



**NED University of Engineering & Technology  
Department of Electrical Engineering**

**LAB MANUAL  
For the course**

**ENGINEERING DRAWING  
(EE-156) For F.E.(EE)**

**Instructor name:** \_\_\_\_\_

**Student name:** \_\_\_\_\_

**Roll no:** \_\_\_\_\_ **Batch:** \_\_\_\_\_

**Semester:** \_\_\_\_\_ **Year:** \_\_\_\_\_

**LAB MANUAL**  
**For the course**

**ENGINEERING DRAWING**  
**(EE-156) For F.E.(EE)**

Content Revision Team:

Mr. Muhammad Uzair Khan and Mr. Muhammad Irfan Shaikh

Last Revision Date:

Approved By

**The Board of Studies of Department of Electrical Engineering**

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\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**To be filled by lab technician**

Attendance: Present out of \_\_\_\_ Lab sessions

Attendance Percentage \_\_\_\_\_

**To be filled by Lab Instructor**

Lab Score Sheet

Roll No.	Rubric based Lab I	Rubric based Lab II	Rubric based Lab III	Rubric based Lab IV	Rubric based Lab V	Rubric based Lab VI	OEL/PBL Rubric Score A	Final LAB Rubric Score B	Attendance Percentage C	Final weighted Score for MIS System [10(A)+10(B)+5(C)]/25 Round to next higher multiple of 5

EE-156 ED Rubric Based Labs 3, 5, 6, 7, 10, 11

Note: All Rubric Scores must be in the next higher multiple of 5 for correct entry in MIS system.

## CONTENTS

**Psychomotor / Cognitive / Affective Level: P3 / C3 / A4****CLO/PLO: CLO1 (C3)/ PLO1, CLO2 (P3)/ PLO5, CLO3 (A4), PLO6**

S.No.	Date	Title of Experiment	Total Marks	Signature
1		To understand basic tools of AutoCAD 2015		
2		To practice basic tools of AutoCAD through a layout plan of a classroom		
3		*To draw civil layout plan of hotel on AutoCAD with proper scaling and dimensions.		
4		To understand the section views and Elevation plans		
5		*To draw and understand sheet spacing and location of orthographic views by Third Angle Projection		
6		*To draw orthographic views of curved planes by Third Angle Projection		
7		*To draw Isometric view of object using parallel lines concept		
8		To draw Isometric view of curved surfaces using circle projections and layers concept		
9		To convert and draw Isometric view into oblique view		
10		*To understand and draw electrical wiring of home.		
11		*Single Line Diagram		
12		Extension board and its wiring diagram. (PBL)		

