Draft Study Material

CONSTRUCTION PAINTER AND DECORATOR

(Qualification Pack: Ref. Id. CON/QP0503)

Sector: Construction

(Grade XII)

PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION
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Preface

Vocational Education is a dynamic and evolving field, and ensuring that every student has access to quality learning materials is of paramount importance. The journey of the PSS Central Institute of Vocational Education (PSSCIVE) toward producing comprehensive and inclusive study material is rigorous and time-consuming, requiring thorough research, expert consultation, and publication by the National Council of Educational Research and Training (NCERT). However, the absence of finalized study material should not impede the educational progress of our students. In response to this necessity, we present the draft study material, a provisional yet comprehensive guide, designed to bridge the gap between teaching and learning, until the official version of the study material is made available by the NCERT. The draft study material provides a structured and accessible set of materials for teachers and students to utilize in the interim period. The content is aligned with the prescribed curriculum to ensure that students remain on track with their learning objectives.

The contents of the modules are curated to provide continuity in education and maintain the momentum of teaching-learning in vocational education. It encompasses essential concepts and skills aligned with the curriculum and educational standards. We extend our gratitude to the academicians, vocational educators, subject matter experts, industry experts, academic consultants, and all other people who contributed their expertise and insights to the creation of the draft study material.

Teachers are encouraged to use the draft modules of the study material as a guide and supplement their teaching with additional resources and activities that cater to their students' unique learning styles and needs. Collaboration and feedback are vital; therefore, we welcome suggestions for improvement, especially by the teachers, in improving upon the content of the study material.

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Module 1 Waterproofing

Module Overview

This module provides a comprehensive introduction to waterproofing, covering key concepts and techniques. It begins with an overview of waterproofing and the various types available. You'll explore the general steps involved in waterproofing existing surfaces and learn how to address defects in painting caused by water leakage or rain. The module also discusses the tools and equipment commonly used in waterproofing, along with advanced techniques for enhanced protection. Additionally, the properties of materials used in waterproofing are also discussed, equipping you with the knowledge to select the most effective solutions for durable results.

Learning Outcomes

After completing this module, you will be able to:

- To understand the fundamental concepts of waterproofing.
- To identify and differentiate between various types of waterproofing.
- To understand the general steps involved in waterproofing existing surfaces.
- To recognize and address defects in painting caused by water leakage or rain.
- To become familiar with the tools and equipment used in waterproofing.
- To explore advanced waterproofing techniques for improved protection.

Module Structure

1.1: Introduction to Waterproofing
1.2: Types of waterproofing
1.3: General steps involved in waterproofing in existing surface
1.4: Various defects in painting due to water leakage/rainwater
1.5 Tools and equipment used for waterproofing
1.5: Advance Water proofing technique
1.6: Properties of material used in Waterproofing

Building may be of any type such as house, office or service building which is an important asset involving large investment. Water means to be the most destructive weathering element of these

structures; water continues to damage or completely destroy more buildings and structures than natural disasters. Retainment of water or moisture on the surface can cause severe damages which are costly to repair. The most crucial segment of a building is Roof/Terrace and assumes of greater importance in case of large plan terraces of buildings. These surfaces are exposed to direct climatic variations, extremes of rainfall and structural movements caused thereby and every effort should be taken at the design stage, to ensure that a proper protection system has been incorporated.

It is obvious that every time repair work is not a solution for these kinds of problems and so, prime focus is to provide maximum protection even though it may cost little more. Even providing protection to such level can costs a bit more but also secure the building for a long time. Therefore, in building or any structures where protection from moisture/water is required, waterproofing is done.

1.1 Introduction to Waterproofing

Waterproofing is the formation of an internal or external membrane (or layer) which is designed to prevent water from entering the surface. As defined, the membranes can be provided internally or externally as suitable. Internal membranes are created with waterproofing admixture whereas, External membranes are applied to the surface which resists the water to penetrate.

Basic concept behind various methods used for water proofing, is use of material such as admixtures, impregnation, film forming membranes, surfacing, joint seal and grouting that can restrict the water to enter into it.

Thus, waterproofing can be defined as a method of making a structure waterproof or water-resistant so that it stays unaffected by water. The term “waterproofing” is often used for building structures (Such as basement areas, roofs, bathrooms, and balconies), clothing (raincoats), electronic devices (mobiles, watches) and paper packaging (cartons holding liquids) etc.

In construction, a building or structure is said to be waterproofed, which does not permit the liquid water to penetrate through it. This can be obtained by using impermeable membranes, waterproofing coating, waterproofing admixtures while concreting/ plastering/ flooring, etc.

Waterproofing creates a barrier that makes it impossible for water to pass through the material and so prevents moisture retention in buildings. It helps reduce the humidity inside the house, thus avoiding indoor damage from exposure to smoke or water.

Do you know?

Various methods have been used for waterproofing. Some basic concept behind various methods used for water proofing which are described as below:
Admixtures: An admixture is a substance which can be added to the concrete to induced some properties in the concrete. Mineral admixtures and Chemical admixtures widely used for specific purposes. These help to reduce the water content of mix and make the concrete dense, compact and durable.

- **Impregnation**: For water proofing of old and new structures, impregnation type is used. In this method the solution is penetrated into the pore structures considering three different actions such as hydrophobic, partial filling and filling. For hydrophobic phase silane, siloxane, diffused quartz carbide solution is used. For partial filling phase silicone, sodium silicate solutions are being used. For filling low viscosity epoxy and methacrylate solutions are being used.
  Film forming membranes: This may be liquid applied waterproofing coating or a preformed elastomeric membrane.

- **Surfacing**: For water proofing, asphalt, concrete, epoxy mortar, polymer concrete, polymer modified mortar etc. are used as an overlayment or cover over Sealants: Joints are the necessary important parts of the structures as it acts as a link between parts of structures as column-beam joint, column-slab joint, slab-slab joint, beam-beam joint, floor-floor joint etc. all these shall be sealed with proper sealants. There are various types of solvents that are used in waterproofing such as:
  1. **Transparent sealants** are the most popular type, as it is often best for industrial and commercial projects that do not need colour. The tinted sealant that specializes in waterproofing is also available, though.
  2. **Cementitious sealants** are perfect for working with swimming pools, cellars other interior or exterior groups composed of tiling or tile-based substrates.
  3. **Silyl modified polymer (SMP)** are acid-free and ideal for a broad range of waterproofing needs. Our silylated modified polymers can bond to the exact variety of substrates as a traditional silicone sealant but have a much higher bond and skin strength.
  4. **Bitumen sealant** are the solutions resist most salt resolutions, water, alcohol, cut acids and alkalis. It makes them ideal for waterproofing, particularly for external applications like roofing materials.
  5. **Epoxy sealant and epoxy acrylic adhesive technology** is perfect for cellar and water-holding tank sealing.

If a building is considered then following are the components of the building that require waterproofing:

1. **The basement of the building**: This component has direct contact with the earth and, in some cases, the groundwater table. Hence, it is very prone to seepage or ingress of water from the surrounding areas.
2. **Kitchen, Toilet and Bathroom**: These are the components of a building where water is continuously used for utility and bathing. There is always a chance of seepage from these locations to their adjoining rooms or walls.
3. **Balcony areas**: This component is exposed to the outer environment; water mainly comes from rain.
4. **Roof/ Terrace/ Podium:** These components are constantly exposed to the monsoon and other seepages.
5. **Water Tank**: It is generally built or placed on the terrace of a building. It has a high chance of leakage as it contains an enormous quantity of water. Any leakage in it can cause damage to the terrace and seepage into the rooms.

Why Waterproofing is needed?

Environmental elements such as rainwater, wind, groundwater, and temperature-induced moisture can create problems in the buildings. A faulty roof that permits the water penetration can cause harm to structural building and its strength, interior, fittings, and furnishings, shows unhealthy building syndrome and affects indoor air quality.

Hence, proper care must be taken care off for non-retention of water or moisture on any part of the structure. Waterproofing reduces the maintenance of the structure moisture control and provides the building an envelope:

1. It prevents the water seepage and rainwater from penetrating a building; treatment is given to check water entry into the wall, bathroom, and roof.
2. It increases the life of the structure.
3. In the basement, podiums, damp areas, water bodies, terraces, roof, and external walls, waterproofing is done.
4. Waterproofing can be done during as well as after the construction.
5. Water absorption can be decreased.
6. It prevents the shape of cracks on the concrete floor.
7. The appliance is easy.
8. It will increase the lifetime of solid construction.
9. It prevents corrosion of reinforcement.
10. It prevents dampness inside the building.

1.2 Types of Waterproofing

It is important to consider waterproofing buildings because it builds an impenetrable barrier over foundations, roofs, and walls against water. Here are some of the common waterproofing materials used in building constructions:

1. Cementitious Waterproofing

Cemented waterproofing is the easiest way of waterproofing, materials required are freely available and easy to mix and apply. It is usually rigid or semi-flexible waterproofing, consequently used in interior places such as toilets & areas not exposed to sunlight and weathering. Thus, the limitation and expansion process does not lead to a local waterfall. This type of waterproofing uses cementitious products, which are readily available in the market dealing with masonry products. These products are easy to mix and apply. Refer the Fig. 1.1. Also curing of the concrete surface is shown in Fig. 1.2.

Fig 1.1: Cementitious Waterproofing

Fig 1.2: Curing of surface

One of the most commonly used cementitious products for waterproofing is an acrylic-based polymeric compound such as "Tapecrete material".

Tapecrete is a white milky acrylic-based polymeric compound. It is used for surface treatment, concrete repair, and protection of concrete surfaces and waterproofing. It is used in basements, toilets, terraces, roofs, swimming pools, water tanks, etc.

All the concrete surfaces should be thoroughly pre-wetted with water before the application of the papercrete coating on the flat/ vertical/ inclined surface.

1. Tapecrete polymer is mixed with cement in the ratio of weight, not by volume.
   - For slurry coating, papercrete is mixed with neat, fresh cement in a 1:2 ratio.
   - For brush topping, mix tapecrete, silica sand and cement in a 1:2:2 ratio.

2. The first coat of slurry mix can be applied using a paintbrush over a clean, moist concrete surface. The slurry mix can be applied in 2 strokes: two vertical and two horizontals.

3. Moist curing should be done after 24 hours by spraying or sprinkling portable water on the applied surface for the next 48 years. The ideal curing method is to

cover the area with a wet gunny bag. Fibreglass cloth is generally used to reinforce the coating.

Do you know?
Before implementing any of the waterproofing method, some basic steps such as cleaning of the surface to remove dust, foreign matters, loose materials or any other deposition must be carried out. This can be achieved by scarifying, grinding, water blasting, acid washing or other methods.

2. Liquid Waterproofing Membrane

A liquid membrane as shown in Fig. 1.3 is a thin coating containing a primer coat and top coat utilized by a spurt, roller, or trowel, which provides additional flexibility compared to cementitious waterproofing. Liquid waterproofing membrane is available in the form of liquid and is sprayed or applied by brush or roller to the concrete surface which forms a thick joint free membrane in contact with air.

These liquids applied systems feature coatings have elongation properties, durability, flexibility, abrasion, chemical resistance providing successful installation. The liquid waterproofing membrane provides optimized performance and also most importantly longevity. Thus, this method of waterproofing is time saving process and also no need to shut down the other works as if applied in morning gets dry and strong till afternoon. It saves a lot of labor cost, and gives maximum quality results.

It is critical that the applied membrane should be watered soon after the membrane is touch dry. As per standard specs it has to be cured by water following couple of days. It gives a low maintenance service long life.

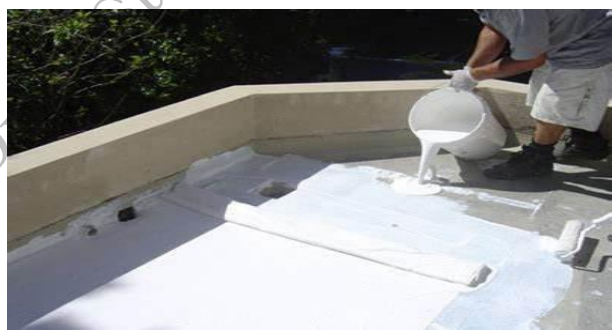

Fig 1.3: Liquid Waterproofing Membrane

It's a lifetime smart alternative then other conventional methods. If the bridge last for 200 years so as the work too. It also saves the cost of filler and sealers and other materials which will be used in future to repair cracks and still remains a temporary solution only.

3. Bituminous Coating Waterproofing

Bituminous waterproofing can be used to protect residential and commercial buildings. Bitumen is a mixture of substances made up of organic liquids which are highly sticky, viscous, and waterproof. Sometimes, it is used as a coating material and applied over the surface to make it waterproof. Its most common applications include an area that is beneath screed wet.

