and follow it

Non-Negotiable Employee Safety Habits

Every employer is obligated to ensure that his workplace follows the highest possible safety protocol. When setting up a business, owners must make it a point to:

- Immediately report unsafe conditions to a supervisor
- Recognize and report safety hazards that could lead to slips, trips and falls
- Report all injuries and accidents to a supervisor
- Wear the correct protective equipment when required
- Learn how to correctly use equipment provided for safety purposes
- Be aware of and avoid actions that could endanger other people
- Take rest breaks during the day and some time off from work during the week

Tips

- Be aware of what emergency number to call at the time of a workplace emergency
- Practice evacuation drills regularly to avoid chaotic evacuations

8.1.3 Self Analysis – Attitude, Achievement Motivation: What is Self-Analysis
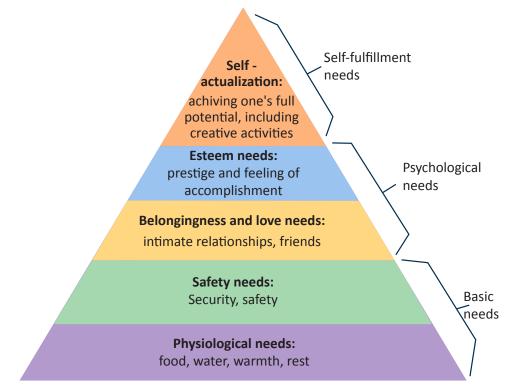
To truly achieve your full potential, you need to take a deep look inside yourself and find out what kind of person you really are. This attempt to understand your personality is known as self-analysis. Assessing yourself in this manner will help you grow, and will also help you to identify areas within yourself that need to be further developed, changed or eliminated. You can better understand yourself by taking a deep look at what motivates you, what your attitude is like, and what your strengths and weaknesses are.

What is Motivation?

Very simply put, motivation is your reason for acting or behaving in a certain manner. It is important to understand that not everyone is motivated by the same desires – people are motivated by many, many different things. We can understand this better by looking at Maslow's Hierarchy of Needs.

Maslow's Hierarchy of Needs

Famous American psychologist Abraham Maslow wanted to understand what motivates people. He believed that people have five types of needs, ranging from very basic needs (called physiological needs) to more important needs that are required for self-growth (called self-actualization needs). Between the physiological and self-actualization needs are three other needs – safety needs, belongingness and love needs, and esteem needs. These needs are usually shown as a pyramid with five levels and are known as Maslow's Hierarchy of Needs.

Self-fulfillment needs

Self - actualization: achiving one's full potential, including creative activities

Psychological needs

Esteem needs: prestige and feeling of accomplishment

Belongingness and love needs: intimate relationships, friends

Basic needs

Safety needs: Security, safety

Physiological needs: food, water, warmth, rest

As you can see from the pyramid, the lowest level depicts the most basic needs. Maslow believed that our behaviour is motivated by our basic needs, until those needs are met. Once they are fulfilled, we move to the next level and are motived by the next level of needs. Let's understand this better with an example.

Rupa comes from a very poor family. She never has enough food, water, warmth or rest. According to Maslow, until Rupa is sure that she will get these basic needs, she will not even think about the next level of needs – her safety needs. But, once Rupa is confident that her basic needs will be met, she will move to the next level, and her behaviour will then be motivated by her need for security and safety. Once these new needs are met, Rupa will once again move to the next level, and be motivated by her need for relationships and friends. Once this need is satisfied, Rupa will then focus on the fourth level of needs – her esteem needs, after which she will move up to the fifth and last level of needs – the desire to achieve her full potential.

Understanding Achievement Motivation

We now know that people are motivated by basic, psychological and self-fulfillment needs. However, certain people are also motivated by the achievement of highly challenging accomplishments. This is known as Achievement Motivation, or 'need for achievement'.

The level of motivation achievement in a person differs from individual to individual. It is important that entrepreneurs have a high level of achievement motivation – a deep desire to accomplish something important and unique. It is equally important that they hire people who are also highly motivated by challenges and success.

What Motivates You?

What are the things that really motivate you? List down five things that really motivate you. Remember to answer honestly!

I am motivated by:

_____

_____

_____

_____

_____

_____

_____

_____

_____

Characteristics of Entrepreneurs with Achievement Motivation

Entrepreneurs with achievement motivation can be described as follows:

- Unafraid to take risks for personal accomplishment
- Love being challenged
- Future-oriented
- Flexible and adaptive

- Value negative feedback more than positive feedback

- Very persistent when it comes to achieving goals
- Extremely courageous
- Highly creative and innovative
- Restless – constantly looking to achieve more
- Feel personally responsible for solving problems

Think about it:

How to Cultivate a Positive Attitude

The good news is attitude is a choice. So it is possible to improve, control and change our attitude, if we decide we want to! The following tips help foster a positive mindset:

- Remember that you control your attitude, not the other way around
- Devote at least 15 minutes a day towards reading, watching or listening to something positive
- Avoid negative people who only complain and stop complaining yourself
- Expand your vocabulary with positive words and delete negative phrases from your mind
- Be appreciative and focus on what's good in yourself, in your life, and in others
- Stop thinking of yourself as a victim and start being proactive
- Imagine yourself succeeding and achieving your goals

What is Attitude?

Now that we understand why motivation is so important for self-analysis, let's look at the role our attitude plays in better understanding ourselves. Attitude can be described as your tendency (positive or negative), to think and feel about someone or something. Attitude is the foundation for success in every aspect of life. Our attitude can be our best friend or our worst enemy. In other words:

"The only disability in life is a bad attitude."

When you start a business, you are sure to encounter a wide variety of emotions, from difficult times and failures to good times and successes. Your attitude is what will see you through the tough times and guide you towards success. Attitude is also infectious. It affects everyone around you, from your customers to your employees to your investors. A positive attitude helps build confidence in the workplace while a negative attitude is likely to result in the demotivation of your people.

What Are Your Strengths and Weaknesses?

Another way to analyse yourself is by honestly identifying your strengths and weaknesses. This will help you use your strengths to your best advantage and reduce your weaknesses.

Note down all your strengths and weaknesses in the two columns below. Remember to be honest with yourself!

Strengths	Weaknesses

Tips

- Achievement motivation can be learned.
- Don't be afraid to make mistakes.
- Train yourself to finish what you start.
- Dream big.

8.1.4 Honesty & Work Ethics: What is Honesty?

Honesty is the quality of being fair and truthful. It means speaking and acting in a manner that inspires trust. A person who is described as honest is seen as truthful and sincere, and as someone who isn't deceitful or devious and doesn't steal or cheat. There are two dimensions of honesty – one is honesty in communication and the other is honesty in conduct.

Honesty is an extremely important trait because it results in peace of mind and builds relationships that are based on trust. Being dishonest, on the other hand, results in anxiety and leads to relationships full of distrust and conflict.

Qualities of Honest People

Honest individuals have certain distinct characteristics. Some common qualities among honest people are:

1. They don't worry about what others think of them. They believe in being themselves – they don't bother about whether they are liked or disliked for their personalities.

2. They stand up for their beliefs. They won't think twice about giving their honest opinion, even if they are aware that their point of view lies with the minority.

3. They are think skinned. This means they are not affected by others judging them harshly for their honest opinions.

4. They forge trusting, meaningful and healthy friendships. Honest people usually surround themselves with honest friends. They have faith that their friends will be truthful and upfront with them at all times.

They are trusted by their peers. They are seen as people who can be counted on for truthful and objective feedback and advice.

- Honesty and employees: When entrepreneurs build honest relationships with their employees, it leads to more transparency in the workplace, which results in higher work performance and better results.

- Honesty and investors: For entrepreneurs, being honest with investors means not only sharing strengths but also candidly disclosing current and potential weaknesses, problem areas and solution strategies. Keep in mind that investors have a lot of experience with startups and are aware that all new companies have problems. Claiming that everything is perfectly fine and running smoothly is a red flag for most investors.

- Honesty with oneself: The consequences of being dishonest with oneself can lead to dire results, especially in the case of entrepreneurs. For entrepreneurs to succeed, it is critical that they remain realistic about their situation at all times, and accurately judge every aspect of their enterprise for what it truly is.

Importance of Honesty in Entrepreneurs

One of the most important characteristics of entrepreneurs is honesty. When entrepreneurs are honest with their customers, employees and investors, it shows that they respect those that they work with. It is also important that entrepreneurs remain honest with themselves. Let's look at how being honest would lead to great benefits for entrepreneurs.

- Honesty and customers: When entrepreneurs are honest with their customers it leads to stronger relationships, which in turn results in business growth and a stronger customer network.

What are Work Ethics?

Being ethical in the workplace means displaying values like honesty, integrity and respect in all your decisions and communications. It means not displaying negative qualities like lying, cheating and stealing.

Workplace ethics play a big role in the profitability of a company. It is as crucial to an enterprise as high morale and teamwork. This is why most companies lay down specific workplace ethic guidelines that must compulsorily be followed by their employees. These guidelines are typically outlined in a company's employee handbook.

Elements of a Strong Work Ethic

An entrepreneur must display strong work ethics, as well as hire only those individuals who believe in and display the same level of ethical behaviour in the workplace. Some elements of a strong work ethic are:

- **Professionalism**: This involves everything from how you present yourself in a corporate setting to the manner in which you treat others in the workplace.

- **Respectfulness**: This means remaining poised and diplomatic regardless of how stressful or volatile a situation is.

- **Dependability**: This means always keeping your word, whether it's arriving on time for a meeting or delivering work on time.

- **Dedication**: This means refusing to quit until the designated work is done, and completing the work at the highest possible level of excellence.

- **Determination**: This means embracing obstacles as challenges rather than letting them stop you, and pushing ahead with purpose and resilience to get the desired results.

- **Accountability**: This means taking responsibility for your actions and the consequences of your actions, and not making excuses for your mistakes.

- **Humility**: This means acknowledging everyone's efforts and had work, and sharing the credit for accomplishments.

How to Foster a Good Work Ethic

As an entrepreneur, it is important that you clearly define the kind of behaviour that you expect from each and every team member in the workplace. You should make it clear that you expect employees to display positive work ethics like:

- **Honesty**: All work assigned to a person should be done with complete honesty, without any deceit or lies.

- **Good attitude**: All team members should be optimistic, energetic, and positive.

- **Reliability**: Employees should show up where they are supposed to be, when they are supposed to be there.

- **Good work habits**: Employees should always be well groomed, never use inappropriate language, conduct themselves professionally at all times, etc.

- **Initiative**: Doing the bare minimum is not enough. Every team member needs to be proactive and show initiative.

- **Trustworthiness**: Trust is non-negotiable. If an employee cannot be trusted, it's time to let that employee go.

- **Respect**: Employees need to respect the company, the law, their work, their colleagues and themselves.

- **Integrity**: Each and every team member should be completely ethical and must display above board behaviour at all times.

- **Efficiency**: Efficient employees help a company grow while inefficient employees result in a waste of time and resources.

Tips

- Don't get angry when someone tells you the truth and you don't like what you hear.
- Always be willing to accept responsibility for your mistakes.

8.1.5 Creativity & Innovation : What is Creativity

Creativity means thinking outside the box. It means viewing things in new ways or from different perspectives, and then converting these ideas into reality. Creativity involves two parts: thinking and producing. Simply having an idea makes you imaginative, not creative. However, having an idea and acting on it makes you creative.

Characteristics of Highly Creative People

Some characteristics of creative people are:

- They are imaginative and playful
- They see issues from different angles
- They notice small details
- They have very little tolerance for boredom
- They detest rules and routine
- They love to daydream
- They are very curious

What is Innovation?

There are many different definitions of innovation. In simple terms, innovation means turning an idea into a solution that adds value. It can also mean adding value by implementing a new product, service or process, or significantly improving on an existing product, service or process.

Characteristics of Highly Innovative People

Some characteristics of highly innovative people are:

- They embrace doing things differently
- They don't believe in taking shortcuts
- They are not afraid to be unconventional
- They are highly proactive and persistent
- They are organized, cautious and risk-averse

Tips

- Take regular breaks from your creative work to recharge yourself and gain fresh perspective.
- Build prototypes frequently, test them out, get feedback, and make the required changes.

8.1.6 Time Management: What is Time Management?

Time management is the process organizing your time, and deciding how to allocate your time between different activities. Good time management is the difference between working smart (getting more done in less time) and working hard (working for more time to get more done).

Effective time management leads to an efficient work output, even when you are faced with tight deadlines and high pressure situations. On the other hand, not managing your time effectively results in inefficient output and increases stress and anxiety.

Benefits of Time Management

Time management can lead to huge benefits like:

- Greater productivity
- Better professional reputation
- Higher chances for career advancement
- Higher efficiency
- Reduced stress
- Greater opportunities to achieve goals

Not managing time effectively can result in undesirable consequences like:

- Missing deadlines
- Substandard work quality
- Stalled career
- Inefficient work output
- Poor professional reputation
- Increase in stress and anxiety

Traits of Effective Time Managers

Some traits of effective time managers are:

- They begin projects early
- They set daily objectives
- They modify plans if required, to achieve better results
- They are flexible and open-minded
- They inform people in advance if their help will be required
- They know how to say no
- They break tasks into steps with specific deadlines
- They continually review long term goals
- They think of alternate solutions if and when required
- They ask for help when required
- They create backup plans

Effective Time Management Techniques

You can manage your time better by putting into practice certain time management techniques. Some helpful tips are:

- Plan out your day as well as plan for interruptions. Give yourself at least 30 minutes to figure out your time plan. In your plan, schedule some time for interruptions.
- Put up a "Do Not Disturb" sign when you absolutely have to complete a certain amount of work.
- Close your mind to all distractions. Train yourself to ignore ringing phones, don't reply to chat messages and disconnect from social media sites.

- Delegate your work. This will not only help your work get done faster, but will also show you the unique skills and abilities of those around you.
- Stop procrastinating. Remind yourself that procrastination typically arises due to the fear of failure or the belief that you cannot do things as perfectly as you wish to do them.
- Prioritize. List each task to be completed in order of its urgency or importance level. Then focus on completing each task, one by one.
- Maintain a log of your work activities. Analyse the log to help you understand how efficient you are, and how much time is wasted every day.
- Create time management goals to reduce time wastage.