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\* RUBRIC based Assessment

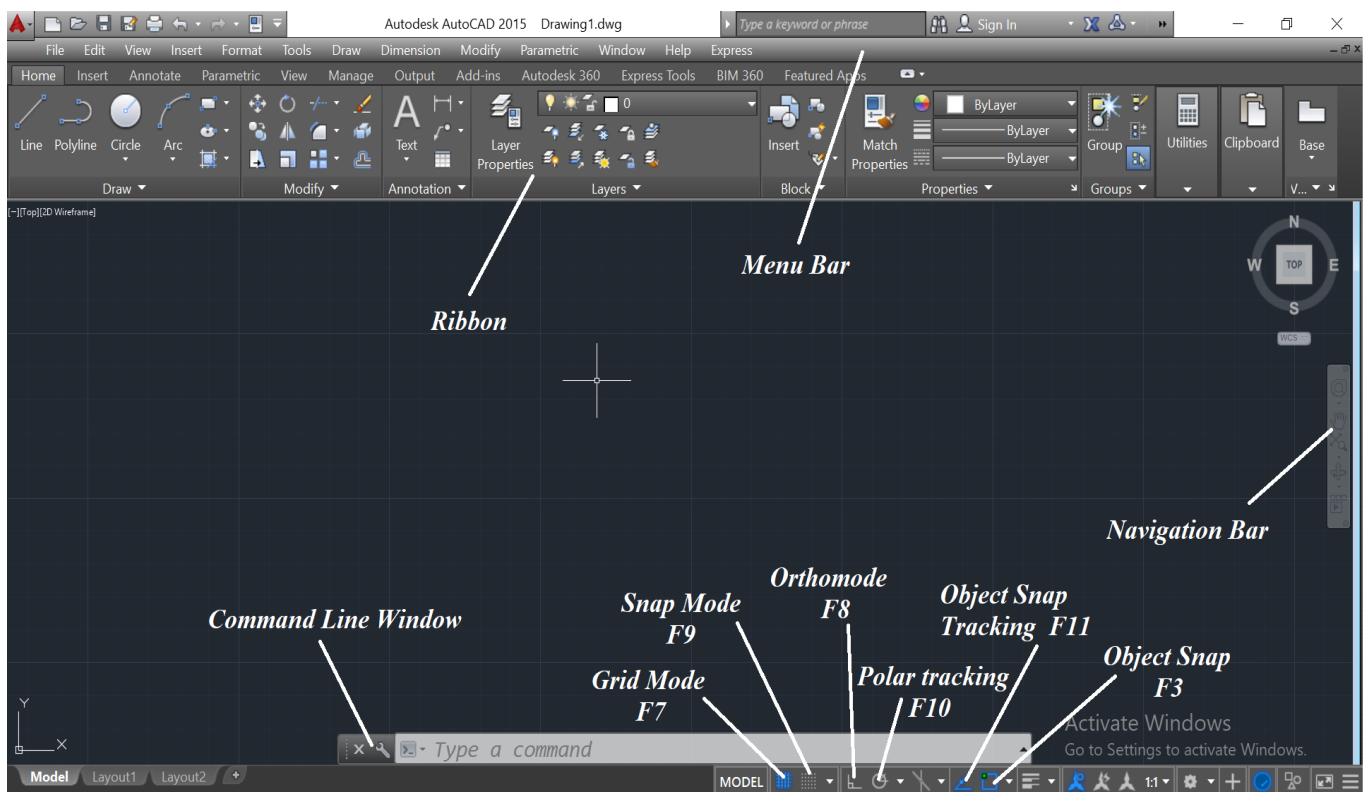
**LAB SESSION 01****Essential Overview of AutoCAD 2015****OBJECTIVE**

*To understand basic tools of AutoCAD 2015*

**Location: Computer Lab**

**Basic structure of AutoCAD 2015**

AutoCAD is used to draw various types of drawings. Basic overview of AutoCAD 2015 is shown in figure below.

**Getting Start with AutoCAD**

- Open AutoCAD 2015
- Type 'mvsetup' in command window
- Type 'NO' or 'YES' in 'enable paper step'
- Select type of drawing i.e 'A' for architecture drawing
- Select scale factor
- Enter width of paper
- Enter height of paper

**Overview of Basic Tools**

- Draw
- Modify
- Dimensions
- Layers
- Units (directly enter)
- Text
- Block (like grouping)
- Hatch
- Snap and tracking

**Exercise**

- 1) Draw four rectangles one inside another by using different layers
- 2) Draw the following shapes with dimensions
  - Circle (take your roll number as radius)
  - Rectangle (large side is equal to your roll no)
  - Triangle (each side is equal to your roll no)
  - Pentagon (Each side is equal to your roll no)
  - Ellipse (smaller radius is equal to your roll no)

**Note**

1. Download Free Education Version of AutoCAD 2015 or above from Auto desk website
2. Install AutoCAD 2015 on your Home PC as per instruction given in Lab.
2. Take handout of AutoCAD 2015 self-learning tutorial.
3. This tutorial will be helpful through the semester.