Bituminous coating waterproofing shown in fig. 1.4 is flexible and protects against water that can be affected by polymer grades and fibre reinforcement. This waterproofing is constructed up of bitumen manufactured material as it evolves very flaky when uncovered to daylight with elastic materials such as polyurethane or acrylic-based polymers. The flexibility depends on the reliable content of the polymer counted to the bitumen.

Fig 1.4: Bituminous Coating Waterproofing

4. Polyurethane Liquid Membrane

Polyurethane is one of the versatile polymers that can be made into fibres, elastomers, flexible and rigid foams, or surface coatings. In the liquid form, this polyurethane protective coating is applied to the surface of the substrate to protect from various types of defects like corrosion, abrasion, weathering, and deteriorating processes. Refer Fig. 1.5.

Some properties of polyurethane liquid membrane are as follows:

1. Impermeability - Zero water penetration is necessary.
2. Durability - It must be able to retain its integrity when exposed to harsh weather conditions like heat, cold, rain, storm, etc.
3. Flexibility - It must withstand the normal movement of building structures that may be due to distortion, earthquake, etc.
4. Resistance - The membrane must be resistant to UV, normal wear and tear, and adverse weather.
5. Breathability - The membranes must be able to breathe so that the moisture vapors trapped inside the building interiors and the substrate can escape freely.

The step-by-step procedure of applying the waterproofing method on the flat roof surface using the polyurethane liquid coating is explained here.

1. The first step is to clean the roof surface thoroughly so that it should be free of dust, dirt, grease, and other debris.
2. The next step is to fix the cracks on the surface bed by cutting it into the V section, followed by cleaning and filling with polyurethane-based crack filling compound and white cement in the ratio of 1: 2.
3. Then, the substrate should be neutralized using the acid application to remove the alkalinity.
4. The next step would be to apply a pack of polyurethane primer coats to the surface as an adhesive coat, and it should be allowed to dry completely for at least 8 hours.
5. Then, the three successive finishing coats must be applied using a brush with each time coated with two components of polyurethane as per the design ratio.

Fig 1.5: Polyurethane liquid Membrane

5. Injection Grouting Waterproofing

In injection grouting waterproofing, as shown in Fig. 1.7, a low viscous injection polish for waterproofing application in slight to medium infiltration is used in bricks, concrete, and other structures like the basement, tunnels, etc. It is filling the cracks, voids or honeycombs under pressure in concrete or masonry structural members for repairing cracks, strengthening damaged concrete or masonry structure member and providing waterproofing ability to the structure.

Fig 1.7: Injection Grouting

6. EPDM Waterproofing Membrane

The EPDM (ethylene propylene diene monomer) rubber membranes, shown in Fig. 1.8 is a single-ply membrane that can be used for various applications such as waterproofing of basements, roofs/terraces, expansion joints, wet areas (toilet blocks), facades, etc. It is a single product that can be used for waterproofing most parts of a building. The EPDM

rubber waterproofing membranes are techno-commercially much better than substitutes such as bitumen membranes, crystalline products, admixtures, various coatings, etc. The use of these products may be avoided in projects where EPDM rubber membranes are used. The EPDM waterproofing membranes are an excellent substitute to the torch-on membranes.

Following are the advantages of EPDM waterproofing membrane -

1. Resistant to UV, Ozone, and air pollutants.
2. Wide range of temperature resistance form -40°C to +160°C.
3. Nearly millions of square meters of EPDM membrane have been installed on rooftops globally and they are known to have a service life of beyond 30 years.
4. No torches or gas required during installation.
5. Flame free and heat free installations.
6. It is an environmentally and recyclable system.
7. Lightweight: around 1.25Kgs/SQM.
8. Single product for various areas such as basements, roofs, podiums/landscape areas, expansion joints, etc.
9. Acts as an anti-root barrier. So, they are idea for green roofs and landscape projects.

Fig 1.8: EPDM Waterproofing Membrane

7. **Brick Bat Coba Waterproofing**

Brickbat Coba waterproofing shown in Fig. 1.9 is an effective way of providing waterproofing and insulation for thermal comfort for flat RCC roofs to prevent leakage of water. It is one of the oldest procedures of waterproofing, which consists of laying brickbats on the flat RCC roof and grouting the same with waterproofing compound with a slope to drain the surface water

Fig 1.9 Brick Bat Coba Waterproofing

The step-by-step procedure of applying the brickbat coba waterproofing method on the flat roof surface are as follows –

1. **Surface Preparation**

   In the case of existing treatment, the coating on the slab top shall be removed, and surface cleaned by hard wire brush and washed with water. In the case of a new slab to be cast, the surface of the concrete must be roughened by scraping.

2. **Application of Slurry and Base Coat**

   The slurry is prepared with cement and water to a required consistency. It shall be applied over the dampened surface with brushes very carefully. The prescribed quantity of slurry application is 2.75 Kg of cement per Sqm. The use of the slurry should continue up to a height of 300 mm over the parapet wall.

   The laying of a 25mm thick base coat is carried out soon after the application of slurry when the application is still green. The cement plaster of 25 mm thick with a mix ratio of 1:4 is evenly applied over the concrete surface.

3. **Placing of Brickbat**

   While the base coat is still green, brickbats of the size (65mm to 120mm) are placed with a gap of 15 and 20mm. The brickbats shall be wholly burnt and are well soaked overnight before laying.

   Once after laying of brickbats, curing is carried out for a minimum of 24 hrs after which, the gaps between the brickbats are filled with the same mix mortar used for base coat.

4. **Laying of Protective Coat**

   A waterproofing compound confirming to IS 2645 is blended with the cement water mixture as per the manufacture specification. However, not more than 3 % of the waterproofing compound shall be used per 50 Kg of grey cement.

A cement mortar of a 1:4 ratio is prepared with the waterproofing compound and applied over the surface, including the haunches/gola and 300mm on the parapet wall. The surface is neatly finished with the help of wooden/steel hand float.

5. **Curing**

The entire surface thus treated shall be flooded with water by making bunds with low cement mortar. The curing shall be carried out for a minimum period of 2 weeks.

1.3 General Steps Involved in Waterproofing on existing surface

Although every waterproofing method has its own procedure of application. But still some general steps are carried out for application of various waterproofing methods.

1.3.1 General Steps Involved in Waterproofing using membrane technique

1. **Base Preparation**: Remove the floor systematically to be free from loose materials, mud, and oil. Floor cleaning performs a vital function in all membrane-based waterproofing coating programs.
2. **Application of Primary Coat:** Apply a primary coat to the structure's floor, while solvent-based or water-based primers are suitable for bitumen membranes.
3. **Unrolling the Membrane Sheets**: Examine the proper alignment, adjust the sheets where required, and unroll the sheets on the structure floor.
4. **Heating the Membranes**: Heat the burn-off film present on the beneath facet of the membrane with the torch. Now the membrane will be prepared for bonding with the entire concrete surface.
5. **Pressing the Membrane:** Press the membrane firmly, making sure the proper bonding with the surface of the concrete. Further care should be taken for the overlaps, edges, and angles to verify appropriate bonding.

1.3.2 General Steps Involved in Waterproofing using other than membrane technique

1. Surface Preparation

The surface preparation is the key to any of the treatment process, as it shall create a strong foundation for any waterproofing systems to last longer than life expectancy.

The surface preparation needs to be in the following ways such as Cleaning/Washing. Clearing with a brush or washing with pressure washer shall remove all the impurities like oil or grease, loosely adhered particles and weaken or decomposed algae/fungus which might have accumulated on the surface because of weathering.

2. Repair or Strengthening of Weaken substrate

The loosen concrete or plaster to be removed and re-plastered or re- concreting is required. Once done, the same needs curing for a sufficient period. Moving forward this surface to be cleaned to remove any dirt or foreign particle left. The surface needs a strong investigation for any presence of the crack. Refer fig. 1.10 showing general repair of floor.

Note: General curing period what we recommend is of at least 3 days. If the surface is tiled or is with china mosaic chip then the hollow tiling part has to be treated first.

Fig 1.10 Repair of Floor

3. Sealing the Outlets & projections

Every flat roof shall have an outlet for the rainwater or overflow water to drain down off the roof. Likewise, there's plumbing projection with air-release & sewage projection with gas-release for any roof. A few of the roofs also have the columns/pillar for the overhead water tank or a platform for the lift room access. The joints between the surface & floor require to be sealed. Ensure that there's no void or opening for water to enter through it.

4. Apply Primer

The primer act as the bonding agent between the coating and the surface which ensures the better adhesion along with an increase in the coating's durability and also helps with additional protection to the surface.

5. Apply Base Coat

Application of Base Coat is the primary, important & critical part of any coating. Base Coat straightly affects the performance & functionality of the coating system. Waterproofing Base Coat creates a foundation for the coating to absorb the movement shocks which may be caused either by the surface or because of any external movement. This kind of step also includes creating a coving at the junction of walls & floor.

6. Apply Topcoat:

As the name suggests, it's a top-level of the system. It comes with the many properties like Anti Abrasive, UV stable, Anti-Static, Solar Reflective & aesthetically pleasant.

1.3.3 General Steps involved in dampness treatment for walls

Generally, for removing the dampness of the wall, DPC (Damp proof course) is being carried out. Damp proof coarse is provided over the plinth at 45 to 100cm above the ground level to protect wall from dampness. DPC is usually a layer of concrete, which is 40 to 50mm thicknesses in a 1:2:4 proportion.

In many buildings, beam is placed at Plinth level about 100mm thickness with steel rod. But in the old buildings where DPC is not placed, there are questions to easily moisture come in the walls. Following are the methods adapted to fix dampness in walls:

1. Creating a new Damp Proof Course (DPC) level.
2. Injecting chemical in Plinth.
3. Injecting Resin mortar with pressure.

1. Creating a new Damp Proof Coarse (DPC) level:

In this way, New DPC layer provided at a place of old DPC layer of building. In this method mortar bed is removed by help of cutting above the two layers of brick from the ground level. This mortar bed is cut until the length of about 1meter at a time. The new DPC waterproofing compound is filled in this place. This method is very slow. If the wall is poor, then the structure settlement and cracks are likely to occur in building. This way is not used specifically.

2. Injecting chemical in Plinth to repair dampness:

In this method the inclined hole is drill in the plinth portion of the wall. Injecting soluble silicon chemical with water in this hole. This causes a created watertight layer at the plinth level. Silicone Paints are used for waterproofing of the outside wall. So, rainwater does not enter the walls.

The two methods to feed chemical into the hole are as follows:

1. Pressure Injection
2. Gravity Feed

1. Pressure Injection (Refer Fig. 1.10)

- In this method, the plaster on the layer of 3 – 4 bricks above the ground level is removed.
- 12 mm diameter hole is done until the 2/3 depth of the wall thickness.
- The horizontal distance between such a hole is kept 150 mm.

- This hole is slipped out of the outside.
- Injecting polyurethane resin in this hole with the help of jel presser pump.
- Keep 0.3 to 0.7 MPa Pressure for a solvent-based solution and 0.1 to
- 0.3 MPa pressure for a water-based solution.
- Eventually, the hole is closed with a waterproof motor.

Fig 1.10 Pressure Injection

2. Gravity Feed (Refer Fig. 1.11)

- The simple Gravity Feed method is also used to make wall damp proof.
- In this method, inclined hole drilled in wall with 25 mm diameter, done until the 2/3 depth of the wall thickness.
- Rubber tube attached to this hole.
- The above end of the rubber tube container filled with a solution of soluble silicone.
- This solution is allowed to flow from the Gravity Force.

Fig 1.11 Gravity feed of chemicals

3. Injecting Resin mortar with pressure to repair dampness

- In this method, 20 to 30 mm diameter inclined hole drilled in the 2/3 of the thickness of the wall.
- Such hole inclined at an angle of 20 degrees to 30 degrees in a downward direction with 30cm center to center distance.
- Special cement mortar (styrene-butadiene resin or epoxy resin) injecting in such type of hole with the help of chauking gun.
- This resin is dry and becomes hard which is make an impervious layer on it. That prevents moisture.

1.4 Various defects in painting surface due to water leakage/rainwater

Moisture not only affects the strength of the structure but also deteriorates the aesthetic appearance of the structure as it harshly affects the paint and causes many defects directly or indirectly such as:

1. **Peeling and Blistering**
   Blistering of colour, shown in Fig.1.12 is a defect that induces a bulge of the paint flick. The reason behind the film of colour's swelling is the formation of airdrops underneath the coating due to the ingress of moisture, oil, or grease matter. If the swelling of the film of paint occurs due to grease or oil, then it is known as blistering. On the other hand, if the paint film's swelling occurs due to water or

moisture, it is called peeling, as shown in fig. 1.13. Usually, the swelling is caused due to the use of excessive oil during the application of the last coat, improper condiment of timber, trapping of gases beneath the skin of paint etc.

