COMPUTER AIDED DRAFTING OF BUILDINGS LABORATORY

LAB MANUAL

Year	**:**	**2018 - 2019**
Course Code	**:**	**ACE102**
Regulations	**:**	**IARE – R16**
Semester	**:**	**III**
Branch	**:**	**CE**

Prepared By

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DEPARTMENT OF CIVIL ENGINEERING

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

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DEPARTMENT OF CIVIL ENGINEERING

Program: Bachelor of Technology (B. Tech)

VISION OF THE DEPARTMENT

To produce eminent, competitive and dedicated civil engineers by imparting latest technical skills and ethical values to empower the students to play a key role in the planning and execution of infrastructural & developmental activities of the nation.

MISSION OF THE DEPARTMENT

To provide exceptional education in civil engineering through quality teaching, state-of-the-art facilities and dynamic guidance to produce civil engineering graduates, who are professionally excellent to face complex technical challenges with creativity, leadership, ethics and social consciousness.

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DEPARTMENT OF CIVIL ENGINEERING

Program: Bachelor of Technology (B. Tech)

PROGRAM OUTCOMES (PO's)	
PO1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis**:Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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The Program Specific outcomes (PSO‟s) listed below were developed specifically to meet the Program Educational Objectives (PEO‟s). The focus of these PSO‟s is consistent with the set of required PO‟s identified in the NBA accreditation guidelines.

The Civil Engineering PSO‟s require that graduates receiving a Bachelor of Technology in Civil Engineering degree from IARE demonstrate the following.

PROGRAM SPECIFIC OUTCOMES (PSO'S)	
PSO1.	**ENGINEERING KNOWLEDGE** Graduates shall demonstrate sound knowledge in analysis, design, laboratory investigations and construction aspects of civil engineering infrastructure, along with good foundation in mathematics, basic sciences and technical communication.
PSO2.	**BROADNESS AND DIVERSITY** Graduates will have a broad understanding of economical, environmental, societal, health and safety factors involved in infrastructural development, and shall demonstrate ability to function within multidisciplinary teams with competence in modern tool usage.
PSO3.	**SELF-LEARNING AND SERVICE** Graduates will be motivated for continuous self-learning in engineering practice and/or pursue research in advanced areas of civil engineering in order to offer engineering services to the society, ethically and responsibly.

SYLLABUS

EXP. NO.	NAME OF THE EXPERIMENT
1	Introduction to computer aided drafting
2	Software for CAD- Auto CAD Commands
3	Practice exercises on CAD Commands
4	Drawing of plans of buildings using software for Single storeyed buildings
5	Drawing of plans of buildings using software for Multi storeyed buildings
6	Developing sections and elevations for Single storeyed buildings
7	Developing sections and elevations for Multi storeyed buildings
8	Detailing of building components like doors, windows using CAD software
9	Development of building components roof trusses using CAD software

ATTAINMENT OF PROGRAM OUTCOMES (PO's) & PROGRAM SPECIFIC OUTCOMES

Exp No.	Name of Experiment	Program Outcomes Attained	Program Specific Outcomes Attained
1.	Introduction to computer aided drafting	PO1, PO5, PO9	PSO1, PSO2
2.	Software for CAD- Auto CAD Commands	PO1, PO5, PO9	PSO1, PSO2
3.	Practice exercises on CAD Commands	PO1, PO5, PO9	PSO1, PSO2
4.	Drawing of plans of buildings using software Single storeyed buildings	PO1, PO5, PO9	PSO1, PSO2
5.	Drawing of plans of buildings using software for Multi storeyed buildings	PO1, PO5, PO9	PSO1, PSO2
6.	Developing sections and elevations for Single storeyed buildings	PO1, PO5, PO9	PSO1, PSO2
7.	Developing sections and elevations for Multi storeyed buildings	PO1, PO5, PO9	PSO1, PSO2
8.	Detailing of building components for doors, windows roof trusses using CAD software‟s	PO1, PO5, PO9	PSO1, PSO2
9.	Development of building components for roof trusses using CAD software‟s	PO1, PO5, PO9	PSO1, PSO2

MANDATORY INSTRUCTIONS

1. Students should report to the labs concerned as per the timetable.

2. Record should be updated from time to time and the previous experiment must be signed by the faculty in charge concerned before attending the lab.

3. Students who turn up late to the labs will in no case be permitted to perform the experiment scheduled for the day.

4. After completion of the experiment, certification of the staff in-charge concerned in the observation book is necessary.

