LABORATORY MANUAL

Name : __________________________________________________________
Reg. No. : ______________________________________________________
Section : _______________________________________________________
DHANALAKSHMI COLLEGE OF ENGINEERING

VISION

Dhanalakshmi College of Engineering is committed to provide highly disciplined, conscientious and enterprising professionals conforming to global standards through value based quality education and training.

MISSION

- To provide competent technical manpower capable of meeting requirements of the industry
- To contribute to the promotion of Academic Excellence in pursuit of Technical Education at different levels
- To train the students to sell his brawn and brain to the highest bidder but to never put a price tag on heart and soul

DEPARTMENT OF CIVIL ENGINEERING

VISION

The department of civil engineering is committed to the relentless pursuit of innovation in training budding engineers to compete globally in the field of civil engineering and to establish a unique identity for the development of high quality human and knowledge resource in diverse areas of technology and management.

MISSION

- The department of civil engineering strives to provide strong theoretical foundation complemented with extensive practical training
- To inculcate value-based, socially committed professionalism to the cause of overall development of student and society.
PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

1. Fundamentals
   To provide students with a solid foundation in Mathematics, Science and fundamentals of engineering, enabling them to apply, to find solutions for engineering problems and use this knowledge to acquire higher education.

2. Core Competence
   To train the students in Civil Engineering technologies so that they apply their knowledge and training to compare, and to analyze various engineering industrial problems to find solutions.

3. Breadth
   To provide relevant training and experience to bridge the gap between theories and practice this enables them to find solutions for the real time problems in industry, and to design products.

4. Professionalism
   To inculcate professional and effective communication skills, leadership qualities and team spirit in the students to make them multi-faceted personalities and develop their ability to relate engineering issues to broader social context.

5. Lifelong Learning/Ethics
   To demonstrate and practice ethical and professional responsibilities in the industry and society in the large, through commitment and lifelong learning needed for successful professional career.
PROGRAMME OUTCOMES (POs)

a) To demonstrate and apply knowledge of Mathematics, Science and engineering fundamentals in Civil Engineering field

b) To design a component, a system or a process to meet the specific needs within the realistic constraints such as economics, environment, ethics, health, safety and manufacturability

c) To demonstrate the competency to use software tools for computation, simulation and testing of Civil engineering structures

d) To identify, formulate and solve Civil engineering problems

e) To demonstrate an ability to visualize and work on laboratory and multi-disciplinary tasks

f) To function as a member or a leader in multidisciplinary activities

g) To communicate in verbal and written form with fellow engineers and society at large

h) To understand the impact of Civil Engineering in the society and demonstrate awareness of contemporary issues and commitment to give solutions exhibiting social responsibility.

i) To demonstrate professional & ethical responsibilities

j) To exhibit confidence in self-education and ability for lifelong learning

k) To participate and succeed in competitive exams
CE 6312 – COMPUTER AIDED BUILDING DRAWING
SYLLABUS

COURSE OBJECTIVES

1. To acquire hands on experience in design.
2. To prepare structural drawings for concrete / steel structures normally encountered in Civil Engineering practice.

List of Experiments

1. Principal of planning, orientation and complete joinery details (panelled and glazed doors and windows)
2. Building with load bearing walls
3. Building with load bearing walls
4. Building with sloping roof
5. R.C.C. framed structure.
6. Industrial buildings – North light roof structures
7. Building information modeling

COURSE OUTCOMES

1. The students will be able to draft the plan elevation and sectional views of the buildings using computer software.
2. The students will be able to draft the plan elevation and sectional views of the industrial structures using computer software.
3. The students will be able to draft the plan elevation and sectional views of framed building using computer software.

CE 6312 – COMPUTER AIDED BUILDING DRAWING

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INTRODUCTION

Aim:

CADD - Computer Aided Designing and Drafting

Overview:

CADD is an electronic tool that enables us to make quick and accurate drawings. CADD has number of advantages over drawings created on a drawing board. Electronic drawings can be modified quite easily and can be represented in a variety of formats. CADD extends its power to yet another branch of engineering called computer aided manufacturing (CAM). CADD and manufacturing program are often integrated into one system called CAD-CAM. This system import CADD drawings into CAM program to automate the manufacturing process. When the design is finalized, the drawings are brought into a CAD-CAM system that uses numerical data from the CADD drawing for actual manufacturing. There is separate category of programs called Computer Aided Engineering (CAE) that can use CADD drawing for engineering analysis. The CAE programs have a number of applications in Structural Design, Civil Engineering, Mechanical Engineering and Electrical Engineering.

Expectations from CADD:

We can do amazing things with CADD that we never thought possible while creating drawings with pen or pencil. The following are some of the important capabilities that make CADD a powerful tool.

1. Presentations.
2. Flexibility in editing.
3. Unit and accuracy levels.
4. Storage and access for drawings.
5. Sharing CADD drawings.

Presentations:

There are a number of ready-made presentation symbols available in CADD that can be used to enhance the look of drawings. In addition to prepare impressive presentations on paper, we can use CADD to make an on-screen presentations. Advanced CADD programs ever allow us to create an animated image.

