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Final Exam

Check by:

Q 1 (A) Give the Characteristics of Earth used for manufacturing of bricks.

Earth brick walls are an excellent example of efficient sustainable construction; when properly designed they can easily be used internally and externally. Construction professionals can design these walls effectively by:

- **Uniformly distributing loading.**
- **Using finishes and insulations that allow the bricks to breathe.**
- **Protecting the bricks from water penetration.**

STEPS INVOLVED IN BRICK MANUFACTURING

Manufacturing of bricks consists of the following 4 operations or steps.

1. **Preparation of brick clay or brick earth**
2. **Moulding of bricks**
3. **Air drying of bricks**
4. **Burning of bricks**

1. PREPARATION OF BRICK CLAY OR BRICK EARTH

In this step the soil is excavated in steps and then laid on leveled ground. Then the soil is cleaned of impurities such as vegetation matter, stones or pebbles etc. After removing impurities it is exposed to weather for few months. This is called the process of weathering. After completion of weathering process the soil is blended with other material to prepare good brick earth. Then the mixed soil is tempered by being thoroughly broken up, watered and kneaded. The tempering is usually done in pug mill.

2. MOULDING OF BRICKS

Bricks are moulded in many ways depending on the quality of the product to be made. Generally the moulding is done in the following two ways

- **Hand moulding**
- **Machine moulding**

For hand moulding the tempered clay is forced in the mould in such a way that it fills all the corners of the mould. Extra clay is removed either by wooden strike or frame with wire. Mould is then lifted up and raw brick is left on ground.

Machine moulding is used where large numbers of bricks are to be made. Machines used for moulding is generally of two types.

- **Plastic clay machines**

- **Dry clay machines**

In plastic clay machine the clay in plastic state is forced to rectangular openings of a size equal to the length and breadth of the bricks and are then cut into strips of thickness of the brick with wires in frames.

In dry clay machines, dry clay is reduced to powder, filled dry into mould by the machine and then are subjected to high pressure to form hard and well-shaped bricks.

3. DRYING OF BRICKS

Drying is usually done by placing the bricks in sheds with open sides so as to ensure free circulation of air and protection from bad weather and rains. The bricks are allowed to dry till they are left with 5 to 7 percent moisture content. The drying period usually varies from 7 to 14days. The moulded bricks are dried because of the following reasons.

- **If damp bricks or green bricks are directly taken to burning then, they are likely to be cracked and distorted**
- **To remove maximum moisture from the brick so as to save time and fuel during burning**
- **To increase the strength of raw bricks so that they can be handled and stacked in greater heights in the kiln for burning without damage.**

4. BURNING OF THE BRICKS

It is the very important step in manufacture of bricks. Bricks may be burnt by two distinct methods given below.

- **Burning in a clamp or Pazawah known as clamp burning**
- **Burning in a flame kiln or Bhatta known as kiln burning**

In clamps, one batch of green bricks is heaped along with firewood, coal etc. and sealed with clay. It is then fired slowly to intense heat which may take many days. Modern kilns, however, permanent structures consisting of many chambers. There are *intermittent and continuous kilns*. Moulded clay is stacked in the chambers. They are then slowly dried and burned to high temperature and cooled. One cycle of loading, drying, burning, cooling and emptying may take as much as two weeks. These processes are carried out intermittently in intermittent kilns and in cyclic order in continuous kilns.

5. Tempering Of The Bricks

Tempering is the process of adding water to the clay and allowing it to stand undisturbed for a few days before mixing occurs. ... This tempering tank should be located close to the place where you mix the clay and mould the bricks. In thetempering pit or tank, the clay is moistened with the correct amount of water.

Q 1 (B) Suggest a good building stone of your home town and give the technical reasons for using it.

Answer: I will suggest a marble stone for my home.