Tips

- Always complete the most important tasks first.
- Get at least 7 – 8 hours of sleep every day.
- Start your day early.
- Don't waste too much time on small, unimportant details.
- Set a time limit for every task that you will undertake.
- Give yourself some time to unwind between tasks.

8.1.7 Anger Management: What is Anger Management

Anger management is the process of:

1. Learning to recognize the signs that you, or someone else, is becoming angry

2. Taking the best course of action to calm down the situation in a positive way

Anger management does not mean suppressing anger.

Importance of Anger Management

Anger is a perfectly normal human emotion. In fact, when managed the right way, anger can be considered a healthy emotion. However, if it is not kept in check, anger can make us act inappropriately and can lead to us saying or doing things that we will likely later regret.

Extreme anger can:

- **Hurt you physically**: It leads to heart disease, diabetes, a weakened immune system, insomnia, and high blood pressure.
- **Hurt you mentally**: It can cloud your thinking and lead to stress, depression and mental health issues.
- **Hurt your career**: It can result in alienating your colleagues, bosses, clients and lead to the loss of respect.
- **Hurt your relationships**: It makes it hard for your family and friends to trust you, be honest with you and feel comfortable around you.

This is why anger management, or managing anger appropriately, is so important.

Anger Management Strategies

Here are some strategies that can help you control your anger:

Strategy 1: Relaxation

Something as simple as breathing deeply and looking at relaxing images works wonders in calming down angry feelings. Try this simple breathing exercise:

1. Take a deep breath from your diaphragm (don't breathe from your chest)

2. Visualize your breath coming up from your stomach

3. Keep repeating a calming word like 'relax' or 'take it easy' (remember to keep breathing deeply while repeating the word)

4. Picture a relaxing moment (this can be from your memory or your imagination)

Follow this relaxation technique daily, especially when you realize that you're starting to feel angry.

Strategy 2: Cognitive Restructuring

Cognitive restructuring means changing the manner in which you think. Anger can make you curse, swear, exaggerate and act very dramatically. When this happens, force yourself to replace your angry thoughts with more logical ones. For instance, instead of thinking 'Everything is ruined' change your mindset and tell yourself 'It's not the end of the world and getting angry won't solve this'.

Strategy 3: Problem Solving

Getting angry about a problem that you cannot control is a perfectly natural response. Sometimes, try as you may, there may not be a solution to the difficulty you are faced with. In such cases, stop focusing on solving the problem, and instead focus on handling and facing the problem. Remind yourself that you will do your best to deal with the situation, but that you will not blame yourself if you don't get the solution you desire.

Strategy 4: Better Communication

When you're angry, it is very easy to jump to inaccurate conclusions. In this case, you need to force yourself to stop reacting, and think carefully about what you want to say, before saying it. Avoid saying the first thing that enters your head. Force yourself to listen carefully to what the other person is saying. Then think about the conversation before responding.

Strategy 5: Changing Your Environment

If you find that your environment is the cause of your anger, try and give yourself a break from your surroundings. Make an active decision to schedule some personal time for yourself, especially on days that are very hectic and stressful. Having even a brief amount of quiet or alone time is sure to help calm you down.

Tips for Anger Management

The following tips will help you keep your anger in check:

- Take some time to collect your thoughts before you speak out in anger.
- Express the reason for your anger in an assertive, but non-confrontational manner once you have calmed down.
- Do some form of physical exercise like running or walking briskly when you feel yourself getting angry.
- Make short breaks part of your daily routine, especially during days that are stressful.
- Focus on how to solve a problem that's making you angry, rather than focusing on the fact that the problem is making you angry.

Tips

- Try to forgive those who anger you, rather than hold a grudge against them.
- Avoid using sarcasm and hurling insults. Instead, try and explain the reason for your frustration in a polite and mature manner.

8.1.8 Stress Management: What is Stress

We say we are 'stressed' when we feel overloaded and unsure of our ability to deal with the pressures placed on us. Anything that challenges or threatens our well-being can be defined as a stress. It is important to note that stress can be good and bad. While good stress keeps us going, negative stress undermines our mental and physical health. This is why it is so important to manage negative stress effectively.

Causes of Stress

Stress can be caused by internal and external factors.

Internal causes of stress

- Constant worry
- Rigid thinking
- Unrealistic expectations

- Pessimism
- Negative self-talk
- All in or all out attitude

External causes of stress

- Major life changes
- Difficulties with relationships
- Having too much to do

- Difficulties at work or in school
- Financial difficulties
- Worrying about one's children and/or family

Symptoms of Stress

Stress can manifest itself in numerous ways. Take a look at the cognitive, emotional, physical and behavioural symptoms of stress.

Cognitive Symptoms	Emotional Symptoms
• Memory problems	• Depression
• Concentration issues	• Agitation
• Lack of judgement	• Irritability
• Pessimism	• Loneliness
• Anxiety	• Anxiety
• Constant worrying	• Anger

Physical Symptoms	Behavioural Symptoms
• Aches and pain	• Increase or decrease in appetite
• Diarrhea or constipation	• Over sleeping or not sleeping enough
• Nausea	• Withdrawing socially
• Dizziness	• Ignoring responsibilities
• Chest pain and/or rapid heartbeat	• Consumption of alcohol or cigarettes
• Frequent cold or flu like feelings	• Nervous habits like nail biting, pacing etc.

Tips to Manage Stress

The following tips can help you manage your stress better:

- Note down the different ways in which you can handle the various sources of your stress.
- Remember that you cannot control everything, but you can control how you respond.
- Discuss your feelings, opinions and beliefs rather than reacting angrily, defensively or passively.
- Practice relaxation techniques like meditation, yoga or tai chi when you start feeling stressed.
- Devote a part of your day towards exercise.
- Eat healthy foods like fruits and vegetables. Avoid unhealthy foods especially those containing large amounts of sugar.
- Plan your day so that you can manage your time better, with less stress.
- Say no to people and things when required.
- Schedule time to pursue your hobbies and interests.
- Ensure you get at least 7-8 hours of sleep.
- Reduce your caffeine intake.
- Increase the time spent with family and friends.

Tips

- Force yourself to smile even if you feel stressed. Smiling makes us feel relaxed and happy.
- Stop yourself from feeling and thinking like a victim. Change your attitude and focus on being proactive.

8.2. Digital Literacy: A Recap

Unit Objectives

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

1. Identify the basic parts of a computer

2. Identify the basic parts of a keyboard

3. Recall basic computer terminology

4. Recall basic computer terminology

5. Recall the functions of basic computer keys

6. Discuss the main applications of MS Office

7. Discuss the benefits of Microsoft Outlook

8. Discuss the different types of e-commerce

9. List the benefits of e-commerce for retailers and customers

10. Discuss how the Digital India campaign will help boost e-commerce in India

11. Describe Explain how you will sell a product or service on an e-commerce platform

8.2.1 Computer and Internet basics:
Basic Parts of a Computer

Monitor
Power Button
Mouse
Keyboard

Basic Parts of a Keyboard

Caps   Backspace

Shift   Space   Enter   Arrow Keys

Basic Parts of a Computer

- **Central Processing Unit (CPU)**: The brain of the computer. It interprets and carries out program instructions.
- **Hard Drive**: A device that stores large amounts of data.
- **Monitor**: The device that contains the computer screen where the information is visually displayed.
- **Desktop**: The first screen displayed after the operating system loads.
- **Background**: The image that fills the background of the desktop.

Basic Parts of a Computer

- **Mouse**: A hand-held device used to point to items on the monitor.
- **Speakers**: Devices that enable you to hear sound from the computer.
- **Printer**: A device that converts output from a computer into printed paper documents.
- **Icon**: A small picture or image that visually represents something on your computer.
- **Cursor**: An arrow which indicates where you are positioned on the screen.
- **Program Menu**: A list of programs on your computer that can be accessed from the Start menu.
- **Taskbar**: The horizontal bar at the bottom of the computer screen that lists applications that are currently in use.
- **Recycle Bin**: A temporary storage for deleted files.

Basic Internet Terms

- **The Internet**: A vast, international collection of computer networks that transfers information.
- **The World Wide Web**: A system that lets you access information on the Internet.
- **Website**: A location on the World Wide Web (and Internet) that contains information about a specific topic.
- **Homepage**: Provides information about a website and directs you to other pages on that website.
- **Link/Hyperlink**: A highlighted or underlined icon, graphic, or text that takes you to another file or object.
- **Web Address/URL**: The address for a website.
- **Address Box**: A box in the browser window where you can type in a web address.

Basic Computer Keys

- **Arrow Keys**: Press these keys to move your cursor.
- **Space bar**: Adds a space.
- **Enter/Return**: Moves your cursor to a new line.
- **Shift**: Press this key if you want to type a capital letter or the upper symbol of a key.
- **Caps Lock**: Press this key if you want all the letters you type to be capital letters. Press it again to revert back to typing lowercase letters.
- **Backspace**: Deletes everything to the left of your cursor.

Tips

- When visiting a .com address, there no need to type http:// or even www. Just type the name of the website and then press Ctrl + Enter. (Example: Type 'apple' and press Ctrl + Enter to go to www.apple.com)
- Press the Ctrl key and press the + or - to increase and decrease the size of text.
- Press F5 or Ctrl + R to refresh or reload a web page.

8.2.2 MS Office and Email: About MS Office

MS Office or Microsoft Office is a suite of computer programs developed by Microsoft. Although meant for all users, it offers different versions that cater specifically to students, home users and business users. All the programs are compatible with both, Windows and Macintosh.

Most Popular Office Products

Some of the most popular and universally used MS Office applications are:

- **Microsoft Word**: Allows users to type text and add images to a document.
- **Microsoft Excel**: Allows users to enter data into a spreadsheet and create calculations and graphs.
- **Microsoft PowerPoint**: Allows users to add text, pictures and media and create slideshows and presentations.
- **Microsoft Outlook**: Allows users to send and receive email.
- **Microsoft OneNote**: Allows users to make drawings and notes with the feel of a pen on paper.
- **Microsoft Access**: Allows users to store data over many tables.

Why Choose Microsoft Outlook

A popular email management choice especially in the workplace, Microsoft Outlook also includes an address book, notebook, web browser and calendar. Some major benefits of this program are:

- **Integrated search function**: You can use keywords to search for data across all Outlook programs.
- **Enhanced security**: Your email is safe from hackers, junk mail and phishing website email.
- **Email syncing**: Sync your mail with your calendar, contact list, notes in OneNote and...your phone!
- **Offline access to email**: No Internet? No problem! Write emails offline and send them when you're connected again.

Tips

- Press Ctrl+R as a shortcut method to reply to email.
- Set your desktop notifications only for very important emails.
- Flag messages quickly by selecting messages and hitting the Insert key.
- Save frequently sent emails as a template to reuse again and again.
- Conveniently save important emails as files.

8.2.3 E-Commerce: What is E-Commerce

E-commerce is the buying or selling of goods and services, or the transmitting of money or data, electronically on the internet. E-Commerce is the short form for "electronic commerce."

Examples of E-Commerce

Some examples of e-commerce are:

- Online shopping
- Online auctions
- Online ticketing
- Electronic payments
- Internet banking

Types of E-Commerce

E-commerce can be classified based on the types of participants in the transaction. The main types of e-commerce are:

- **Business to Business (B2B)**: Both the transacting parties are businesses.
- **Business to Consumer (B2C)**: Businesses sell electronically to end-consumers.
- **Consumer to Consumer (C2C)**: Consumers come together to buy, sell or trade items to other consumers.
- **Consumer-to-Business (C2B)**: Consumers make products or services available for purchase to companies looking for exactly those services or products.
- **Business-to-Administration (B2A)**: Online transactions conducted between companies and public administration.
- **Consumer-to-Administration (C2A)**: Online transactions conducted between individuals and public administration.

Benefits of E-Commerce

The e-commerce business provides some benefits for retailers and customers.

Benefits for retailers:

- Establishes an online presence
- Reduces operational costs by removing overhead costs
- Increases brand awareness through the use of good keywords
- Increases sales by removing geographical and time constraints

Benefits for customers:

- Offers a wider range of choice than any physical store
- Enables goods and services to be purchased from remote locations
- Enables consumers to perform price comparisons

Digital India Campaign

Prime Minister Narendra Modi launched the Digital India campaign in 2015, with the objective of offering every citizen of India access to digital services, knowledge and information. The campaign aims to improve the country's online infrastructure and increase internet connectivity, thus boosting the e-commerce industry.

Currently, the majority of online transactions come from tier 2 and tier 3 cities. Once the Digital India campaign is in place, the government will deliver services through mobile connectivity, which will help deliver internet to remote corners of the country. This will help the e-commerce market to enter India's tier 4 towns and rural areas.

E-Commerce Activity

Choose a product or service that you want to sell online. Write a brief note explaining how you will use existing e-commerce platforms, or create a new e-commerce platform, to sell your product or service.

Tips

- Before launching your e-commerce platform, test everything.
- Pay close and personal attention to your social media.

8.3: Money Matters

Unit Objectives

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

1. Discuss the importance of saving money
2. Discuss the benefits of saving money
3. Discuss the main types of bank accounts
4. Describe the process of opening a bank account
5. Differentiate between fixed and variable costs
6. Describe the main types of investment options
7. Describe the different types of insurance products
8. Describe the different types of taxes
9. Discuss the uses of online banking
10. Discuss the main types of electronic funds transfers

8.3.1 Personal Finance – Why to Save: Importance of Saving

We all know that the future is unpredictable. You never know what will happen tomorrow, next week or next year. That's why saving money steadily through the years is so important. Saving money will help improve your financial situation over time. But more importantly, knowing that you have money stashed away for an emergency will give you peace of mind. Saving money also opens the door to many more options and possibilities.

Benefits of Saving

Inculcating the habit of saving leads to a vast number of benefits. Saving helps you:

- **Become financially independent**: When you have enough money saved up to feel secure you can start making your choices, from taking a vacation whenever you want, to switching careers or starting your own business.
- **Invest in yourself through education**: Through saving, you can earn enough to pay up for courses that will add to your professional experience and ultimately result in higher paying jobs.
- **Get out of debt**: Once you have saved enough as a reserve fund, you can use your savings to pay off debts like loans or bills that have accumulated over time.
- **Be prepared for surprise expenses**: Having money saved enables you to pay for unforeseen expenses like sudden car or house repairs, without feeling financially stressed.
- **Pay for emergencies**: Saving helps you deal with emergencies like sudden health issues or emergency trips without feeling financially burdened.