Flexibility in editing:

CADD allows us to work with great accuracy. If we need to create highly accuracy geometric shapes, CADD is the answer. It can help avoid time-consuming mathematical calculations.
Unit and accuracy level:

We can work with as high precession as 1/1000th of an inch.

Storage and access of drawing:

A computer electronic filing system has the following advantages over the traditional filing system.

1. It is quick and convenient to organize CADD drawing in a computer.
2. It enables us to create a highly organized environment.
3. An electronic drawing never gets old and faded.

Sharing CADD Drawing:

The electronic drawing can be shared by a number of users, allowing them to Co-ordinate projects and work as a team. This is accomplished by connecting different computer via a network.

About AutoCAD:

AutoCAD is a Computer Aided Design (CAD) program used by just about every Engineering and Design office in the world. Although there are alternative CAD packages, AutoCAD is so far the most widely used system. Autodesk's AutoCAD is the industry leader in CAD packages, Used by Civil Engineers, Architects, Mechanical and Electrical Engineers, Aeronautical Engineers plus many other disciplines. There have been several versions of AutoCAD over the years, with each new version introducing new and more powerful features than its predecessor. Any courses, whether through community colleges or online universities.

Accurate, scale drawings can be created and published using AutoCAD powerful features. 3D ‘models’ can also be created giving the designer absolute control over the design from start to finish. The computerized model can be viewed through a 360º angle, and even 'rendered' with a texture on screen to give an idea of the finished product.

Result:

Thus the introduction about Computer Aided Designing and Drafting is studied successfully

Outcome:

The students will be able to draft the plan elevation and sectional views of the buildings, industrial structures, and framed building using computer software.
1. What is meant by AutoCAD?
2. What is the diff between CAD & CADD?
3. What are the applications of CAD?
4. What is absolute co-ordinates?
5. What are polar coordinates?
6. What is angular dimension?
7. What is meant by units?
8. What is the file formats used in design?
9. What are the fields where you see maximum use of Autocad?
10. How you can create a user interface in Autocad?

Applications

1. Solid Modeling
2. Surface Modeling
3. Drafting
Expt. No. 02 BASIC DRAWING COMMANDS

Aim:
To study the basic commands used in AUTOCAD drawing

Commands used:

Command: Rectangle
Starting point: 100,100
End Point: 104,102

Command: Circle
Centre point: 104,102
Radius: 0.5

Command: Move
Select object: Use any object icon selection method
Basic point of displacement: 104, 102
End Point of displacement: 102,101

Command: Polygon
No. of Sides: 6
Edge Centre point of polygon: E
First point of edge: 100,100
Second point of edge: 103,100

Command: Offset
Select the object of offset [use only object selection method]
Offset distance through [Current]:0.5

Command: Rectangle
First Point: 100,100
Opposite Point: 104,102
Command: Circle
3P/2P/tr<centre point>: 104,100
Diameter<radius>:0.5

Command: Copy
Select object [use only object selection method]
Base point: 104,100
First point of displacement: 104,102
Second point of displacement: 100,102
Third point of displacement: 100, 100
From point 100,100
To point: 102,100
To point: 102, 100, and 75
To point: 100, 75, 100, and 75
To point: 102, 102, and 75
To point: 102,103
To point: 100,103
To point: 102, 100, and 75
To point: 100,100

Command: Polygon
No. of Sides: 5
Edge <centre of polygon>100,100
Inscribed in circle/Circumscribed about circle radius of polygon: 0.5

Command: Array
Rectangular (or) polar array[R/P] <current>: Enter
Select object: Object Selection method
No. of rows (L) <L>:3
No. of columns<\(M\)>: 5
No. of columns between row<3>: 2
Distance between columns (\(M\)): 2

Command: Mirror

Select objects: [use any object selection command]
First point of mirror line: 102,100
End point of mirror line: 102,103
Delete the source object: <\(N\)>

Command: Circle

3P/2P/ttr<centre point>: 100,100
Diameter<radius>:

Command: Arc

Start Point: 100,100
Centre point>/<End point>: F
End point: 100,102

Command: Array

Rectangular (or) Polar(R/P) <current>: P
Base<Centre point of array>: 100,100
No. of items: 6
Angle of items to fill = [10<=10] <360>
Rotate to fill array object [Y.M]: Y

Command: Line

From point: 100,100
To point: 103,100
Command: Arc
Start point: 103,100
Second point: 100,103
End point: 97,100

Command: Array
Rect/Polar(R/P) <current>: P
Current: 100,100
No. of items: 100
Angle of items to fill = [10-2(10)] <360>:180
Rotate angle array object (Y/N): (4)

Command: Circle
3P/2P/ttr<centre point>: 100,100
Diameter<radius>:1.5

Command: Break
Enter the first point: 100, 100.5

Command: Rectangular
First point: 100,100
Opposite corner point: 104,103

Command: Circle
3P/2P/ttr<centre point>: 100,100
Diameter<radius>:1.5

Command: Trim
Select cutting angle edge: Select the rectangle
Select object: Now click the edge to erase with in cutting edge
Command: Polygon
No. of sides: 3
Edge <centre points>: E
First point of edge: 100,100
Second point of edge: 103,100

Command: Rotate
Select object: Use any one object selection method
Base point: 100,100
<Rotation angle>: 6.3

Command: Rectangle
First point: 100,100
Opposite point: 103,103

Command: Scale
Select object: Use only one object
Select Base point: 100,100
<Scale factor>/reference: 2

Result:
Thus the given drawing is drawn by using basic AUTOCAD commands.