Marble stone

It is used for facing and ornamental works in columns, flooring, and steps. The compressive strength of marble varies from 70MPa to 75MPa. Marble stones are quite strong, uniform in texture, least porous, and take an excellent polish. It can be easily cut and carved into different shapes. Marble is available in different colors like white and pink. I will use marble stone which have high Durability, Heat Resistance and Fire Resistance

Reason of using marble stone in our homes:

Benefits:

Marble is a good building material. It has a very soft look, and therefore it is very popular with sculptors especially. Various monuments and places have been built using this stones. Ancestors made magnificent architecture which today has become an architectural heritage. The best example of the architectural heritage is the Taj Mahal which is one of the Seven Wonders of the World. Let us look into the benefits of marble stone:

Durable: Marble is one of the durable stone among all the natural stone. It always guarantees the long life of the items builds with marble.

Heat Resistance: The Marble is one of the best heat resistance stone among all the natural stones. This also ensures the uniform temperature within the home.

Fire Resistance: Marble being fire resistance makes it ideal for home and office construction. In case of any fire accident in the home, marble ensures less damage.

Q#2 (A): Give the uses of Copper, Lead, Tin, Zinc, and Aluminum in different civil engineering works.

<u>Uses of Copper in construction:</u>

- **It is used as electric wire and cable.**
- **It is used as lighting conductor.**
- **For water proofing the construction joints copper plates are used.**
- **Copper tubes are used for hot and cold water supply, gas and sanitation connections.**
- **It forms a major constituent of brass and bronze.**

It is also the most electrically conductive of the metals and is an important part of the world's telecommunications systems. While not as strong as steel it is tough and malleable making it useful for many building applications.

USE OF ALUMINIUM:

• Aluminum is the second most widely specified metal in buildings after steel, and is used in all construction sectors, from commercial buildings to domestic dwellings.

• Aluminum is also used extensively in plant, ladders and scaffolding.

•The main market sectors are windows, roofing, cladding, curtain walling and structural glazing, prefabricated buildings, and architectural hardware.

• Modern building and construction is more than merely erecting buildings as functionally as possible. In addition to functional and economic criteria, aesthetic and design considerations together with ecological demands placed on building projects play an equally important role. This means the materials used are of major significance.

USES OF TIN:

- **A crystalline, silvery metallic element obtained chiefly from cassiterite, and having two notable allotropic forms.**
- **Malleable white tin is the useful allotrope, but at temperatures below 13.2°C it slowly converts to the brittle gray allotrope.**
- **Tin is used to coat other metals to prevent corrosion and is a part of numerous alloys, such as soft solder, pewter, type metal, and bronze.**

Uses of Lead

- **It is a soft, malleable poor metal, also considered to be one of the heavy metals.**
- **Lead has a bluish white color when freshly cut, but tarnishes to a dull grayish color when it is exposed to air and is a shiny chrome silver when melted into a liquid.**
- **Very easy to cut and work, enabling it to be fitted over uneven surfaces.**
- **Used for roofing, flashing and spandrel wall panels.**

Uses of zinc:

- **Zinc is used for the treatment and prevention of zinc deficiency and its consequences, including stunted growth and acute diarrhea in children, slow wound healing, and Wilson's disease.**
- **Zinc is also used for many other conditions.**
- **There is some scientific evidence to support its use for some of these conditions.**
- **But for most, there is no good scientific evidence to support its use.**

Q 2 (b) what precautions must be observed while blasting in quarrying?

Precautions to be taken while Blasting:

Following precautions are to be taken in the process of blasting to avoid the occurrence of serious accidents:

(1) Failure of Explosion:

Sometimes a charge fails to explode due to any reason. In such a case, a fresh blast hole is made near the hole that has failed and the process of blasting is repeated. The fresh blast hole should not be too near the failed hole. In many cases, the explosion of fresh blast hole will also explode the charge of failed blast hole and in such a case, it may result into a serious accident.

(2) Line of Least Resistance:

The rocks contain Fissures, cracks, faults or bedding planes. When explosion occurs, the gases are formed. If blast hole is tamped sufficiently hard, it will not be possible for the gases to come out through blast hole. In such a case, the gases will follow the line of path which offers the least resistance.

(3) Needle and Tamper:

These should be made of copper, brass or bronze and not of steel. A spark is formed when steel strikes the rock. Hence, if they are of steel, premature explosion will take place and it may result into a serious accident.