- **Afford large purchases and achieve major goals**: Saving diligently makes it possible to place down payments towards major purchases and goals, like buying a home or a car.
- **Retire**: The money you have saved over the years will keep you comfortable when you no longer have the income you would get from your job.

Tips

- Break your spending habit. Try not spending on one expensive item per week, and put the money that you would have spent into your savings.
- Decide that you will not buy anything on certain days or weeks and stick to your word.

8.3.2 Types of Bank Accounts, Opening a Bank Account: Types of Bank Accounts

In India, banks offer four main types of bank accounts. These are:

• Current Accounts

• Savings Accounts

• Recurring Deposit Accounts

• Fixed Deposit Accounts

Current Accounts

Current accounts offer the most liquid deposits and thus, are best suited for businessmen and companies. As these accounts are not meant for investments and savings, there is no imposed limit on the number or amount of transactions that can be made on any given day. Current account holders are not paid any interest on the amounts held in their accounts. They are charged for certain services offered on such accounts.

Savings Accounts

Savings accounts are meant to promote savings, and are therefore the number one choice for salaried individuals, pensioners and students. While there is no restriction on the number and amount of deposits made, there are usually restrictions on the number and amount of withdrawals. Savings account holders are paid interest on their savings.

Recurring Deposit Accounts

Recurring Deposit accounts, also called RD accounts, are the accounts of choice for those who want to save an amount every month, but are unable to invest a large sum at one time. Such account holders deposit a small, fixed amount every month for a pre-determined period (minimum 6 months). Defaulting on a monthly payment results in the account holder being charged a penalty amount. The total amount is repaid with interest at the end of the specified period.

Fixed Deposit Accounts

Fixed Deposit accounts, also called FD accounts, are ideal for those who wish to deposit their savings for a long term in return for a high rate of interest. The rate of interest offered depends on the amount deposited and the time period, and also differs from bank to bank. In the case of an FD, a certain amount of money is deposited by the account holder for a fixed period of time. The money can be withdrawn when the period expires. If necessary, the depositor can break the fixed deposit prematurely. However, this usually attracts a penalty amount which also differs from bank to bank.

Opening a Bank Account

Opening a bank account is quite a simple process. Take a look at the steps to open an account of your own:

Step 1: Fill in the Account Opening Form

This form requires you to provide the following information:

• Personal details (name, address, phone number, date of birth, gender, occupation, address)

• Method of receiving your account statement (hard copy/email)

• Details of your initial deposit (cash/cheque)

• Manner of operating your account (online/mobile banking/traditional via cheque, slip books)

Ensure that you sign wherever required on the form.

Step 2: Affix your Photograph

Stick a recent photograph of yourself in the allotted space on the form.

Step 3: Provide your Know Your Customer (KYC) Details

KYC is a process that helps banks verify the identity and address of their customers. To open an account, every individual needs to submit certain approved documents with respect to photo identity (ID) and address proof. Some Officially Valid Documents (OVDs) are:

• Passport
• Driving License
• Voters' Identity Card
• PAN Card
• UIDAI (Aadhaar) Card

Step 4: Submit All your Documents

Submit the completed Account Opening Form and KYC documents. Then wait until the forms are processed and your account has been opened!

Tips

• Select the right type of account.
• Fill in complete nomination details.
• Ask about fees.
• Understand the rules.
• Check for online banking – it's convenient!
• Keep an eye on your bank balance.

8.3.3 Costs: Fixed vs Variable: What are Fixed and Variable Costs

Fixed costs and variable costs together make up a company's total cost. These are the two types of costs that companies have to bear when producing goods and services.

A fixed cost does not change with the volume of goods or services a company produces. It always remains the same.

A variable cost, on the other hand, increases and decreases depending on the volume of goods and services produced. In other words, it varies with the amount produced.

Differences Between Fixed and Variable Costs

Let's take a look at some of the main differences between fixed and variable costs:

Criteria	Fixed Costs	Variable Costs
Meaning	A cost that stays the same, regardless of the output produced.	A cost that changes when the output changes.
Nature	Time related.	Volume related.
Incurred	Incurred irrespective of units being produced.	Incurred only when units are produced.
Unit cost	Inversely proportional to the number of units produced.	Remains the same, per unit.
Examples	Depreciation, rent, salary, insurance, tax etc.	Material consumed, wages, commission on sales, packing expenses, etc.

Tips

- When trying to determine whether a cost is fixed or variable, simply ask the following question: Will the particular cost change if the company stopped its production activities? If the answer is no, then it is a fixed cost. If the answer is yes, then it is probably a variable cost.

8.3.4 Investment, Insurance and Taxes:

Investment

Investment means that money is spent today with the aim of reaping financial gains at a future time. The main types of investment options are as follows:

- **Bonds:** Bonds are instruments used by public and private companies to raise large sums of money – too large to be borrowed from a bank. These bonds are then issued in the public market and are bought by lenders.
- **Stocks:** Stocks or equity are shares that are issued by companies and are bought by the general public.
- **Small Savings Schemes:** Small Savings Schemes are tools meant to save money in small amounts. Some popular schemes are the Employees Provident Fund, Sukanya Samriddhi Scheme and National Pension Scheme.
- **Mutual Funds:** Mutual Funds are professionally managed financial instruments that invest money in different securities on behalf of investors.
- **Fixed Deposits:** A fixed amount of money is kept aside with a financial institution for a fixed amount of time in return for interest on the money.
- **Real Estate:** Loans are taken from banks to purchase real estate, which is then leased or sold with the aim of making a profit on the appreciated property price.
- **Hedge Funds:** Hedge funds invest in both financial derivatives and/or publicly traded securities.
- **Private Equity:** Private Equity is trading in the shares of an operating company that is not publicly listed and whose shares are not available on the stock market.
- **Venture Capital:** Venture Capital involves investing substantial capital in a budding company in return for stocks in that company.

Insurance

There are two types of insurance – Life Insurance and Non-Life or General Insurance.

Life Insurance

Life Insurance deals with all insurance covering human life.

Life Insurance Products

The main life insurance products are:

- **Term Insurance:** This is the simplest and cheapest form of insurance. It offers financial protection for a specified tenure, say 15 to 20 years. In the case of your death, your family is paid the sum assured. In the case of your surviving the term, the insurer pays nothing.
- **Endowment Policy:** This offers the dual benefit of insurance and investment. Part of the premium is allocated towards the sum assured, while the remaining premium gets invested in equity and debt. It pays a lump sum amount after the specified duration or on the death of the policyholder, whichever is earlier.
- **Unit-Linked Insurance Plan (ULIP):** Here part of the premium is spent on the life cover, while the remaining amount is invested in equity and debt. It helps develop a regular saving habit.

- **Money Back Life Insurance:** While the policyholder is alive, periodic payments of the partial survival benefits are made during the policy tenure. On the death of the insured, the insurance company pays the full sum assured along with survival benefits.

- **Whole Life Insurance:** It offers the dual benefit of insurance and investment. It offers insurance cover for the whole life of the person or up to 100 years whichever is earlier.

General Insurance

General Insurance deals with all insurance covering assets like animals, agricultural crops, goods, factories, cars and so on.

General Insurance Products

The main general insurance products are:

- **Motor Insurance:** This can be divided into Four Wheeler Insurance and Two Wheeler Insurance.

- **Health Insurance:** The main types of health insurance are individual health insurance, family floater health insurance, comprehensive health insurance and critical illness insurance.

- **Travel Insurance:** This can be categorised into Individual Travel Policy, Family Travel Policy, Student Travel Insurance and Senior Citizen Health Insurance.

- **Home Insurance:** This protects the house and its contents from risk.

- **Marine Insurance:** This insurance covers goods, freight, cargo etc. against loss or damage during transit by rail, road, sea and/or air.

Taxes

There are two types of taxes – Direct Taxes and Indirect Taxes.

Direct Tax

Direct taxes are levied directly on an entity or a person and are non-transferrable.

Some examples of Direct Taxes are:

- **Income Tax:** This tax is levied on your earning in a financial year. It is applicable to both, individuals and companies.

- **Capital Gains Tax:** This tax is payable whenever you receive a sizable amount of money. It is usually of two types – short term capital gains from investments held for less than 36 months and long term capital gains from investments held for longer than 36 months.

- **Securities Transaction Tax:** This tax is added to the price of a share. It is levied every time you buy or sell shares.

- **Perquisite Tax:** This tax is levied is on perks that have been acquired by a company or used by an employee.

- **Corporate Tax:** Corporate tax is paid by companies from the revenue they earn.

Indirect Tax

Indirect taxes are levied on goods or services.

Some examples of Indirect Taxes are:

- **Sales Tax:** Sales Tax is levied on the sale of a product.

- **Service Tax:** Service Tax is added to services provided in India.
- **Value Added Tax:** Value Added Tax is levied at the discretion of the state government. The tax is levied on goods sold in the state. The tax amount is decided by the state.
- **Customs Duty & Octroi:** Customs Duty is a charge that is applied on purchases that are imported from another country. Octroi is levied on goods that cross state borders within India.
- **Excise Duty:** Excise Duty is levied on all goods manufactured or produced in India.

Tips

- Think about how quickly you need your money back and pick an investment option accordingly.
- Ensure that you are buying the right type of insurance policy for yourself.
- Remember, not paying taxes can result in penalties ranging from fines to imprisonment.

8.3.5 Online Banking, NEFT, RTGS etc.: What is Online Banking

Internet or online banking allows account holders to access their account from a laptop at any location. In this way, instructions can be issued. To access an account, account holders simply need to use their unique customer ID number and password.

Internet banking can be used to:

• Find out an account balance
• Transfer amounts from one account to another
• Arrange for the issuance of cheques
• Instruct payments to be made
• Request for a cheque book
• Request for a statement of accounts
• Make a fixed deposit

Electronic Funds Transfers

Electronic funds transfer is a convenient way of transferring money from the comfort of one's own home, using integrated banking tools like internet and mobile banking.

Transferring funds via an electronic gateway is extremely convenient. With the help of online banking, you can choose to:

• Transfer funds into your own accounts of the same bank.
• Transfer funds into different accounts of the same bank.
• Transfer funds into accounts in different banks, using NEFT.
• Transfer funds into other bank accounts using RTGS.
• Transfer funds into various accounts using IMPS.

NEFT

NEFT stands for National Electronic Funds Transfer. This money transfer system allows you to electronically transfer funds from your respective bank accounts to any other account, either in the same bank or belonging to any other bank. NEFT can be used by individuals, firms and corporate organizations to transfer funds between accounts.

In order to transfer funds via NEFT, two things are required:

• A transferring bank
• A destination bank

Before you can transfer funds through NEFT, you will need to register the beneficiary who will be receiving the funds. In order to complete this registration, you will require the following information:

• Recipient's name
• Recipient's account number
• Recipient's bank's name
• Recipient's bank's IFSC code

RTGS

RTGS stands for Real Time Gross Settlement. This is a real time funds transfer system which enables you to transfer funds from one bank to another, in real time or on a gross basis. The transferred amount is immediately deducted from the account of one bank, and instantly credited to the other bank's account. The RTGS payment gateway is maintained by the Reserve Bank of India. The transactions between banks are made electronically.

RTGS can be used by individuals, companies and firms to transfer large sums of money. Before remitting funds through RTGS, you will need to add the beneficiary and his bank account details via your online banking account. In order to complete this registration, you will require the following information:

- Name of the beneficiary
- Beneficiary's account number

IMPS

IMPS stands for Immediate Payment Service. This is a real-time, inter-bank, electronic funds transfer system used to transfer money instantly within banks across India. IMPS enables users to make instant electronic transfer payments using mobile phones through both, Mobile Banking and SMS. It can also be used through ATMs and online banking. IMPS is available 24 hours a day and 7 days a week. The system features a secure transfer gateway and immediately confirms orders that have been fulfilled.

To transfer money through IMPS, the you need to:

- Register for IMPS with your bank
- Receive a Mobile Money Identifier (MMID) from the bank
- Receive a MPIN from the bank

Once you have both these, you can login or make a request through SMS to transfer a particular amount to a beneficiary.

For the beneficiary to receive the transferred money, he must:

1. Link his mobile number with his respective account
2. Receive the MMID from the bank

In order to initiate a money transfer through IMPS, you will need to enter the following information:

1. The beneficiary's mobile number
2. The beneficiary's MMID
3. The transfer amount
4. Your MPIN

As soon as money has been deducted from your account and credited into the beneficiary's account, you will be sent a confirmation SMS with a transaction reference number, for future reference.

Differences Between NEFT, RTGS & IMPS

Criteria	NEFT	RTGS	IMPS
Settlement	Done in batches t	Real-time	Real-time
Full form	National Electronic Fund Transfer	Real Time Gross Settlement	mmediate Payment Service
Timings on Monday – Friday	8:00 am – 6:30 pm	9:00 am – 4:30 pm	24x7
Timings on Saturday	8:00 am – 1:00 pm	9:00 am – 1:30 pm	24x7
Minimum amount of money transfer limit	₹1	₹2 lacs	₹1
Maximum amount of money transfer limit	₹10 lacs	₹10 lacs per day	₹2 lacs
Maximum charges as per RBI	Upto 10,000 – ₹2.5 above 10,000 – 1 lac – ₹5 above 1 – 2 lacs – ₹15 above 2 – 5 lacs – ₹25 above 5 – 10 lacs – ₹25	above 2 – 5 lacs – ₹25 above 5 – 10 lacs – ₹50	Upto 10,000 – ₹5 above 10,000 – 1 lac – ₹5 above 1 – 2 lacs – ₹15

Tips

- Never click on any links in any e-mail message to access your online banking website.
- You will never be asked for your credit or debit card details while using online banking.
- Change your online banking password regularly.

8.4. Preparing for Employment & Self Employment

Unit Objectives

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

1. Discuss the steps to prepare for an interview
2. Discuss the steps to create an effective Resume
3. Discuss the most frequently asked interview questions
4. Discuss how to answer the most frequently asked interview questions
5. Discuss basic workplace terminology

8.4.1 Interview Preparation: How to Prepare for an Interview

The success of your getting the job that you want depends largely on how well your interview for that job goes. Therefore, before you go in for your interview, it is important that you prepare for it with a fair amount of research and planning. Take a look at the steps to follow in order to be well prepared for an interview:

1. **Research the organization that you are having the interview with.**

   - Studying the company beforehand will help you be more prepared at the time of the interview. Your knowledge of the organization will help you answer questions at the time of the interview, and will leave you looking and feeling more confident. This is sure to make you stand out from other, not as well informed, candidates.

