NRI INSTITUTE OF INFORMATION SCIENCE & TECHNOLOGY BHOPAL

DEPARTMENT OF CIVIL ENGINEERING

LAB MANUAL
BUILDING PLANNING & ARCHITECTURE/ AUTOCAD LAB

NIIST BHOPAL		NRI INSTITUTE OF INFORMATION SCIENCE & TECHNOLOGY DEPARTMENT : CIVIL ENGINEERING	FORM NO	NIIST/A/10
BRANCH	CIVIL	LIST OF EXPERIMENTS	REV. NO	0
SEMESTER	IV		REV. DT	30/06/2011

SUBJECT /CODE: SOFTWARE LAB /CE406

SNO	LIST OF EXPERIMENTS
1	Introduction to CAD, Introduction to AutoCAD, Software and hardware requirements,various input and output devices. Getting started with Autocad,setting drawinglimits,units etc
2	Learning and practice of Draw commands, Modify commands, utility and other commands.
3	Drawing basic Geometric Shapes, Basic Plotting and Editing Tools, Architectural Views & darfting views
4	3D modelling with AutoCAD
5	Dimensioning, Annotating in AutoCAD with Text & Hatching, Blocks, drafting symbols and attributes, layers, templates & Design center, advanced plotting
6	Drawing plan, section and elevation of 1 BHK house.
7	Drawing plan, section and elevation of primary school.

BUILDING PLANNING & ARCHITECTURE/AUTOCAD LAB

LO	LAB OUTCOMES
LO1	Installing AUTOCAD, along with system requirements for various projects. Installing OpenCAD and its studying its features.
LO2	Installing Photoshop along with sketch up pro for drawing making sketching work along with various tools for house elements
LO3	Modeling with AutoCAD , various commands of AutoCAD
LO4	Planning a residential and institutional building

Experiment No. 1 INTRODUCTION TO COMPUTER AIDED DRAFTING

Computer Aided Drafting is a process of preparing a drawing of an object on the screen of a computer. There are various types of drawings in different fields of engineering and sciences. In the fields of mechanical or aeronautical engineering, the drawings of machine components and the layouts of them are prepared. In the field of civil engineering, plans and layouts of the buildings are prepared. In the field of electrical engineering, the layouts of power distribution system are prepared. In all fields of engineering use of computer is made for drawing and drafting.

The use of CAD process provides enhanced graphics capabilities which allows any designer to

Conceptualize his ideas

Modify the design very easily

Perform animation

Make design calculations

Use colors, fonts and other aesthetic features.

1.1 REASONS FOR IMPLEMENTING A CAD SYSTEM

1. **Increases the productivity of the designer**: CAD improves the productivity of the designer to visualize the product and its component, parts and reduces the time required in synthesizing, analyzing and documenting the design
2. **Improves the quality of the design**: CAD system improves the quality of the design. A CAD system permits a more detailed engineering analysis and a larger number of design alternatives can be investigated. The design errors are also reduced because of the greater accuracy provided by the system
3. **Improves communication:** It improves the communication in design. The use of a CAD system provides better engineering drawings, more standardization in the drawing, and better documentation of the design, few drawing errors and legibility.
4. **Create data base for manufacturing:** In the process of creating the documentation for these products, much of the required data base to manufacture the products is also created.
5. **Improves the efficiency of the design:** It improves the efficiency of the design process and the wastage at the design stage can be reduced

6. APPLICATION OF CAD:

There are various processes which can be performed by use of computer in the drafting process.

1. **Automated drafting**: This involves the creation of hard copy engineering drawings directly from CAD data base. Drafting also includes features like automatic dimensioning, generation of cross – hatched areas, scaling of the drawing and the capability to develop sectional views and enlarged views in detail. It has ability to perform transformations of images and prepare 3D drawings like isometric views, perspective views etc.,
2. **Geometric modeling**: concerned with the computer compatible mathematical description of the geometry of an object. The mathematical description allows the image of an object to be displayed and manipulated on a graphics terminal through signals from the CPU of the CAD system. The software that provides geometric modeling capabilities must be designed for efficient use both by computer and the human designer.