Outcome:
The students will be able to draft the plan elevation and sectional views of the buildings, industrial structures, and framed building using computer software.
1. What is current UCS?
2. What is dwg?
3. What is mirror
4. What is an object snap mode?
5. What is rotate?
6. What is meant by dimension?
7. What is offset?
8. What is trim?
9. What is the difference between erase and trim?
10. What do you mean by array?

In CADD, we can choose from a variety of drawing tools that create lines, circles, spline curves, and more.

We can easily move, copy, offset, rotate, and mirror objects. You can also copy objects between open drawings.
Expt. No. 03  RESIDENTIAL BUILDING WITH R.C.C. FLAT ROOF

Aim:
To draw a residential room with R.C.C. flat roof using basic AutoCAD commands

Procedure:
1. To Draw Foundation:
The following commands are used to draw the foundation
   a) Line  
   b) Hatch  
   c) Rectangle  
   d) Trim  
   e) Copy  
   f) Break
   With the above commands footing was drawn to given boundaries.

2. Draw Basements:
   For drawing the basement the following commands are used
   a) Line  
   b) Hatch  
   c) Rectangle
   Boundary Hatch command allows you to hatch a region enclosed with in a boundary layer picking a point inside the boundary. Hatch can be changed from the options suitable in the BH dialog box.

3. To draw Super Structure
   For the following main wall, parapet and veranda, retaining walls the following commands must be used:
   a) M line  
   b) BH 
   Parallel lines can be draw using M Line commands.
   a) Select ML in format menu.
   b) Element properties were chosen from M line dialog box.
   c) We can modify the offset distance line type and colour.
4. **Draw Roofing:**

To draw doors and windows, blocks and insert ends can be used.

a. Blocks and creates a block of definition of selected objects.
b. Select the block from the draw menu.
c. The block menu name as given in the tank box.
d. The select object command button was decided.
e. All objects required to be in that block were selected.

5. **To draw lintel:**

a. To draw lintel, the line command is used.
b. To draw flooring, line and hatch commands are used.
c. Horizontal lines are drawn by using line commands.
d. Floor finishing was hatched with a suitable pattern by using the hatch command.

6. **To draw step**

Line and offset commands are used to offset commands is used to draw parallel lines at a particular interval.

**Specifications:**

The following specifications correspond to a residential building with RCC Flat roof.

**Foundations:**

The following for all the main walls will be in 1:4:8 mix 800 mm wide and 200 mm thick at 650 mm below the ground level the masonry footing being 500x450 for walls.

**Basement:**

Basement will be in reinforced masonry in 1:5, 300 mm wide and 450 mm thick above the ground level for all walls and is filled with sand to a depth of 300mm.A DPC in 1:4:8, 20mm thick will be provided for all walls at basement level.

**Superstructure:**

The wall including basement will be plastered smooth in CM 1:4 externally and 1:6 internally of 20mm thick. Parapet walls 200 mm thick 500mm height will be provided all rounds.

**Roofing:**

Roofing will be of RCC 1:5:8 with 100mm thick flat side over line room. A weathering course in the brick lime concrete mix plastered with combination mortar 75mm thick over the roof.
Doors and Windows

Panelled Door - 1000 mm x 2000 mm
Window Panel - 2000 mm x 1000 mm
Ventilator glazed - 800 mm x 500 mm

Result:
The residential room with RCC Flat roof was drawn using AUTOCAD.

Outcome:
The students will be able to draft the plan, elevation and sectional views of the buildings, industrial structures, and framed building using computer software.
1. What is by layer?
2. What is command prompt?
3. What is cross hair cursor?
4. What is a foundation?
5. What is basement?
6. What is superstructure?
7. What is lintel?
8. What is roofing?
9. What is parapet wall?
10. Difference between roof and slab?

**Applications**

1. Residential design plans would encompass all the plans required to design and build a structure, such as a house, office building, church, etc.
2. For many projects, such as a new house, a room addition, or a tenant improvement, a designer can provide the necessary residential design plans using AUTOCAD.
Expt. No. 04  RESIDENTIAL BUILDING WITH TWO BED ROOMS

WITH R.C.C. FLAT ROOF

Aim:
To draw a residential room with two bedrooms with R.C.C. flat roof using basic AutoCAD commands

Procedure:
1. To Draw Foundation:
   The following commands are used to draw the foundation
   a. Line
   b. Hatch
   c. Rectangle
   d. Trim
   e. Copy
   f. Break
   With the above commands footing was drawn to given boundaries.
2. Draw Basements:
   For drawing the basement the following commands are used
   a. Line
   b. Hatch
   c. Rectangle
   Boundary Hatch command allows you to hatch a region enclosed with in a boundary layer picking a point inside the boundary. Hatch can be changed from the options suitable in the BH dialog box.
3. To draw Super Structure
   For the following main wall, parapet and veranda, retaining walls the following commands must be used.
   a. Mline
   b. BH
   Parallel lines can be draw using MLine commands.
   a. Select ML in format menu.
   b. Element properties were chosen from Mline dialog box.
   c. We can modify the offset distance line type and colour.
4. Draw Roofing:
   a. To draw doors and windows, blocks and insert ends can be used.
   b. Blocks and creates a block of definition of selected objects.
   c. Select the block from the draw menu.
   d. The block menu name as given in the tank box.
   e. The select object command button was decided.
   f. All objects required to be in that block were selected.