Fig 1.12 Peeling Defect

Fig 1.13 Blistering defect

Causes of Peeling & Blistering - Some of the causes of peeling and blistering of paint can be listed as follows:

1. Extreme dampness
2. Increased humidity
3. Unnecessary coatings of paint
4. Lack of consistent practice before application
5. Usage of poor-quality paint
6. Increased temperature
7. Long direction to sunlight
8. Use of improper application techniques

2. Fading:

Fading, shown in fig. 1.14 is a typical type of fault in painting work that causes the discoloration of the used paint. The foremost causes of such defects are the various atmospheric elements such as rain, sunlight, moisture infiltration, etc. Fading can be defined as losing one or more colour stains from the paint film. Over time, the paint film loses the colour pigments under harsh atmospheric conditions and continuous sun exposure.

Fig 1.14 Fading defect

Causes of fading - Some of the causes of fading of paint can be listed as follows:

1. Daylight, Infrared, and Ultraviolet Radiation
2. Temperature Variations
3. Application of unclear colour paints (darker colours tend to soak more radiations from the sunlight)
4. Coastal and Extreme Environmental Conditions
5. Bad Film Thickness

6. Use of subordinate quality paints

3. Flaking

This type of fault in which the colour flick separates from the texture is known as flaking of paint. In general, flaking may be understood as the spectacle where the paint coat accomplishes not adhere properly to the surface. In this defect paint drips downwards on the surface due to application of too thick or wet layer of paint. High humidity or low temperature can also lead to this. Refer Fig. 1.15.

Fig 1.15 Flaking defect

Causes of flaking – Some of the causes of flaking of paint can be listed as follows:

1. Proper humidity control.
2. Use appropriate thinner on clean surface.

4. Mildew

It is a form of fungus which grows well in a warm moist and dark environment. They grow rapidly and form grey patches on the painted surface. It can be prevented by keeping the surface dry and clean before applying paint. If there is any trace of its growth, then wash the surface with the bleach. Refer Fig. 1.16.

Fig 1.16 Mildew defect

Do you know?

Waterproofing on one side provides such safety to the structure from moisture/ water while on the other side also have some disadvantages which are as follows:

1. Bitumen-primarily based products melt inside the summer warmness because the black color is limited because of solvent evaporation.
2. The polyurethane defensive coating shouldn't be very flexible.
3. Polyurethane defensive coating delays the herbal breathing functionality of concrete.

4. The polyurethane protective coating has a restrained pot life; the impermeable floor coating lets in water to shape under the ground coating.
5. Cementation waterproofing cannot preserve the cracks, which causes similar leakage.

1.5 Tools and Equipment used for waterproofing

These tools generally used for the waterproofing work are as follows:

Tools/Equipment	Usage
Dampness Meters	It will use a moisture meter to determine hidden moisture and precisely what to look for because you may even have the same problem under concrete.
Grinders	Waterproof system installers use a grinder to ensure your deck surface is completely smooth. These do everything from light texturing to start surface pores. Grinders also release previous coatings or paint you applied to your deck. Most single-disc grinders can protect over 12 inches with single access on a deck surface. However, dual-disc grinders wrap up to 20 inches.
Trowels and Rollers	Depending on the waterproof coating you are using, you'll need suitable applicators to ensure a comprehensive application. • Stainless steel trowels are standard, though so are collection trowels. The latter is flat-bladed with spherical endings and planned to apply coatings to concrete. These are mainlyuseful when doing waterproofing on swimming pool decks. • Rollers are a standard tool as well to ensure smooth coatings. Missing just one small spot could mean moisture getting through a smallhole or crack. So trust your waterproofing expert to use the most suitable rollers, including paint brushes for tiny cracks.

Do you know?

Tile grouting:

Tile grout is a construction tool available in quite a few varieties, each of which comes in different colours. Grout fills in the spaces between tiles. It is essential for creating a seamless tile appearance and protecting both your tiles and the surfaces underneath. It prevents moisture from seeping into the substrate, straightens tile lines, and keeps tiles from cracking or rubbing against each other. Tile grout plays an important role. From an aesthetic perspective, grout gives a wall, floor, or tiled surface a clean appearance. It keeps dirt and debris from getting between or under the tile. It even adds rigidity and strength to the tile installation

1.6 Advance Waterproofing techniques

Various polymers have developed advanced technology to stop leakages from terraces, walls, basements, toilets and water retaining structures. Among these are Epoxy compounds, Polyurethane coatings, Polymer emulsions/ membranes, Cementitious polymer compounds are some few.

All the above materials have their advantage as well as limitation. No single product can provide an effective solution to the range of waterproofing application requirements. In every instance, it is necessary to examine the causes of leakage and select the proper material suitable for the relevant problem and environmental factors.

Material	Applications
Bituminous coatings	Waterproofing of floors, basements, floors, under-ground constructionsand pipelines, as well as some use for waterproofing of top slabs
Water based coatings	Dampness and efflorescence, polymer-modified cementitious layers for waterproofing and mortar for rehabilitation.
Epoxy coatings	Waterproofing and moist proofing of structures, domes, ducts, floors etc.Epoxy mortar or repairs. Low- density epoxies as grouting material.

Polyurethane	Waterproofing of construction features such as layer terraces, terraces, chajjas etc., storage tanks- external applications, sealants and moisture curable polyurethanes for damp proofing.
Polythylene film	Waterproofing of building components such as ceiling slabs,terraces, balconies, hajj etc.

Polymer-based liquid membranes are a chemical type of waterproofing coating systems which require a clean, inert and mechanically sound surface to achieve adequate bonding and better performance. The efficiency of the treatment also depends upon the proper surface preparation and artistry during its application. Therefore, the following general precautions should be undertaken before the application of the protective treatment:

1. The coating should be applied on a smooth and mechanically sound surface.
2. The surface should be free from cracks and potholes, which should be filled with a suitable sealant.
3. Any traces of mould, grease etc., if any, should be removed using a suitable solvent or washing with a soap solution.
4. Loose mortar, dust particles etc., should be removed by using a wire brush. The surface should be cleaned off open matter and subsequently washed with water.
5. Whenever fillet has not been provided at the junctions of roof and parapet, 75mm radius should be made with concrete and finished smooth with mortar.

Instant leak plugging compound

It is a compound which solidifies immediately upon contact with leaking water. It is ideal for instantaneous sealing of leaks, surface dampness, waterpenetration and seepage points in basements, piles, water retaining structures etc. It is available under many brand names like dispatch etc.

Waterproofing precautions on old roof slabs

The following additional precautions should be undertaken before applying waterproofing coating on the old roof slabs, balconies and chajjas etc.

- Plants and shrubs on roofs, parapet walls and rain-water outlets should be removed. Their roots should be removed entirely.

- The roofs already treated with tar felt, or any other bitumen-based treatment should be free from bitumen in the case of non-bituminous-based medicine, as the coating may not have proper adhesion on such surfaces.
- The coating should not be applied directly on the slabs already treated with brick bat Coba in cement or lime mortar, as the layer may not have required adhesion with the available surface of the roof slab. Therefore, the above treatment should either be removed if it has lived its life or in case of surface erosion of brick Coba; the eroded coba should be removed.

1.6 Properties of material used in waterproofing

All the materials that have been used for waterproofing must contains some common properties such as:

1. **Water resistance**: It means that its performance is basically unchanged under the action of water and after being infiltrated by water. It is impervious to water under the action of pressure water, and is usually expressed by indicators such as impermeability and water absorption.

2. **Temperature stability:** refers to the performance of not flowing, non- foaming, non-slip at high temperature, not brittle at low temperature, that is, the ability to maintain the original performance under certain temperature changes. It is commonly used for indicators such as heat resistance and heat resistance.

3. **Mechanical strength, elongation and fracture resistance**: refers to the performance of waterproofing membranes subjected to certain loads, stresses or failure under certain deformation conditions. Commonly used for tensile strength, tensile strength and elongation at break.

4. **Flexibility**: This refers to the performance of maintaining flexibility under low temperature conditions. It is very important to ensure easy construction and no brittle fracture. Commonly used for flexibility, low temperature bending and other indicators.

5. **Atmospheric stability**: This refers to the ability to resist erosion under the long-term combined effects of sunlight, heat, ozone and other chemical attack media. It is commonly used for indicators such as aging resistance and heat aging retention.

Activity

Activity 01: Enlist the properties of different water proofing material

Material required:

1. Notebook
2. Pen

Procedure:

1. Take permission to the hardware shop owner.
2. Visit the hardware shop.
3. Enlist different waterproofing materials used.
4. Differentiate and separate according to usage of waterproofing material as perthe existing surface.
5. Write the properties of each of the waterproofing material.

Check Your Progress

A. Answer the following

1. Define sealants with its types.
2. Enlist the properties of polyurethane liquid membrane.
3. Explain about EPDM waterproofing membrane.
4. Write down the characteristic of interior and exterior paint?
5. Define the following terms: 1. Peeling 2. Fading
6. What are general steps involved in waterproofing using membrane technique?State all.

B. Fill in the blank

1. For slurry coating papercrete is mixed with neat fresh cement in 1 in……ratio.
2. …… is one of the versatile polymers that can be made into fibres,elastomers or surface coatings.
3. The curing period of brickbat coba for minimum of …… weeks.
4. …… Is form of fungus which grows well in moist and dark environment.
5. If the paint film swelling occurs due to water/moisture is called…… .

C. Match the following

Column A	Column B

1. Paint film swell due to moisture	A. Fading
2. Paint film swell due to grease or oil	B. Peeling
3. Causes discoloration of paints	C. Blistering
4. Color flick separates from texture	D. A type of waterproofing material
5. Polyurethane	E. Flaking

Module 2 Painting Aesthetics and Software Application

Module Overview

This module explores the importance of aesthetics in painting, highlighting the crucial role of visual appeal in construction projects. It covers the role of software in modern painting works, showing how technology enhances efficiency and precision. Additionally, the module explains how computer software can be used for colour visualization, enabling better planning and decision-making in selecting the right colours for any project.

Learning Outcomes

After completing this module, you will be able to:

- To understand the importance of aesthetics in painting.
- To recognize the role of software in construction painting works.
- To learn how to use computer software for colour visualization in painting projects.

Module Structure

2.1: Importance of aesthetics in painting
2.2: Role of software in construction painting works
2.3: Colour visualization with the help of computer software

Aesthetic is a branch of intellectual analysis that represents the beauty and taste of nature. It is also basically a part of philosophy that tests to know the nature of the ability. An painter

can draw inspiration from nature or gain more experience and skills to improve his creativity. Like painting and statues, architecture can be considered a graphic artist to which the philosophy of aesthetics can be applied. However, this application of aesthetics to structures and architecture is complicated by the physical requirements of the brief, budget, system, regulations, climate, weather, etc. The graphic spaces dynamic method depends on the aesthetical aspects of architecture colour, light, fabric, surface, shape, dimensions as well as their interrelationship.

The elements that together comprise a design include:

Line	A marker between two points.
Shape	Geometric or organic shape
Direction	Horizontal, vertical or oblique
Size	Dimensions in relation to another element
Texture	Surface quality

All these factors are equally essential, and the reverse might impact the overall result. A suitable architect must be ready on combining all these elements rightly atthe right time—suitable utilization of sloped roofs, arches, decorative columns, etc. The basic aesthetic view of a building is shown in Fig. 2.1.

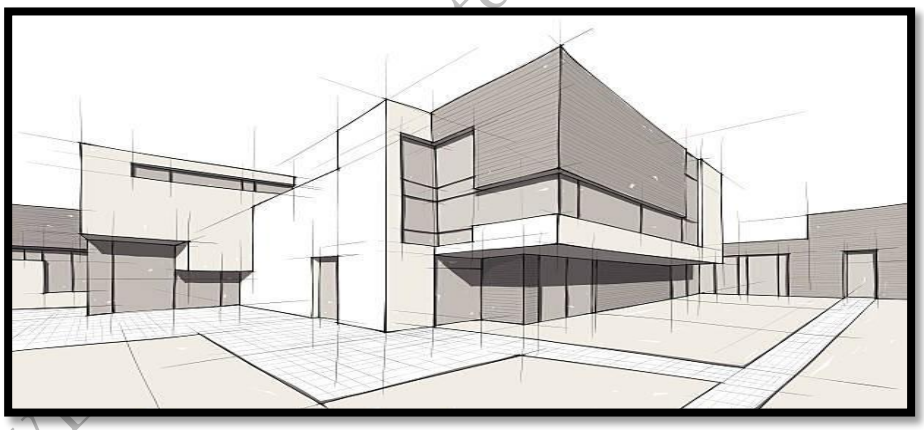

Fig 2.1: Aesthetic View

1. Line: Each of the design elements has unique, expressive qualities. Line, for example, is an involuntary, primeval pattern for representing things; the simple linear imagery of young children's drawings and prehistoric rock paintings is universally understood. The formal relationships of thick with thin lines, broken with continuous, and curved with jagged are forces of contrast and repetition in the design of many paintings in all periods of chronology.