   - Look for background information on the company. Try and find an overview of the company and its industry profile.

   - Visit the company website to get a good idea of what the company does. A company website offers a wealth of important information. Read and understand the company's mission statement. Pay attention to the company's products/services and client list. Read through any press releases to get an idea of the company's projected growth and stability.

   - Note down any questions that you have after your research has been completed.

2. **Think about whether your skills and qualifications match the job requirements.**

   - Carefully read through and analyse the job description.

   - Make a note of the knowledge, skills and abilities required to fulfill the job requirements.

   - Take a look at the organization hierarchy. Figure out where the position you are applying for fits into this hierarchy.

3. **Go through the most typical interview questions asked, and prepare your responses.**

   - Remember, in most interviews a mix of resume-based, behavioural and case study questions are asked.

   - Think about the kind of answers you would like to provide to typical questions asked in these three areas.

   - Practice these answers until you can express them confidently and clearly.

4. **Plan your attire for the interview.**

    - It is always safest to opt for formal business attire, unless expressly informed to dress in business casual (in which case you should use your best judgement).
    - Ensure that your clothes are clean and well-ironed. Pick neutral colours – nothing too bright or flashy.
    - The shoes you wear should match your clothes, and should be clean and suitable for an interview.
    - Remember, your aim is to leave everyone you meet with the impression that you are a professional and highly efficient person.

5. **Ensure that you have packed everything that you may require during the interview.**

    - Carry a few copies of your resume. Use a good quality paper for your resume print outs.
    - Always take along a notepad and a pen.
    - Take along any information you may need to refer to, in order to fill out an application form.
    - Carry a few samples of your work, if relevant.

6. **Remember the importance of non-verbal communication.**

    - Practice projecting confidence. Remind yourself to smile and make eye contact. Practice giving a firm handshake.
    - Keep in mind the importance of posture. Practice sitting up straight. Train yourself to stop nervous gestures like fidgeting and foot-tapping.
    - Practice keeping your reactions in check. Remember, your facial expressions provide a good insight into your true feelings. Practice projecting a positive image.

7. **Make a list of questions to end the interview with.**

    - Most interviews will end with the interviewer(s) asking if you have any questions. This is your chance to show that you have done your research and are interested in learning more about the company.
    - If the interviewer does not ask you this question, you can inform him/her that you have some queries that you would like to discuss. This is the time for you to refer to the notes you made while studying the company.
    - Some good questions to ask at this point are:
        o What do you consider the most important criteria for success in this job?
        o How will my performance be evaluated?
        o What are the opportunities for advancement?
        o What are the next steps in the hiring process?

Tips

- Ask insightful and probing questions.
- When communicating, use effective forms of body language like smiling, making eye contact, and actively listening and nodding. Don't slouch, play with nearby items, fidget, chew gum, or mumble.

8.4.2 Preparing an Effective Resume: How to Create an Effective Resume

A resume is a formal document that lists a candidate's work experience, education and skills. A good resume gives a potential employer enough information to believe the applicant is worth interviewing. That's why it is so important to create a résumé that is effective. Take a look at the steps to create an effective resume:

Step 1: Write the Address Section

The Address section occupies the top of your resume. It includes information like your name, address, phone number and e-mail address. Insert a bold line under the section to separate it from rest of your resume.

Example:

> Jasmine Watts
>
> Breach Candy, Mumbai – India
>
> Contact No: +91 2223678270
>
> Email: jasmine.watts@gmail.com

Step 2: Add the Profile Summary Section

This part of your resume should list your overall experiences, achievements, awards, certifications and strengths. You can make your summary as short as 2-3 bullet points or as long as 8-10 bullet points.

Example:

> **Profile Summary**
> - A Content Writer graduated from University of Strathclyde having 6 years of experience in writing website copy.
> - Core expertise lies in content creation for e-learning courses, specifically for the K-12 segment.

Step 3: Include Your Educational Qualifications

When listing your academic records, first list your highest degree. Then add the second highest qualification under the highest one and so on. To provide a clear and accurate picture of your educational background, it is critical that include information on your position, rank, percentage or CPI for every degree or certification that you have listed.

If you have done any certifications and trainings, you can add a Trainings & Certifications section under your Educational Qualifications section.

Example:

> **Educational Qualifications**
> - Masters in International Management (2007) from Columbia University with 8.8 CPI.
> - Bachelor of Management Studies (2004) from Mumbai University with 87% marks.
> - 10+2 with Math, Stats (2001) from Maharashtra Board with 91% marks.
> - High School (1999) from Maharashtra Board with 93% marks.

Step 4: List Your Technical Skills

When listing your technical skills, start with the skills that you are most confident about. Then add the skills that you do not have as good a command over. It is perfectly acceptable to include just one skill, if you feel that particular skill adds tremendous value to your résumé. If you do not have any technical skills, you can omit this step.

Example:

Technical Skills
- Flash
- Photoshop

Step 5: Insert Your Academic Project Experience

List down all the important projects that you have worked on. Include the following information in this section:

- Project title
- Organization
- Platform used
- Contribution
- Description

Example:

Academic Projects

Project Title: Different Communication Skills

Organization: True Blue Solutions

Platform used: Articulate

Contribution: Content writing and graphic visualization

Description: Development of storyboards for corporate induction & training programs

Step 6: List Your Strengths

This is where you list all your major strengths. This section should be in the form of a bulleted list.

Example:

Strengths
- Excellent oral, written and presentation skills
- Action-oriented and result-focused
- Great time management skills

Step 7: List Your Extracurricular Activities

It is very important to show that you have diverse interests and that your life consists of more than academics. Including your extracurricular activities can give you an added edge over other candidates who have similar academic scores and project experiences. This section should be in the form of a bulleted list.

Example:

Extracurricular Activities
- Member of the Debate Club
- Played tennis at a national level
- Won first prize in the All India Camel Contest, 2010

Step 8: Write Your Personal Details

The last section of your résumé must include the following personal information:

- Date of birth
- Nationality
- Gender & marital status
- Languages known

Example:

Personal Details
- Date of birth: 25th May, 1981
- Gender & marital status: Female, Single
- Nationality: Indian
- Languages known: English, Hindi, Tamil, French

Tips

- Keep your resume file name short, simple and informational.
- Make sure the resume is neat and free from typing errors.
- Always create your resume on plain white paper.

8.4.3 Interview FAQs

Take a look at some of the most frequently asked interview questions, and some helpful tips on how to answer them.

Q1. Can you tell me a little about yourself?

Tips to answer:

- Don't provide your full employment or personal history.
- Offer 2-3 specific experiences that you feel are most valuable and relevant.
- Conclude with how those experiences have made you perfect for this specific role.

Q2. How did you hear about the position?

Tips to answer:

- Tell the interviewer how you heard about the job – whether it was through a friend (name the friend), event or article (name them) or a job portal (say which one).
- Explain what excites you about the position and what in particular caught your eye about this role.

Q3. What do you know about the company?

Tips to answer:

- Don't recite the company's About Us page.
- Show that you understand and care about the company's goals.
- Explain why you believe in the company's mission and values.

Q4. Why do you want this job?

Tips to answer:

- Show that you are passionate about the job.
- Identify why the role is a great fit for you.
- Explain why you love the company.

Q5. Why should we hire you?

Tips to answer:

- Prove through your words that you can not only do the work, but can definitely deliver excellent results.
- Explain why you would be a great fit with the team and work culture.
- Explain why you should be chosen over any other candidate.

Q6. What are your greatest professional strengths?

Tips to answer:

- Be honest – share some of your real strengths, rather than give answers that you think sound good.
- Offer examples of specific strengths that are relevant to the position you are applying for.
- Provide examples of how you've demonstrated these strengths.

Q7. What do you consider to be your weaknesses?

Tips to answer:

- The purpose of this question is to gauge your self-awareness and honesty.
- Give an example of a trait that you struggle with, but that you're working on to improve.

Q8. What are your salary requirements?

Tips to answer:

- Do your research beforehand and find out the typical salary range for the job you are applying for.
- Figure out where you lie on the pay scale based on your experience, education, and skills.
- Be flexible. Tell the interviewer that you know your skills are valuable, but that you want the job and are willing to negotiate.

Q9. What do you like to do outside of work?

Tips to answer:

- The purpose of this question is to see if you will fit in with the company culture.
- Be honest – open up and share activities and hobbies that interest and excite you.

Q10. If you were an animal, which one would you want to be?

Tips to answer:

- The purpose of this question is to see if you are able to think on your feet.
- There's no wrong answer – but to make a great impression try to bring out your strengths or personality traits through your answer.

Q11: What do you think we could do better or differently?

Tips to answer:

- The purpose of this question is to see if you have done your research on the company, and to test whether you can think critically and come up with new ideas.
- Suggest new ideas. Show how your interests and expertise would help you execute these ideas.

Q12: Do you have any questions for us?

Tips to answer:

- Do not ask questions to which the answers can be easily found on the company website or through a quick online search.
- Ask intelligent questions that show your ability to think critically.

Tips

- Be honest and confident while answering.
- Use examples of your past experiences wherever possible to make your answers more impactful.

8.4.4 Work Readiness – Terms & Terminologies:
Basic Workplace Terminology

Every employee should be well versed in the following terms:

- **Annual leave:** Paid vacation leave given by employers to employees.
- **Background Check:** A method used by employers to verify the accuracy of the information provided by potential candidates.
- **Benefits:** A part of an employee's compensation package.
- **Breaks:** Short periods of rest taken by employees during working hours.
- **Compensation Package:** The combination of salary and benefits that an employer provides to his/her employees.
- **Compensatory Time (Comp Time):** Time off in lieu of pay.
- **Contract Employee:** An employee who works for one organization that sells said employee's services to another company, either on a project or time basis.
- **Contract of Employment:** When an employee is offered work in exchange for wages or salary, and accepts the offer made by the employer, a contract of employment exists.
- **Corporate Culture:** The beliefs and values shared by all the members of a company, and imparted from one generation of employees to another.
- **Counter Offer/Counter Proposal:** A negotiation technique used by potential candidates to increase the amount of salary offered by a company.
- **Cover Letter:** A letter that accompanies a candidate's resume. It emphasizes the important points in the candidate's resume and provides real examples that prove the candidate's ability to perform the expected job role.
- **Curriculum Vitae (CV)/Resume:** A summary of a candidate's achievements, educational background, work experience, skills and strengths.
- **Declining Letter:** A letter sent by an employee to an employer, turning down the job offer made by the employer to the employee.
- **Deductions:** Amounts subtracted from an employee's pay and listed on the employee's pay slip.
- **Discrimination:** The act of treating one person not as favourably as another person.
- **Employee:** A person who works for another person in exchange for payment.
- **Employee Training:** A workshop or in-house training that an employee is asked to attend by his or her superior, for the benefit of the employer.
- **Employment Gaps:** Periods of unemployed time between jobs.
- **Fixed-Term Contract:** A contract of employment which gets terminated on an agreed-upon date.
- **Follow-Up:** The act of contacting a potential employer after a candidate has submitted his or her resume.
- **Freelancer/Consultant/Independent Contractor:** A person who works for him or herself and pitches for temporary jobs and projects with different employers.
- **Holiday**: Paid time-off from work.
- **Hourly Rate**: The amount of salary or wages paid for 60 minutes of work.

- **Internship**: A job opportunity offered by an employer to a potential employee, called an intern, to work at the employer's company for a fixed, limited time period.

- **Interview**: A conversation between a potential employee and a representative of an employer, in order to determine if the potential employee should be hired.

- **Job Application**: A form which asks for a candidate's information like the candidate's name, address, contact details and work experience. The purpose of a candidate submitting a job application, is to show that candidate's interest in working for a particular company.

- **Job Offer**: An offer of employment made by an employer to a potential employee.

- **Job Search Agent**: A program that enables candidates to search for employment opportunities by selecting criteria listed in the program, for job vacancies.

- **Lay Off**: A lay off occurs when an employee is temporarily let go from his or her job, due to the employer not having any work for that employee.

- **Leave**: Formal permission given to an employee, by his or her employer, to take a leave of absence from work.

- **Letter of Acceptance**: A letter given by an employer to an employee, confirming the offer of employment made by the employer, as well as the conditions of the offer.

- **Letter of Agreement**: A letter that outlines the terms of employment.

- **Letter of Recommendation**: A letter written for the purpose of validating the work skills of a person.

- **Maternity Leave**: Leave taken from work by women who are pregnant, or who have just given birth.

- **Mentor**: A person who is employed at a higher level than you, who offers you advice and guides you in your career.

- **Minimum wage**: The minimum wage amount paid on an hourly basis.

- **Notice**: An announcement made by an employee or an employer, stating that the employment contract will end on a particular date.

- **Offer of Employment**: An offer made by an employer to a prospective employee that contains important information pertaining to the job being offered, like the starting date, salary, working conditions etc.

- **Open-Ended Contract**: A contract of employment that continues till the employer or employee terminates it.

- **Overqualified**: A person who is not suited for a particular job because he or she has too many years of work experience, or a level of education that is much higher than required for the job, or is currently or was previously too highly paid.

- **Part-Time Worker**: An employee who works for fewer hours than the standard number of hours normally worked.

- **Paternity Leave**: Leave granted to a man who has recently become a father.

- **Recruiters/Headhunters/Executive Search Firms**: Professionals who are paid by employers to search for people to fill particular positions.

- **Resigning/Resignations**: When an employee formally informs his or her employer that he or she is quitting his or her job.

- **Self-Employed**: A person who has his or her own business and does not work in the capacity of an employee.

- **Time Sheet**: A form that is submitted to an employer, by an employee, that contains the number of hours worked every day by the employee.

