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## **AUTOCAD SOLUTIONS**

### **PRACTICAL A**

#### **1. AutoCAD and its commands**

What is AutoCAD?

- **AutoCAD** is a commercial **computer-aided design** (CAD) and drafting software application. Developed and marketed by Autodesk. AutoCAD is used in the industry, by architects, project managers, engineers, graphic designers, city planners and other professionals. It is used for a number of applications like creating blueprints for buildings, bridges, structural and mechanical components to name a few represented in both 2D and 3D designs depending on level of expertise.

Commands used in AutoCAD and their functions

Some of the basic commands used in AutoCAD include;

a. **L (LINE)**

It can be used for making simple lines in the drawing.

b. **REC (RECTANGLE)**

This command will make a rectangle in AutoCAD.

c. **CO (COPY)**

This command is used to copy object(s) in AutoCAD.

d. **TR (TRIM)**

This command is used for trimming a geometry.

e. **F (FILLET)**

This command can be used to add rounded corners to the sharp edges of the geometry, these round corners are also called fillets.

f. **XL (XLINE)**

Using this command you can make infinite lines starting from the point of selection. When you trim or break this infinite line to a finite length it becomes a simple line geometry.

g. **DI (DISTANCE)**

It can be used to find the distance between two points in the drawing.

h. **GROUP**

Using this command you can group multiple objects as a single unit. This command is great for making groupings of the similar type of objects like a group of similar blocks. To break this group you can use UNGROUP command.

i. **ARC**

As the name suggests, this command can be used to make an arc in AutoCAD.

j. **EX (EXTEND)**

This command is used for extending lines in a geometry.

## 2. TYPES OF STAIRCASE

The various types of staircase include;

a. **Straight Stairs**

Straight stairs are stairs without any changes in direction.

b. **L Shaped Stairs**

The L shaped stair is a variation of the straight stair with a bend in some portion of the stair. This bend is usually achieved by adding a landing at the transition point.

c. **U Shaped Stairs**

U shaped stairs are essentially two parallel flights of straight stairs joined by a landing that creates a 180-degree turn in the walk line.

d. **Spiral Stairs**

Spiral stairs follow a helical arc. They usually have a very compact design and the treads radiate around a central pole.

e. **Curved Stairs**

Like spiral stairs, curved stairs follow a helical arc. However, they tend to have a much larger radius and typically do not make a full circle.

f. **Winder Stairs**

Winder stairs are a variation of an L shaped stair but instead of a flat landing, they have pie-shaped or triangular steps at the corner transition.

### 3. TYPES OF DOORS AND WINDOWS

#### TYPES OF DOORS

##### a. Based on Location

- Exterior doors.
- Interior doors.

##### b. Based on Materials

- Wooden or Timber doors.
- Glass doors.
- Steel doors.
- PVC doors.
- FRP doors.

##### c. Based on Operation of Door Shutter

- Swinging doors.
- Folding doors.
- Sliding doors.
- Revolving doors.
- Pivot doors.

##### d. Based on Method of Construction

- Panel doors.
- Flush doors.
- Louvered doors.
- Wire gauzed doors.

#### TYPES OF WINDOWS

##### a. Awning Windows:

Awning windows open out by pivoting from the top of the window sash, operated by a crank.

##### b. Casement Windows:

Casement windows also open out (like awning windows) and usually pivot from side hinges. Many casements have fairly large glass panes to provide ample light that is uninterrupted by muntin bars or other framing.

##### c. Double-Hung and Single-Hung Windows:

Single-hung has a movable lower sash and a fixed upper sash, while double-hung has two movable sashes; the upper sash slides down.

##### d. Picture Windows:

They are often large glass expanses occupying the center portion of a wall to provide broad views and ample sunlight.

##### e. Slider Windows:

Slider windows slide open sideways. Like casements, they can offer clear views and ample ventilation, but they cannot be sealed as tightly as casements.