## LAB SESSION 02

### Essential Practice of Basic Tools

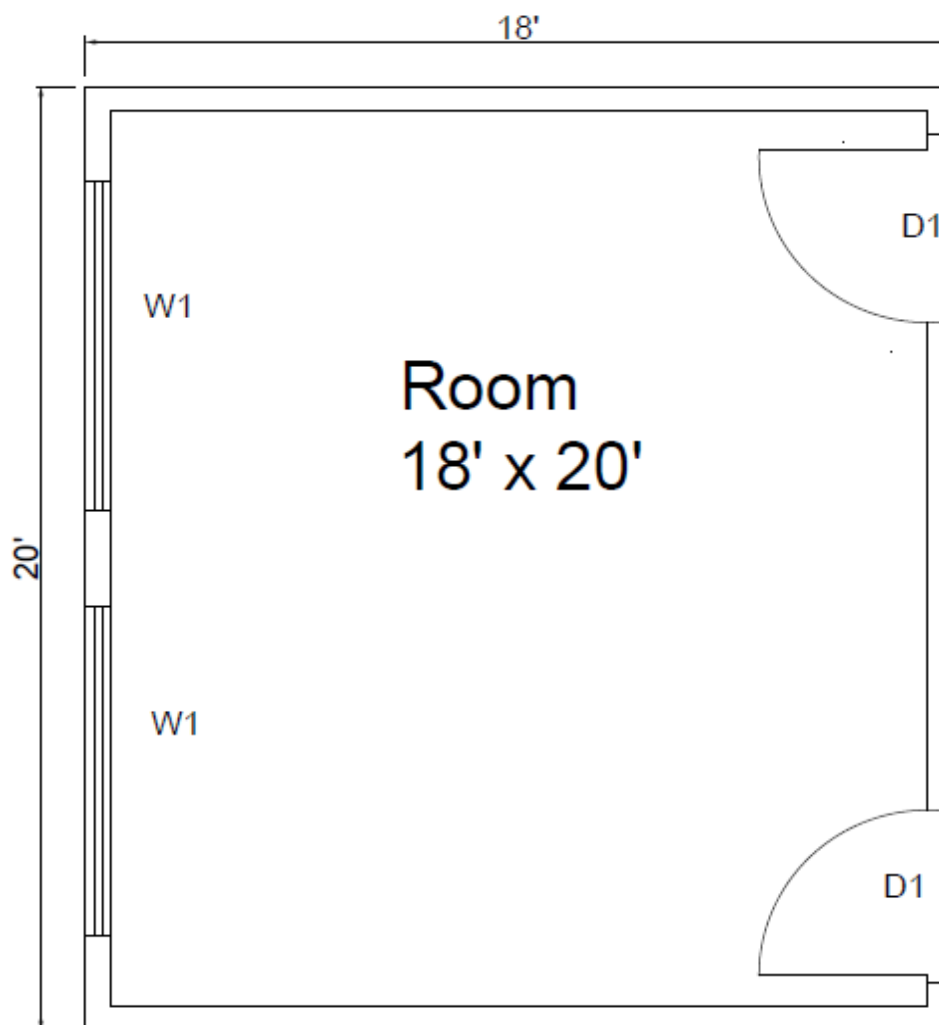
#### **OBJECTIVE**

*To practice basic tools of AutoCAD through a layout plan of a classroom*

**Location: Computer Lab**

#### **Lab Practice**

Make layout plan of your classroom as per following dimensions



D1 = 3.5' x 7'

W1 = 7' x 4'

**Learning Outcomes**

1. Practice of AutoCAD 2010
2. Use of following commands to draw this object
  - Units
  - Line
  - Offset
  - Circle
  - Trim
  - Dimension
  - Text
  - Plot
3. Understanding of floor plan
4. Representation of doors and windows

**Exercise**

Draw Layout plan of single room of your house.

Mention following information.

1. Dimensions
2. Door, windows and ventilator size
3. Size of Room

**Note**

Take print out of task and attach it in your Engineering Drawing portfolio.