5. To draw lintel:
   a. To draw lintel, the line command is used.
   b. To draw flooring, line and hatch commands are used.
   c. Horizontal lines are drawn by using line commands.
   d. Floor finishing was hatched with a suitable pattern by using the hatch command.

6. To draw step
   Line and offset commands are used to offset commands is used to draw parallel lines at a particular interval.

Specifications:

The following specifications correspond to a residential building with RCC Flat roof.

Foundations:

The following for all the main walls will be in 1:4:8 mix 800 mm wide and 200 mm thick at 650 mm below the ground level the masonry footing being 500x450 for walls.

Basement:

Basement will be in reinforced masonry in 1:5, 300 mm wide and 450 mm thick above the ground level for all walls and is filled with sand to a depth of 300mm. A DPC in 1:4:8, 20mm thick will be provided for all walls at basement level.

Superstructure:

The wall including basement will be plastered smooth in CM 1:4 externally and 1:6 internally of 20mm thick. Parapet walls 200 mm thick 500mm height will be provided all rounds.

Roofing:

Roofing will be of RCC 1:5:8 with 100mm thick flat side over line room. A weathering course in the brick lime concrete mix plastered with combination mortar 75mm thick over the roof.
Doors and Windows

a. Panelled Door - 1000 mm x 2000 mm
b. Window Panel - 1000 mm x 1000
c. Window glazed - 2000 x 1000 mm
d. Ventilator glazed - 800mm x 550 mm
e. Opening - 1200 mm x 2100 mm
f. Cupboard - 400 mm depth
g. Cupboard - 300 mm depth
h. Shelf - 200 mm depth.

Result:
The residential building with Two Bed rooms with RCC flat roof was drawn using AUTOCAD command.

Outcome:
The students will be able to draft the plan elevation and sectional views of the buildings, industrial structures, and framed building using computer software.
1. What is command line?
2. What are dimension variables?
3. What is current UCS?
4. What is dwg?
5. What is graphics window?
6. What is ventilator?
7. What is panelled door?
8. Difference between panelled door and normal door.
9. Difference between panelled window and glazed window.
10. What is line type?

For many projects, such as a new house, a room addition, or a tenant improvement, a designer can provide the necessary residential design plans using AUTOCAD.
Expt. No. 05  A SINGLE ROOM BUILDING WITH VARANDAH

Aim:

To draw a single room building with veranda using basic AutoCAD commands

Procedure:

1. To Draw Foundation:
   The following commands are used to draw the foundation
   a. Line
   b. Hatch
   c. Rectangle
   d. Trim
   e. Copy
   f. Break
   With the above commands footing was drawn to given boundaries.

2. Draw Basements:
   For drawing the basement the following commands are used
   a. Line
   b. Hatch
   c. Rectangle
   Boundary Hatch command allows you to hatch a region enclosed with in a boundary layer picking point inside the boundary. Hatch can be changed from the options suitable in the BH dialog box.

3. To draw Super Structure
   For the following main wall, parapet and veranda, retaining walls the following commands must be used.
   a. M line
   b. BH
   Parallel lines can be draw using M Line commands.
   a. Select ML in format menu.
   b. Element properties were chosen from M line dialog box.
   c. We can modify the offset distance line type and colour.
4. Draw Roofing:
   a. To draw doors and windows, blocks and insert ends can be used.
   b. Blocks and creates a block of definition of selected objects.
   c. Select the block from the draw menu.
   d. The block menu name as given in the tank box.
   e. The select object command button was decided.
   f. All objects required to be in that block were selected.

5. To draw lintel:
   a. To draw lintel, the line command is used.
   b. To draw flooring, line and hatch commands are used.
   c. Horizontal lines are drawn by using line commands.
   d. Floor finishing was hatched with a suitable pattern by using the hatch command.

6. To draw step
   Line and offset commands are used to offset commands is used to draw parallel lines at a particular interval.

Specifications:
The following specifications correspond to a residential building with RCC Flat roof.

Foundations
The following for all the main walls will be in 1:4:8 mix 800 mm wide and 200 mm thick at 650 mm below the ground level the masonry footing being 500x450 for walls.

Basement:
Basement will be in reinforced masonry in 1:5, 300 mm wide and 450 mm thick above the ground level for all walls and is filled with sand to a depth of 300mm. A DPC in 1:4:8, 20mm thick will be provided for all walls at basement level.

Superstructure:
The wall including basement will be plastered smooth in CM 1:4 externally and 1:6 internally of 20mm thick. Parapet walls 200 mm thick 500mm height will be provided all rounds.