## TEST A

- A) **Building and construction** steps involving any type of structure is not an easy task, it requires lots of cost and calculations. Although, building construction requires lots of time and is tedious work, yet its result is a permanent asset for us. Therefore, care should be taken in building construction process. Before planning building construction projects important aspects must be considered.

### PROCEDURE:

- 1.** First of all, the plot of land is searched for and acquired in a location that is best suited for building construction processes, noting that it has all desirable facilities nearby after some appropriate site planning considering all factors affecting it. It is the most important step in building construction.
- 2.** After selecting proper land for building, personally create building designs or get help and advice from an architect, prepare the floor plans and building requirements, number of flats, rooms, based on the owner's requirements and budget. Then after, determine the structural details of the reinforcements to be used.
- 3.** After, planning and structural detailing completed these details are transferred to the building estimator. The building estimator will estimate the material quantity, quantity of different items of work, and prepare an abstract sheet that shows the cost of building construction. Of course, after getting appropriate permissions from building and construction authorities.

4. Builders or contractors for construction must be chosen carefully as it is a major factor for securing building construction quality and timely construction of work. In the contract document, all the work-related details must be clearly stated. The contract document should cover layout and work details along with the payment methods, time scales and costs.
5. The construction site must be cleaned before the work is executed. This work involves the removal of roots of trees, debris and leveling ground area. Then the foundation of building ground is excavated with the help of excavating machines as per the building dimension specified in drawings.
6. After the foundation work is done ground beam formwork preparation is started and poured with concrete. Over the plinth beam, masonry work is started and space between foundation and plinth beam filled with soil. The columns are built up to slab level and the frame for further construction is prepared.
7. As column and beam framework is completed, masonry work is started with different materials such as bricks, concrete blocks, fly ash bricks, etc. according to building drawing. The lintel is constructed on the door and window to support the masonry work over it.
8. Then the formwork is started to construct slab resting on the column and beam. Over slab formwork, slab reinforcement is placed as per slab detailed drawing, after that door window frames are fixed at their specified position given in drawing.

## **B) DIFFERENCES BETWEEN;**

- 1) **An Architectural drawing** is a technical drawing of a building or building project. Architectural drawings are used by architects and others for a number of purposes, to develop a design idea into a proposal, to communicate ideas and concepts, to convince clients of the merits of a design, to assist a building contractor to construct it based on design intent, as a record of the design and planned development, or to make a record of a building that already exists, WHILE A **Building or Construction drawing** is the general term used for drawings that form part of the production information that is incorporated into tender documentation and then the contract documents for the construction works. This means they have legal significance and form part of the agreement between the employer and the contractor.

- 2) **A Working drawing** is a drawing or blueprint based on explanations. It is completed with a thorough plan and views (details, notes, and dimensions) to ensure the product construction or replication without any additional information. It is a scale drawing of an object to be made or structure to be built intended for direct use by the workman, WHILE **A Presentation drawing** is any of a set of design drawings made to articulate and communicate a design concept or proposal such as for an exhibition, review, or publication intended to explain a scheme and to promote its merits.
  
- 3) **A Bill of Engineering Measurements and Evaluation (BEME)**. A **BEME** review is a description and evaluation of evidence pertinent to a clearly formulated concept that uses explicit scientific methodologies and methods to systematically identify, assemble, critically analyse and synthesise information relevant to the review topic, WHILE The **Bill of Quantities** (sometimes referred to as '**BOQ**' or '**BQ**') is a document prepared by the cost consultant that provides project specific measured quantities of the items of work identified by the drawings and specifications in the tender documentation.
  
- 4) A **Section** of an element or a structure is cut through that shows the interior details of how an element/structure/material is made in the inside which reveals more details whereas the elevation is the exterior appearance of the same, WHILE the term '**Elevation**' refers to an orthographic projection of the exterior (or sometimes the interior) faces of a building, that is a two-dimensional drawing of the building's façades.