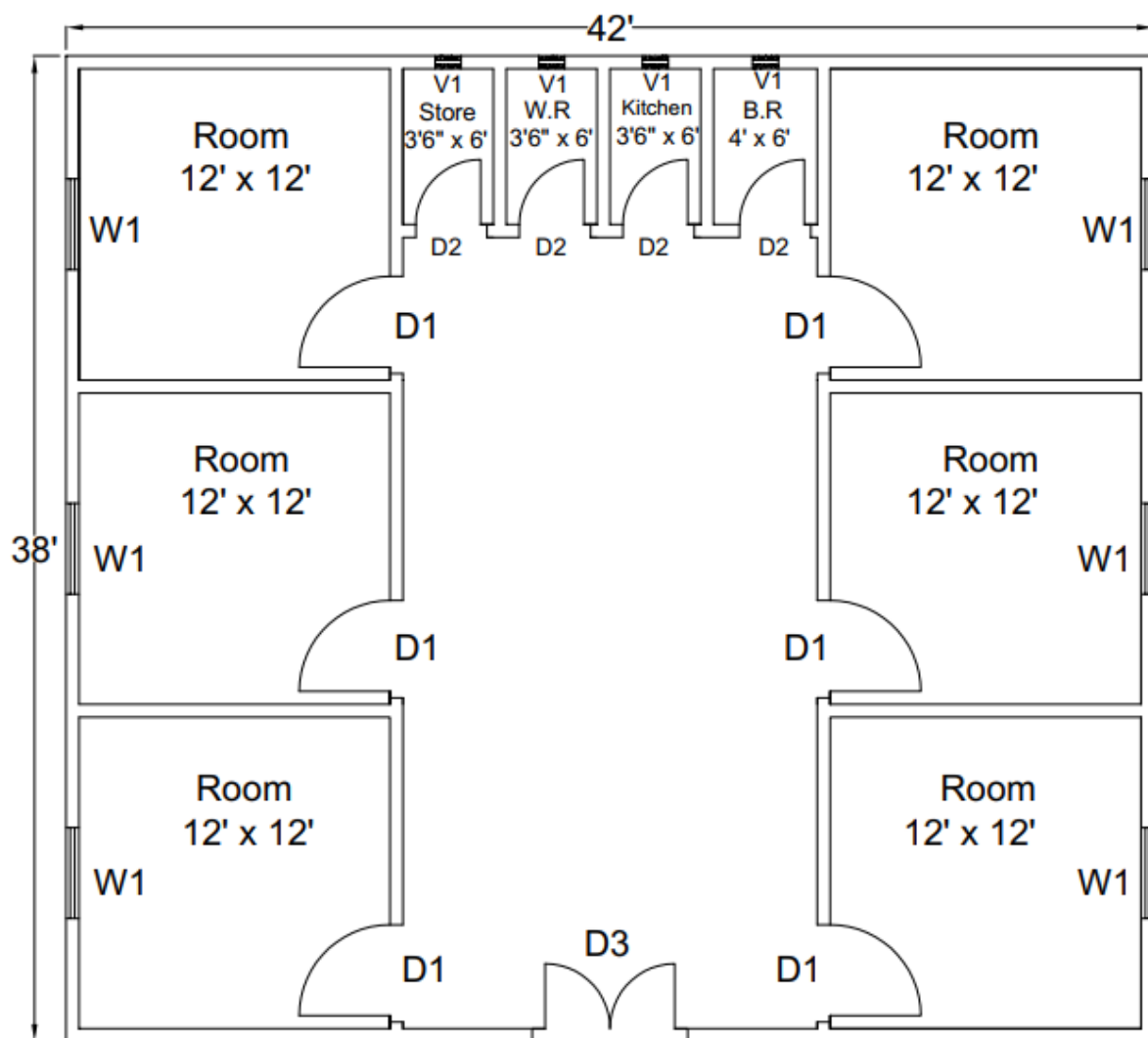
**LAB SESSION 03****Home Civil Layout Plan****OBJECTIVE**

*To draw civil layout plan of hotel on AutoCAD with proper scaling and dimensions.*

**Location: Computer Lab**

**Lab Practice**

Make layout plan of a small hotel as per given dimensions.



Here

D1 = 3.5' x 7'

D2 = 2.5' x 7'

D3 = 5' x 7'

W1 = 3.5' x 4'

V1 = 1' x 1'

**Learning Outcomes**

1. Practice of AutoCAD 2015
2. Use following new commands to make above civil layout plan
  - Arc
  - Block
  - Mirror
  - Fillet
3. Understanding of Civil layout plans

**Exercise**

Draw Civil Layout plan of your house.

Mention following information.

1. Dimensions
2. Door, windows and ventilator size
3. Size of Room

**Note**

Take print out of task and attach it in your Engineering Drawing portfolio.