(4) Notice of Blasting:

Nobody should be allowed to enter the area where blasting is being done. The notices and visible signs such as red flags should be placed at suitable places along the periphery of such area. It is desirable to avoid the blasting operations late in evenings or early in mornings. The fixed hours of blasting operations should be made known to the public.

(5) Retreat to a Distance:

The fuse adopted should be such that a worker can retreat to a safe distance after firing it. For large scale work, the whistles or sirens may be used to warn the workers to go to a safe place before explosion takes place.

(6) Seepage of Water:

If water is entering the blast hole, the charge of explosive should be placed in thin iron plate or in water-proof paper.

(7) Skilled Supervision:

The work of blasting should be entrusted only to the trained and experienced persons. The responsible person should ascertain the fact that the charges exploded are equal to the charges fired with the number of explosions heard.

(8) Storing:

The explosives should be stored very carefully. They should be placed in specially constructed building known as the magazine or store-house

Q 3 (A) Compare Brick masonry and Stone masonry.

Masonry

Masonry is the art of the construction in brick or stone. Except in dry masonry some mortar is used to bind the bricks or blocks of stones, with each other. There are in general two types of masonry, *viz.*, Brick Masonry and Stone masonry. Brick masonry is that in which bricks are used while in stone masonry, stone blocks are used.

Comparison of Brick Masonry and Stone Masonry

Stone masonry	Brick masonry
1. Stone masonry is stronger and more durable than brick masonry	1. Brick masonry is less strong and less durable than stone masonry.
2. Dead load & thickness of wall is more in stone masonry construction.	2. Dead load & thickness of wall is less as compared to stone masonry construction
3. It is costly than brick masonry.	3. It is cheaper than stone masonry and can be easily constructed
4. Being non-uniform and irregular in shape, proper bond cannot be easily obtained in stone masonry.	4. Being uniform and regular in shape, proper bond can be easily obtained in case of brick masonry.

Stone masonry	Brick masonry
5. It is possible to develop better architectural effects by stonework.	5. It is not possible to develop better architectural effects by brickwork.
6. The stone masonry construction proceeds vary slowly.	6. The brick masonry construction proceeds very quickly.
7. It is not essential to plaster the stone masonry walls, when exposed to the open atmosphere.	7. Brick walls have to be plastered or painted, when exposed to the open atmosphere.
8. Stones are less adsorbent and hence stone masonry walls or buildings are more damp proof.	8. Bricks are of an absorbent in nature and make the buildings damp.
9. The stone possesses high crushing strength and hence the stone masonry is adopted in the construction of piers, docks, dams and other marine structure.	9. The brickwork on other hand is considered unsuitable in the construction of piers, docks, dams and other marine structure

Q 3 (B) under what Circumstances would you prefer pointing to plastering?

Plastering

Plastering is the process of covering rough walls and uneven surfaces in the construction of houses and other structures with a plastic material, called plaster, which is a mixture of lime or cement concrete and sand along with the required quantity of water.

REQUIREMENTS OF GOOD PLASTER

It should adhere to the background and should remain adhered during all climatic changes.

It should be cheap and economical.

It should be hard and durable.

It should be possible to apply it during all weather conditions.

It should effectively check the entry or penetration of moisture from the surfaces.

It should possess good workability.

Objective of plastering

To provide an even, smooth, regular, clean and durable finished surface with improved appearance.

To conceal defective workmanship.

To preserve and protect the surface.

To provide a base for the decorative finish.

To cover up the use of inferior quality and porous materials of the masonry work.

METHODS OF PLASTERING

The plaster may be applied in one or more coats, but the thickness of a single coat should not exceed 12 mm. In the case of inferior or cheaper type of construction, the plaster may usually be one coat. For ordinary type of construction, the plaster is usually applied in two coats, whereas for superior type of works it is applied in three coats. The final setting coat should not be applied until the previous coat is almost dry. The previous surface should be scratched or roughened before applying the next coat of plaster. In plastering, the plaster mix is either applied by throwing it with great force against the walls or by pressing it on the surface.

The methods of applying the following common types of plasters are as follows.

Lime Plastering

Lime plastering is the process of covering the surfaces by lime plaster or mortar in various proportions depending upon the nature of work and the number of coats to be applied.

Plaster in Three Coats with Lime Mortar

	Name of Coat	Thickness	Remarks
First Coat	**Rendering Coat**	**12 mm**	**This is left for a period of 2 days to set and is not allowed to dry.**
Second Coat	**Floating Coat**	**6-9 mm**	**This coat is applied with trowels and rubbed with a straight edge, the water is sprinkled on the surface and the surface is well rubbed with floats to make it even surface.**
Third Coat	**Setting Coat or Finishing Coat**	**3 mm**	**This coat is applied after 5 days, neeru or sagol is used to prepare a smooth surface. After giving a rest of 24 hours to the plastered surface, the work should be watered well for a fortnight so**

Cement Plastering

Cement plastering is an ideal plastering for external renderings. It is especially suited for damp conditions such as bathrooms, reservoirs, water tanks, floors, copings, etc. where non-absorbent surfaces are desired. Cement plaster is usually applied in a single coat. However, in certain cases when the thickness of the plaster is more than 15 mm or it is desired to have a finer finish, the plaster is applied in two coats.

Plaster in Three Coats with Cement Mortar

	Name of Coat	Thickness	Remarks
First Coat	**Rendering Coat**	**12 mm**	**This is left for a period of 3-4 days to harden .its surface is kept rough.**
Second Coat	**Floating Coat**	**6-9 mm**	**The purpose of this coat of plaster is to**

			bring the work to an even surface
Third Coat	**Setting Coat or Finishing Coat**	**3 mm**	**This coat is similar to the second coat of a two coat plaster.**

Preparation of a surface for plastering

When a surface is to be plastered, the surface is prepared in the following manner:

- **All the mortar joints of the wall to be plastered are left rough and projecting, so as to give a key or hold to the plaster. All the joints and surfaces are well cleaned with a wire brush and ensured that they are free from oil, grease, etc. If the surface is smooth or the wall to be plastered is an old one, then the mortar joints are raked out at least to a depth of 12 mm to give bond to the plaster.**
- **Projections more than 12 mm over the surface are knocked off so as to obtain a uniform surface of wall and also to reduce the consumption of plaster.**
- **Similarly, all the cavities and holes inside the surface are properly filled up in advance.**
- **All woodwork to be plastered is roughened.**
- **Finally, the mortar joints and surfaces of the wall are well washed, wetted with water and kept for at least 6 hours before plastering.**

POINTING

Pointing**, in building maintenance, the technique of repairing mortar joints between bricks or other masonry elements. When aging mortar joints crack and disintegrate, the defective mortar is removed by hand or power tool and replaced with fresh mortar, preferably of the same composition as the original. Often an entire wall, or even a whole structure, is pointed because defective points cannot easily be detected, and adjacent joints may also be in need of repair. The mortar is packed tightly in thin layers and tooled to a smooth, concave, finished surface. Tuck-pointing is a refinement of pointing, by which sharply defined points are formed for decorative purposes**

Types of Pointing: –

1. **Raised pointing**
2. **Sunk pointing**
3. **Flush pointing**
4. **Vee pointing**

WORK PROCESS OF POINTING:

1. **Rake all the joints for U.C.R. 25mm deep & 20 mm deep for brick masonry.**

2. **Remove all the loose mortar & cleaning the joints.**
3. **Watering to the joints to be done.**
4. **Filling & finishing of joints as per designed type of pointing with cement mortar to be done.**
5. **Curing for 7 days to be done**

Difference b/w Plastering and Pointing

- **Plastering is used to protect the exposed surface of masonry. However, in pointing only joints are properly filled with mortar.**
- **Cement, sand and lime are used in plastering. In pointing, we use just cement mortar.**
- **The plastering is done at both sides of surface (both inside and outside). However, pointing is done only at the outer side of the wall.**
- **In plastering work, we use the large amount of materials. However in pointing, we use less amount of mortar.**
- **After the plastering, the defects of the masonry are not visible. However, after the pointing, the surface does not become smooth and plain.**
- **When we plaster the wall, after the plastering work, the surface becomes smooth and plain. However, after pointing, the defects of masonry can be seen.**

Q 4 (A) what is meant by seasoning of timber? Briefly describe the various methods of seasoning.