8.5. Understanding Entrepreneurship

Unit Objectives

1. At the end of this unit, you will be able to:
2. Discuss the concept of entrepreneurship
3. Discuss the importance of entrepreneurship
4. Describe the characteristics of an entrepreneur
5. Describe the different types of enterprises
6. List the qualities of an effective leader
7. Discuss the benefits of effective leadership
8. List the traits of an effective team
9. Discuss the importance of listening effectively
10. Discuss how to listen effectively
11. Discuss the importance of speaking effectively
12. Discuss how to speak effectively
13. Discuss how to solve problems
14. List important problem solving traits
15. Discuss ways to assess problem solving skills
16. Discuss the importance of negotiation
17. Discuss how to negotiate
18. Discuss how to identify new business opportunities
19. Discuss how to identify business opportunities within your business
20. Understand the meaning of entrepreneur
21. Describe the different types of entrepreneurs
22. List the characteristics of entrepreneurs
23. Recall entrepreneur success stories
24. Discuss the entrepreneurial process
25. Describe the entrepreneurship ecosystem
26. Discuss the government's role in the entrepreneurship ecosystem
27. Discuss the current entrepreneurship ecosystem in India
28. Understand the purpose of the Make in India campaign
29. Discuss the relationship between entrepreneurship and risk appetite
30. Discuss the relationship between entrepreneurship and resilience
31. Describe the characteristics of a resilient entrepreneur
32. Discuss how to deal with failure

8.5.1 Concept Introduction, (Characteristic of an Entrepreneur, types of firms / types of enterprises): Entrepreneurs and Entrepreneurship

Anyone who is determined to start a business, no matter what the risk, is an entrepreneur. Entrepreneurs run their own start-up, take responsibility for the financial risks and use creativity, innovation and vast reserves of self-motivation to achieve success. They dream big and are determined to do whatever it takes to turn their idea into a viable offering. The aim of an entrepreneur is to create an enterprise. The process of creating this enterprise is known as entrepreneurship.

Importance of Entrepreneurship

Entrepreneurship is very important for the following reasons:

1. It results in the creation of new organizations
2. It brings creativity into the marketplace
3. It leads to improved standards of living
4. It helps develop the economy of a country

Characteristics of Entrepreneurs

All successful entrepreneurs have certain characteristics in common.

They are all:

*   Extremely passionate about their work
*   Confident in themselves
*   Disciplined and dedicated
*   Motivated and driven
*   Highly creative
*   Visionaries
*   Open-minded
*   Decisive

Entrepreneurs also have a tendency to:

*   Have a high risk tolerance
*   Thoroughly plan everything
*   Manage their money wisely
*   Make their customers their priority
*   Understand their offering and their market in detail
*   Ask for advice from experts when required
*   Know when to cut their losses

Examples of Famous Entrepreneurs

Some famous entrepreneurs are:

- Bill Gates (Founder of Microsoft)
- Steve Jobs (Co-founder of Apple)
- Mark Zuckerberg (Founder of Facebook)
- Pierre Omidyar (Founder of eBay)

Types of Enterprises

As an entrepreneur in India, you can own and run any of the following types of enterprises:

Sole Proprietorship

In a sole proprietorship, a single individual owns, manages and controls the enterprise. This type of business is the easiest to form with respect to legal formalities. The business and the owner have no separate legal existence. All profit belongs to the proprietor, as do all the losses - the liability of the entrepreneur is unlimited.

Partnership

A partnership firm is formed by two or more people. The owners of the enterprise are called partners. A partnership deed must be signed by all the partners. The firm and its partners have no separate legal existence. The profits are shared by the partners. With respect to losses, the liability of the partners is unlimited. A firm has a limited life span and must be dissolved when any one of the partners dies, retires, claims bankruptcy or goes insane.

Limited Liability Partnership (LLP)

In a Limited Liability Partnership or LLP, the partners of the firm enjoy perpetual existence as well as the advantage of limited liability. Each partner's liability is limited to their agreed contribution to the LLP. The partnership and its partners have a separate legal existence.

Tips

- Learn from others' failures.
- Be certain that this is what you want.
- Search for a problem to solve, rather than look for a problem to attach to your idea.

8.5.2 Leadership & Teamwork:
Leadership and Leaders

Leadership means setting an example for others to follow. Setting a good example means not asking someone to do something that you wouldn't willingly want to do yourself. Leadership is about figuring out what to do in order to win as a team, and as a company.

Leaders believe in doing the right things. They also believe in helping others to do the right things. An effective leader is someone who:

• Creates an inspiring vision of the future.

• Motivates and inspires his team to pursue that vision.

Leadership Qualities That All Entrepreneurs Need

Building a successful enterprise is only possible if the entrepreneur in charge possesses excellent leadership qualities. Some critical leadership skills that every entrepreneur must have are:

1. **Pragmatism**: This means having the ability to highlight all obstacles and challenges, in order to resolve issues and reduce risks.

2. **Humility**: This means admitting to mistakes often and early, and being quick to take responsibility for your actions. Mistakes should be viewed as challenges to overcome, not opportunities to point blame.

3. **Flexibility**: It is critical for a good leader to be very flexible and quickly adapt to change. It is equally critical to know when to adapt and when not to.

4. **Authenticity**: This means showing both, your strengths and your weaknesses. It means being human and showing others that you are human.

5. **Reinvention**: This means refreshing or changing your leadership style when necessary. To do this, it's important to learn where your leadership gaps lie and find out what resources are required to close them.

6. **Awareness**: This means taking the time to recognize how others view you. It means understanding how your presence affects those around you.

Benefits of Effective Leadership

Effective leadership results in numerous benefits. Great leadership leads to the leader successfully:

• Gaining the loyalty and commitment of the team members

• Motivating the team to work towards achieving the company's goals and objectives

• Building morale and instilling confidence in the team members

• Fostering mutual understanding and team-spirit among team members

• Convincing team members about the need to change when a situation requires adaptability

Teamwork and Teams

Teamwork occurs when the people in a workplace combine their individual skills to pursue a common goal. Effective teams are made up of individuals who work together to achieve this common goal. A great team is one who holds themselves accountable for the end result.

Importance of Teamwork in Entrepreneurial Success

For an entrepreneurial leader, building an effective team is critical to the success of a venture. An entrepreneur must ensure that the team he builds possesses certain crucial qualities, traits and characteristics. An effective team is one which has:

1. **Unity of purpose:** All the team members should clearly understand and be equally committed to the purpose, vision and goals of the team.

2. **Great communication skills:** Team members should have the ability to express their concerns, ask questions and use diagrams, and charts to convey complex information.

3. **The ability to collaborate:** Every member should feel entitled to provide regular feedback on new ideas.

4. **Initiative:** The team should consist of proactive individuals. The members should have the enthusiasm to come up with new ideas, improve existing ideas, and conduct their own research.

5. **Visionary members:** The team should have the ability to anticipate problems and act on these potential problem before they turn into real problems.

6. **Great adaptability skills:** The team must believe that change is a positive force. Change should be seen as the chance to improve and try new things.

7. **Excellent organizational skills:** The team should have the ability to develop standard work processes, balance responsibilities, properly plan projects, and set in place methods to

Tips

- Don't get too attached to your original idea. Allow it to evolve and change.
- Be aware of your weaknesses and build a team that will complement your shortfalls.
- Hiring the right people is not enough. You need to promote or incentivize your most talented people to keep them motivated.
- Earn your team's respect.

8.5.3 Communication Skills: Listening & Speaking:
The Importance of Listening Effectively

Listening is the ability to correctly receive and understand messages during the process of communication. Listening is critical for effective communication. Without effective listening skills, messages can easily be misunderstood. This results in a communication breakdown and can lead to the sender and the receiver of the message becoming frustrated or irritated.

It's very important to note that listening is not the same as hearing. Hearing just refers to sounds that you hear. Listening is a whole lot more than that. To listen, one requires focus. It means not only paying attention to the story, but also focusing on how the story is relayed, the way language and voice is used, and even how the speaker uses their body language. The ability to listen depends on how effectively one can perceive and understand both, verbal and non-verbal cues.

How to Listen Effectively

To listen effectively you should:

- Stop talking
- Stop interrupting
- Focus completely on what is being said
- Nod and use encouraging words and gestures
- Be open-minded
- Think about the speaker's perspective
- Be very, very patient
- Pay attention to the tone that is being used
- Pay attention to the speaker's gestures, facial expressions and eye movements
- Not try and rush the person
- Not let the speaker's mannerisms or habits irritate or distract you

How to Listen Effectively

How successfully a message gets conveyed depends entirely on how effectively you are able to get it through. An effective speaker is one who enunciates properly, pronounces words correctly, chooses the right words and speaks at a pace that is easily understandable. Besides this, the words spoken out loud need to match the gestures, tone and body language used.

What you say, and the tone in which you say it, results in numerous perceptions being formed. A person who speaks hesitantly may be perceived as having low self-esteem or lacking in knowledge of the discussed topic. Those with a quiet voice may very well be labelled as shy. And those who speak in commanding tones with high levels of clarity, are usually considered to be extremely confident. This makes speaking a very critical communication skill.

How to Speak Effectively

To speak effectively you should:

- Incorporate body language in your speech like eye contact, smiling, nodding, gesturing etc.
- Build a draft of your speech before actually making your speech.
- Ensure that all your emotions and feelings are under control.
- Pronounce your words distinctly with the correct pitch and intensity. Your speech should be crystal clear at all times.
- Use a pleasant and natural tone when speaking. Your audience should not feel like you are putting on an accent or being unnatural in any way.
- Use precise and specific words to drive your message home. Ambiguity should be avoided at all costs.
- Ensure that your speech has a logical flow.
- Be brief. Don't add any unnecessary information.
- Make a conscious effort to avoid irritating mannerisms like fidgeting, twitching etc.
- Choose your words carefully and use simple words that the majority of the audience will have no difficulty understanding.
- Use visual aids like slides or a whiteboard.
- Speak slowly so that your audience can easily understand what you're saying. However, be careful not to speak too slowly because this can come across as stiff, unprepared or even condescending.
- Remember to pause at the right moments.

Tips

- If you're finding it difficult to focus on what someone is saying, try repeating their words in your head.
- Always maintain eye contact with the person that you are communicating with, when speaking as well as listening. This conveys and also encourages interest in the conversation.

8.5.4 Problem Solving & Negotiation skills:
What is a Problem?

As per The Concise Oxford Dictionary (1995), a problem is, "A doubtful or difficult matter requiring a solution"

All problems contain two elements:

1. Goals 2. Obstacles

The aim of problem solving is to recognize the obstacles and remove them in order to achieve

How to Solve Problems

Solving a problem requires a level of rational thinking. Here are some logical steps to follow when faced with an issue:

Step 1: Identify the problem **Step 2:** Study the problem in detail

Step 3: List all possible solutions **Step 4:** Select the best solution

Step 5: Implement the chosen solution **Step 6:** Check that the problem has really been solved

Important Traits for Problem Solving

Highly developed problem solving skills are critical for both, business owners and their employees. The following personality traits play a big role in how effectively problems are solved:

- Being open minded
- Being proactive
- Having a positive attitude
- Asking the right questions
- Not panicking
- Focusing on the right problem

How to Assess for Problem Solving Skills

As an entrepreneur, it would be a good idea to assess the level of problem solving skills of potential candidates before hiring them. Some ways to assess this skill are through:

1. **Application forms**: Ask for proof of the candidate's problem solving skills in the application form.

2. **Psychometric tests**: Give potential candidates logical reasoning and critical thinking tests and see how they fare.

3. **Interviews**: Create hypothetical problematic situations or raise ethical questions and see how the candidates respond.

4. **Technical questions**: Give candidates examples of real life problems and evaluate their

What is Negotiation?

Negotiation is a method used to settle differences. The aim of negotiation is to resolve differences through a compromise or agreement while avoiding disputes. Without negotiation, conflicts are likely to lead to resentment between people. Good negotiation skills help satisfy both parties and go a long way towards developing strong relationships.

Why Negotiate

Starting a business requires many, many negotiations. Some negotiations are small while others are critical enough to make or break a startup. Negotiation also plays a big role inside the workplace. As an entrepreneur, you need to know not only know how to negotiate yourself, but also how to train employees in the art of negotiation.

How to Negotiate

Take a look at some steps to help you negotiate:

Step 1: Pre-Negotiation Preparation	Agree on where to meet to discuss the problem, decide who all will be present and set a time limit for the discussion.
Step 2: Discuss the Problem	This involves asking questions, listening to the other side, putting your views forward and clarifying doubts.
Step 3: Clarify the Objective	Ensure that both parties want to solve the same problem and reach the same goal.
Step 4: Aim for a Win-Win Outcome	Try your best to be open minded when negotiating. Compromise and offer alternate solutions to reach an outcome where both parties win.
Step 5: Clearly Define the Agreement	When an agreement has been reached, the details of the agreement should be crystal clear to both sides, with no scope for misunderstandings.
Step 6: Implement the Agreed Upon Solution	Agree on a course of action to set the solution in motion

Tips

- Know exactly what you want before you work towards getting it
- Give more importance to listening and thinking, than speaking
- Focus on building a relationship rather than winning
- Remember that your people skills will affect the outcome
- Know when to walk away – sometimes reaching an agreement may not be possible

8.5.5 Business Opportunities Identification: Entrepreneurs and Opportunities

"The entrepreneur always searches for change, responds to it and exploits it as an opportunity."
Peter Drucker

The ability to identify business opportunities is an essential characteristic of an entrepreneur.

What is an Opportunity?

The word opportunity suggests a good chance or a favourable situation to do something offered by circumstances.

A business opportunity means a good or favourable change available to run a specific business

Common Questions Faced by Entrepreneurs

A critical question that all entrepreneurs face is how to go about finding the business opportunity that is right for them.

Some common questions that entrepreneurs constantly think about are:

- Should the new enterprise introduce a new product or service based on an unmet need?
- Should the new enterprise select an existing product or service from one market and offer it in another where it may not be available?
- Should the enterprise be based on a tried and tested formula that has worked elsewhere?

It is therefore extremely important that entrepreneurs must learn how to identify new and existing business opportunities and evaluate their chances of success.

When is an Idea an Opportunity?

An idea is an opportunity when:

- It creates or adds value to a customer
- It solves a significant problem, removes a pain point or meets a demand
- Has a robust market and profit margin
- Is a good fit with the founder and management team at the right time and place

Factors to Consider When Looking for Opportunities

Consider the following when looking for business opportunities:

- Economic trends
- Changes in funding
- Changing relationships between vendors, partners and suppliers
- Market trends
- Changes in political support
- Shift in target audience

Ways to Identify New Business Opportunities

1. Identify Market Inefficiencies

    When looking at a market, consider what inefficiencies are present in the market. Think about ways to correct these inefficiencies.

2. Remove Key Hassles

    Rather than create a new product or service, you can innovatively improve a product, service or process.

3. Create Something New

    Think about how you can create a new experience for customers, based on existing business models.