5. Students should bring a notebook of about 100 pages and should enter the readings/observations/results into the notebook while performing the experiment.

6. The record of observations along with the detailed experimental procedure of the experiment performed in the immediate previous session should be submitted and certified by the staff member in-charge.

7. Not more than FIVE students in a group are permitted to perform the experiment on a set up.

8. The group-wise division made in the beginning should be adhered to, and no mix up of student among different groups will be permitted later.

9. The components required pertaining to the experiment should be collected from Lab- in-charge after duly filling in the requisition form.

10. When the experiment is completed, students should disconnect the setup made by them, and should return all the components/instruments taken for the purpose.

11. Any damage of the equipment or burnout of components will be viewed seriously either by putting penalty or by dismissing the total group of students from the lab for the semester/year.

12. Students should be present in the labs for the total scheduled duration.

13. Students are expected to prepare thoroughly to perform the experiment before coming to Laboratory.

14. Procedure sheets/data sheets provided to the students groups should be maintained neatly and are to be returned after the experiment.

15. DRESS CODE:
    1. Boys - Formal dress with tuck in and shoes.
    2. Girls - Formal dress (salwar kameez).
    3. Wearing of jeans is strictly prohibited

CONTENTS

Experiment No: 01

INTRODUCTION TO COMPUTER AIDED DRAFTING

INTTRODUCTION

Computers use different software‟s to perform tasks. With the help of special software‟s, computers can be advantageously used to do the work of drafting. The process of constructing the drawings on the computer screen with the help of specially developed software‟s and hardware‟s is called „COMPUTER AIDED DRAFTING‟. The drawings in CAD are cleaner and more exact than manual drawings.

The CAD system is based on what is called interactive computer graphics (ICG). ICG helps to convert the data entered by the user in form of graphics.

AUTOCAD: AUTOCAD is very effective CAD software. It is used globally by CAD professionals. It supports 2D drafting and 3D modeling. AUTOCAD is user-friendly and easy to learn. Explaining AUTOCAD in 3D environment is beyond the scope.

CAD workstation: A CAD workstation, in its simplest form, consists of a computer with a keyboard, mouse and monitor and loaded with CAD software. The keyboard and mouse are essential input devices whereas monitor is a real time output device. All the three are integral parts of computer and are always connected to central processing unit. For CAD applications, a computer with reasonably good processing unit is recommended.

Input Devices: The input devices are used to enter numeric data and commands and to control the cursor positions on the screen.

Keyboard and Mouse: The keyboard and mouse are basic input devices for any computer. For CAD purposes, a standard 104 – keyboard is sufficient. A two – button mouse with scroll wheel is recommended for computerized drafting.

Joystick: A Joystick is a cursor control device consisting of handled stick pivoted at one end. The stick can be moved side – to – side (or) front to back.

Trackball: A trackball can be treated as a mouse resting on its back. It has a ball that can be rolled inside a socket. The direction and speed of rotation of ball will decide the direction and speed of cursor movement.

Light pen: A light pen is a light sensitive input device and is used directly on computers GRT monitors. The pen, when placed against the screen; enabling the computer to identify the location of the pen on screen. A light pen can work with any CRT – based monitor, but not with LCD screens, projectors (or) other display devices.

Scanner: The most common Flatbed scanner is used to scan manual drawings. It analyzes the image and process it using optical character recognition technology.

Digitizer: Digitizer (or) pen tablet is an electro- magnetic graphic input device. It is used to construct new drawing (or) convert an existing drawing into digital form.

OUTPUT DEVICES:

The output devices show numeric value, active commands, cursor positions and drawing. These are used to take points of drawings.

Monitor: A monitor provides a screen for visual display. It enables real time control of drafting activity. For a better visibility, IT monitor may be preferred.

Printers: A printer is used to obtain print copies of drawings. Two types of printers, namely inject printer and laser printer are in common use. Inkjet printers are cheaper but cost per print is higher than that of laser printers.

Plotter: Plotter, is a printing device, used prominently for the print of larger sizes i.e. A3 to A0. Plotters print the drawing by moving a pen across surface of paper. Obviously the plotters are good at line art but incapable of drawing colored object with mixing and shadings.

ADVANTAGES OF CAD:

CAD offers the following advantages.

1. **Accuracy:** CAD helps to achieve very high degree of accuracy that is impossible to achieve manually.

2. **Speed:** With sufficient practice, a user can create the drawings specially. Similar objects can be copied (or) arrayed which saves time required for duplication. **Easy editing:** Drawings once constructed can easily be edited or modified as and when needed.