Roofing:
Roofing will be of RCC 1:5:8 with 100mm thick flat side over line room. A weathering course in the brick lime concrete mix plastered with combination mortar 75mm thick over the roof.
Doors and Windows:

a. Flush Door - 900 mm x 2100 mm
b. Window Panel - 900 mm x 1200 mm
c. Ventilator glazed - 1000mm x 500 mm

Result:

The single room building with veranda was drawn using AUTOCAD command

Outcome:

The students will be able to draft the plan elevation and sectional views of the buildings, industrial structures, and framed building using computer software.
Viva - voce

1. What is line type?
2. What is a hatch patterns?
3. What is mirror?
4. What is a hatch patterns?
5. What is hatch?
6. What is an ortho mode?
7. What is an object snap mode?
8. What is block?
9. What is relative co-ordinates?
10. What are the advantages of CAD?

Applications

1. The next important part after designing is making the drawings.
2. With CAD software better and standardized drawings can be made easily.
3. The CAD software helps in better documentation of the design.
A SMALL WORKSHOP WITH NORTH LIGHT STEEL ROOF TRUSS

Aim:
To draw a small workshop with north light steel roof truss using basic AutoCAD commands

Procedure:
1. To Draw Foundation:
   The following commands are used to draw the foundation
   a. Line
   b. Hatch
   c. Rectangle
   d. Trim
   e. Copy
   f. Break
   With the above commands footing was drawn to given boundaries.
2. Draw Basements:
   For drawing the basement the following commands are used
   a. Line
   b. Hatch
   c. Rectangle
   Boundary Hatch command allows you to hatch a region enclosed with in a boundary layer picking point inside the boundary. Hatch can be changed from the options suitable in the BH dialog box.
3. To draw Super Structure
   For the following main wall, parapet and veranda, retaining walls the following commands must be used.
   a. M line
   b. BH
   Parallel lines can be draw using M Line commands.
   a. Select ML in format menu.
   b. Element properties were chosen from M line dialog box.
   c. We can modify the offset distance line type and colour.
4. Draw Roofing:
   a. To draw doors and windows, blocks and insert ends can be used.
   b. Blocks and creates a block of definition of selected objects.
   c. Select the block from the draw menu.
   d. The block menu name as given in the tank box.
   e. The select object command button was decided.
   f. All objects required to be in that block were selected.

5. To draw lintel:
   a. To draw lintel, the line command is used.
   b. To draw flooring, line and hatch commands are used.
   c. Horizontal lines are drawn by using line commands.
   d. Floor finishing was hatched with a suitable pattern by using the hatch command.

6. To draw step
   Line and offset commands are used to offset commands is used to draw parallel lines at a particular interval.

Specifications:
   The following specifications correspond to industrial building with steel roof.

Foundations
   The following for all the main walls will be in 1:4:8 mix 800 mm wide and 200 mm thick at 650 mm below the ground level the masonry footing being 500x450 for walls.

Basement:
   Basement will be in reinforced masonry in 1:5, 300 mm wide and 450 mm thick above the ground level for all walls and is filled with sand to a depth of 300mm. A DPC in 1:4:8, 20mm thick will be provided for all walls at basement level.

Superstructure:
   The wall including basement will be plastered smooth in CM 1:4 externally and 1:6 internally of 20mm thick. Parapet walls 200 mm thick 500mm height will be provided all rounds.

Roofing:
   Roofing will be of steel truss of span 8900 mm. Roof shall consists of purlins over which AC sheet shall be laid to proper slope. The joints shall be weld
Doors and Windows

a. Rolling Shutter - 3000mm x 2400 mm  
b. Steel door - 1000mm x 2000 mm  
c. Steel door - 300mm x 2000 mm  
d. Fixed glazed Window - 1500mm x 1400 mm  
e. Glazed Window - 1000 mm x 1200 mm  
f. Glazed Ventilator - 1000mm x 500 mm

Result:

The small workshop building with north light steel roof truss was drawn using AUTOCAD commands.

Outcome:

The students will be able to draft the plan elevation and sectional views of the buildings, industrial structures, and framed building using computer software.
1. What is an ortho mode?
2. What are the advantages of CAD?
3. What is block?
4. What is mean by arc?
5. Difference between arc and circle
6. What are the different types of roof truss?
7. What is rivet and bolt?
8. What is leant roof?
9. What is the difference between king and queen post truss?
10. What are the different types of riveted joint?

AutoCAD as industrial design tool: AutoCAD helps to reduce manufacturing costs as it saves time and efforts required for manual designing.
**Expt. No. 07**  
**HOSPITAL BUILDING**

**Aim:**

To draw a hospital building with R.C.C. flat roof using basic AutoCAD commands

**Procedure:**

1. To Draw Foundation:
   
The following commands are used to draw the foundation
   
   a. Line
   b. Hatch
   c. Rectangle
   d. Trim
   e. Copy
   f. Break
   
   With the above commands footing was drawn to given boundaries.

2. Draw Basements:
   
   For drawing the basement the following commands are used
   
   a. Line
   b. Hatch
   c. Rectangle

   Boundary Hatch command allows you to hatch a region enclosed with in a boundary layer picking point inside the boundary. Hatch can be changed from the options suitable in the BH dialog box.