1.2 BENEFITS OF CAD:

The implementation of the CAD system provides variety of benefits to the industries in design and production as given below:

1. Improved productivity in drafting
2. Shorter preparation time for drawing
3. Reduced man power requirement
4. Customer modifications in drawing are easier
5. More efficient operation in drafting
6. Low wastage in drafting
7. Minimized transcription errors in drawing
8. Improved accuracy of drawing
9. Assistance in preparation of documentation
10. Better designs can be evolved
11. Revisions are possible
12. Colors can be used to customize the product
13. Production of orthographic projections with dimensions and tolerances
14. Hatching of all sections with different filling patterns

1.3 LIMITATIONS OF CAD

1. 32 – bit word computer is necessary because of large amount of computer memory and time
2. The size of the software package is large
3. Skill and judgment are required to prepare the drawing
4. Large investment.

1.4 Pre-lab questions:

1. Full form of AUTO CAD
2. What are the benefits of auto cad?
3. What are the reasons for implementing of auto cad?

1.5 Post lab questions:

1. Briefly explain application of auto cad?
2. What are the benefits of auto cad in civil engineering point of view?
3. What are the limitations of auto cad?

Experiment No. 2 SOFTWARE FOR CAD- INTRODUCTION TO DIFFERENT SOFTWARE'S

CAD SOFTWARES

The software is an interpreter or translator which allows the user to perform specific type of application or job related to CAD. The following software's are available for drafting

1. AUTOCAD
2. Pro – E
3. CATIA
4. MS OFFICE
5. PAINT
6. ANSYS
7. MSc. NASTRAN
8. IDEAS
9. SOLID WORKS
10. HYPERMESH
11. FLUENT –GAMBIT

The above software's are used depending upon their application.

AUTO CAD

Auto CAD package is suitable for accurate and perfect drawings of engineering designs. The drawing of machine parts, isometric views and assembly drawings are possible in AutoCAD. The package is suitable for 2D and 3D drawings.

2.1 STARTING WITH AUTO CAD

CAD uses four basic elements for preparation of any drawing:

1. Line
2. Curves
3. Text
4. Filling point.

Computer Aided Drafting is done by the operator by placing the mouse pointer by placing the mouse pointer at the desired location and then executing the command to draw the graphic elements using different methods.

Advanced computer aided drafting packages utilize four areas on the screen.

1. Drawing Area
2. Command Area

3. Menu Area
4. Tool Boxes.

2.2 Layout and Sketching

The package provides various facilities for layout, sketching and borders for preparing a drawing. It provides facilities for display co-ordinates and measurement units.

a. **Units:** The format for display co – ordinates and measurement can be selected according to the requirement.

Several measurement styles are available in ACAD. The main methods are engineering and architectural, having specific base unit assigned to them.

i. Decimal: select to enter and display measurements in decimal notation
ii. Engineering: Display measurements in feet and decimal inches.
iii. Architectural: Display measurements in feet, inches and fractional inches
iv. Fractional: Display measurements in mixed numbers notation
v. Scientific: Display measurements in scientific notation.

The precision that is specified controls the number of decimal places or fractional size to which we want linear measurements displayed.

b. **Angles**: Select the format in which we want to enter and display angles.
   i. Decimal Degrees: Display partial degrees as decimals
   ii. Deg/Min/Sec: Display partial degrees as minutes and seconds.
   iii. Grades: Display Angles as grades
   iv. Radians: Display angles as radians.
   v. Surveyor: Displays angles in surveyor units.

c. **Angle measure:** Select the direction of the zero angle for the entry of angles:
   i. East: Select to specify the compass direction east as the zero angles.
   ii. North: Select to specify the compass direction north as the zero angles.
   iii. West: Select to specify the compass direction west as the zero angles.
   iv. South: Select to specify the compass direction south as the zero angles.
   v. Other: Select to specify a direction different from the points of the compass as the zero angles.

d. **Area:** Enter the approximate width and length which is planned to draw in full scale units. This limits the area of the drawing covered by grid dots when the grid is turned on. It also adjusts several default settings, such as text height, line type scaling and