3. **Space Effectiveness:** A computer can store several thousand drawing files over a long period of time.

4. **Standard Libraries:** „CAD" software have libraries containing drawings of standard parts such as gears, values, and pulleys.

5. **Scaling:** A drawing can be enlarged (or) reduced by any scale factor.

6. **Better visualization:** Use of different colors help avoiding confusion. 3D view of object can be easily created to boost imagination.

7. **Freedom from using drawings instruments:** A simple CAD system needs a computer with a mouse and keyboard to draw. The draftsmen need not use bulky drawing instruments like drawing board, drafter, set square, etc.

Experiment No: 02

SOFTWARE OF CAD: Auto CAD Commands

The Auto CAD design package is a very powerful tool to prepare desired drawings. According to instructions given by mouse (or) keyboard etc. it prepares drawings to the scale. Auto CAD prepares exact, precise, neat and clean drawings. Drawings prepared by Auto CAD looks better than manually prepared drawings. Auto CAD provides facility to correct errors, to increase (or) decrease size, to store drawing in disc, to send drawing to other places by storing inside disc, to repeat drawings in as many number as you want to rotate the drawings as you desire etc.

Auto CAD provides various commands like circle, polygon, mirror, rotate, ellipse, arc, zoom, erase, hatch, chamfer, copy, redraw etc. prepared drawings on auto CAD can be plotted on paper with a pen, plotter, dot matrix printer, laser printer (or) inkjet printer etc. CAD is used in industry, business, education, research project etc.

INTRODUCTION TO DIFFERENT SOFTWARES:

Generally CAD software is used for further enhancement & development of drawings either design consideration (or) appearance considerations.

For desired considerations:

With the help of Auto CAD highly accurate precise drawing can be prepared in comparatively smaller time when manually prepared drawings. The design and analyses can be done by using software called "STAAD PRO" which is designing software for any of structural member concrete, steel, timber, aluminum etc.

For Appearance:

1. With the help of AutoCAD the prepared drawings can be modified to desired elevations which may (or) may not be to scale. Mostly they are not to scale. Drawings which give interior, exterior decorative projections, architectural designs etc.

2. To add require corrections which are not possible in CAD like external grooves, arch flower designs, dome vault scaling etc, appearance designs are done by using two different soft wares called ADT("Architectural Desk Top") and "Micro statum – I

3. Both the software"s generally used to give decorative design and elevation designs each may be (or) may not be to scale.

Experiment No: 03

PRACTISE EXPERIMENT ON CAD SOFTWARE

Line: To draw a line, line command is used. Line command can be given by following ways.

1. Click on line icon.
2. Type by key board, „line‟ in command window.
3. By selecting line option icon „DRAW‟ menu.

Having given line command, supply co – ordinates of start point and endpoint. Starting point & end point can be clicked also.

Command: line ←┘ (enter)

From Pt – 1: (50, 50) ←┘ (enter)◄┘

To Pt – 2:(200, 50) ←┘ (enter)

Line will be ready on screen.

Multiline command: This command is used to draw parallel lines with specified effect distance between two lines. Multiline command can be given in following two ways.

(i) Type by keyboard word “MLINE” in command window.
(ii) By selecting multiline option from draw menu.

Command: MLINE ◄┘ (enter)

Current settings: Justification = Top; Scale= 1.00; Style= Standard.

Specify start point: 5.0, 10.0.

Specify next point: 20.0, 15.0

Justification is alignment of two lines w.r.t. reference top/zero/bottom. Scale is spacing between two parallel lines.

Rectangle Command:

Rectangle is a quadrilateral having two pairs of opposite sides equal and 4 angles are each of rectangle command can be given in 3 different ways as under.

(i) Click by mouse on “Rectangle” tool bar icon.
(ii) Type by keyboard word “Rectangle” in command.
(iii) Select “Rectangle” option from draw menu

Command: Rectangle

Specify first corner point: 40, 30 ◄┘ (enter)

(or) [Chamfer/elevation/ fillet/thickness/width]

Specify other corner point: 170, 110 ◄┘ (enter)

(or) (Dimensions)

Circle command:

1. **Center radius method:**

Command: Circle

3p/2p/ΠR/<centre point> : 100,100 (locate point with mouse/ type by key board)

Diameter/ < Radius >: 50 (given radius by mouse/ type radius by kb as 50)

Circle will be drawn having center point (100, 100)