3. To draw Super Structure
   
   For the following main wall, parapet and veranda, retaining walls the following commands must be used.
   
   a. M line
   b. BH
   
   Parallel lines can be draw using M Line commands.
   
   a. Select ML in format menu.
   b. Element properties were chosen from M line dialog box.
   c. We can modify the offset distance line type and colour.
4. Draw Roofing:
   
g. To draw doors and windows, blocks and insert ends can be used.

h. Blocks and creates a block of definition of selected objects.

i. Select the block from the draw menu.

j. The block menu name as given in the tank box.

k. The select object command button was decided.

l. All objects required to be in that block were selected.

5. To draw lintel:
   
e. To draw lintel, the line command is used.

f. To draw flooring, line and hatch commands are used.

g. Horizontal lines are drawn by using line commands.

h. Floor finishing was hatched with a suitable pattern by using the hatch command.

6. To draw step
   
Line and offset commands are used to offset commands is used to draw parallel lines at a particular interval.

Specifications:

The following specifications correspond to a residential building with RCC Flat roof.

Foundations

The following for all the main walls will be in 1:4:8 mix 800 mm wide and 200 mm thick at 650 mm below the ground level the masonry footing being 500x450 for walls.

Basement:

Basement will be in reinforced masonry in 1:5, 300 mm wide and 450 mm thick above the ground level for all walls and is filled with sand to a depth of 300mm. A DPC in 1:4:8, 20mm thick will be provided for all walls at basement level.

Superstructure:

The wall including basement will be plastered smooth in CM 1:4 externally and 1:6 internally of 20mm thick. Parapet walls 200 mm thick 500mm height will be provided all rounds.

Roofing:
Roofing will be of RCC 1:5:8 with 100mm thick flat side over line room. A weathering course in the brick lime concrete mix plastered with combination mortar 75mm thick over the roof.

Doors and Windows:

a. Panelled Door - 1000 mm x 1200 mm
b. Window Panel - 1500 mm x 1000 mm
c. Cupboard - 1500 mm x 2100 mm
d. Window glazed - 1200 x 2100 mm
e. Ventilator glazed - 600mm x 400 mm
f. Opening - 1200 mm x 2100 mm
g. Cupboard - 400 mm depth
h. Cupboard - 300 mm depth
i. Shelf -200 mm depth.

Result:
The Hospital building was drawn using AUTOCAD commands.

Outcome:
The students will be able to draft the plan elevation and sectional views of the buildings, industrial structures, and framed building using computer software.
1. What is an ortho mode?
2. What are the advantages of CAD?
3. What is block?
4. What is minimum and maximum thickness of roof slab?
5. What are the different types of foundation?
6. What are the rooms available in hospital buildings?
7. What is RCC?
8. What is mix ratio?
9. What is meant by column?
10. What is beam?

AutoCAD has innate features that enable users to plan and map out spaces and take advantage of the space available.
Expt. No. 08 A LIBRARY BUILDING

Aim:
To draw a library building with R.C.C. flat roof using basic AutoCAD commands

Procedure:
1. To Draw Foundation:
   The following commands are used to draw the foundation
   a. Line
   b. Hatch
   c. Rectangle
   d. Trim
   e. Copy
   f. Break
   With the above commands footing was drawn to given boundaries.

2. Draw Basements:
   For drawing the basement the following commands are used
   a. Line
   b. Hatch
   c. Rectangle
   Boundary Hatch command allows you to hatch a region enclosed with in a boundary layer picking point inside the boundary. Hatch can be changed from the options suitable in the BH dialog box.

3. To draw Super Structure
   For the following main wall, parapet and veranda, retaining walls the following commands must be used.
   a. M line
   b. BH
   Parallel lines can be draw using M Line commands.
   a. Select ML in format menu.
   b. Element properties were chosen from M line dialog box.
   c. We can modify the offset distance line type and colour.
4. Draw Roofing:
   a. To draw doors and windows, blocks and insert ends can be used.
   b. Blocks and creates a block of definition of selected objects.
   c. Select the block from the draw menu.
   d. The block menu name as given in the tank box.
   e. The select object command button was decided.
   f. All objects required to be in that block were selected.

5. To draw lintel:
   a. To draw lintel, the line command is used.
   b. To draw flooring, line and hatch commands are used.
   c. Horizontal lines are drawn by using line commands.
   d. Floor finishing was hatched with a suitable pattern by using the hatch command.

6. To draw step
   Line and offset commands are used to offset commands is used to draw parallel lines at a particular interval.

Specifications:
The following specifications correspond to a residential building with RCC Flat roof.

Foundations
The following for all the main walls will be in 1:4:8 mix 800 mm wide and 200 mm thick at 650 mm below the ground level the masonry footing being 500x450 for walls.

Basement:
Basement will be in reinforced masonry in 1:5, 300 mm wide and 450 mm thick above the ground level for all walls and is filled with sand to a depth of 300mm. A DPC in 1:4:8, 20mm thick will be provided for all walls at basement level.