Experiment No. 4 DRAWING OF PLANS OF BUILDINGS USING SOFTWARE

a) SINGLE STOREYED

b) MULTI STOREYED

a) SINGLE STOREYED

4.1 Aim:

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

4.2 Software Used:

AutoCADD 2016

4.3 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

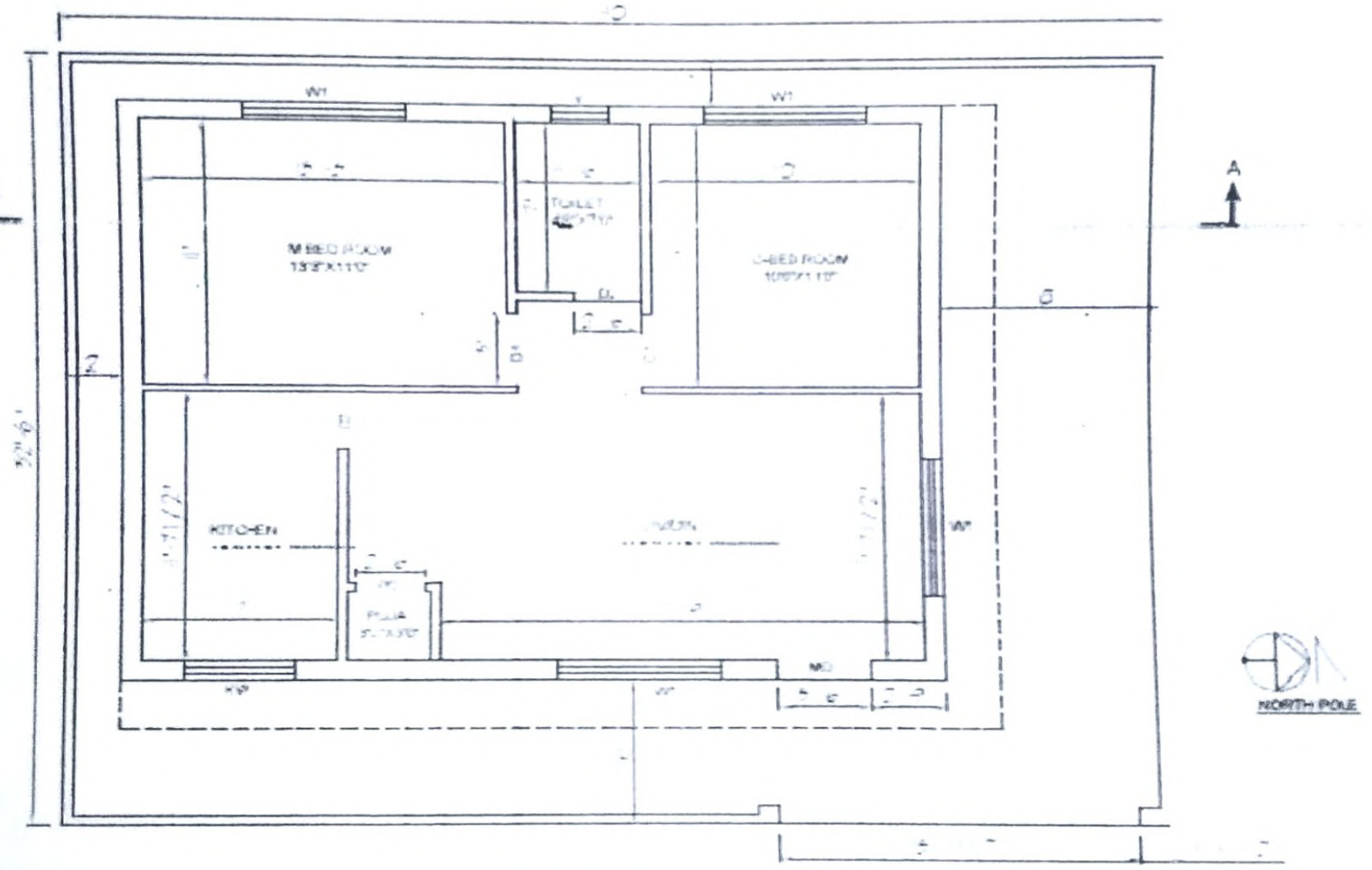
Trim – trims off an object using cutting edges defined by other objects.2

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

Exp. No 4 a) SINGLE STOREYED BUILDING



R O A D

PLAN

Experiment No. 4. Drawing of plans of Buildings using software

b) MULTI STOREYED

4.1 Aim:

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

4.2 Software Used:

AutoCADD 2016

4.3 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

4.4 Procedure: