

BITT POLYTECHNIC, RANCHI

DEPARTMENT OF CIVIL ENGINEERING

Question Set-1 Construction Technology

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A. Objectives Questions:

1. Where dado is usually provided ?
- Bathroom
2. The foundation in which a cantilever beam is provided to join two footings, is known as
- Strap footing
3. Why foundations are placed below ground level, to increase
- stability of structure
4. The 9 cm x 9 cm side of a brick as seen in the wall face, is generally known as
- Header
5. The taper of precast concrete pile should not be more than
- 2 cm per metre length
6. The under surface of an arch, is called
- Soffit
7. The raft slab is projected beyond the outer walls of the structure by
- 30 to 45 cm
8. The process of making the back ground rough, before plastering, is
- hacking
9. Black cotton soil is unsuitable for foundations because its
- property to undergo a volumetric change due to variation of moisture content.
10. The portion of a brick cut across the width, is called
- bat.

B. Short Answer Types Questions:

1) what is a building ?

Building is a kind of structure which is built with materials and including with foundation, plinth, walls, floors, roofs, chimneys, plumbing and building services, fixed platforms, veranda,

balcony, cornice or projection, part of a building or anything affixed thereto or any wall enclosing or intended to enclose any land or space and signs and outdoor display structures. For example, houses, factories, shopping malls, hospitals, etc.

2) write down various types of building ?

Buildings may be load bearing masonry buildings, RCC or steel framed structure buildings. There are many different types of Buildings. Such as-

- Residential houses,
- Schools, Colleges & Universities,
- Hospitals,
- Factories, Workshops,
- Churches, Temples, Mosques,
- Malls

3) Explain the Basic Components & Parts of Buildings

Building components or parts are essential materials for building construction. All buildings built with the same components such as foundations, walls, floors, rooms, and roofs. Buildings need to decorate or renovate with paints, plasters, supplied electricity, and doors and windows fittings, fencing, and external other works to finish accurately. All these works called Building Service.

A building has three basic requirements and components. They are -

- Foundation
- Plinth
- Superstructure

4) What is Foundation ? write down its types

Foundation is the most critical work of building construction. A load of buildings depends on the foundation which is the strength of buildings. It is one kind of substructure. Foundations can be divided into two categories such as Shallow and Deep Foundations.

shallow and deep indicate as the depth of foundation in the soil. Shallow foundations used for small and light buildings for e.g. a small or medium size houses, small shopping centers, etc. and deep foundations used for heavy and large buildings for e.g. tall buildings, huge shopping malls, large hospitals, and universities, etc. Generally, shallow foundations can be made in depth of as little as 3ft (1m) and deep foundations made at depth of 60-200ft (20-65m).

*shallow foundation- its depth is equal or less than its width,

*deep foundation- its depth is greater than its width.

5) What is Pad foundation?

Foundations which carry and spread concentrated loads to the soil from superstructures is called pad foundation. They are isolate type foundation,

Pad foundations may be square, rectangular or circular in shape. If the pad is subjected to a heavy loaded structure, the pad footing may be stepped.

6) When isolated Pad Foundation is Selected ?

- There is high bearing capacity at a shallow depth.
- There is no chance of differential settlement.
- Loads from superstructure are relatively low.
- For cost-effective solution.

7) Explain Reinforced Concrete Pad Foundation

Reinforcement in pad foundation reduces the thickness required for the foundation. For the ease of construction, they are usually designed to be square plan area. Rectangular pads are also used, especially when there is eccentric or inclined loading.

8) what is grillage foundation also write down its types.

A foundation which consists of one, two or more tiers of beams (typically steel) superimposed on a layer of concrete to disperse load over an extensive area is *grillage foundation*. It is used at the base of columns. These tiers are encased in concrete and are at right angles to each other. This type of foundation is generally used for heavy structure columns piers and scaffolds.

This are two types

- a) Steel grillage b) timber grillage

9) What is Pile Foundation? Write down the types of Pile

Foundations provide support to the structure, transfers the loads from the structure to the soil. But the layer at which the foundation transfers the load shall have an adequate bearing capacity and suitable settlement characteristics. There are several types of foundation depending on various considerations

Types of pile are a) end bearing pile, 2) friction pile

10) write down the condition when pile foundation use

- Total load from the superstructure.
- Soil conditions.
- Water level.
- Noise and vibrations sensitivity.
- Available resources.
- Time-frame of the project.
- Cost.

C. Long Answer Types Questions:

1) write down when to use pile foundation. Also write down its types.