2. **Center, diameter method:**

Command: circle

3p/2p/ΠR/<centre point> : 100,100

Diameter: D 100(First enter D & then type diameter 100.ircle will

Circle will drawn having diameter 100 & cp 100

3. **Two – point method:**

Command: Circle

3p/2p/ΠR/<cp> : TTR (Tangent – Tangent – Radius)

Line1: Command line from point: 80, 30

To point: 170, 20

Line 2: Command line from point: 10, 30

To point: 10, 160

Line 1 and line 2 can be drawn using mouse radius:

Circle will be drawn having radius 50 and line 1 and line 2 as tangent to circle

4. **3 point method:**

Command: Circle

3p/2p/ΠR/<centre point> : 3p

First point 1 : 60, 70

Second point 2 : 150, 100

Third point 3 : 100, 50

Circle will be drawn passing through three points having the co ordinates (60, 70); (150, 100); (100, 50)

5. Tangent – Tangent Radius Method:

Command: Circle

3p/2p/ΠR/< cp >: TTR (Tangent – Tangent – Radius)

Line – 1: Command line

From point: 10, 30

To point: 10, 160

Line – 2: Command line

From point: 80, 30

To point: 170, 20

Line – 1 & line – 2 can be drawn using mouse radius: 50 circle will be drawn having radius 50 and line – 1 & line – 2 as tangent to the circle.

Command: Circle

3p/2p/TTR/< cp >: TTR

Select (click by mouse tangent circle – 1)

Select (click by mouse tangent circle – 2)

Specify radius of circle: 40

Arc Command:

Arc command is used to draw arc of a circle. Arc command can be given in 3 different ways as under.

(i) Click by mouse (or) "Arc" tool bar as under.

(ii) Type by key board word "Arc" in command window.

(iii) Select "Arc" option from draw menu.

Method – 1: Command : Arc ◄┘ (enter)

First start pt – 1 of arc (or) (center) :120, 70 ◄┘ (enter)

2nd pt – 2 of arc (or) (centre/end) :70, 120 ◄┘ (enter)

3 rd end pt – 3 of arc : 40, 30 ◄┘ (enter)

Method – 2: Command : Arc ◄┘ (enter)

Specify start point of arc (or) (center): CE ◄┘ (enter)

Centre point of arc : (70, 70) ◄┘ (enter)

1st start point of arc : (120, 70) ◄┘ (enter)

End point of arc : (40, 30) ◄┘ (enter)

Method – 3: Command : Arc ◄┘ (enter)

Start point of arc (or) (center) : CE ◄┘ (enter)

Centre point of arc : (70, 70) ◄┘ (enter)

Start point of arc : (120, 70) ◄┘ (enter)

End point of arc : a ◄┘ (enter)

(Angle/chord length)

Included angle : 233.13^0 ◄┘ (enter)

Method – 4: Command : Arc ◄┘ (enter)

Start point of arc : C ◄┘ (enter)

Centre point of arc : (70, 70) ◄┘ (enter)

Start point of arc : (120, 70) ◄┘ (enter)

End point of arc : L ◄┘ (enter)

Chord (length) : 89.4 ◄┘ (enter)

Ellipse Command:

To draw ellipse, ellipse command is used. This command can be operated in 3 different methods as under.

(i) Click on "ellipse" tool bar icon
(ii) Type "ellipse" by K.B in command window
(iii) By selecting Ellipse option from draw menu

Ex: Command : Ellipse ◄┘ (enter)

(i) Specify axis end point of ellipse : (45, 90) ◄┘ (enter)

(ii) Specify other end point of axis : (195,90) ◄┘ (enter)
(iii) Specify distance to other axis : 120, B5 ◄┘ (enter)
(Or) (Rotation)

Ellipse will be drawn having

(i) Major axis length = (195 – 45) = 150
(ii) minor axis length = 2(135 – 90) = 90

One can select the point by clicking the mouse at axis end point , centre etc. instead of giving co – ordinates.

Polygon Command:

Polygon command is used to draw regular polygon shapes. Although one can draw polygon also with line command but it takes more time polygon command draws polygon faster with high accuracy.3 sides i.e., triangle, to 1024 sides regular polygons can be draw with polygon command. Polygon command can be given in 3 different methods as under.

(i) Click on "polygon" tool bar

(ii) Type polygon by key board in command window

(iii) Select polygon option from „draw" menu

There are 3 methods of drawing polygons.