Superstructure:
The wall including basement will be plastered smooth in CM 1:4 externally and 1:6 internally of 20mm thick. Parapet walls 200 mm thick 500mm height will be provided all rounds.

Roofing:
Roofing will be of RCC 1:5:8 with 100mm thick flat side over line room. A weathering course in the brick lime concrete mix plastered with combination mortar 75mm thick over the roof.

Doors and Windows
a. Panelled Door - 1000 mm x 2000 mm
b. Window Panel - 900 mm x 1200 mm
c. Ventilator glazed - 800mm x 300 mm
d. Opening - 1200 mm x 2100 mm
e. Counter - 2200 mm x 1100 mm
f. RCC Jally - 2200 mm x 1100 mm

Result:
The library building was drawn using AUTOCAD commands.

Outcome:
The students will be able to draft the plan elevation and sectional views of the buildings, industrial structures, and framed building using computer software.
1. What is an object snap mode?
2. What is relative coordinates?
3. Who is the father of building drawing?
4. What scale is to be used in civil engineering drawings for submission to a sanctioning authority?
5. What is damp proof coarse?
6. What is meant by PCC?
7. What are the different types of concrete?
8. What is cement?
9. What are the different grades in cement
10. What is pillar?

Applications

AutoCAD is one of the recommended design software applications because it provides professionals in these niches with unique drafting tools that can be used to bring their engineering ideas to life with the accuracy they require.
A TWO STOREY RESIDENTIAL BUILDING

Aim:
To draw a two storey residential building with R.C.C. flat roof using basic AutoCAD commands

Procedure:
1. To Draw Foundation:
   The following commands are used to draw the foundation
   a. Line
   b. Hatch
   c. Rectangle
   d. Trim
   e. Copy
   f. Break

   With the above commands footing was drawn to given boundaries.

2. Draw Basements:
   For drawing the basement the following commands are used
   a. Line
   b. Hatch
   c. Rectangle

   Boundary Hatch command allows you to hatch a region enclosed with in a boundary layer picking point inside the boundary. Hatch can be changed from the options suitable in the BH dialog box.

3. To draw Super Structure
   For the following main wall, parapet and veranda, retaining walls the following commands must be used.
   a. M line
   b. BH

   Parallel lines can be draw using M Line commands.
   a. Select ML in format menu.
   b. Element properties were chosen from M line dialog box.
   c. We can modify the offset distance line type and colour.
4. Draw Roofing:
   a. To draw doors and windows, blocks and insert ends can be used.
   b. Blocks and creates a block of definition of selected objects.
   c. Select the block from the draw menu.
   d. The block menu name as given in the tank box.
   e. The select object command button was decided.
   f. All objects required to be in that block were selected.

5. To draw lintel:
   a. To draw lintel, the line command is used.
   b. To draw flooring, line and hatch commands are used.
   c. Horizontal lines are drawn by using line commands.
   d. Floor finishing was hatched with a suitable pattern by using the hatch command.

6. To draw step
   Line and offset commands are used to offset commands is used to draw parallel lines at a particular interval.

Specifications:
   The following specifications correspond to a residential building with RCC Flat roof.

Foundations
   The following for all the main walls will be in 1:4:8 mix 800 mm wide and 200 mm thick at 650 mm below the ground level the masonry footing being 500x450 for walls.

Basement:
   Basement will be in reinforced masonry in 1:5, 300 mm wide and 450 mm thick above the ground level for all walls and is filled with sand to a depth of 300mm. A DPC in 1:4:8, 20mm thick will be provided for all walls at basement level.

Superstructure:
   The wall including basement will be plastered smooth in CM 1:4 externally and 1:6 internally of 20mm thick. Parapet walls 200 mm thick 500mm height will be provided all rounds.

Roofing:
   Roofing will be of RCC 1:5:8 with 100mm thick flat side over line room. A weathering course in the brick lime concrete mix plastered with combination mortar 75mm thick over the roof.
Doors and Windows

a. Panelled Door - 1000 mm x 2000 mm
b. Window Panel - 900 mm x 1200 mm
c. Ventilator glazed - 800mm x 300 mm
d. Opening - 1200 mm x 2100 mm
e. Counter - 2200 mm x 1100 mm
f. RCC Jally - 2200 mm x 1100 mm

Result:
The two storey residential building was drawn using AUTOCAD commands.

Outcome:
The students will be able to draft the plan elevation and sectional views of the buildings, industrial structures, and framed building using computer software.
Viva - voce

1. What is damp proof course?
2. What is a dwelling?
3. What are the different types of building?
4. What is lintel?
5. What is residential building?
6. What is basement?
7. What is flooring?
8. What are the different types of flooring?
9. What is weathering course?
10. What is the nominal size of bricks?

Applications

To draw & print
1. Architectural floor plans.
2. Roof plan;
3. Exterior elevations;
4. Door/ window/ room finish schedules
5. Design details
Expt. No. 10  STEEL ROOF TRUSS

Aim:

To draw a steel roof truss using basic AutoCAD commands

Procedure:

1. To Draw Foundation:
   The following commands are used to draw the foundation
   a. Line
   b. Hatch
   c. Rectangle
   d. Trim
   e. Copy
   f. Break
   With the above commands footing was drawn to given boundaries.