Seasoning of timber and its methods

Reduction of moisture content along with improving some qualities before the use of woods is called seasoning of timber. By seasoning, generally, the moisture is reduced to about 15% where new cut woods bear about 50%.

Reasons for Seasoning

Seasoning of timber is done to fulfill some specific requirement. Followings are the reasons to perform timber seasoning.

- **To change and improve the properties of wood.**
- **To make a correct percentage of shrinking of woods.**
- **To make a confident use of woods.**
- **To reduce the adverse behavior of woods.**

Methods of Seasoning of Timber

There are mainly two methods of seasoning of timber. These are:

- **Natural Seasoning**
- **Artificial Seasoning**

Natural Seasoning

Seasoning of woods or timbers using natural elements is called natural seasoning. eg. Water and air seasoning.

a. Water seasoning

Removal of wood sap immersing logs into water flow is called water seasoning. It is carried out on the banks of the river while thicker ends are kept towards upstream. After that, the logs are allowed to dry. Disadvantage: It is time consuming such as 2 to 4 weeks generally.

b. Air seasoning

Exposing the woods to air for seasoning. At first, a platform is required that is built on the ground at 300mm height above the ground.

Secondly, the arrangement of woods in layers. Air circulation is maintained between logs because it helps to reduce the moisture which is important for seasoning. The environment for this need to maintain some conditions. A clean, shady, dry, cool place is preferred. Sometimes logs are coated by the impermeable substance to reduce extreme moisture. To improve the quality oil coating, thick paint coating is maintained. To prevent fungal infection logs are treated with petrol or gasoline.

Advantage

Good quality of seasoned wood.

A large amount is convenient in this process.

Well-seasoned timber is formed.

Disadvantage:

It's a slow process.

Artificial Seasoning

a) Seasoning by Boiling

Seasoning by boiling wood logs in hot water is called seasoning by boiling. Drying is done after proper boiling. For a large amount of wood, it is done in an enclosed place where hot steam is passed.

Advantages

It takes a short amount of time. Generally, 3-4 hours is good enough.

Develops the strength and elasticity.

Disadvantages

It is serviceable basically for a small quantity of wood, not convenient for a large amount.

The cost is high.

b) Chemical seasoning

Reduction of moisture using salt solution is called chemical seasoning. After the absorption of water by the solution logs are let to dry.

Advantage

It increases the strength of the timber.

It is less time-consuming.

Disadvantage

Chemical reagents can sometimes reduce strength.

It can cause a problem in gluing or finishing or corrosion while using.

c) Kiln seasoning

Seasoning of wood by using a large chamber or oven where there is a good process for the circulation of hot air.

Advantage

Most effective and economic seasoning.

Kiln seasoning can be done by 2 processes such as:-

Progressive kiln seasoning: Wood log is entered through the kiln ant the temperature and humidity differentials are maintained through the length of the kiln to maintain proper drying.

Compartmental Seasoning: It's maintained by enclosed container or buildings. Advantage: It accelerates the process because external energy is used.

d) Electrical seasoning

Dry wood is non-conductor of electricity while green timber is a conductor, so, can pass alternating current. Thus in this method alternating current is used for drying the cells of wood by creating heat. As electricity is used, it's called electrical seasoning.

Advantage:

Using this method quick drying is obtained. A French electrical seasoning method is used to season overnight.

Disadvantages:

The equipment required is very costly.

It is an uneconomic process as a high rate of electricity is consumed.

During heating the cells of wood or timber they lose their strength and become weak.

Q 4 (B) Suggest the remedial measures for the failure of foundation.

There can be different types of foundation failures on soil due to movement and settlement which can cause the building to collapse. Failure of foundation causes different defects in buildings such as cracks leading to failure or collapse. Foundation is the first element of a building where the construction starts

Repair of defects in foundations are most difficult and very costly, so it is most important to understand the types of foundation failure to avoid them by taking necessary steps before construction starts.