4. Pick a Growing Sector/Industry

    Research and find out which sectors or industries are growing and think about what opportunities you can tap in the same.
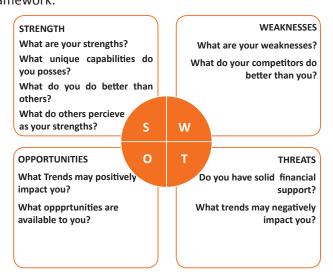
5. Think About Product Differentiation

    If you already have a product in mind, think about ways to set it apart from the existing ones.

Ways to Identify Business Opportunities Within Your Business

1. SWOT Analysis

    An excellent way to identify opportunities inside your business is by creating a SWOT analysis. The acronym SWOT stands for strengths, weaknesses, opportunities, and threats.

    SWOT analysis framework:

STRENGTH
What are your strengths?
What unique capabilities do you posses?
What do you do better than others?
What do others percieve as your strengths?

WEAKNESSES
What are your weaknesses?
What do your competitors do better than you?

S W

O T

OPPORTUNITIES
What Trends may positively impact you?
What oppprtunities are available to you?

THREATS
Do you have solid financial support?
What trends may negatively impact you?

Consider the following when looking for business opportunities:

By looking at yourself and your competitors using the SWOT framework, you can uncover opportunities that you can exploit, as well as manage and eliminate threats that could derail your success.

2. Establishing Your USP

Establish your USP and position yourself as different from your competitors. Identify why cus-

Opportunity Analysis

Once you have identified an opportunity, you need to analyse it.

To analyse an opportunity, you must:

- Focus on the idea
- Focus on the market of the idea
- Talk to industry leaders in the same space as the idea
- Talk to players in the same space as the idea

Tips

- Remember, opportunities are situational.
- Look for a proven track record.
- Avoid the latest craze.
- Love your idea.

8.5.6 Entrepreneurship Support Eco - System: What is an Entrepreneur?

An entrepreneur is a person who:

• Does not work for an employee
• Runs a small enterprise
• Assumes all the risks and rewards of the enterprise, idea, good or service

Types of Entrepreneurs

There are four main types of entrepreneurs:

1. **The Traditional Entrepreneur**: This type of entrepreneur usually has some kind of skill – they can be a carpenter, mechanic, cook etc. They have businesses that have been around for numerous years like restaurants, shops and carpenters. Typically, they gain plenty of experience in a particular industry before they begin their own business in a similar field.

2. **The Growth Potential Entrepreneur**: The desire of this type of entrepreneur is to start an enterprise that will grow, win many customers and make lots of money. Their ultimate aim is to eventually sell their enterprise for a nice profit. Such entrepreneurs usually have a science or technical background.

3. **The Project-Oriented Entrepreneur**: This type of entrepreneur generally has a background in the Arts or psychology. Their enterprises tend to be focus on something that they are very passionate about.

4. **The Lifestyle Entrepreneur**: This type of entrepreneur has usually worked as a teacher or a secretary. They are more interested in selling something that people will enjoy, rather than making lots of money.

Characteristics of an Entrepreneur

Successful entrepreneurs have the following characteristics:

• They are highly motivated
• They are creative and persuasive
• They are mentally prepared to handle each and every task
• They have excellent business skills – they know how to evaluate their cash flow, sales and revenue
• They are willing to take great risks
• They are very proactive – this means they are willing to do the work themselves, rather than wait for someone else to do it
• They have a vision – they are able to see the big picture
• They are flexible and open-minded
• They are good at making decisions

Entrepreneur Success Stories

Dhiru Bhai Ambani

Dhirubhai Ambani began his entrepreneurial career by selling "bhajias" to pilgrims in Mount Girnar on weekends. At 16, he moved to Yemen where he worked as a gas-station attendant, and as a clerk in an oil company. He returned to India with Rs. 50,000 and started a textile trading company. Reliance went on to become the first Indian company to raise money in global markets and the first Indian company to feature in Forbes 500 list.

Dr. Karsanbhai Patel

Karsanbhai Patel made detergent powder in the backyard of his house. He sold his product door-to-door and offered a money back guarantee with every pack that was sold. He charged Rs. 3 per kg when the cheapest detergent at that time was Rs.13 per kg. Dr. Patel eventually started Nirma which became a whole new segment in the Indian domestic detergent market.

The Entrepreneurial Process

Let's take a look at the stages of the entrepreneurial process.

Stage 1: Idea Generation. The entrepreneurial process begins with an idea that has been thought of by the entrepreneur. The idea is a problem that has the potential to be solved.

Stage 2: Germination or Recognition. In this stage a possible solution to the identified problem is thought of.

Stage 3: Preparation or Rationalization. The problem is studied further and research is done to find out how others have tried to solve the same problem.
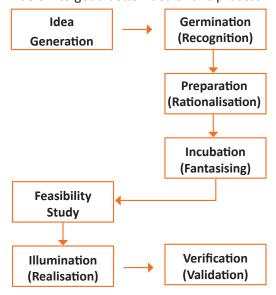
Stage 4: Incubation or Fantasizing. This stage involves creative thinking for the purpose of coming up with more ideas. Less thought is given to the problem areas.

Stage 5: Feasibility Study: The next step is the creation of a feasibility study to determine if the idea will make a profit and if it should be seen through.

Stage 6: Illumination or Realization. This is when all uncertain areas suddenly become clear. The entrepreneur feels confident that his idea has merit.

Stage 7: Verification or Validation. In this final stage, the idea is verified to see if it works and if it is useful.

Take a look at the diagram below to get a better idea of this process.

What is an Entrepreneur?

The entrepreneurship support ecosystem signifies the collective and complete nature of entrepreneurship. New companies emerge and flourish not only because of the courageous, visionary entrepreneurs who launch them, but they thrive as they are set in an environment or 'ecosystem' made of private and public participants. These players nurture and sustain the new ventures, facilitating the entrepreneurs' efforts.

An entrepreneurship ecosystem comprises of the following six domains:

1. **Favourable Culture:** This includes elements such as tolerance of risk and errors, valuable networking and positive social standing of the entrepreneur.

2. **Facilitating Policies & Leadership:** This includes regulatory framework incentives and existence of public research institutes.

3. **Financing Options:** Angel financing, venture capitalists and micro loans would be good examples of this.

4. **Human Capital:** This refers to trained and untrained labour, entrepreneurs and entrepreneurship training programmes, etc.

5. **Conducive Markets for Products & Services:** This refers to an existence or scope of existence of a market for the product/service.

6. **Institutional & Infrastructural Support:** This includes legal and financing advisers, telecommunications, digital and transportation infrastructure, and entrepreneurship networking programmes.

These domains indicate whether there is a strong entrepreneurship support ecosystem and what actions should the government put in place to further encourage this ecosystem. The six domains and their various elements have been graphically depicted.

Early Customers
- Early adopters for proof-of-concept
- Expertise in productizing
- Reference customer
- First reviews
- Distribution channels

Leadership
- Unequivocal support
- Social legitimacy
- Open door for advocate
- Entrepreneurship strategy
- urgency, crisis and challenge

Government
- Institutions
  e.g. Investment, support
- Financial support
  e.g. for R&D, jump start funds
- Regulatory framework
  incentives
  e.g. Tax benifits
- Research institutes
- Venture-friendly
  legislation
- e.g. Bankruptcy,
  contract enforcement,
  property rights, and labour

Financial Capital
- Micro-loans
- Angel investors,
  friends and family
- Zero-stage venture
  capital
- Venture capital funds
- Private equity
- Public capital markets
- Debt

Success Stories
- Visible successes
- Wealth generation for founders
- International reputation

Societal norms
- Tolerance of risk, mistakes, failure
- Innovation, creativity, experimentation
- Social status of entrepreneur
- Wealth creation
- Ambition, drive, hunger

Networks
- Entrepreneure's networks
- Diaspora networks
- Multinational corporations

Labour
- Skilled and unskilled
- Serial entrepreneures
- Later generation family

Educational Institutions
- General degrees (professional and academic)
- Specific entrepreneurship training

Infrastructure
- Telecommunications
- Transportation & logistics
- Energy
- Zones, incubation centers, clusters

Support Professions
- Legal
- Accounting
- Investment bankers

Non-Government Institution
- Entrepreneurship
  promotion in
  non-profits
- Business plan
  contests
- Conferences
- Entrepreneur-
  friendly association

Entrepreneurship

Finance · Culture · Policy · Supports · Market · Human Capital

Every entrepreneurship support ecosystem is unique and all the elements of the ecosystem are interdependent. Although every region's entrepreneurship ecosystem can be broadly described by the above features, each ecosystem is the result of the hundred elements interacting in highly complex and particular ways.

Entrepreneurship ecosystems eventually become (largely) self-sustaining. When the six domains are resilient enough, they are mutually beneficial. At this point, government involvement can and should be significantly minimized. Public leaders do not need to invest a lot to sustain the ecosystem. It is imperative that the entrepreneurship ecosystem incentives are formulated to be self-liquidating, hence focusing on sustainability of the environment.

Government's Role in the Entrepreneurship Ecosystem

Encouraging new ventures is a major focus for policymakers. Governments across the world are recognizing that new businesses flourish in distinctive types of supportive environments. Policymakers should study the scenario and take into account the following points whilst they formulate policies and regulations that enable successful entrepreneurship support ecosystems.

1. Policymakers should avoid regulations that discourage new entrants and work towards building efficient methods for business startups. Policies and regulations that favour existing, dominant firms over entrepreneurial ventures, restrict competition and obstruct entry for new companies.

2. Instead of developing policies conceptually intended to correct market failures, policymakers should interact with entrepreneurs and understand the challenges faced by them. The feedback should be used to develop policies that incite idea exploration, product development and increased rates of deal flow.

3. Entrepreneurial supporters should create a database that enables identifying who the participants in the ecosystem are and how they are connected. These ecosystem maps are useful tools in developing engagement strategies.

4. Disruptions are unavoidable in economic and social life. However, it's important to note that economic disruption gives rise to entrepreneurial opportunities. Architects of the entrepreneurship ecosystems (entrepreneurs, mentors, policymakers and consumers,) should anticipate these dips, thus capitalizing on the opportunities they create.

The need for effective strategies to enable local entrepreneurship support ecosystems is a practical one. Better understanding of the actual ecosystems provides a framework within which policy makers can ask relevant questions, envisage more efficient approaches, and assess ensuing outcomes.

Snapshot of the Entrepreneurship Ecosystem in India

Entrepreneurship has earned a newfound respect in India. Many Indians, with exposure to the world of business, who traditionally would have opted for a job, are setting up their own ventures. Many elements of the entrepreneurship ecosystem are beginning to come together. For example, increase in venture capitalists, government schemes and incubators, academia industry linkages, and emerging clusters and support to rural economy. All these initiatives are effective but there is a need to scale up and enrich the ecosystem further in the following ways:

1. We need to review our attitude towards failures and accept them as learning experiences.

2. We must encourage the educated to become entrepreneurs and provide students in schools and colleges with entrepreneurship skills.

3. Universities, research labs and the government need to play the role of enablers in the entrepreneurship support ecosystem.

4. Policymakers need to focus on reducing the obstacles such as corruption, red tape and bureaucracy.

5. We need to improve our legal systems and court international venture capital firms and bring them to India.

6. We must devise policies and methods to reach the secondary and tertiary towns in India, where people do not have access to the same resources available in the cities.

Today, there is a huge opportunity in this country to introduce innovative solutions that are

Make in India Campaign

Every entrepreneur has certain needs. Some of their important needs are:

• To easily get loans
• To easily find investors
• To get tax exemptions
• To easily access resources and good infrastructure
• To enjoy a procedure that is free of hassles and is quick
• To be able to easily partner with other firms

The Make in India campaign, launched by Prime Minister Modi aims to satisfy all these needs of young, aspiring entrepreneurs. Its objective is to:

• Make investment easy
• Support new ideas
• Enhance skill development
• Safeguard the ideas of entrepreneurs
• Create state-of-the-art facilities for manufacturing goods

Tips

• Research the existing market, network with other entrepreneurs, venture capitalists, angel investors, and thoroughly review the policies in place to enable your entrepreneurship.
• Failure is a stepping stone and not the end of the road. Review yours and your peers' errors and correct them in your future venture.
• Be proactive in your ecosystem. Identify the key features of your ecosystem and enrich them to ensure self-sustainability of your entrepreneurship support ecosystem.

8.5.7 Risk Appetite & Resilience: Entrepreneurship and Risk

Entrepreneurs are inherently risk takers. They are path-makers not path-takers. Unlike a normal, cautious person, an entrepreneur would not think twice about quitting his job (his sole income) and taking a risk on himself and his idea.

An entrepreneur is aware that while pursuing his dreams, assumptions can be proven wrong and unforeseen events may arise. He knows that after dealing with numerous problems, success is still not guaranteed. Entrepreneurship is synonymous with the ability to take risks. This ability, called risk-appetite, is an entrepreneurial trait that is partly genetic and partly acquired.

What is Risk Appetite?

Risk appetite is defined as the extent to which a company is equipped to take risk, in order to achieve its objectives. Essentially, it refers to the balance, struck by the company, between possible profits and the hazards caused by changes in the environment (economic ecosystem, policies, etc.). Taking on more risk may lead to higher rewards but have a high probability of losses as well. However, being too conservative may go against the company as it can miss out on good opportunities to grow and reach their objectives.

The levels of risk appetite can be broadly categorized as "low", "medium" and "high." The company's entrepreneur(s) have to evaluate all potential alternatives and select the option most likely to succeed. Companies have varying levels of risk appetites for different objectives. The levels depend on:

- The type of industry
- Market pressures
- Company objectives

For example, a startup with a revolutionary concept will have a very high risk appetite. The startup can afford short term failures before it achieves longer term success. This type of appetite will not remain constant and will be adjusted to account for the present circumstances of the company.

Risk Appetite Statement

Companies have to define and articulate their risk appetite in sync with decisions made about their objectives and opportunities. The point of having a risk appetite statement is to have a framework that clearly states the acceptance and management of risk in business. It sets risk taking limits within the company. The risk appetite statement should convey the following:

- The nature of risks the business faces.
- Which risks the company is comfortable taking on and which risks are unacceptable.
- How much risk to accept in all the risk categories.
- The desired tradeoff between risk and reward.
- Measures of risk and methods of examining and regulating risk exposures.