2. Draw Basements:
   For drawing the basement the following commands are used
   a. Line
   b. Hatch
   c. Rectangle
   Boundary Hatch command allows you to hatch a region enclosed with in a boundary layer picking point inside the boundary. Hatch can be changed from the options suitable in the BH dialog box.

3. To draw Super Structure
   For the following main wall, parapet and veranda, retaining walls the following commands must be used.
   a. M line
   b. BH
   Parallel lines can be draw using M Line commands.
   a. Select ML in format menu.
   b. Element properties were chosen from M line dialog box.
   c. We can modify the offset distance line type and colour.
4. Draw Roofing:
   a. To draw doors and windows, blocks and insert ends can be used.
   b. Blocks and creates a block of definition of selected objects.
   c. Select the block from the draw menu.
   d. The block menu name as given in the tank box.
   e. The select object command button was decided.
   f. All objects required to be in that block were selected.

5. To draw lintel:
   a. To draw lintel, the line command is used.
   b. To draw flooring, line and hatch commands are used.
   c. Horizontal lines are drawn by using line commands.
   d. Floor finishing was hatched with a suitable pattern by using the hatch command.

6. To draw step
   Line and offset commands are used to offset commands is used to draw parallel lines at a particular interval.

Specifications:

The following specifications correspond to a residential building with RCC Flat roof.

Foundations

The following for all the main walls will be in 1:4:8 mix 800 mm wide and 200 mm thick at 650 mm below the ground level the masonry footing being 500x450 for walls.

Basement:

Basement will be in reinforced masonry in 1:5, 300 mm wide and 450 mm thick above the ground level for all walls and is filled with sand to a depth of 300mm. A DPC in 1:4:8, 20mm thick will be provided for all walls at basement level.

Result:

Thus the steel roof truss was drawn using AUTOCAD commands.

Outcome:

The students will be able to draft the plan elevation and sectional views of the buildings, industrial structures, and framed building using computer software.
1. What is command line?
2. What are dimension variables?
3. What is damp proof course?
4. What is a dwelling?
5. What is stone masonry?
6. What are the different types of foundation?
7. What are the different types of truss?
8. Draw north light truss?
9. What is girder?
10. What is purlin?

Applications

AUTOCAD finds more applications in industrial designs like steel roof truss
Expt. No. 11 FOUNDATION DRAWING

Aim:
To draw a foundation of a residential building using basic AutoCAD commands

Procedure:
1. To Draw Foundation:
The following commands are used to draw the foundation
g. Line
h. Hatch
i. Rectangle
j. Trim
k. Copy
l. Break

With the above commands footing was drawn to given boundaries.

2. Draw Basements:
For drawing the basement the following commands are used
d. Line
e. Hatch
f. Rectangle

Boundary Hatch command allows you to hatch a region enclosed with in a boundary layer picking point inside the boundary. Hatch can be changed from the options suitable in the BH dialog box.

3. To draw Super Structure
For the following main wall, parapet and veranda, retaining walls the following commands must be used:
c. M line
d. BH

Parallel lines can be draw using M Line commands.
d. Select ML in format menu.
e. Element properties were chosen from M line dialog box.
f. We can modify the offset distance line type and colour.

4. Draw Roofing:
g. To draw doors and windows, blocks and insert ends can be used.
h. Blocks and creates a block of definition of selected objects.
i. Select the block from the draw menu.

j. The block menu name as given in the tank box.

k. The select object command button was decided.

l. All objects required to be in that block were selected.

5. To draw lintel:

   e. To draw lintel, the line command is used.

   f. To draw flooring, line and hatch commands are used.

   g. Horizontal lines are drawn by using line commands.

   h. Floor finishing was hatched with a suitable pattern by using the hatch command.

6. To draw step

   Line and offset commands are used to offset commands is used to draw parallel lines at a particular interval.

Specifications:

   The following specifications correspond to a residential building with RCC Flat roof.

Foundations

   The following for all the main walls will be in 1:4:8 mix 800 mm wide and 200 mm thick at 650 mm below the ground level the masonry footing being 500x450 for walls.

Basement:

   Basement will be in reinforced masonry in 1:5, 300 mm wide and 450 mm thick above the ground level for all walls and is filled with sand to a depth of 300mm. A DPC in 1:4:8, 20mm thick will be provided for all walls at basement level.

Result:

   To draw a foundation of a residential building using basic AutoCAD commands.

Outcome:

   The students will be able to draft the plan elevation and sectional views of the buildings, industrial structures, and framed building using computer software.
1. What is FSI?
2. What is FAR?
3. What is the minimum standard width for veranda?
4. What is the minimum size of a bath room in a residential building?
5. What is the minimum height of roof?
6. What is height of parapet wall?
7. What is foundation?
8. What is workability?
9. What is aggregate?
10. What is fine and coarse aggregate?

**Applications**

Used to draft foundation plan for a structural project
LIST OF PROJECTS

Draft the Plan, Elevation and Sectional views of the:

1. Multistoried building
2. Industrial structures
3. Framed buildings
4. Residential villa
5. School building
6. Hospital
7. Street design
8. Park design
9. Railroads
10. Foundation design