- When the groundwater table is high.
- Heavy and un-uniform loads from superstructure are imposed.
- Other types of foundations are costlier or not feasible.
- When the soil at shallow depth is compressible.
- When there is the possibility of scouring, due to its location near the river bed or seashore, etc.
- When there is a canal or deep drainage systems near the structure.
- When soil excavation is not possible up to the desired depth due to poor soil condition.

- When it becomes impossible to keep the foundation trenches dry by pumping or by any other measure due to heavy inflow of seepage

Types –

A. Based on Function or Use

1. Sheet Piles
2. Load Bearing Piles
3. End bearing Piles
4. Friction Piles
5. Soil Compactor Piles

B. Based on Materials and Construction Method

1. Timber Piles
2. Concrete Piles
3. Steel Piles
4. Composite Piles

2) Explain about sheet pile and end bearing pile.

Sheet pile - This type of pile is mostly used to provide lateral support. Usually, they resist lateral pressure from loose soil, the flow of water, etc. They are usually used for cofferdams, trench sheeting, shore protection, etc. They are not used for providing vertical support to the structure. They are usually used to serve the following purpose-

- Construction of retaining walls.
- Protection from river bank erosion.
- Retain the loose soil around foundation trenches.
- For isolation of foundation from adjacent soils.
- For confinement of soil and thus increase the bearing capacity of the soil.

End bearing pile - In this type of pile, the loads pass through the lower tip of the pile. The bottom end of the pile rests on a strong layer of soil or rock. Usually, the pile rests at a transition layer of a weak and strong slayer. As a result, the pile acts as a column and safely transfers the load to the strong layer.

The total capacity of end bearing pile can be calculated by multiplying the area of the tip of the pile and the bearing capacity of at that particular depth of soil at which the pile rests. Considering a reasonable factor of safety, the diameter of the pile is calculated.

3) Elaborate friction pile

Friction pile transfers the load from the structure to the soil by the frictional force between the surface of the pile and the soil surrounding the pile such as stiff clay, sandy soil, etc. Friction can be developed for the entire length of the pile or a definite length of the pile, depending on the strata of the soil. In friction pile, generally, the entire surface of the pile works to transfer the loads from the structure to the soil.

The surface area of the pile multiplied by the safe friction force developed per unit area determines the capacity of the pile.

While designing skin friction pile, the skin friction to be developed at a pile surface should be sincerely evaluated and a reasonable factor of safety should be considered. Besides this one can increase the pile diameter, depth, number of piles and make pile surface rough to increase the capacity of friction pile.

It also consist of verious teeth which create friction to the soil.

4) Explain timber pile

Timber piles are placed under the water level. They last for approximately about 30 years. They can be rectangular or circular in shape. Their diameter or size can vary from 12 to 16 inches. The length of the pile is usually 20 times of the top width.

They are usually designed for 15 to 20 tons. Additional strength can be obtained by bolting fish plates to the side of the piles.

Advantages of Timber Piles-

- Timber piles of regular size are available.
- Economical.
- Easy to install.
- Low possibility of damage.
- Timber piles can be cut off at any desired length after they are installed.

- If necessary, timber piles can be easily pulled out.

Disadvantages of Timber Piles-

- Piles of longer lengths are not always available.
- It is difficult to obtain straight piles if the length is short.
- It is difficult to drive the pile if the soil strata are very hard.
- Spicing of timber pile is difficult.
- Timber or wooden piles are not suitable to be used as end-bearing piles.
- For durability of timber piles, special measures have to be taken. For example- wooden piles are often treated with preservative.

5) write down the advantage of precast concrete pile and also write down its disadvantage also

Advantages of Pre-cast Piles

- Provides high resistance to chemical and biological cracks.
- They are usually of high strength.
- To facilitate driving, a pipe may be installed along the center of the pile.
- If the piles are cast and ready to be driven before the installation phase is due, it can increase the pace of work.
- The confinement of the reinforcement can be ensured.
- Quality of the pile can be controlled.
- if any fault is identified, it can be replaced before driving.
- Pre-cast piles can be driven under the water.
- The piles can be loaded immediately after it is driven up to the required length.

Disadvantages of Pre-cast Piles

- Once the length of the pile is decided, it is difficult to increase or decrease the length of the pile afterward.
- They are difficult to mobilize.

- Needs heavy and expensive equipment to drive.
- As they are not available for readymade purchase, it can cause a delay in the project.
- There is a possibility of breakage or damage during handling and driving of piles.