Entrepreneurship and Resilience

Entrepreneurs are characterized by a set of qualities known as resilience. These qualities play an especially large role in the early stages of developing an enterprise. Risk resilience is an extremely valuable characteristic as it is believed to protect entrepreneurs against the threat of challenges and changes in the business environment.

What is Entrepreneurial Resilience?

Resilience is used to describe individuals who have the ability to overcome setbacks related to their life and career aspirations. A resilient person is someone who is capable of easily and quickly recovering from setbacks. For the entrepreneur, resilience is a critical trait. Entrepreneurial resilience can be enhanced in the following ways:

• By developing a professional network of coaches and mentors

• By accepting that change is a part of life

• By viewing obstacles as something that can be overcome

Characteristics of a Resilient Entrepreneur

The characteristics required to make an entrepreneur resilient enough to go the whole way in their business enterprise are:

• A strong internal sense of control

• Strong social connections

• Skill to learn from setbacks

• Ability to look at the bigger picture

• Ability to diversify and expand

• Survivor attitude

• Cash-flow conscious habits

• Attention to detail

Tips

• Cultivate a great network of clients, suppliers, peers, friends and family. This will not only help you promote your business, but will also help you learn, identify new opportunities and stay tuned to changes in the market.

• Don't dwell on setbacks. Focus on what the you need to do next to get moving again.

• While you should try and curtail expenses, ensure that it is not at the cost of your growth.

8.5.8 Success & Failures: Understanding
Successes and Failures in Entrepreneurship

Shyam is a famous entrepreneur, known for his success story. But what most people don't know, is that Shyam failed numerous times before his enterprise became a success. Read his interview to get an idea of what entrepreneurship is really about, straight from an entrepreneur who has both, failed and succeeded.

Interviewer: Shyam, I have heard that entrepreneurs are great risk-takers who are never afraid of failing. Is this true?

Shyam: Ha ha, no of course it's not true! Most people believe that entrepreneurs need to be fearlessly enthusiastic. But the truth is, fear is a very normal and valid human reaction, especially when you are planning to start your own business! In fact, my biggest fear was the fear of failing. The reality is, entrepreneurs fail as much as they succeed. The trick is to not allow the fear of failing to stop you from going ahead with your plans. Remember, failures are lessons for future success!

Interviewer: What, according to you, is the reason that entrepreneurs fail?

Shyam: Well, there is no one single reason why entrepreneurs fail. An entrepreneur can fail due to numerous reasons. You could fail because you have allowed your fear of failure to defeat you. You could fail because you are unwilling to delegate (distribute) work. As the saying goes, "You can do anything, but not everything!" You could fail because you gave up too easily – maybe you were not persistent enough. You could fail because you were focusing your energy on small, insignificant tasks and ignoring the tasks that were most important. Other reasons for failing are partnering with the wrong people, not being able to sell your product to the right customers at the right time at the right price… and many more reasons!

Interviewer: As an entrepreneur, how do you feel failure should be looked at?

Shyam: I believe we should all look at failure as an asset, rather than as something negative. The way I see it, if you have an idea, you should try to make it work, even if there is a chance that you will fail. That's because not trying is failure right there, anyway! And failure is not the worst thing that can happen. I think having regrets because of not trying, and wondering 'what if' is far worse than trying and actually failing.

Interviewer: How did you feel when you failed for the first time?

Shyam: I was completely heartbroken! It was a very painful experience. But the good news is, you do recover from the failure. And with every subsequent failure, the recovery process gets a lot easier. That's because you start to see each failure more as a lesson that will eventually help you succeed, rather than as an obstacle that you cannot overcome. You will start to realize that failure has many benefits.

Interviewer: Can you tell us about some of the benefits of failing?

Shyam: One of the benefits that I have experienced personally from failing is that the failure made me see things in a new light. It gave me answers that I didn't have before. Failure can make you a lot stronger. It also helps keep your ego in control.

Interviewer: What advice would you give entrepreneurs who are about to start their own enterprises?

Shyam: I would tell them to do their research and ensure that their product is something that is actually wanted by customers. I'd tell them to pick their partners and employees very wisely and cautiously. I'd tell them that it's very important to be aggressive – push and market your product as aggressively as possible. I would warn them that starting an enterprise is very expensive and that they should be prepared for a situation where they run out of money.

I would tell them to create long term goals and put a plan in action to achieve that goal. I would tell them to build a product that is truly unique. Be very careful and ensure that you are not copying another startup. Lastly, I'd tell them that it's very important that they find the right investors.

Interviewer: That's some really helpful advice, Shyam! I'm sure this will help all entrepreneurs

Tips

- Remember that nothing is impossible.
- Identify your mission and your purpose before you start.
- Plan your next steps – don't make decisions hastily.

8.6: Preparing to be an Entrepreneur

Unit Objectives

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

1. Discuss how market research is carried out
2. Describe the 4 Ps of marketing
3. Discuss the importance of idea generation
4. Recall basic business terminology
5. Discuss the need for CRM
6. Discuss the benefits of CRM
7. Discuss the need for networking
8. Discuss the benefits of networking
9. Understand the importance of setting goals
10. Differentiate between short-term, medium-term and long-term goals
11. Discuss how to write a business plan
12. Explain the financial planning process
13. Discuss ways to manage your risk
14. Describe the procedure and formalities for applying for bank finance
15. Discuss how to manage your own enterprise
16. List important questions that every entrepreneur should ask before starting an enterprise

8.6.1 Market Study / The 4 Ps of Marketing / Importance of an IDEA: Understanding Market Research

Market research is the process of gathering, analyzing and interpreting market information on a product or service that is being sold in that market. It also includes information on:

- Past, present and prospective customers
- Customer characteristics and spending habits
- The location and needs of the target market
- The overall industry
- Relevant competitors

Market research involves two types of data:

- Primary information. This is research collected by yourself or by someone hired by you.
- Secondary information. This is research that already exists and is out there for you to find and use.

Primary research

Primary research can be of two types:

- Exploratory: This is open-ended and usually involves detailed, unstructured interviews.
- Specific: This is precise and involves structured, formal interviews. Conducting specific research is the more expensive than conducting exploratory research.

Secondary research

Secondary research uses outside information. Some common secondary sources are:

- Public sources: These are usually free and have a lot of good information. Examples are government departments, business departments of public libraries etc.
- Commercial sources: These offer valuable information but usually require a fee to be paid. Examples are research and trade associations, banks and other financial institutions etc.
- Educational institutions: These offer a wealth of information. Examples are colleges, universities, technical institutes etc.

The 4 Ps of Marketing

The 4 Ps of marketing are Product, Price, Promotion and Place. Let's look at each of these 4 Ps in detail.

Product

A product can be:

- A tangible good
- An intangible service

Whatever your product is, it is critical that you have a clear understanding of what you are offering, and what its unique characteristics are, before you begin with the marketing process.

Some questions to ask yourself are:

- What does the customer want from the product/service?
- What needs does it satisfy?
- Are there any more features that can be added?
- Does it have any expensive and unnecessary features?
- How will customers use it?
- What should it be called?
- How is it different from similar products?
- How much will it cost to produce?
- Can it be sold at a profit?

Price

Once all the elements of Product have been established, the Price factor needs to be considered.

The Price of a Product will depend on several factors such as profit margins, supply, demand and the marketing strategy.

Some questions to ask yourself are:

- What is the value of the product/service to customers?
- Do local products/services have established price points?
- Is the customer price sensitive?
- Should discounts be offered?
- How is your price compared to that of your competitors?

Promotion

Once you are certain about your Product and your Price, the next step is to look at ways to promote it. Some key elements of promotion are advertising, public relations, social media marketing, email marketing, search engine marketing, video marketing and more.

Some questions to ask yourself are:

- Where should you promote your product or service?
- What is the best medium to use to reach your target audience?
- When would be the best time to promote your product?
- How are your competitors promoting their products?

Place

According to most marketers, the basis of marketing is about offering the right product, at the right price, at the right place, at the right time. For this reason, selecting the best possible location is critical for converting prospective clients into actual clients.

Some questions to ask yourself are:

- Will your product or service be looked for in a physical store, online or both?
- What should you do to access the most appropriate distribution channels?
- Will you require a sales force?
- Where are your competitors offering their products or services?
- Should you follow in your competitors' footsteps?
- Should you do something different from your competitors?

Importance of an IDEA

Ideas are the foundation of progress. An idea can be small or ground-breaking, easy to accomplish or extremely complicated to implement. Whatever the case, the fact that it is an idea gives it merit. Without ideas, nothing is possible. Most people are afraid to speak out their ideas, out for fear of being ridiculed. However, if are an entrepreneur and want to remain competitive and innovative, you need to bring your ideas out into the light.

Some ways to do this are by:

- Establishing a culture of brainstorming where you invite all interested parties to contribute
- Discussing ideas out loud so that people can add their ideas, views, opinions to them
- Being open minded and not limiting your ideas, even if the idea who have seems ridiculous
- Not discarding ideas that you don't work on immediately, but instead making a note of them and shelving them so they can be revisited at a later date

Tips

- Keep in mind that good ideas do not always have to be unique.
- Remember that timing plays a huge role in determining the success of your idea.
- Situations and circumstances will always change, so be flexible and adapt your idea accordingly.

8.6.2 Business Entity Concepts:
Basic Business Terminology

If your aim is to start and run a business, it is crucial that you have a good understanding of basic business terms. Every entrepreneur should be well versed in the following terms:

- Accounting: A systematic method of recording and reporting financial transactions.
- Accounts payable: Money owed by a company to its creditors.
- Accounts Receivable: The amount a company is owed by its clients.
- Assets: The value of everything a company owns and uses to conduct its business.
- Balance Sheet: A snapshot of a company's assets, liabilities and owner's equity at a given moment.
- Bottom Line: The total amount a business has earned or lost at the end of a month.
- Business: An organization that operates with the aim of making a profit.
- Business to Business (B2B): A business that sells goods or services to another business.
- Business to Consumer (B2C): A business that sells goods or services directly to the end user.
- Capital: The money a business has in its accounts, assets and investments. The two main types of capital are debt and equity.
- Cash Flow: The overall movement of funds through a business each month, including income and expenses.
- Cash Flow Statement: A statement showing the money that entered and exited a business during a specific period of time.
- Contract: A formal agreement to do work for pay.
- Depreciation: The degrading value of an asset over time.
- Expense: The costs that a business incurs through its operations.
- Finance: The management and allocation of money and other assets.
- Financial Report: A comprehensive account of a business' transactions and expenses.
- Fixed Cost: A one-time expense.
- Income Statement (Profit and Loss Statement): Shows the profitability of a business during a period of time.
- Liabilities: The value of what a business owes to someone else.
- Marketing: The process of promoting, selling and distributing a product or service.
- Net Income/Profit: Revenues minus expenses.
- Net Worth: The total value of a business.
- Payback Period: The amount of time it takes to recover the initial investment of a business.
- Profit Margin: The ratio of profit, divided by revenue, displayed as a percentage.
- Return on Investment (ROI): The amount of money a business gets as return from an investment.

- Revenue: The total amount of income before expenses are subtracted.
- Sales Prospect: A potential customer.
- Supplier: A provider of supplies to a business.
- Target Market: A specific group of customers at which a company's products and services are aimed.
- Valuation: An estimate of the overall worth of the business.
- Variable Cost: Expenses that change in proportion to the activity of a business.
- Working Capital: Calculated as current assets minus current liabilities.

8.6.3 CRM & Networking: What is CRM?

CRM stands for Customer Relationship Management. Originally the expression Customer Relationship Management meant managing one's relationship with customers. However, today it refers to IT systems and software designed to help companies manage their relationships.

The Need for CRM

The better a company can manage its relationships with its customers, the higher the chances of the company's success. For any entrepreneur, the ability to successfully retain existing customers and expand the enterprise is paramount. This is why IT systems that focus on addressing the problems of dealing with customers on a daily basis are becoming more and more in demand.

Customer needs change over time, and technology can make it easier to understand what customers really want. This insight helps companies to be more responsive to the needs of their customers. It enables them to modify their business operations when required, so that their customers are always served in the best manner possible. Simply put, CRM helps companies recognize the value of their clients and enables them to capitalize on improved customer relations.

Benefits of CRM

CRM has a number of important benefits:

- It helps improve relations with existing customers which can lead to:
  - Increased sales
  - Identification of customer needs
  - Cross-selling of products
- It results in better marketing of one's products or services
- It enhances customer satisfaction and retention
- It improves profitability by identifying and focusing on the most profitable customers

6.3.4 What is Networking?

In business, networking means leveraging your business and personal connections in order to bring in a regular supply of new business. This marketing method is effective as well as low cost. It is a great way to develop sales opportunities and contacts. Networking can be based on referrals and introductions, or can take place via phone, email, and social and business networking websites.

6.3.5 The Need for Networking

Networking is an essential personal skill for business people, but it is even more important for entrepreneurs. The process of networking has its roots in relationship building. Networking results in greater communication and a stronger presence in the entrepreneurial ecosystem. This helps build strong relationships with other entrepreneurs.

Business networking events held across the globe play a huge role in connecting like-minded entrepreneurs who share the same fundamental beliefs in communication, exchanging ideas and converting ideas into realities. Such networking events also play a crucial role in connecting entrepreneurs with potential investors. Entrepreneurs may have vastly different experiences and backgrounds but they all have a common goal in mind – they all seek connection, inspiration, advice, opportunities and mentors. Networking offers them a platform to do just that.

Benefits of Networking

Networking offers numerous benefits for entrepreneurs. Some of the major benefits are:

- Getting high quality leads
- Increased business opportunities
- Good source of relevant connections
- Advice from like-minded entrepreneurs
- Gaining visibility and raising your profile
- Meeting positive and enthusiastic people
- Increased self-confidence
- Satisfaction from helping others
- Building strong and lasting friendships

Tips

- Use social media interactions to identify needs and gather feedback.
- When networking, ask open-ended questions rather than yes/no type questions.

8.6.4 Business Plan: Why Set Goals

Setting goals is important because it gives you long-term vision and short-term motivation. Goals can be short term, medium term and long term.

Short-Term Goals

• These are specific goals for the immediate future.

Example: Repairing a machine that has failed.

Medium-Term Goals

• These goals are built on your short term goals.

• They do not need to be as specific as your short term goals.

Example: Arranging for a service contract to ensure that your machines don't fail again.

Long-Term Goals

These goals require time and planning.

They usually take a year or more to achieve.

Example: Planning your expenses so you can buy new machinery

Why Create a Business Plan

A business plan is a tool for understanding how your business is put together. It can be used to monitor progress, foster accountable and control the fate of the business. It usually offers a 3-5 year projection and outlines the plan that the company intends to follow to grow its revenues. A business plan is also a very important tool for getting the interest of key employees or future investors.

A business plan typically comprises of eight elements.

Elements of a Business Plan

Executive Summary

The executive summary follows the title page. The summary should clearly state your desires as the business owner in a short and businesslike way. It is an overview of your business and your plans. Ideally this should not be more than 1-2 pages.

Your Executive Summary should include:

• The Mission Statement: Explain what your business is all about.

  Example: Nike's Mission Statement

  Nike's mission statement is "To bring inspiration and innovation to every athlete in the world."

• Company Information: Provide information like when your business was formed, the names and roles of the founders, the number of employees, your business location(s) etc.

• Growth Highlights: Mention examples of company growth. Use graphs and charts where possible.

• Your Products/Services: Describe the products or services provided.

• Financial Information: Provide details on current bank and investors.

• Summarize future plans: Describe where you see your business in the future.

Business Description

The second section of your business plan needs to provide a detailed review of the different elements of your business. This will help potential investors to correctly understand your business goal and the uniqueness of your offering.

Your Business Description should include:

• A description of the nature of your business

• The market needs that you are aiming to satisfy

• The ways in which your products and services meet these needs

• The specific consumers and organizations that you intend to serve

• Your specific competitive advantages

Market Analysis

The market analysis section usually follows the business description. The aim of this section is to showcase your industry and market knowledge. This is also the section where you should lay down your research findings and conclusions.

Your Market Analysis should include:

• Your industry description and outlook

• Information on your target market

• The needs and demographics of your target audience

• The size of your target market

• The amount of market share you want to capture

• Your pricing structure

• Your competitive analysis

• Any regulatory requirements

Organization & Management

This section should come immediately after the Market Analysis.

Your Organization & Management section should include:

• Your company's organizational structure

• Details of your company's ownership

• Details of your management team

• Qualifications of your board of directors

• Detailed descriptions of each division/department and its function

• The salary and benefits package that you offer your people

• The incentives that you offer

Service or Product Line

The next section is the service or product line section. This is where you describe your service or product, and stress on their benefits to potential and current customers. Explain in detail why your product of choice will fulfill the needs of your target audience.

Your Service or Product Line section should include:

- A description of your product/service
- A description of your product or service's life cycle
- A list of any copyright or patent filings
- A description of any R&D activities that you are involved in or planning

Marketing & Sales

Once the Service or Product Line section of your plan has been completed, you should start on the description of the marketing and sales management strategy for your business.

Your Marketing section should include the following strategies:

- **Market penetration strategy**: This strategy focuses on selling your existing products or services in existing markets, in order to increase your market share.
- **Growth strategy**: This strategy focuses on increasing the amount of market share, even if it reduces earnings in the short-term.
- **Channels of distribution strategy**: These can be wholesalers, retailers, distributers and even the internet.
- **Communication strategy**: These can be written strategies (e-mail, text, chat), oral strategies (phone calls, video chats, face-to-face conversations), non-verbal strategies (body language, facial expressions, tone of voice) and visual strategies (signs, webpages, illustrations).

Your Sales section should include the following information:

- **A salesforce strategy**: This strategy focuses on increasing the revenue of the enterprise.
- **A breakdown of your sales activities**: This means detailing out how you intend to sell your products or services – will you sell it offline or online, how many units do you intend to sell, what price do you plan to sell each unit at, etc.

Funding Request

This section is specifically for those who require funding for their venture.

The Funding Request section should include the following information:

- How much funding you currently require.
- How much funding you will require over the next five years. This will depend on your long-term goals.
- The type of funding you want and how you plan to use it. Do you want funding that can be used only for a specific purpose, or funding that can be used for any kind of requirement?
- Strategic plans for the future. This will involve detailing out your long-term plans – what these plans are and how much money you will require to put these plans in motions.
- Historical and prospective financial information. This can be done by creating and maintaining all your financial records, right from the moment your enterprise started, to the present day. Documents required for this are your balance sheet which contains details of your company's assets and liabilities, your income statement which lists your company's revenues, expenses and net income for the year, your tax returns (usually for the last three years) and your cash flow budget which lists the cash that came in, the cash that went out and states whether you had a cash deficit (negative balance) or surplus (positive balance) at the end of each month.

Financial Planning

Before you begin building your enterprise, you need to plan your finances. Take a look at the steps for financial planning:

Step 1: Create a financial plan. This should include your goals, strategies and timelines for accomplishing these goals.

Step 2: Organize all your important financial documents. Maintain a file to hold your investment details, bank statements, tax papers, credit card bills, insurance papers and any other financial records.

Step 3: Calculate your net worth. This means figure out what you own (assets like your house, bank accounts, investments etc.), and then subtract what you owe (liabilities like loans, pending credit card amounts etc.) the amount you are left with is your net worth.

Step 4: Make a spending plan. This means write down in detail where your money will come from, and where it will go.

Step 5: Build an emergency fund. A good emergency fund contains enough money to cover at least 6 months' worth of expenses.

Step 6: Set up your insurance. Insurance provides long term financial security and protects you against risk.

Risk Management

As an entrepreneur, it is critical that you evaluate the risks involved with the type of enterprise that you want to start, before you begin setting up your company. Once you have identified potential risks, you can take steps to reduce them. Some ways to manage risks are:

- Research similar business and find out about their risks and how they were minimized.
- Evaluate current market trends and find out if similar products or services that launched a while ago are still being well received by the public.
- Think about whether you really have the required expertise to launch your product or service.
- Examine your finances and see if you have enough income to start your enterprise.
- Be aware of the current state of the economy, consider how the economy may change over time, and think about how your enterprise will be affected by any of those changes.
- Create a detailed business plan.

Tips

- Ensure all the important elements are covered in your plan.
- Scrutinize the numbers thoroughly.
- Be concise and realistic.
- Be conservative in your approach and your projections.
- Use visuals like charts, graphs and images wherever possible.

8.6.5 Procedure and Formalities for Bank Finance: The Need for Bank Finance

For entrepreneurs, one of the most difficult challenges faced involves securing funds for startups. With numerous funding options available, entrepreneurs need to take a close look at which funding methodology works best for them. In India, banks are one of the largest funders of startups, offering funding to thousands of startups every year.

What Information Should Entrepreneurs Offer Banks for Funding?

When approaching a bank, entrepreneurs must have a clear idea of the different criteria that banks use to screen, rate and process loan applications. Entrepreneurs must also be aware of the importance of providing banks with accurate and correct information. It is now easier than ever for financial institutions to track any default behaviour of loan applicants. Entrepreneurs looking for funding from banks must provide banks with information relating to their general credentials, financial situation and guarantees or collaterals that can be offered.

General Credentials

This is where you, as an entrepreneur, provide the bank with background information on yourself. Such information includes:

- Letter(s) of Introduction: This letter should be written by a respected business person who knows you well enough to introduce you. The aim of this letter is set across your achievements and vouch for your character and integrity.
- Your Profile: This is basically your resume. You need to give the bank a good idea of your educational achievements, professional training, qualifications, employment record and achievements.
- Business Brochure: A business brochure typically provides information on company products, clients, how long the business has been running for etc.
- Bank and Other References: If you have an account with another bank, providing those bank references is a good idea.
- Proof of Company Ownership or Registration: In some cases, you may need to provide the bank with proof of company ownership and registration. A list of assets and liabilities may also be required.

Financial Situation

Banks will expect current financial information on your enterprise. The standard financial reports you should be prepared with are:

- Balance Sheet
- Cash-Flow Statement
- Business Plan
- Profit-and-Loss Account
- Projected Sales and Revenues
- Feasibility Study

Guarantees or Collaterals

Usually banks will refuse to grant you a loan without security. You can offer assets which the bank can seize and sell off if you do not repay the loan. Fixed assets like machinery, equipment, vehicles etc. are also considered to be security for loans.

The Lending Criteria of Banks

Your request for funding will have a higher chance of success if you can satisfy the following lending criteria:

- Good cash flow
- Adequate shareholders' funds
- Adequate security
- Experience in business
- Good reputation

The Procedure

To apply for funding the following procedure will need to be followed.

1. Submit your application form and all other required documents to the bank.

2. The bank will carefully assess your credit worthiness and assign ratings by analyzing your business information with respect to parameters like management, financial, operational and industry information as well as past loan performance.

3. The bank will make a decision as to whether or not you should be given funding.

Tips

- Get advice on funding options from experienced bankers.
- Be cautious and avoid borrowing more than you need, for longer than you need, at an interest rate that is higher than you are comfortable with.

8.6.6 Enterprise Management - An Overview:
How to Manage Your Enterprise

To manage your enterprise effectively you need to look at many different aspects, right from managing the day-to-day activities to figuring out how to handle a large scale event. Let's take a look at some simple steps to manage your company effectively.

Step 1: Use your leadership skills and ask for advice when required.

Let's take the example of Ramu, an entrepreneur who has recently started his own enterprise. Ramu has good leadership skills – he is honest, communicates well, knows how to delegate work etc. These leadership skills definitely help Ramu in the management of his enterprise. However, sometimes Ramu comes across situations that he is unsure how to handle. What should Ramu do in this case? One solution is for him to find a more experienced manager who is willing to mentor him. Another solution is for Ramu to use his networking skills so that he can connect with managers from other organizations, who can give him advice on how to handle such situations.

Step 2: Divide your work amongst others – realize that you cannot handle everything yourself.

Even the most skilled manager in the world will not be able to manage every single task that an enterprise will demand of him. A smart manager needs to realize that the key to managing his enterprise lies in his dividing all his work between those around him. This is known as delegation. However, delegating is not enough. A manager must delegate effectively if he wants to see results. This is important because delegating, when done incorrectly, can result in you creating even more work for yourself. To delegate effectively, you can start by making two lists. One list should contain the things that you know you need to handle yourself. The second list should contain the things that you are confident can be given to others to manage and handle. Besides incorrect delegation, another issue that may arise is over-delegation. This means giving away too many of your tasks to others. The problem with this is, the more tasks you delegate, the more time you will spend tracking and monitoring the work progress of those you have handed the tasks to. This will leave you with very little time to finish your own work.

Step 3: Hire the right people for the job.

Hiring the right people goes a long way towards effectively managing your enterprise. To hire the best people suited for the job, you need to be very careful with your interview process. You should ask potential candidates the right questions and evaluate their answers carefully. Carrying out background checks is always a good practice. Running a credit check is also a good idea, especially if the people you are planning to hire will be handling your money. Create a detailed job description for each role that you want filled and ensure that all candidates have a clear and correct understanding of the job description. You should also have an employee manual in place, where you

put down every expectation that you have from your employees. All these actions will help ensure that the right people are approached for running your enterprise.

Step 4: Motivate your employees and train them well.

Your enterprise can only be managed effectively if your employees are motivated to work hard for your enterprise. Part of being motivated involves your employees believing in the vision and mission of your enterprise and genuinely wanting to make efforts towards pursuing the same. You can motivate your employees with recognition, bonuses and rewards for achievements. You can also motivate them by telling them about how their efforts have led to the company's success. This will help them feel pride and give them a sense of responsibility that will increase

Besides motivating your people, your employees should be constantly trained in new practices and technologies. Remember, training is not a one-time effort. It is a consistent effort that needs to be carried out regularly.

Step 5: Train your people to handle your customers well.

Your employees need to be well-versed in the art of customer management. This means they should be able to understand what their customers want, and also know how to satisfy their needs. For them to truly understand this, they need to see how you deal effectively with customers. This is called leading by example. Show them how you sincerely listen to your clients and the efforts that you put into understand their requirements. Let them listen to the type of questions that you ask your clients so they understand which questions are appropriate.

Step 6: Market your enterprise effectively.

Use all your skills and the skills of your employees to market your enterprise in an effective manner. You can also hire a marketing agency if you feel you need help in this area.

Now that you know what is required to run your enterprise effectively, put these steps into play, and see how much easier managing your enterprise becomes!

Tips

- Get advice on funding options from experienced bankers.
- Be cautious and avoid borrowing more than you need, for longer than you need, at an interest rate that is higher than you are comfortable with.

8.6.7. 20 Questions to Ask Yourself Before Considering Entrepreneurship

1. Why am I starting a business?

2. What problem am I solving?

3. Have others attempted to solve this problem before? Did they succeed or fail?

4. Do I have a mentor[1] or industry expert that I can call on?

5. Who is my ideal customer[2]?

6. Who are my competitors[3]?

7. What makes my business idea different from other business ideas?

8. What are the key features of my product or service?

9. Have I done a SWOT[4] analysis?

10. What is the size of the market that will buy my product or service?

11. What would it take to build a minimum viable product[5] to test the market?

12. How much money do I need to get started?

13. Will I need to get a loan?

14. How soon will my products or services be available?

15. When will I break even[6] or make a profit?

16. How will those who invest in my idea make a profit?

17. How should I set up the legal structure[7] of my business?

18. What taxes[8] will I need to pay?

19. What kind of insurance[9] will I need?

20. Have I reached out to potential customers for feedback?

Tips

- It is very important to validate your business ideas before you invest significant time, money and resources into it.
- The more questions you ask yourself, the more prepared you will be to handle to highs and lows of starting an enterprise.

Footnotes:

1. A mentor is a trusted and experienced person who is willing to coach and guide you.

2. A customer is someone who buys goods and/or services.

3. A competitor is a person or company that sells products and/or services similar to your products and/or services.

4. SWOT stands for Strengths, Weaknesses, Opportunities and Threats. To conduct a SWOT analysis of your company, you need to list down all the strengths and weaknesses of your company, the opportunities that are present for your company and the threats faced by your company.

5. A minimum viable product is a product that has the fewest possible features, that can be sold to customers, for the purpose of getting feedback from customers on the product.

6. A company is said to break even when the profits of the company are equal to the costs.

7. The legal structure could be a sole proprietorship, partnership or limited liability partnership.

8. There are two types of taxes – direct taxes payable by a person or a company, or indirect taxes charged on goods and/or services.

9. There are two types of insurance – life insurance and general insurance. Life insurance covers human life while general insurance covers assets like animals, goods, cars etc.

Notes