Method – 1: command : polygon ◄┘ (enter)

Number of sides : 6 ◄┘ (enter)

Centre of polygon : (100, 100) ◄┘ (enter)

Inscribed in circle/circumscribed

About circle (I / C) : I ◄┘ (enter)

Radius of circle : 50 ◄┘ (enter)

Method – 2: command : polygon ◄┘ (enter)

Number of sides : 5 ◄┘ (enter)

Centre of polygon : (100, 100) ◄┘ (enter)

Inscribed in circle : c ◄┘ (enter)

Radius of circle : 50 ◄┘ (enter)

Method – 3: command : polygon ◄┘ (enter)

Number of sides : 8 ◄┘ (enter)

First end pt of edge : (60, 20) ◄┘ (enter)

Second end pt of edge : (100, 20) ◄┘ (enter)

Donut Command: Donut or dough nut command enables us to draw filled rings and solid circle required data"s are

(1) Centre point (2) outside diameter (3) inside diameter

'DONUT" command can be in two different ways.

1. Type of key board word „DONUT" in command window.
2. Select „DONUT" option from draw menu.

Ex: Command : „DONUT" ◄┘ (enter)

Inside diameter of donut : 80 ◄┘ (enter)

Out side diameter of donut : 120 ◄┘ (enter)

Centre diameter of donut : 80, 80 ◄┘ (enter)

Spline Command: Spline command is used to draw a smooth line passing through number of given points.

Spline command can be given in 3 different ways.

1. Click by mouse on „spline" tool bar.
2. Type by key board word „spline" in the command window.
3. select „spline" option from „DRAW" menu.

Ex. Command : spline ◄┘ (enter)

Specify first point (or) (object) : 15, 6.5 ◄┘ (enter)

Specify Next point : 3, 7.5 ◄┘ (enter)

Specify next point (or) (close) : 4.5, 6.5 ◄┘ (enter)

(Start tangent)

- do - : 4, 5.5 ◄┘ (enter)

- do - : 2, 4 ◄┘ (enter)

- do - : 1.5, 2.5 ◄┘ (enter)

- do - : 2, 1 ◄┘ (enter)

- do - : 3.5, 0.5 ◄┘ (enter)

- do - : 5, 1 ◄┘ (enter)

- do - : 5.5, 2. ◄┘ (enter)

Solid Command: This command draws solid – filled triangle and polygons

command : solid (centre)

solid, specify first point : fix one point by any method

specify second point : fix second point by any method

specify third point : fix third point by any method

specify 4 th point(or) <exit > : fix fourth point ◄┘ (enter)

First two points marked fix one edge of the polygon third point should be specified diagonally opposite to the second specify fourth point.

Auto CAD 2004 takes the last two points of the first polygon as the first two points for the next polygon.

Once the command solid is on it will continue unless ◄┘ (entered) i.e., exit.

Pan Command: Pan command moves the drawing on the screen display does not change in shape & size only its location changes in fact it moves the display window. Cursor changes to a hand shape cursor by hidden down the pick button you are locking the cursor to its current location. Now cursor is moved in the desired direction & along with cursor graphics also more when pick. button is released panning stops only hand cursor move. At the end of stop panning either press ◄┘ (enter) (or) escape **EC**.

Erase Command:

Erase command is used to remove object/ object from the drawing it‟s an editing tool. It is nothing but erase/ rubber as we use for manual drawing. This erase leave zero impression of object/ objects removed.

It can be given in 3 different ways.

(i) Click on mouse on erase tool bar icon.
(ii) Type by keyboard word „ERASE‟ in the command window
(iii) Select „ERASE‟ option from modify menu.

Ex: Command : Erase

Select objects : Select by simple window totally (or) by crossing

Window totally

Select objects : ◄┘ (enter) circle will disappear.

Rotate Command: Rotate command facilitates to rotate the object at defined angle. This command is used to rotate object about a base point max by 360 where as move command facilitates to move the object anywhere in the drawing.

Rotate command can be give in 3 different ways as under.

(i) Click on mouse by „Rotate" tool bar icon
(ii) Type by keyboard word "Rotate" in command window.
(iii) By selecting „Rotate" option from modify menu.

After giving rotate command, computer will prompt

(i) Select the object
(ii) Specifying the base point of rotation &
(iii) Specifying rotation angle.

Ex: Command : ROTATE.

Select objects : Select rectangle by clicking on it by mouse ◄┘ (enter)

Specify Base pt: Click on pt c by mouse.

Rotation angle: 45^0 ◄┘ (enter)

NOTE: Rotation angle should be mentioned only in counter clock wise direction.

Move Command: Move command is used when we can"t display object to a specified location.