2. Shape: Shape as elements of design, including all areas of different colours, tones, and textures, as well as individual and grouped images.

3. Colour: It is one of the essential low-level features. We usually measure colour in colourfulness, colour balance, and opposing colours. Combining different forms and colours creates aesthetical values in space. Various shades with shade card are shown in Fig. 2.2.

Fig 2.2: Colours of different shade

4. Texture: As an aspect of design, the surface includes all areas of a painting enhanced or invigorated by vibrating patterns of lines, shapes, tones, and colours, in addition to the textures created by the plastic qualities of certain mediums. Decorative surfaces may be of geometrical reproduction patterns, as in many Indian, Islamic, and European paintings and other art, or representations of patterns in nature, such as spread leaves, dropping snow, and flying's of birds.

5. Space and Volume: The perceptual and abstract ways of expressing volume and space on the dull surface of a painting are related to the two groups of comprehending spatial connections in everyday life.

6. Time: Time in the painting is not restricted to representations of physical energy but are elements of all design. Part of the viewer's whole experience of a great image is to allow the arrangement of lines, shapes, and accents of tone or paint to show the eye across the picture surface at controlled rhythms suggestions. These structures contribute to telling a particular mood, vision, and idea.

2.1 Importance of aesthetics in painting

1. Aesthetic painting plays a vital role in determining the different qualities in the image and helps analyse the painting's nature.
2. It allows the artist to set their values and gain more experience. It helps to represent certain qualities quickly.
3. It also provides simple answers by taking different opinions about painting and aesthetics to give that power.
4. Aesthetics painting helps to understand an artist's respect and interests better.

5. It provides good ideas for the future. It also offers excellent diagnoses and knowledge about prehistoric art.

6. Mainly modern artists think that painting techniques in the past are now outdated. However, excellent details can still be achieved from those paintings through an aesthetic idea, and they can be changed as needed to enhance the everyday industry.

7. Art is an element of every human life. We are all artists because we control our everyday work with great skill, which shows our artistic quality. He must be aesthetic while reviewing if a person likes to improve his job, business, or anything. And it must be taken as an integral part of the art.

Do you know?

Another parameter that affects the aesthetics is visual weightage given to it, such as following:

1. Contrast: It defines the difference between colour hues.
2. Brightness: It is the quality or state of giving out or reflecting light.
3. Using such colour combinations according to the space and environment will automatically enhances the aesthetic appearance.

2.2 Role of software in construction painting works

Paint industries face similar challenges that occur in other chemical industry. Proper formulation, accurate and precise composition, and thickness of the paint must be calculated. High demand in paint industries compels the industry to constant work. Plant and equipment maintenance is inevitable is certain conditions. Myriad of challenges occur each day, and the industry must handle the challenges swiftly so that the operations in the industry does not shutdown. Part from maintenance and operations, handling finance is huge challenge in itself.

Paints can be of various types and kinds, and composition of each type is different than of others. Recipe and pain making process is fed to the paint manufacturing machine and replaced at times.

To manage all these intricate operations, its advantageous to have software that can control and monitor the processes. The world is in digital age, and every industry is shifting onto digital solutions to further improve working and operations in industry. Digital solutions engender the industry to eliminate delays, and also cut down errors.

ERP software can be the best pick among other digital solutions that are made available for the industries for smoother operations. Enterprise Resource Planning, or ERP software aids the industries in achieving absolute control over all the operations. Operations are simplified, and monitoring them becomes easy. ERP software alleviate the tedious tasks in paint industry, and introduces harmony among the operations. ERP software largely

depends on its modules for its working. These modules connect all the divisions and departments in the industry, so sharing information and data becomes seamless.

Modules in ERP for Paint Industry

1. **Procurement** - Procurement of raw material for manufacturing the paint is crucial task in pain industry. Without raw material, the manufacturing process cannot be initiated. Procurement is done in batches, and preparing purchase orders and bills for procurement has to be done by ERP software.

2. **Inventory Management** - Inventory is important in every industry, let alone for paint industry. Inventory Management module keeps track of all the raw material, products, and batches of manufactured paint.

3. **Production Planning** - Every production industry has a timeline, and manufacturing must be completed in the given timeline. Production planning ensures that the paint industry achieves the targeted production in planned time.

2.3 Colour Visualization with the help of computer software

For visualizing colour, we use a tool or stated as a software tool called as Colour Visualizer.

A Colour Visualizer is an interactive tool that allows you to upload photos of the interior of your house. With over 1500 colors to choose from, it enables you to browse through an array of colour combinations from the colour visualizer online. It is an excellent and easy way for you to virtually try out various colour palette combinations for any room of your home.

As opposed to olden times when people would be too sceptical to try on a new shade of colour for their homes and had to continue with the shades they previously had. Now, with digitalization and the advancement of technology, we can virtually paint our house and get a brief idea of how the space would look.

You can use a color visualizer for various segments of your home to see which colors look best in different areas of your house. Before going ahead and choosing the color pallet for the Interior painting of the house, you now have the option to visualize it virtually which gives you an idea of how your space would look. Using the color visualizer for the master bedroom, guest, and kid's bedroom will help you plan better. The color visualizer for your living room will give you a clear picture of how your living area would look in a specific color scheme along with your existing furniture. Choose from the living room color stimulator the best colors for your living area.

The virtual paint stimulator for the dining room allows you to choose which colors or a combination of colors are best suited for your dining space. What would go best with your existing set of furniture in the dining room and give the house a vibrant makeover?

The kitchen cabinet colour visualizer helps you understand virtually how your kitchen would appear in a specific colour tone or which colour best suites your kitchen with the existing set of appliances.

Do you know?

Get a 360° view of the exterior of your house by using the Color Visualizer for exterior house walls. Be careful while buying exterior paint as several factors affect the durability of external paint and unlike internal house paint, painting the exterior of the house is expensive and is something that cannot be afforded to be repeated. While opting for exterior paint along with what best suits the house visually, also check for durability and ensure that you opt for a paint that is suitable for all weathers (is weather shield). Also, ensure that the activity is carried out at the right temperature as that would also affect the durability of the paint.

Activity

Activity 01: Enlist different ERP software of different Paint Industries.

Material required:

1. Notebook
2. Pen

Procedure:

1. Move to the paint shop of different paint manufacturing companies such as Asian paints, Berger etc.
2. Have a discussion with the shop owner about the software used for that companies.
3. Enlist all the software used for different paint manufacturing companies.
4. Differentiate between all of them.
5. Enlist features of each of them.

Check Your Progress

A. Answer the following

1.Define all the elements that comprise a design.

2.Enlist the importance of aesthetics in painting.

3.What do you mean by color visualizer?

B. Match the following

Column A	Column B
1. Line	A. Surface quality

2. Shape	B. Dimensions in relation to another element
3. Direction	C. Horizontal, vertical or oblique
4. Size	D. Geometric or organic shape
5. Texture	E. A marker between two points.

Module 3 Features of Designing and Decoration

Module Overview

This module introduces the fundamentals of interior designing, starting with the basic principles that guide the creation of functional and aesthetically pleasing spaces. It explores the role of an interior designer, detailing their responsibilities and contributions to a project. You'll learn about the essential elements of interior design and the different types of design styles. The module also covers various special effects used to enhance interiors, introduces high-end wood finishes, and touches on the basics of exterior designer finishes, offering a well-rounded understanding of both interior and exterior design practices.

Learning Outcomes

After completing this module, you will be able to:

3. To understand the basics of interior designing.
4. To recognize the role and responsibilities of an interior designer.
5. To identify the key elements of interior design.
6. To differentiate between various types of interior design styles.
7. To learn about special effects used in interior designing.
8. To understand about high-end wood finishes.

Module Structure

3.1: Basics of interior designing
3.2: Role of Interior designer
3.3: Elements of interior design
3.4: Types of interior designing
3.5: Various kind of special effects used in interior designing

3.6: Introduction to high end wood finishes
3.7: Introduction to exterior designer finishes

Interior design is the skill and science of enhancing the interior of a structure to achieve a healthier and better aesthetically lovely background for the people utilizing the area. An interior design is a group of various earlier related projects that involve depending on an interior space into a practical setting for the range of human activities to take place there. It arranges line, direction, form, shape, colour, and texture and sets them aesthetically and tastefully.

Interior decoration is the art of completing lovely surroundings in the living room with the expansion of a complex of furnishings, art, and crafts, adequately integrated to achieve a planned design.

These arts and skills have to be well maintained by the housekeeping department. Decorating blooms are creative and stimulating art that often carries a message or theme.

3.1 Basics of Interior designing

The basics of interior design help to recognize the basic principles used by professional interior designers to create an outstanding design. Interior design is a creative practice to generate functional spaces within a building.

Do you know?

A term used in interior designing is Balance which deals with quantity or number in the arrangement, colour, pattern distribution or plain surfaces. There are two modes to achieve balance: symmetry and asymmetry.

Symmetry is the idea of holding a mirror image, and it's an essential tool for making visual pairs. Bedrooms, for example, lend themselves to symmetry, as the bed is commonly placed in the middle of the room with nightstands on either side.

Asymmetry: Asymmetry is the concept of making balance with different items while maintaining cohesion. Service items that share similarities, such as being the same colour or the same height. Test your asymmetrical design skills by curating a gallery wall.

3.2 Role of Interior Designer

Interior design deal with individual internal spaces formed by the members of enclosure walls, roof and floor. An interior design like architecture deeply studies users' living and social patterns, habits, and culture. Interior design includes studying the ultimate use of the area concerned, proper use of body dynamics, ergonomics, anthropometrics etc. The Interior Designer will create functional, safe, and aesthetically pleasing spaces by assessing

space requirements, determining optimal furniture placement, and selecting decorative items, all while adhering to relevant blueprint, building code, and inspection requirements.

The interior designer includes various considerations related to the interior space, interior planning, layout, and innovation. Different elements related to the plan include forms, shape, colour, texture, light, proportion, scale, balance, harmony, unity, variety, rhythm, emphasis, and the relationship of these elements visual with the qualities of human visual perception.

3.3 Elements of Interior Design

Strategy features are the basic units of a graphic image. Following are included as the basic elements of interior designing:

- **Space:** Space is the area provided for a particular objective. It may have two dimensions (length and width, such as a floor) or three dimensions (length, width, and height). The area includes the background, foreground and mid- ground.

- **Line:** The line is an essential element that refers to continuous movement points along a surface, such as a pencil or brush. The boundaries of shapes to create lines. Stripes and angles are the fundamental construction blocks of two-dimensional shapes like a home's plan. Every line has length, thickness, and direction. It was curved, flat, horizontal, vertical, tilted, zigzag, wavy, parallel, dash, and spotty.

- **Colour:** Colour is seen either by how light reflects off a surface or in colours light sources. There are primary, secondary, and tertiary colours. Complementary shades are colours opposite each other on the colour wheel.

- **Shape**: The shape is an area that stands out from the space next to or around it due to an expressed or implied boundary or because of value, colour, or texture differences. Shape in interior design depends on the object's function as a kitchen cabinet door. Natural conditions, including strategies on wood or rock, may help improve visual appeal in interior design. In geography, natural shapes, such as trees, decide with geometric such as houses.

- **Texture**: The texture is perceived surface quality. In art, there are two types of texture: tactile and implied.

- **Tactile texture (actual texture)** is the way the surface of an object feels. It includes sandpaper, cotton balls, tree bark, puppy fur, etc. Implied texture is how the surface of an object looks like it feels. The texture may look rough, fizzy, and gritty but cannot be touched.

- **Form:** The Form can be measured from height, width and depth. The form is also defined by light and dark. There are two types of structure, geometric and natural. The condition may be created by the combining of two or more shapes. It may be enhanced by tone, texture and colour.

- **Value**: Value is an element of art that refers to the relationship between light and dark on a surface or object and also helps with Form. It gives objects depth and perception. Value is also referred to as tone. Colour is seen either by how light reflects off a surface or in colour light sources. There are primary, secondary, and tertiary colours. Complementary shades are colours opposite each other on the colour wheel. Matching colours are colours that are found side by side on the colour rotation. These can be used to create colour balance.

3.4 Types of interior designing

An excellent design will live selected with unique adorning styles, modern accessories and experienced practitioners. With this connection, youngsters interested in creativity and designing may take it as a profession.