Functions of Foundation in Buildings

There are three main functions of a building foundation:

1. To sustain and safely transmit the loads from building / structure to the ground in such a way that it does not impair the stability or cause damage to the building or surrounding buildings

2. The construction of foundations must safeguard the building against damage by physical forces generated in the subsoil.

3. Foundations must resist the chemical compounds present in soil to prevent corrosion to reinforcement.

The properties of soil have the major influence on the design, stability and sustainability of foundations to make it perform its functions.

Types of Types of Foundation Failures

1. Foundation failure due to Soil Movement

When water present between soil particles is removed, the soil tend to move closer together. When water is absorbed by soil, the soil starts to swell. This movement of soil is based on the type of soil. Large movement is seen with clayey soils than sandy soils. These kind of movement of soil due to change in water content affects the foundation settlement. Foundation tends to settle to and excessive settlement of foundation may lead to differential settlement and damage to the structure.

Soil movement can occur due to following:

1. **Presence of vegetation or remains of old cut tree**
2. **Presence of mining areas**
3. **Shrinkable soils**

Remedies for foundation failure due to soil movement:

1. **Use of pile foundations where the soil is shrinkable, so that forces are transferred to the hard strata or rock.**
2. **Taking the foundation levels down to avoid foundation on shrinkable soils.**
3. **The vegetation is removed from the construction site and its roots are removed. Any cavity due to roots of vegetation shall be compacted and filled with concrete.**
4. **Presence of any mining areas needs to be inspected and professional help shall be taken while construction new buildings in such areas**

2. Foundation failure due Settlement of Soil Fill

If the building is constructed on a newly developed land by soil filling, the foundation on such soils tend to settle more with time as long time is needed for such soil to settle and become compact to resist the loads from the building foundation.

Remedies

It shall be ensured that such soils are adequately compacted before construction begins on them. The foundation depth shall be increased to the hard strata or rock below the filled soil or pile foundations shall be used to prevent subsidence of foundation.

Q 5 (A) what sort of method will you suggest for preventing dampness in building at your home town. Explain with a valid reason.

Answer: I will suggest the damp proof course (D.P.C) for preventing dampness in building at our home town.

USE OF DAMP-PROOF COURSES (D.P.C.)

These are layers or membranes of water repellent materials such as bituminous felts, mastic asphalt, plastic sheets, cement concrete, mortar, metal sheets, stones etc. which are interposed in the building structure at all locations wherever water entry is anticipated or suspected. The best location or position of D.P.C. in the case of building without basement lies at plinth level or structures without any plinth level, it should be laid at least 15cm above ground level. The damp proof course is provided horizontally and vertically in floors, walls etc.

A damp-proof course (DPC) is a barrier through the structure designed to prevent moisture rising by capillary action such as through a phenomenon known as rising damp. Rising damp is the effect of water rising from the ground into property. The damp proof course may be horizontal or vertical. A DPC layer is usually laid below all masonry walls, regardless if the wall is a load bearing wall or a partition wall.

The valid reason of using damp proof course in our buildings:

- **The use of cement leads to a better water system.**
- **It gives the roof a reasonable slope.**
- **It is durable and sustainable.**
- **It repairs other voids or cracks that are already present in roof slabs.**
- **It should be impervious.**
- **It should be strong and durable and should be capable of withstanding both dead as well as live loads without damage.**
- **It should be dimensionally stable.**
- **It should be free from deliquescent salts like sulfates, chlorides, and nitrates.**

Q 5 (B) Explain the different methods of fastening with rope.

Fastening

What is Fastener?

Fastener, a main Hardware component is used almost everywhere, be it your Home Ceilings Installation or your door hinge, be it a machinery or an Infrastructure all items will require Fasteners to Fix them all. We mainly use a fastener for a non-permanent joint, a joint that can be removed or dismantled without causing any damage to the joining

components. There are a variety of Fastener available in the market each of them used for a specific reason and according to the need.

Fastening methods

Bolts:

- **These are supposed to be threaded lengths made of steel rods with heads on single end**
- **Bolts are generally used along with nuts at other end and every so often with a washer too**
- **Bolts are of four types including carriage bolt, Cap screw, hex bolts and Plow bolts.**

Nuts:

- **Nuts are flat steel pieces, usually hexagonal in shape with internally cut threads.**
- **Hex nuts, Square Nuts and Castle Nuts are some of the commonly used types**

Washers:

- **Washers are mainly divided into types namely a plain washer or flat washer and split lock washer.**
- **Plain washers are generally steel disks having a hole in the center.**
- **These types are used to minimize the stress present in the bolts and buts**
- **They can able to spread a clamping force right from the bolt to span slots in order to oversize the holes in the wood.**
- **Helical spring washers or lock washers are normally made from tough spring steel and installed under the bolt or nut.**
- **They are utilized to protect nuts from rotation.**

Nails:

- **Nails are none other steel rods, which are usually pointed at one end and having a head at the other end.**
- **Nails are primarily used to join woods together**
- **The size of the nail is generally referred in terms of "Penny"**
- **"D" will indicate the penny size as nails are sold by pound at most of the hardware stores.**
- **Common nails, box nails, finish nails; duplex nails and roofing nails are some common types of nails used.**

Screws:

- **Just like bolts, screws too are threaded lengths of rods made of steel with a head on one end**
- **The heads of the screw may be slotted, square, cross slotted or hexagonal**
- **Types of screws include: Slotted Flathead, Slotted Roundhead, Slotted Oval Head, Phillips Drive and Square Drive**

Rope

A rope is a group of yarns, plies, fibers or strands that are twisted or braided together into a larger and stronger form. Ropes have tensile strength and so can be used for dragging and lifting. Rope is thicker and stronger than similarly constructed cord, string, and twine.

Rope Terminology

- **Bend**: **Joins two ropes or fishing lines, e.g., Sheet Bend, Alpine Butterfly Bend, Figure 8 Bend, Ashley Bend, Hunter's Bend, Zeppelin Bend.**
- **Bight**: **Made by folding a piece of rope so that the two parts lie alongside each other. When tied near the rope's end, the parts will be the Tail lying beside the Standing End. A bight can be used to finish many knots – making them easy to untie by just pulling the tail. The term "Bight" does not imply a "Loop" and does not mean the same.**
- **Bitter End**: **Derived from the "Bitts" – the stout metal posts used for attaching mooring ropes – it is applied to the tail end of a mooring line.**
- **Breaking Strength**: **The theoretical strength of a rope – derived by averaging many tests of a rope tested under optimal conditions, i.e., when stretched slowly while wound many times round a smooth, large diameter drum. The theoretical breaking strength is rarely (if ever) achieved in practice despite claims made by enthusiastic knot proponents.**
- **Dressing a Knot**: **Arranging the components of the knot to optimize security and/or strength.**
- **Hitch: Attaches a rope to something, e.g., a Hitching Post, dock pole, mooring buoy, anchor, or cleat. Such knots include the Rolling Hitch, Cleat Hitch, Buntline Hitch, Icicle Hitch, Distell Hitch, and Lighter man's Hitch, and Midshipman's Hitch.**
- **Hollow Braid: A loosely woven single-braid rope which can be spliced using a Brummel or a Long Bury technique.**
- **Kern mantle: A type of rope construction with a Kern (interior core) protected by a Mantle (woven exterior sheath) – a design that achieves abrasion resistance and strength.**
- **Lay: The direction in which the strands of a rope twist. As the strands progress away from the viewer, if they rotate clockwise like a right hand thread, it is a Right Hand Lay or Z-Twist – typically used for most three-strand rope. Steel cables are usually laid with a Left Hand Lay or S-Twist – hence the term Cable Laid, which is used when rope has a Left Hand Lay. If you have become accustomed to splicing three-stranded rope, splicing a piece of cabled-laid rope feels very awkward.**
- **Loop: Made when a rope forms a partial circle with the ends crossing each other.**
- **Racking Turns: Lashing turns which pass between poles to bind against the pole better. They are used in Tripod Lashings**