(i) Click on mouse („Move" tool bar icon)
(ii) Type by K.B word "Move" in command window.
(iii) Select "Move" option from the "modify" menu.

Experiment No: 04

DRAWING OF PLANS OF BUILDINGS USING SOFTWARE FOR SINGLE STOREYED

INTRODUCTION:

The detailed drawings of a building (may be residential, public building like schools, colleges, hostels, offices, hospitals, factory building, buildings meant for business) shall include.

(a) Plan
(b) Section along given vertical plane and
(c) Elevation.

(a) Plan: Plan of building represents, a horizontal section of building at given height seen from top. For buildings, it is a general convention to imagine that the building has been cut down by a horizontal plane at the sill level of the windows and is seen from the top after removal of the so cut part. Thus plan of a building means the details that can be seen which are below the window sill level.

(b) Section: Section means vertical section. It is imagined that a finished building is cut vertically along a line so that the building is separated into two portions along the imagined vertical plane right from top of the building to the lowest part of the foundation. The view that can be seen while traveling along this imaginary vertical plane when looking towards left is drawn to the same scale as that adopted for the plan and this view is called a sectional elevation, cross – section or simply section.

(c) Elevation: Elevation is the outward view of a completed building along any side of the building. When a building is seen by standing in front of it, the view that can be viewed is known as front elevation. Similarly, building can be viewed from back side (rear elevation) or from any side of it which is known as side elevation.

AIM: To draw the plan, section and elevation of single storied building by using Auto

CAD

SOFT WARE: Auto CAD 2006.

PROCEDURE:

1. Type „U‟ ◄┘ (enter) and set up the units in meters.

2. Type „L‟ ◄┘ give the dimensions for line as 5.0 ◄┘ and indicate the direction of line if ortho is ON

3. Proceed the above procedure for all the walls.

4. By typing „O" ◄┘ give offset distance as 3.0 ◄┘ for external walls and 0.15 ◄┘ for internal walls

5. Type „Tr" double enter ◄┘ ◄┘ for trim command then trim the extra and unnecessary lines.

6. By typing A ◄┘ give arc command to indicate or give doors.

7. Type DLI ◄┘ to give the dimensions for the plan.

8. Type DT ◄┘ to give text in each part of the plan.

9. Using the above commands section and elevation is also drawn by following same procedure.

10. Type „H" ◄┘ for batch command and indicate the cross section and indicate brick work, concrete and sand filling etc.,

11. Thus by following above steps required plan is obtained.

RESULT: The given plan, section and elevation of a single storeyed building is drawn as per specifications using software AUTOCAD.

Experiment No: 05

DRAWING OF PLANS OF BUILDINGS USING SOFTWARE FOR MULTISTOREYED BUILDING

Aim:

To draw the plan of single storeyed building using the various commands in AutoCAD

Command Used And Their Description:-

Zoom – It is used to zoom the object created.

Units – Used to set the current format for units of measure.

Line –Line commands allows creating a line where the end points allow creating a line where the end points are dimensional co-ordinates.

Line type – using this command different type of lines can be used to draw object.

Offset – create a news object at a specified distance from an existing object or through a specified point.

Fillet - This command is basically used for rounding off edges

Trim – trims off an object using cutting edges defined by other objects.2 Break – removes only a part of an object.

Arc – Used to create an arc segment. Methods are:

1. 3 Points,

2. Start, Center, End

3. Start, Center, Angle

4. Center, Start, End

5. Center, Start, Angle

6. Start, Center, Length

7. Center, Start, Length

8. Start, End, Angle

9. Start, End, Radius

10. Start, End, Diameter

11. Continue

Copy- Moves the selected objects from a given square to destination, learning a copy at the originally selected location.