Following are the types of interior designing which are truly dependent n the theme and colours:

1. **Modern Interior Design**
   A modern interior design style is defined by new and modest colour structures, a warm feel, clean individual elements, heavy use of glass and steel and much-needed siding replacements that date back in historical times.

2. **Nautical Interior Designing**
   This type of design inside your home will depict a cheerful wave. You will get an image of a warm and relaxing view. The nautical décor has examples from cottage or coastal style décor. Usually, the designers put the foundation of sand colour or white colour.

3. **Contemporary Interior Design**
   This type of interior design style refers to trends that are ruling now- at this very moment. Contemporary homes usually have open floor plans and use a lot of natural light. The materials used are eco-friendly or recycled with a lot of focus on energy conservation. In this type of designing, Natural light is used as well as open spaces are included much more. More preference is given to natural colour.

4. **Traditional Interior Designing**
   The design has a touch of our old classic. The use of wooden furniture with style used by the traditional craftsmen is one of its elements. The style is also known as the old-school European style.

5. **Art Modern Interior Design**
   This interior design style was all about bigger, bolder, and brassier. Furniture was designed with a swelling curve, and other décor items were either pared or stripped down. Designers also refer to this interior design style as the American Modern or Modernist.

6. **Mid-Century Interior Design**
   It was the trend in almost every aspect of life; this interior design style emphasized vivid use of colour, from the walls to the wall arts to the artefacts. Everything was colourful in this era. Crisp lines defined furniture, and indoor plants were in plenty.

7. **Plain Interior Design**
   All interior design elements, from uncomplicated furnishing to neutral colour palettes to functional but not colourful accessories. Everything is updated, simple, and essential.

8. **Scandinavian Interior Design**
   It also represents basic yet highly functional spaces. It is also warm and leaves room for personal invitations. It differs from minimalist designs because the style emphasizes affordability and not just necessity. Most décor items are bare ornaments, rounded furniture, organic and clean detailing, and dominantly black and white colour palettes.

9. **Shabby Chic**
   It is characterized by laid-back vibes, soft lighting fixtures, antique-touch furniture, and a vintage-inspired charm. Modern designs inspire it, but it has some elements of contemporary design.

10. **Eclectic Interior Designing**
    The eclectic interior design is all about energy—modern furnishing and glamorous look combined with high power to bring out this eclectic design. The interiors inside this style have bold colour palettes, patterns, and textures. This has a rich mix to make it inspiring. This design is trendy for youngsters.

11. **Beach Style Interior Design**
    The main element of the style is painting with light colour. Make it white. A touch of turquoise colour will make it look beautiful. Some gravel and beachside decor can be set inside the interiors.

3.5 Various kind of special effects used in interior design

There are different types of paint effects available to interior designers for home decorating. There are such useful tools for adding extra flair to an interior. Understanding what the different types of paint effects are allows one to be able to specify to their painter what type of look one wants to have.

Following are the various kinds of special effects used in painting the surface:

I. Stencil finishes

Stencilling is a fetching finish method used to produce and replicate a design or pattern. The image or print is created by applying paint to a surface using the stencil to apply a design to a surface through cut-designed openings—the openings allowing the colour to reach the desired parts of the surface determined by the stencil design.

Stencil is created by using a thin sheet of material to repeat the art when the paint is transferred through the opening.

The stencil can differ in form and be made from paper, mylar, plastic, metal etc. The artwork in stencils can range from simple lettering and basic patterns to very ornate and complex multi-layer designs. Multi-layer designs require using different colour stencil plates for each colour of the invention.

Each of these stencil plates that will be used needs to have registration points to line up correctly.

Before any stencil pattern is traced, the surface must be cleaned with an approved cleaning method. Then the existing stencil is outlined, and a stencil pattern is prepared on the appropriate material. Once a stencil is made, the design is cut, and that pattern can easily be used in the decorative process. It can be traced on the walls, canvas or other material.

Fig 3.1 Painting using stencil

After the stencil pattern has been traced onto the appropriate surface, the in painting of the designs can occur, matching the original colour palette.

Combination of stencils:

As defined above, Wall stencil is a handy tool for painting patterns on plain walls. It creates an expensive designer wallpaper look on walls for very less expense. Here as number of combinations of stencils can also be used on a same surface. Here are some different kinds of stencils which can be used in combination for the as per demand interior of the surface:

1. Border stencils can be used to add a scenery-like aesthetic to the walls and ceiling of a room. It is available in patterns such as flower, lace, ribbon borders etc.

2. Geometric stencils: Playing with geometric zigzag shapes and solving puzzles, making shapes of objects with blocks of different geometric shapes has been a fun game in our childhood days. Now an array of geometrical shapes and wall stencil patterns are available for decorating your interior wall surface.

3. Nature Stencils: The nature-inspired stencil pattern creates soothing and aromatherapy effects for the mind and body. The musical environment of nature helps the mind to be free from worries.

4. Ethnic wall stencils: These are inspired by traditional artefacts, cultural heritage objects of everyday use, etc.

5. Theme Based Stencils: Wall stencil designs can be used for theme- based decoration of the home. The theme of your choice can be selected from the range of wall stencil patterns depending on the usage of the room. Theme based wall stencils range includes Music lovers, technology, kitchen, geography, travelers, decorative items etc.

II. Textured Painting

Textured paint is colour mixed with other materials, tools, and equipment that help professional painters create various visual effects on the wall or ceiling.

Wall and ceiling textures are usually constructed using paint, crushed silica, crushed stone, sand particles, wood, rollers, stencils, trowels, sponges, troughs, texturing comb and brushes, etc., providing your walls or ceilings with a variety of dimensions – from grainy finishes to high-shine optical illusions. Water-based textured wall paints can be an option for traditional flat paints with zero volatile organic compounds.

Types of Wall Texture Designs

1. **Actual texture:** this type of day to day texture paint is a combination of the design looks and how it feels. It includes rich colour build up like impasto effect and addition of material. Most common textures include: rough, wet, bumpy, fuzzy, scratchy, gritty, soft, lumpy, hard, liquid, solid, sticky, dusty, sharp etc.

2. **Simulated texture:** in this type of wall texture design, an illusion is made. The faux texture is when the painter draws a visual effect without actually adding it. It is like

when the paint is used to look like something else to create an illusion of something that isn't really there – like wood, marble etc.

3. **Abstract texture**: Like in paintings, the conceptual texture wall design doesn't convey what is connected with but would send the message in a textured pattern or design. These are famous for exterior wall texture designs for your garden and entrance.

4. **Invented texture:** this type of wall texture painting is an exciting way of adding your personalized touch. In this, you can add different materials together or alternatively to make your space feel like home.

5. **Needle texture**: a distinct way of wall texture painting; in this, creative lines of colours are made in patterns to form an image.

High end Texture designs

The prime objective is to keep your home unique and luxurious, listed here are most of the trendy textures:

1. **Classic wall textures**: Classic deep wall texture gives a pleasing look to the entire room area. This is the basic type of texture used now a days. Refer Fig. 3.2.

Fig 3.2 Classic wall texture

2. **Line Texture** - Lines texture gives an illusion of height and space to the entire room. The entire room seems to be wide and spacious in all manner. Refer Fig. 3.3.

Fig 3.3 Line Texture

3. **Uneven is the new even** - Uneven art seems to be more sounding these days. As it creates a look which is other than the casual lines or patterns. Refer Fig. 3.4.

Fig 3.4 Uneven Texture

4. **Wooden texture effect** - The most common yet evergreen texture is wooden texture. This can be the first choice of anyone. It immensely gives s a royal look with sound finish. Refer Fig. 3.5.

Fig 3.5 Uneven Texture

5. **A mix of two textures** - Combination of two types of different designing of textures will enhance the look of the surface to a different level. It adds the aesthetical value to the next level. But a proper care of the colours is to be taken while choosing the combination of two. Refer Fig. 3.6.

Fig 3.6 Mixing of two textures

6. **High end texture inspired by marble** - Marble's brilliant shades and unmatched smooth texture come with a promise to turn your walls into the centre piece of your home. Refer Fig. 3.7.

Fig 3.7 Texture inspired by marble

III. Wallpaper Application

Wallpaper, also referred to today as wallcovering (because not all are now made out of paper), is a cost-efficient way to change your interior. Decorating with wallpaper is a way to change your interior space without too large of a commitment. Imagine yourself wanting to change out your space every few years. With wallpaper, it's possible and more cost-effective than to reinvent the space entirely by tearing out walls or changing the interior carpentry.

All wallcoverings will add depth, and depending on the design, can add movement and warmth to a space. There are thousands of patterns, colour, and textures to choose. Wallcovering content nowadays is much more resistant.

Following are the reasons that one should move to wallpapers for a good and pleasant look for interiors:

- It is available in a wide variety of designs, patterns, and surface finishes.
- There are many ways to attach the wallpaper to your walls which include: paste the wall, paste the paper, and peel and stick.
- Wallpaper, and especially the peel-and-stick, can be easily removed and replaced.
- Some types can last for more than 15 years.
- Many wallpaper types are washable.
- Some types can be used for busy areas at home owing to their durability and easy maintenance.
- Wallpaper can, also, be used to personalize temporary homes, like dorms and rentals, since it can be easily installed and removed without leaving traces.
- It can cover uneven walls and hide the defects easily, with little initial preparations.
- Wallpaper can be considered eco-friendly, since it can be purely manufactured from natural materials, and its adhesives do not contain harmful chemicals.

Types of Wallpaper

1. **Liner Wallpaper**

Also known as lining paper, this type of wallpaper is made from paper or fiberglass. It is effective for hiding wall defects and minimizing repairs, and it can be a base for more delicate wallpaper types. It can be used alone, and maybe even painted. Moreover, it is easy to apply and remove. Refer Fig. 3.8.

Fig 3.8 Liner Wallpaper

2. **Printed Wallpaper**

This type is commonly used and available in a wide variety of colors and patterns. The digitally-printed wallpaper is normally cheaper than the hand- printed, and it can be mass-produced, but it could be torn easily. Also, the printing ink is water-based, so it'd better not be used in kitchens and bathrooms.

3. **Vinyl Wallpaper**

This type of wallpaper is composed of printed paper coated with layered vinyl. It is the most commonly used type of wallpaper, currently, because of its high durability. The thicker the vinyl coating layer is, the more durable the wallpaper will be. Vinyl paper can be used in kitchens and bathrooms, as it can of withstanding steam. It is can also be washed, making for easy maintenance.

4. **Foil Wallpaper**

A polished metal foil is used as a base for this type to give the interior space a shiny metallic effect. Due to its high reflectivity, foil wallpaper highlights wall defects. So, the base wall needs to be repaired, treated, or covered with lining paper first.

5. **Flock Wallpaper**

Flock wallpaper is distinct for its fuzzy three-dimensional patterns, created from a velvet-like fiber that is printed on a base of the paper. It is one of the most expensive wallpaper types, yet it is hard to maintain. Its velvety texture reflects a sense of luxury; however, it is not washable and could be hard to remove.

6. **Mylar Wallpaper**

Mylar wallpaper comprises a printed paper base and a polyester film applied on top of it. It has a wet or shiny appearance, kind of similar to foil wallpaper, and likewise, it highlights wall defects, so prior paper lining is recommended. The Polyester film

makes it possible to wash Mylar wallpaper, and it is also easy to remove. However, further care should be given to the installation process to avoid creasing the paper. It is most commonly used for kitchens and bathrooms. Refer Fig. 3.9.

Fig 3.9 Mylar Wallpaper

7. **Bamboo Wallpaper**

   This type is handcrafted from natural bamboo and glued to paper. It is environmentally friendly, and its hue varies from one roll to another owing to its natural base. However, it requires delicate treatment when gluing and installing as the adhesives can ruin its appearance, and it is not washable.

Step by Step procedure for applying Wallpaper

Here is a step by step guide on how to apply the wallpaper of your choice and how to fix mistakes you may make.

Wallpaper Installation Tools – Wallpaper, Primer/paste, Sandpaper, Putty, knife, Wallpaper brush, Measuring tape, Wallpaper tray/table, Level and a Clean cloth.

How to Wallpaper a Room Step by Step

1. **Prepare your wall**

   Your first step is to make sure your wall is ready for the wallpapers. Remove all nails, screws, or hooks with pliers or screwdrivers. And cover the outlets with tape.

   Smoothen the cracks on the wall with wall putty by applying it to any crack or holes you see on the wall. Covering cracks is necessary so that your wallpapering can come out smooth and clean. When you applied your wall putty, use a sandpaper to smoothen the patch into the surface.

2. **Measure your wall**

   Measure your wall to be sure of how long the wallpaper should be. When measuring, add about 20cm for leeway at the top or bottom. It can cover up for incorrect measurements. For measuring the wall, measuring tape is used which is shown in Fig. 3.10.

Fig 3.10 Measuring tape

3. **Paste your first strip**

One common rule is to paste the wall and paste the paper. It can be tough and all messy. Applying paste on the paper will make it difficult to transport it from the table to the wall. It will stick to everything and even stick to itself, which can lead to tearing. ReferFig.3.11.

Fig 3.11 Pasting of wallpaper

4. **Lay the second strip**

This second strip is harder than the first; you have to match up patterns and avoid overlay. Not all wallpapers have a pattern sequence. Some are free and you can lay them however you want. But for wallpapers with patterns, be ready to match up and expect wastage.

Unroll your wallpaper and align it next to the first strip on the wall. If your wallpaper is patterned, you should start matching the patterns from the middle. Make sure you get it close enough.

5. **Wallpaper corners and tricky areas**

Simply lay your paper round to the next wall for the corners. You should meet up the patterns at the edges as you did before. Then, press it in gently with your cloth or brush.

When the first wall is correctly lined to the corner, make a small incision at the top (where corner meets the ceiling) with scissors. The incision will make it easy to fold the paper.

When the paper has rested well, the shape of the outlet will be more definite. You can then cut the excess paper with a knife.

6. **Cut out the excess paper**

There are various ways to get the excess paper out. You can either use your free hand, ruler, or scissors.

Common Mistakes

1. **Trapped Bubbles**
   If you see bubbles, just relax, you haven't ruined it. Get a knife, glue injector, and seam adhesive. Make a small incision along the side of the air bubbles, use your glue injector to insert some adhesive and press it down. Then, clean excess glue with a clean cloth. If this is too tricky, you can gently peel your paper off the wall and smoothen it again.

2. **Peeling edges**
   Peeling edges will come up if you have a rough surface underneath your wallpaper. Lift the area and sand down the wall. Make it smooth enough, add wallpaper paste to the surface, and stick the wallpaper. If peeling persists, you may need to try another brand of wallpaper paste.

Do you know?

Some other commonly used paint effects are as follows:

1. **Lacquering (Japanning)** - Lacquering is the layering of numerous coats of varnish, sanding in between coats. This creates a smooth lustrous effect. The original technique came from Eastern cultures and the sap of the Lac tree was used. It is popular for use on furniture and can be used on walls.

2. **Crackle-Glaze** – It imitates old peeling paint and provides a cobweb look. The crackle glaze is applied between two water-based coats of differing colors. This then produces a series of cracks on the top layer and exposes the base coat colour underneath.

3. **Craquelure** - Craquelure is a process that was developed to imitate the crazing of very old varnish. It is achieved by applying two varnishes to a surface that dry at different rates.

4. **Antiquing** - This is the process of artificially aging paint. It can be achieved by rubbing over the new paint with a darker glaze or colour wash. This creates a dirtier colour.

5. **Dragging** - Dragging is a process which creates fine vertical irregular lines, a soft textured look to walls generally. It is achieved by applying a translucent colour glaze over a base coat and then using a dry wide brush, dragging it over the glaze before it dries.

6. **Stippling** - Stippling is achieved by dabbing a stippling brush over a wet glaze or layer of paint. It creates a soft dappled grainy texture and is ideal as a wall finish.

7. **Colourwash** - This is a diluted layer of paint or proprietary product that is applied over a base coat to provide a wash or "glimpse" of colour. Used often in country homes.

8. **Sponging** - Sponging creates a mottled, granulated, knobbly, distressed finish and can vary greatly depending on the colours, method i.e. sponging on or off, and the type of sponge used i.e. sea sponge, artificial, large holes or small.
9. **Rubbing** - Rubbing starts with a base coat of colour, a glaze is rubbed over creating a soft cloudy film of colour, which imitates the aged look of fresco paintings. It is ideal to use over stencils to slightly distress the look.

10. **Stamping** - Stamping is where designs can be converted into rubber stamps or proprietary stamps can be purchased to achieve a look similar to stenciling but is much faster to perform. Stamping can be used to add pattern to walls, by dipping into paint or translucent glaze (or painting onto the stamp) and applying pressure to the stamp onto the wall.

11. **Ragging** - Ragging is an irregular flow of variegated texture, usually a wall finish, that can vary enormously depending on the colors i.e. contrasting creates a 3-dimensional look, monochromatic creates a soft muted look,

12. **Combing -** Combing is similar to wood graining, a notched card or comb is dragged over a painted or translucent glazed surface to achieve lines, squiggles, zig zags or any pattern that is desired.

3.6 Introduction to high-end wood finishes

Wood Finishes protect the wooden surfaces from moisture and make their appearance richer and more profound. Wood finish is different from painting in that painting hides the original wooden surface while Wood finishes improving the character's appearance. The term finish can also represent several coats of finish or an entire coating build-up. Below are the most common types of wood finishes. Finishing a wood surface is highly recommended, whether it's new or old furniture. Finishing is done by adding a liquid to the surface of the Wood.

3.6.1 Different types and techniques used in wood finish

Wood finishing creates a wood material looking like dashing and adds a protective layer. There are two types of wood finishes, i.e. surface finishing and penetrating finishing.

Understanding the variety of clear wood finishes can be a challenge, even for painting professionals. Sometimes terms are used interchangeably or a brand name may be used incorrectly as a synonym for a type of finish. It is no wonder that making the correct selection for the task at hand can be confusing.

Separating clear finishes into "families," based on how the products cure, can make understanding this category of coating products a lot easier.

1. **Shellacs and lacquers -**

   These simply evaporate. "Evaporative" finishes cure when their solvents evaporate. Shellacs and lacquers fall into this group. Shellac uses a natural resin — a secretion from the lac bug — which is dissolved in alcohol. Lacquer, a solvent-based product commonly made with nitrocellulose, has overtaken shellac as the product of choice in this family. Original equipment manufacturers (such as cabinet and furniture manufacturers), paint contractors and antique restoration/refinishing professionals are the primary consumers of these finishes.

   Both shellac and lacquer dry very quickly and are excellent when dust may be a problem. Both develop a tough coating on wood, though lacquer is more durable than shellac. Because the molecules are small, light can reach through these finishes to give "depth" to wood. And because these products are solvent-based, when applying multiple coats it is not necessary to sand between coats. For example, when you apply numerous coats of lacquer, each new coat partially dissolves the previous coat and chemically bonds with it. This characteristic also makes these finishes easy to repair. Refer Fig.3.12.

Fig 3.12 Shellac & lacquer

2. **Varnishes and polyurethanes –**

   These generally react to oxygen. Varnishes and polyurethanes fall into the "reactive" group family. These finishes cure with a chemical reaction when the liquid finish comes into contact with oxygen. The finish of using varnishes paint is shown in Fig.3.13.

Fig 3.13 Varnishes paint

Polyurethanes are made with a mixture of urethane-alkyd resins. They handle wear and abrasions better than varnishes and have pretty much taken over the varnish market.

Nonetheless, both varnishes and polyurethanes are very scratch-resistant and chemical-resistant. Varnishes and polyurethanes protect wood surfaces and are exceptionally good for heavy-use surfaces, such as floors, furniture, cabinetry and moulding.

3. Water-based products

Water-based finishes are "coalescing" finishes because they use both evaporation and a chemical reaction to melt or coalesce together. Don't let the names fool you, however. Water-based polyurethanes, water-based varnishes and water-based lacquers are not the same as the original products.

The water-based "family" has its own distinctive benefits. Water-based products are water-clear, have low odor and are quick to dry. By using water- based polyurethanes, professional floor finishers can apply several coats in one day (sanding between coats is still required). But while water-based products are moisture-, abrasion- and chemical-resistant, they are not as tough as their oil-based cousins. The obvious soap and water clean-up, however, is a plus.

What about those other clear finishes?

There are other clear wood finish products. True oil finishes — either linseed or tung oil — usually enhance the beauty of wood, but do little to protect it. Spar varnish is a flexible varnish product that performs well in marine applications, but offers little scratch resistance. Wax — typically paste wax — also offers little protection. As a group these products would not be on the professional painter's shopping list.

3.6.2 Procedure to apply polyester resin to wood

Polyester resin is used for laminating fibreglass support, decays and waterproofing wood. It arrives in two types, exhausting and laminating. Exhausting resin is laminating resin with counted wax that allows it to solidify fully. Laminating resin will become tough but stay negligibly adhesive, allowing paint or more additional fibreglass to bind to it. Waxed or finishing polish cannot be smudged over without first removing the top layer of hardened wax. This is the most-used wax type and can be located online or at your local aquatic supply store.

Following are stepwise procedure of applying polyester resin to wood;

Step 1 - Fill a small pail with some polyester laminating resin. Add 4 to 6 parts acetone to the polish to thin it release and allow it to infiltrate profound into the wood. Combine the acetone using a move stick until the wax is almost water's surface.

Step 2 - Add 12 descents of motivation per fluid ounce of resin and thoroughly mix it into the wax. It would help to incorporate a fresh batch of polish for each coat because it must harden between coats. The resin will generally harden within 20 to 30 minutes.

Step 3 - Involve the top coat to the lumber using a handled roller. Cover the wood with the resin, then clean the roller with acetone.

Step 4 - Mix another collection of resin with slight acetone than the first batch. Add the catalyst to it and stir it up. Use the wax and then clean the roller out. Use at least five more coats with less acetone each time.

Step 5 - Mix a final set of the resin, adding 4 to 5 drops of the liquid wax solution. Count the grounds and mix it up. Apply the final coat to the wood and clean out the roller. Allow the resin to cure for four to six hours, and the wood will be waterproof.

3.7 Introduction to exterior designer finishes

The exterior walls of the house are the most crucial aspect of the house. Not only do they act as the face of the house, but a stunning wall design can also immediately grab the guests' attention and become a topic of conversation during parties. Whenever homeowners decide on which exterior wall texture design to choose, they get overwhelmed because of the countless options and technicalities. However, one does not need to be an interior designer to understand which texture and material are best for their house. With the pandemic hitting

the world, a lot of interest was taken in remodeling houses or interior designing as a whole. So, if you looked up on the internet, you will easily find assistance. An example of exterior wall finishes is shown in Fig. 3.14.

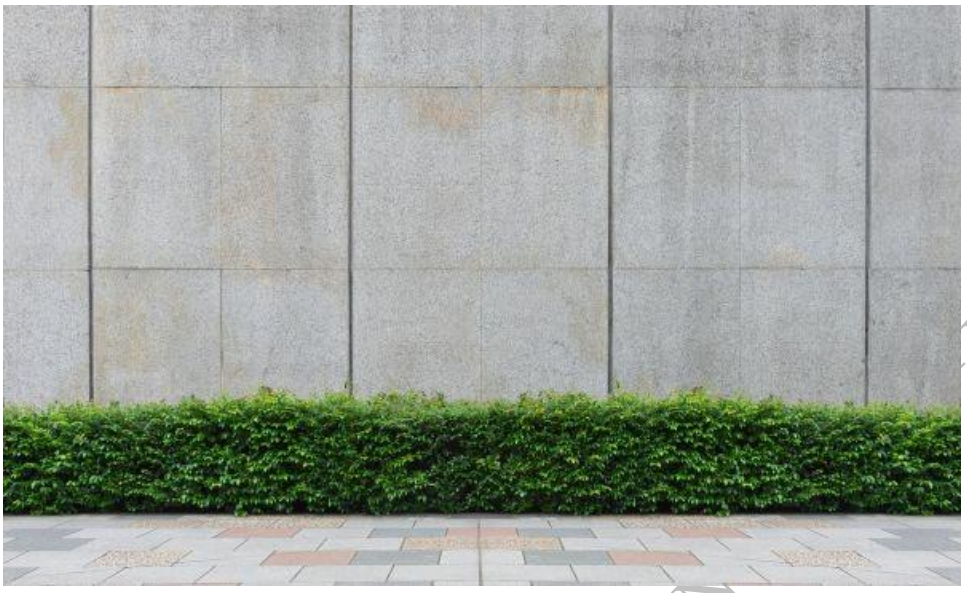

Fig 3.14 Exterior wall finishes

3.7.1 Factors to Consider Before Choosing the Exterior texture

When choosing the right paint for walls, knowing the difference between interior and exterior walls is vital. The homeowner has more freedom when choosing the design and paint type for interior walls because the impact of weather, surrounding environment, sunlight, rain, etc., on these walls is lesser than that of the outside walls. Some essential factors while choosing the paint and exterior wall texture design are:

1. Choosing water-based paints can result in a much smoother finish on the walls due to their "high-density" principles.
2. Pollution can significantly impact how long the paint or outside wall texture design looks fresh. Choosing dust-resistant paint is thus a necessity!
3. Similarly, if the house is located in a humid city due to proximity with a water body such as the sea or there is heavy rainfall in the area, the homeowner must ensure that waterproof emulsions are being used before the final exterior wall texture design.