Rotate- rotate objects around a specified point

Move- moves object to the destination place from the source place

B Hatch – makes shaded patterns as matter of few picks and clicks

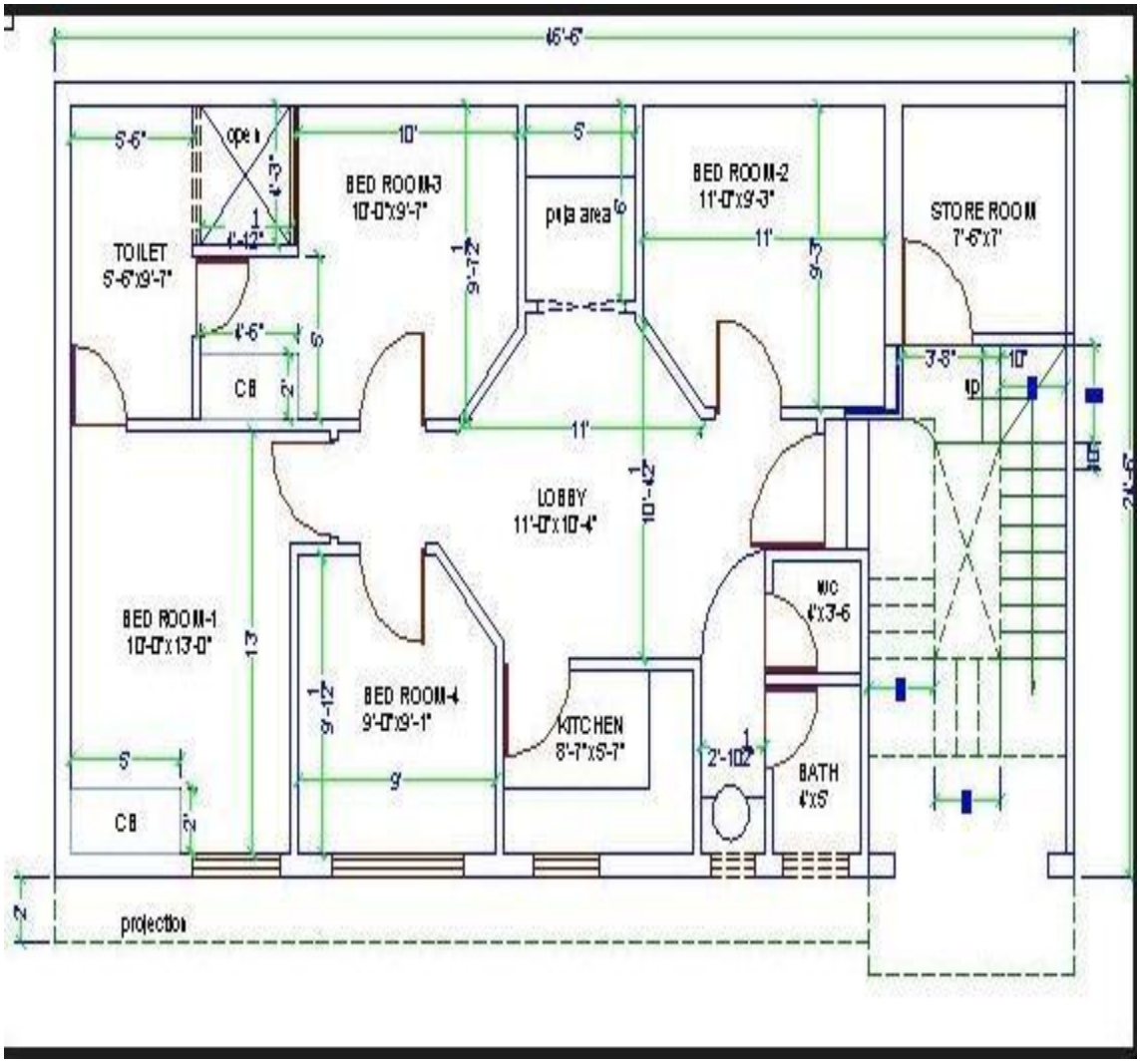
away Extend – elongates an object to a boundary defined by other

objects Erase – used to erase the unwanted objects

Text – creates text object with specified height and orientation

O snap – AutoCAD displays the object snaps tab in drafting setting dialog box. If we enter O snap at command prompt it presents options on the command line.

Procedure:



Results:

The functional requirements of the multi storeyed building is planned and the plan drawn in AutoCAD 2016.

Experiment No: 06

DEVELOPING SECTIONS AND ELEVATIONS FOR SINGLE STOREYED BUILDING

AIM: - To draw elevation of a single storied building

SOFTWARE:- Auto cad – 2006

PROCEDURE:-

1. Type U (enter) change units in meters.
2. Type L (enter) to give line command and type dimensions as 0.8m. Indicate the direction of the line is ortho is ON.
3. Type 0(enter) for offset command and type offset distance as 0.15 (enter) then, click inside where parallel line is required
4. Type „Tr‟ (enter) for trim command trim the extra lines.
5. By typing „DT‟ (enter) text command is given to write the text.

   By typing „DLI‟ (enter) dimensioning is also given.
6. By adopting the above command the elevation of a single storied building is drawn with dimensions.
7. The size of dimensions and the size of arrows can be changed by typing D (enter) command.
8. By typing „C‟ (enter) to give circle command.