3.7.2 Popular Modern Exterior Wall Texture Designs

1. Brick Wall Texture Design – The Classic This colossal popularity is simple; this is the easiest way to give a natural look to the outside walls without investing in installing panels or stone tiles. Refer Fig. 3.15.

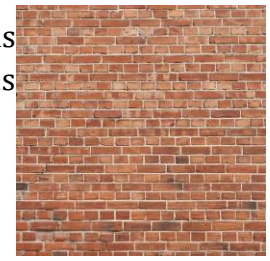

Fig 3.15 Brick wall texture designing

2.Classy Fabric Texture Design for Outside Walls

Fabric texture design for outer walls with softer hues is trending due to the sleek and chic finish look. Many commercial and residential property owners in India are looking for a fresh look that is easy to look at and pretty on the eyes. This texture is chic but also has elegance in its minimalism. Refer Fig. 3.16.

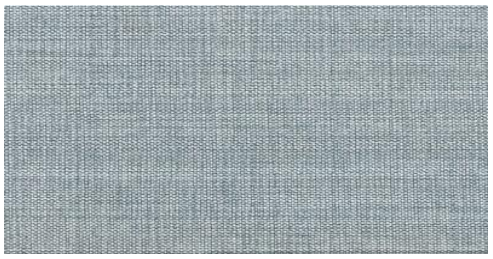

Fig 3.16 Fabric textured wall

3. Stripes Wall texture

Another exterior modern wall texture design that will always be in trend is the stripes design! Homeowners who do not wish to look at hundreds of design patterns should go with the stripes design that gives a sleek and punchy look to the walls. Refer Fig. 3.17.

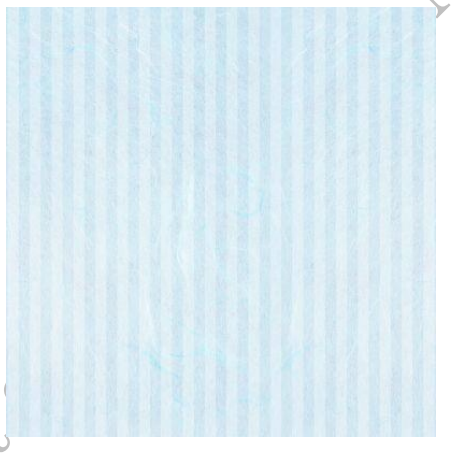

Fig 3.17 Stripes textured wall

4. **Marble Finish Texture Design**
   Whether, it is interior design or exterior texture wall design, Marble is another stunning option that one should be looking at! If you are specifically looking for a design texture that will provide an ultra-smooth look to the eyes of the beholder, Marble is a choice that you will never go wrong with. Refer Fig. 3.18.

Fig 3.18 Marble finish texture

5. Multi-Material Exterior Wall Texture Design

The high contrast palette of these texture paint designs for the outer wall creates a premium experience and thus has become an in-demand texture design for modern, large bungalows. Add a touch of gold to the corners of the pointed end and watch the design turn from raw to authentic elegance. Refer Fig. 3.19.

Fig 3.19 Multi material finish

7. Printed Grass cloth External Wall Texture Design

Another superb option for homeowners that love all-things-natural is a rustic looking printed grass cloth texture paint design for exterior walls; it is soothing to the eyes due to the natural fabric finish that the cloth gives to the surface. One of the reasons this is such a popular design is the 3- dimensional feel that this texture provides. This pattern truly elevates the house's look, which is why it is one of the best latest texture designs for exterior walls. Refer Fig. 3.20.

Fig 3.20 Grasscloth external wall finish

8. Optical Illusion Exterior Wall Design

These designs have plenty of options, are very easy to apply on the walls, Homeowners with a dull outside wall can wisely use this optical illusion design to spruce up their space. Refer Fig. 3.21.

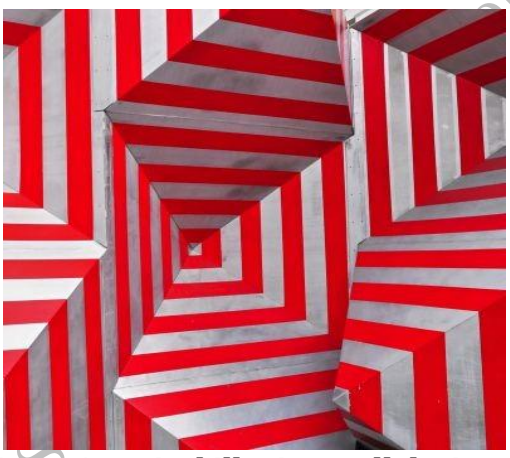

Fig 3.21 Optical illusion wall design

9. Contrast Colour Textures Design

The exterior wall texture paint designs need not be complex and artistic. An attractive design can also be created by simply playing around with the different shades of colour. Refer Fig. 3.22.

Fig 3.22 Contrast colour texture

Rustic Texture Finish

Rustic Texture Finish is made with high quality marble powder, silica sand and quartz in a rich acrylic binding medium. This paint gives a very unique and different feel making the walls stand out. This material has excellent binding to the surface and has the ability to hide small cracks.

Advantages

1. Ready-mix paste for direct application
2. Resistant to Sunlight and Rainfall (to be overcoated with appropriate top coat)
3. Easy Application
4. Long Durability

Surface preparation & application

1. New Masonry must be cured completely. Only if essential, fill the surface cavities and level the surface by using Indigo Polymer Putty or Acrylic Wall Putty followed by one coat of Indigo Wall Primer else directly apply one coat of the appropriate Indigo Wall Primer
2. Apply Indigo Rough Texture Finish on the surface using a trowel at 1.5- or 2-mm thickness.
3. Use the trowel to scratch the surface to create a different pattern depending upon the trowel movement
4. Allow the surface to dry for 12-16 hours then apply 2-3 coats of Indigo Acrylic Laminate or Indigo Dirtproof and Waterproof Exterior Laminate.

Activitiy

Activity 01: Compare interior and exterior finishes

Material required:

1.Notebook
2.Pen

Procedure:

1.First, take permission to the paint shop owner.
2.Visit the shop.
3.List out different interior and exterior finishes material available. Note them separately.
4.Enlist the different properties of interior and exterior finishes.
5.Enlist the advantages and disadvantages of each listed finishes.

Check Your Progress

1. Answer the following

1. Why wallpaper is used on the surface in designing?
2. Explain the role of interior designer.
3. Write down step by step procedure for installation of wallpaper.
4. What are common problem occur while installing wallpaper?
5. Describe Rustic Wall finish.

2. Fill in the blank

1. ……and polyurethanes fall into the category of reactive group.
2. Shellac uses a ……resin which is dissolved in alcohol.
3. ……is the layering of numerous coats of varnish sanding in between coats.
4. ……. edges will come if you have rough surface underneath your wallpaper.
5. ……wallpaper comprises a printed paper base and a polyester film applied on top of it

Module 4 Allied features of painting

Module Overview

This module covers essential topics for managing painting projects. It starts with an introduction to material handling, focusing on effective and safe practices. You'll learn how to manage painting activities, ensuring tasks are well-organized and coordinated. The module also explains standard procedures for calculating painting work accurately. It explores mechanized painting techniques, showcasing technological advancements that boost efficiency. Additionally, the module highlights the significance of soft skills, such as communication and teamwork, in enhancing the success of painting programs.

Learning Outcomes

After completing this module, you will be able to:

- To understand the fundamentals of material handling in painting projects.
- To learn how to manage and coordinate painting activities effectively.

- To master the standard procedures for calculating painting work.
- To understand the use and benefits of mechanized painting.
- To recognize the importance of soft skills in a painting program.

Module Structure

4.1: Introduction to material handling
4.2: Management of painting activities
4.3: Standard procedure of calculating of painting work
4.4: Mechanized Painting
4.5: Importance of soft skills in painting programme

In the previous modules, we have gone through all about the painting aspects. Another important aspect is features of painting. Particularly for high end textures and allied painting work, some specific features need to be understood well.

4.1 Introduction to material handling

Material handling is the movement, protection, storage and control of materials and products throughout manufacturing, warehousing, distribution, consumption and disposal. As a process, material handling incorporates a wide range of manual, semi-automated and automated equipment and systems that support logistics and make the supply chain work. Their application helps with:

- Forecasting
- Resource allocation
- Production planning
- Flow and process management
- Inventory management and control
- Customer delivery
- After-sales support and service

A company's material handling system and processes are put in place to improve customer service, reduce inventory, shorten delivery time, and lower overall handling costs in manufacturing, distribution and transportation.

4.1.1 Maintaining the durability of paint

In order to proper use paints for longer periods of time, we must comply with certain requirements:

1. **Temperature control**

   All paints have specific temperature requirements when stored. For example, vinyl esters that are kept at temperatures above 35 °C start to become solid whether or not the components are mixed.

   In order to keep the paints in optimal conditions to apply them properly, the paints must be kept in a temperature range between 15 and 25 °C. This can be achieved if heating the storage space during the winters and cooling the air during the summers. For low energy consumption, the entire facility must be properly insulated.

2. **Temperature monitoring**

   Any paint has a certain storage time also called "Shelf Life". The period of time described in the technical specifications is usually, three or six months, or one year or more, depending on the type of paint. Some paint manufactures may extend this term if evidence is found that the paint has been kept in optimal temperature conditions.

3. **Proper ventilation**

   Many industrial paints are solvent-based. These, even when stored in special cans, may release solvent vapours and produce a toxic or potentially explosive atmosphere. Therefore, the store facility is recommended to be mechanically ventilated.

4. **Sufficient lighting**

   Any industrial paint storage facility should be light enough to allow operators to proper identify the products that are to be used.

5. **Fire protection**

   Since most paints in use are flammable, we need to make sure that the risk of a fire is as low as possible. Use flameproof electrical equipment must be done such as luminaires, heaters, solvent recovery equipment, certified air conditioners etc.

6. **Accidental anti-spill protection**

A complying paint storage facility use protection against accidental spills of products to prevent leaking the paints or their chemical components into the soil or the groundwater. Proper inventory management and evidence of the stored product lots.

It is very important to have a correct inventory of the products in the store facility. Lot number help us establish the traceability between paint used and the painted items,

which is evidence that for a certain item we used the proper paint, in accordance with the technical requirements.

Easy access to Safety Data Sheets and Product Data Sheets

In the store facility, there must be an area clearly defined where the Material Safety Data Sheets (MSDS) are available for the stored products. The Safety Data Sheets are useful to establish the paint handling procedures, what protective equipment should be used, or - in case of an accident - for doctors to determine the appropriate treatment method.

As we presented before, all paints have a finite shelf life after which they are considered expired and are no longer recommended for use. When we have significant amounts of paint, the storage must be kept considering product rotation by age (FIFO management: the first product stored is the first product used). This prevents forgetting products in the warehouse, where they expire and can cause quality issues, financial losses and unwanted waste.

Also, a good practice is to organize products by project / orders, to ensure that inappropriate products for the work in progress are not mistakenly used.

4.1.2 Safety measures

Since most paints are toxic, we must ensure proper signaling and protection means in the storage facility. The protection equipment includes: respiratory masks, eye showers, medical kit.

A hazard is the potential for harm (physical or mental) to the health and safety of people. Work hazards can be divided in the following categories:

1. **Safety hazards** can cause immediate accidents and injuries. Examples are hot surfaces, broken ladders, and slippery floors. Safety hazards can result in burns, cuts, broken bones, electric shock, or death.

2. **Physical hazards** are factors within the environment that can harm the body without necessarily touching it. Physical Hazards include: radiation, high exposure to sunlight/ultraviolet rays, extreme temperatures and constant loud noise.

3. **Chemical hazards** are present when a worker is exposed to any chemical preparation in the workplace in any form (solid, liquid or gas). Some are safer than others, but to some workers who are more sensitive to chemicals, even common solutions can cause illness, skin irritation, or breathing problems.

Examples include cleaning products, asbestos, and pesticides. Hence the following work must be done under strict supervision:

- Working at heights.
- Using ladders, platforms and scaffolds.
- Working in confined spaces.
- Risk of eye injury.
- Slips, trips and falls.
- Risk of injury from falling objects.
- Exposure to mold, fungi and bacteria.
- Exposure to bird and rodent droppings

Routes of entry to the organism of chemical pollutants

Chemicals are organic and inorganic substances, they may be natural or synthetic, toxic or not and they can harm people or the environment. Hazardous chemical products are those that can harm people or the environment. Every day we are exposed to countless chemical products that have become essential in our life but unfortunately, we are not informed about their effects and consequences.

RESPIRATORY ROUTE through the nose and the mouth, the lungs, etc.		This is one of the most important routes of entry or penetration because it is through the air that many toxic substances
PARENTERAL ROUTE Through open wounds, sores, etc.		Route of entry of the pollutant to the body through open wounds, sores, etc.
DERMAL ROUTE through the skin		Route of entry of many substances that are able to go through the skin without causing erosion or noticeable alterations and that can enter the blood to later be spread to the whole body.

4.2 Management of painting activities

The painting management come under the construction project management. The painting work technique is the completing thing in any construction. Painting influences the all-out appearance of building from inside and outside. In this manner, it ought to be done with the extraordinary ability of workmanship.

This part manages the painting work method, particular of materials, sorts of paint, method of estimations, and so on. Starting from the documentation of job, then requisition of resources which will forwarded to organization of painting tools, materials tend to the things to be done before starting any painting work.

Generally, a checklist is prepared and series wise procedure is being accrued out to complete the work on time. The procedure followed in painting work is:

- Before you start painting work, following needed to be followed:

  1. Fix scaffolding properly
  2. Fill surface voids, pores and cracks
  3. Clean painting surface and room
  4. Dry up priming coat for 48 hours. The priming coat applied already should be dried out for at least 48 hours before starting painting.
  5. Fix electrical, water supply, sanitary pipes and door and window frames
  6. Wet the surface with water before applying cement paint
  7. Employ skilled painter
  8. Allow newly plastered surface to mature for six months.
  9. Fix ladders properly

- While painting the surface/wall

  1. Mix adequate distemper for one room
  2. Do painting in right weather condition

- Stir paint well to maintain uniformity.
- Do subsequent coats after 24 hours.
- Paint edges, corners, all doors and window accessories well.
- Utilize proper brushes.
- Wear protective glasses and be safe.
- Avoid alcohol and smoking.
- keep children away from painting area.
- Park your vehicle away from painting area to protect it from the fumes of paint.
- No brush mark is left on surface.
- Clean paint drops thoroughly.

4.3 Standard procedure of calculation of painting work

General Procedure:

Understanding this with an example:

Calculate the carpet area of your home. Multiply this by 4. For example, if your carpet area is 500 sq. ft. then 500 x 4 = 20000 sq. ft. is your number. Now find out how much does your painter charge you per sq. ft. In Mumbai for Painters charge anywhere from Rs 26 to Rs 30 per sq. ft. as per situation. hence your cost would come out to be 27 x 2000 = Rs 54,000. This number is on higher side.

Here, 4 represents 4 side of the wall. Now what about Windows, balcony, door etc. these areas should get subtracted from the calculation.

Well, we have not counted your ceiling which will also get painted. Right? Hence multiple of 4 comes out to be pretty close to the actual cost.

4.4 Mechanized painting

In the present world, painting has become a way of art to present your home to others. Painting today, is become cumbersome for clients. They have to spare time, shift household things, and pay more money for repainting etc.

Mechanized painting is all about getting rid of all these traditional practices. It uses tools & equipment which not only keep your space clean and tidy while painting, but also speedup the painting job with perfection.

A painting project demands precision. These mechanized tools will not only offer the required precision, but also simplify the whole process of painting. Following are the mechanized tools used:

1. Laser Distance Meter

The laser distance meter, shown in Fig.4.1 is a measuring tool that accurately determines the distance of the target using a certain parameter of the modulated laser. The pulsed laser distance finder will emit a beam or a sequence of short pulsed laser beams to the target when it is working and receive the laser beam reflected by the target. Then the time from the launch to the reception of the laser beam will be measured by the timer, and the distance between the laser distance measure and the target will be calculated.

Fig 4.1 Laser Distance meter

2. Air- Assisted Spray

Spray painting is a painting technique in which a device sprays coating material (paint, ink, varnish, etc.) through the air onto a surface. The most common types employ compressed gas—usually air—to atomize and direct the paint particles.

Spray guns as shown in Fig. 4.2 evolved from airbrushes, and the two are usually distinguished by their size and the size of the spray pattern they produce. Airbrushes are hand- held and used instead of a brush for detailed work such as photo retouching, painting nails, or fine art. Air gun spraying uses generally larger equipment. It is typically used for covering large surfaces with an even coating of liquid. Spray guns can be either automated or hand-held and have interchangeable heads to allow for different spray patterns.

Fig 4.2 Air assisted Spray Gun

3. Airless Spray Painting

The airless paint spray as shown in Fig. 4.3 is an easy-to-use design tool that efficiently generates professional looking graphics and logos. It can produce high quality graphics with great speed.

Fig 4.3 Airless Spray-Painting machine

4. Power sanders

These are electric or battery-powered tools that make short work of abrading surfaces for a variety of home repair and improvement jobs.

Refer Fig. 4.4, showing the image of power sanders.

Power sanders are often categorized by the action by which the motor moves the sanding pad and sandpaper. This action can take one of three forms:

- **Rotary**: On some sanders, the motor simply spins a circular pad to which the sandpaper is affixed. An ordinary power drill can become a rotary sander simply by affixing a sanding disk to the drill's chuck.
- **Random orbit**: A random orbit sander moves the sanding pad in small, irregular circles, which prevents the sandpaper from leaving distinguishable patterns in the surface being sanded
- **Rotating belt**: Portable belt sanders and upright drum sanders both work by means of wide sanding belts that spin around powered drive wheels or drums.

An electric power sander is the way to go for many home projects. Every home workshop should include at least one, and more advanced DIYers will probably want more than one. And you can also rent specialty sanders for occasional use.

	Basics	**Pros**	**Cons**
Random orbitsander	A must-have general-purpose sander used mostly for finishing and refinishing wood	Easy to use, good forfinishing	Not good for wood removal
Belt sander	A versatile tool for deep sandingand wood removal	Good for deep sanding,stripping	Not good for finefinishing
Rotary sander	Handheld tool, good for paint,finish removal	Inexpensive,good for stripping	Hard to control
Drum sander	Designed for sanding hardwoodfloors	Best tool for refurbishing floors	Heavy, large, expensive
Spindle/disksander	Specialty sander for fine woodworking	Excellent for detail sanding on woodworking projects	Limited uses,can be expensive

Fig 4.4 Power Sanders

6. Jet Washers

A pressure washer (also known as Jet washer), as shown in Fig. 4.5 is a power tool that sprays water at high pressures to clean large, sturdy surfaces such as buildings, farm equipment and roads.

Fig 4.5 Jet Washer

7. Computerized Colour

It allows users to blend two or more colors in different quantities and see the color that the mixture will result in after blending as well as the proportions and colors used to create it.

The user will have to proceed with a basic selection of primary and secondary colors which the user can then mix and blend freely as they see fit. Start by choosing colors that you want to blend.

Custom Colors

Users can add custom colors of their choosing by using either the Color Picker which will display the color palette and allow the user to choose the desired color by clicking on it from the color wheel, or by entering either the colors Hex Code, the RGB decimal code, or the values of the hue, saturation, and brightness.

Additionally, the user can swap to the swatches tab which will, in turn, display the color swatches for both primary and secondary basic colors. A Customized Computerized Colour machine is shown in fig. 4.6

Fig. 4.6 Customized Computerized Colour

4.5 Importance of soft skills in Painting Profession

In the construction industry, soft skills are arguably more important than any hard skill you can ever learn. In fact, if you have a good set of soft skills, hard skills tend to fall into place once management recognizes this talent. In addition to being easily recognized, your ability to become a role model for your team will improve your credibility and give you a leg up on the competition. Given this reality, it is vital that you figure out how to develop these soft skills before it's too late.

1. Time Management

Time management is an important soft skill when working in the construction industry. The construction industry is one of the toughest jobs because of its tight schedules and deadlines, and so it needs people who can handle the pressure involved.

The construction industry also needs people who can keep track of multiple tasks, juggle different deadlines, and who can communicate efficiently. To develop great time management, always ensure you understand your schedules, and the deadlines. That way, you can make sure you spend a specific amount of time on each task and be done with them all at the end of the day.

2. Communication

Communication is a learned skill. It is important to develop good communication skills in order to become proficient at working in the construction industry. When developing good communication skills, it is first important to listen. So, listen carefully and actively, and ask questions when necessary, express yourself clearly, and provide the right information. This will help you to understand how to communicate effectively with your both your fellow employees and bosses.

3. Problem Solving

Problem-solving is another crucial soft skill when working in the construction industry. This skill involves the use of logic and creative thinking to come up with a viable solution to a problem. It is vital in the construction industry because every problem is unique, and there will never be a 'one size fits all' answer.

When working on projects, you will inevitably face many situations where the answer is not obvious, or there may be various opinions or perspectives that could be correct. Being able to spot a problem, draw conclusions and come up with a viable solution is, therefore, essential to the success of any construction project.

The construction industry is very fast-paced, and problem-solving is a skill that can be learnt and developed with practice. If you are not sure about a problem, you can always ask the superiors until you get the hang of it.

5. Leadership

Leadership is the ability to inspire others to achieve a common goal. The construction industry has an enormous need for leaders at all levels. The skills that are required of a leader are similar to those required in any industry. However, the construction industry places additional demands on leaders.

6. Project Management

A project manager in this industry is expected to possess the following skills:

- The ability to listen and to understand.
- The ability to lead, persuade, influence and motivate team members.
- The ability to communicate effectively both verbally and in writing.
- The ability to negotiate with clients and other construction team members.

Activity

Activity 01: Calculate the cost of painting of your classroom

Material required:

1. Notebook
2. Pen
3. Measuring tape

Procedure:

1. Take the permission of your headmaster
2. Measure the length, width and height of your class room.
3. Calculate the area of the classroom.
4. Specify the rates as per the Schedule of rates.

5. Estimate the total cost required for painting of your classroom.

Check Your Progress

A. Answer the following

1. What do you mean by material handling?
2. Define Hazardous chemicals present in painting.
3. Define the working of following:
    a. Laser distance meter
    b. Power sanders
    c. Airless spray painting
4. Enlist the soft skills a skilled painter should have.
5. Define Jet washer.

B. Fill in the blank

1. ……are electric or battery-powered tools that make short work of abrading surfaces.
2. The ……..meter is a measuring tool that accurately determines the distance of the target using a certain parameter of the modulated laser.
3. An ordinary power drill can become a …… sander simply by affixing a sanding disk to the drill's chuck.
4. ……..is the ability to inspire others to achieve a common goal and a painter must have it.
5. …….. are used for sanding hard wood floors.

Answer Key

Unit 1: Waterproofing

B. Fill in the blanks

1. 2
2. Polyurethane
3. 2
4. Mildew
5. Peeling

C. Match the following

1.B
2. C
3. A
4. E
5. D

Unit 2: Painting aesthetics and software application

C. Match the following

1. E
2. D
3. C
4.B
5. A

Unit 3: Features of designing and decoration

B. Fill in the blanks

1.Varnishes
2. Natural
3.Lacquering
4. Peeling
5.Mylar

Unit 4: Allied features of painting

B. Fill in the blanks

1.Power Sanders
2. Laser distance meter
3. Rotary
4. Leadership

Glossary

Aesthetics - *concerned with beauty or the appreciation of beauty*
Bleach - *cause (a material such as cloth, paper, or hair) to become white or much lighter by a chemical process or by exposure to sunlight.*
Building syndrome- *a situation in which the occupants of a building experience acute health- or comfort-related effects that seem to be linked directly to the time spent in the building.*
Chauking - *a substance used to fill in gaps around the edge of something, for example a bath or a window, and stop air or liquid from getting through.*
Chronology - *the arrangement of events or dates in the order of their occurrence.*
Disasters - *a sudden accident or a natural catastrophe that causes great damage or loss of life.*
Durability - *the ability to withstand wear, pressure, or damage.*
Grouting - *to put a thin line of mortar in the spaces between tiles*
Gunny bag - *a large, simple bag made of rough material and traditionally used for carrying grain or vegetables.*
Honeycomb - *a rough and stony surface that appears on concrete when there are air voids between the course and the aggregate.*
Impermeability - *not allowing fluid to pass through.*
Impregnation - *to cause to be filled, imbued, permeated, or saturated. Inventory - a complete list of items such as property, goods in stock, or the contents of a building*
Mortar - *material used in building construction to bond brick, stone, tile, or concrete blocks into a structure.*
Myriad - *a set of something of that number*
Overlap – *one above the other*
Pallete - *thin board or slab on which an artist lays and mixes colours*
Penetrate - *go into or through (something), especially with force or effort. - the set of operations which aim to increase the level of quality of building systems*
Spatial -*relating to or occupying space.*
Underneath - *situated directly below (something* else).
UV- *ultra violet rays, a form of non-ionizing radiation that is emitted by the sun and artificial sources*
Weathering - *the process of wearing or being worn by long exposure to the atmosphere*.