RESULT:-

The elevation of a single storied building is drawn as per dimensions using the Software Auto CAD.

Experiment No: 07

DEVELOPING SECTIONS AND ELEVATIONS FOR MULTI STORIED BUILDING

AIM: - To draw the elevation of multi storied building.

SOFTWARE: - AUTO CAD – 2006

PROCEDURE:-

1. Type U (enter) change units in meters.

2. Type L (enter) to give line command and type dimensions indicate the direction of the line s Ortho ON.

3. Type 0 (enter) for offset command and type offset distance then click inside where parallel lines is required.

4. Type Tr (enter) for trim command and turn the extra lines.

5. By typing DT (enter) text command and to give the text.

6. By typing DLI (enter) dimensioning is also given.

7. By adopting the above command the elevation of a multi storied building is drawn with dimensions.

8. The size of dimensions and size of arrows can be changed by typing D (enter) command.

9. After completing the drawing of elevation save it.

RESULT:-

Thus by following procedure the elevation of multi storied building is obtained.

EXPERIMENT NO: 08

DETAILING OF BUILDING COMPONENTS LIKE DOORS, WINDOWS, USING CAD SOFTWARE

INTRODUCTION:

Doors are the means to provide access to the rooms of a building. A door consists of a frame and one or two shutters or leaves. Accordingly they are called as single shuttered or double shuttered doors.

DOOR FRAME:

A door frame consists of two vertical members called styles and two horizontal members one at top called as top rail and one bottom rail (or) threshold. The top rail is projected beyond the styles by about 150mm and these projections are known as horns. These are built into masonry for keeping in position M.S. clamps of flat iron are fixed to the vertical styles on the outer side known as „Hold fast" in the shape of letter „Z". These are embedded into masonry wall to hold the frame in position.

AIM: To draw the components of doors and windows in AUTOCAD.

SOFTWARE: AUTOCAD 2006.

PROCEDURE:

1. Type „U" ◄┘ (enter) change units in meters.
2. Type „L" ◄┘ to give line command and type dimensions as 0.8m indicate the direction of the line if ortho is ON.
3. Type „O" ◄┘ for offset command and type offset distance as 0.15 ◄┘ then click

   Inside, where parallel lines is required.
4. Type „Tr" ◄┘ for trim command trim the extra lines.
5. By typing „DT" ◄┘ text command is given to write the text.
6. By typing „DLT" ◄┘ dimensioning is also given.
7. By adopting the above command doors and windows are drawn with dimensioning and text
8. The size of dimensions and the size of arrows can be changed by typing D ◄┘ Command.

RESULT: The doors and windows are drawn as per dimensions using the software AUTOCAD.

EXPERIMENT NO: 09

DEVELOPMENT OF BUILDING COMPONENTS FOR ROOF TRUSSES USING CAD SOFTWARE

AIM: To draw the truss using Auto CAD software.

SOFTWARE: AutoCAD 2006

THEORY:

Truss is a structural member which has a load bearing capacity. Steel truss is an economical member which is designed for larger spans greater than 6mts. It is designed with different members either single or composite in section with various standard shape and size, like IAS, IRS, ISHB, ISMB etc. for the fabrication of trusses.

All the members of truss are designed to take different type of trusses in different members (direct tensile or compressive stress) which depends upon there position in the truss, as there should be no bending or deflection developed in the truss. The height and slope of the truss depends upon the central effective span (centre to centre distance from supports) and also the type of loads coming over the roof. (wind load and dead load). All the members in the truss are fixed in there position by different methods either by riveting, nut bolting and welding. Above the design structure a thin roofing material is used to serve the purpose of roofing which is laid over intermediate horizontal perlings or battens which are kept together with joineries (nut bolting, nut screwing, riveting etc.)

PROCEDURE:

1. Type Un ◄┘ to change the units in to meters.
2. Type L ◄┘ to give line command and give the dimensions to the command. Indicate the direction of the line by keeping ortho in „ON"
3. Type O ◄┘ for offset command and type the distance of the offset and click inside where parallel lines are required.
4. Type „Tr" ◄┘ command to trim all the extra lines which are not necessary
5. Type „DT" ◄┘ command to write the text at any part of the truss.
6. Type „DLI"◄┘ command to give dimensions.
7. Type „Mirror" ◄┘ command to indicate another half of the truss.

8. The size of arrows and the dimension lines can be changed by typing D ◄┘ command
9. Type line type ◄┘ command to indicate the dotted lines.

RESULT: The truss is drawn as per dimensions using AutoCAD software.