**NED University of Engineering & Technology**  
**Department of Electrical Engineering**



Course Code: **EE-156**

Course Title: **Engineering Drawing**

Laboratory Session No.: \_\_\_\_\_

Date: \_\_\_\_\_

**Psychomotor Domain Assessment Rubric for Laboratory (Level P3)**

Skill(s) to be assessed	Extent of Achievement				
	0	1	2	3	4
<b>Software Menu Identification and Usage:</b> Ability to initialise, configure and <u>operate</u> software environment <u>under supervision</u> , using menus, shortcuts, instructions etc. <b>10%</b>	Unable to understand and use software menu <b>0</b>	Little ability and understanding of software menu operation, makes many mistake <b>10</b>	Moderate ability and understanding of software menu operation, makes lesser mistakes <b>20</b>	Reasonable understanding of software menu operation, makes no major mistakes <b>30</b>	Demonstrates command over software menu usage with frequent use of advance menu options <b>40</b>
<b>Transforming Physical Specifications into CAD Parameters:</b> Ability to <u>perceive</u> conversion of physical dimensions into CAD software parameters <b>15%</b>	Completely unable to understand and transform physical dimensions into CAD parameters <b>0</b>	Slightly able to understand and transform physical dimensions into CAD parameters <b>15</b>	Somewhat able to understand and transform physical dimensions into CAD parameters <b>30</b>	Moderately able to understand and transform physical dimensions into CAD parameters <b>45</b>	Fully able to understand and transform physical dimensions into CAD parameters <b>60</b>
<b>Use of Input and Output Devices:</b> Receiving <u>Sensory</u> input from computer screen and effectively <u>handling</u> input devices for software interface <b>15%</b>	Not able to use mouse and keyboard effectively in accordance of visual input from screen <b>0</b>	Rarely uses mouse and keyboard effectively in accordance of visual input from screen <b>15</b>	Occasionally uses mouse and keyboard effectively in accordance of visual input from screen <b>30</b>	Often uses mouse and keyboard effectively in accordance of visual input from screen <b>45</b>	Handles mouse and keyboard effectively in accordance of visual input from screen <b>60</b>
<b>Detecting and Removing Errors:</b> <u>Detect</u> Errors/Exceptions and in CAD model and remove them <b>15%</b>	Unable to check and detect error messages and indications in software <b>0</b>	Able to find error messages and indications in software but no understanding of detecting those errors and their types <b>15</b>	Able to find error messages and indications in software as well as understanding of detecting some of those errors and their types <b>30</b>	Able to find error messages/indication in software as well as understanding of detecting all of those errors and their types <b>45</b>	Able to find error messages/indication in software along with the understanding to detect and rectify them <b>60</b>

Psychomotor Domain Assessment Rubric for Laboratory (Level P3)					
Skill(s) to be assessed	Extent of Achievement				
	0	1	2	3	4
<b>Understanding CAD Symbols and their Interconnection:</b> <u>Recognise</u> and <u>recall</u> CAD symbols and their interconnection 15%	Unable to recognise and recall any CAD symbol and their inter-connection 0	Recognises and recalls only a few CAD symbols and their inter-connection 15	Recognises and recalls many CAD symbols and their inter-connection 30	Recognises and recalls most CAD symbols and their inter-connection 45	Recognises and recalls all CAD symbols and their inter-connection 60
<b>Following step-by-step procedure to complete lab work:</b> <u>Observe, imitate and operate</u> software to complete the provided sequence of steps 10%	Inability to recognise and perform given lab procedures 0	Able to recognise given lab procedures and perform them but could not follow the prescribed order of steps 10	Able to recognise given lab procedures and perform them by following prescribed order of steps, with frequent mistakes 20	Able to recognise given lab procedures and perform them by following prescribed order of steps, with occasional mistakes 30	Able to recognise given lab procedures and perform them by following prescribed order of steps, with no mistakes 40
<b>Recording/Saving Visual Output from CAD Software:</b> <u>Recognise</u> the prescribed output file format and manipulate software features to save and print required output file 10%	Inability to recognise prescribed output file format 0	Able to recognise prescribed output file format but does not record according to given instructions 10	—	Able to recognise prescribed output file format but records it incompletely or erroneously 30	Able to recognise prescribed output file format and records it completely and error free 40
<b>Incorporating Civil Plan and Electrical SLD in CAD Software:</b> <u>Demonstrate</u> skills to incorporate knowledge of Civil Plans and Electrical SLD into CAD Software 10%	Unable to remember or recall concepts of Civil Plan and Electrical SLD 0	Able to remember and recall most concepts of Civil Plan and Electrical SLD, but unable to design them in CAD 10	—	Able to remember and recall most concepts of Civil Plan and Electrical SLD, also unable to design them in CAD with some mistakes and errors 30	Able to remember and recall most concepts of Civil Plan and Electrical SLD, also able to design them in CAD with no mistakes or errors 40

Total Points (out of 400)	
Weighted CLO (Psychomotor Score)	(Points/4)
Remarks	
Instructor's Signature with Date	

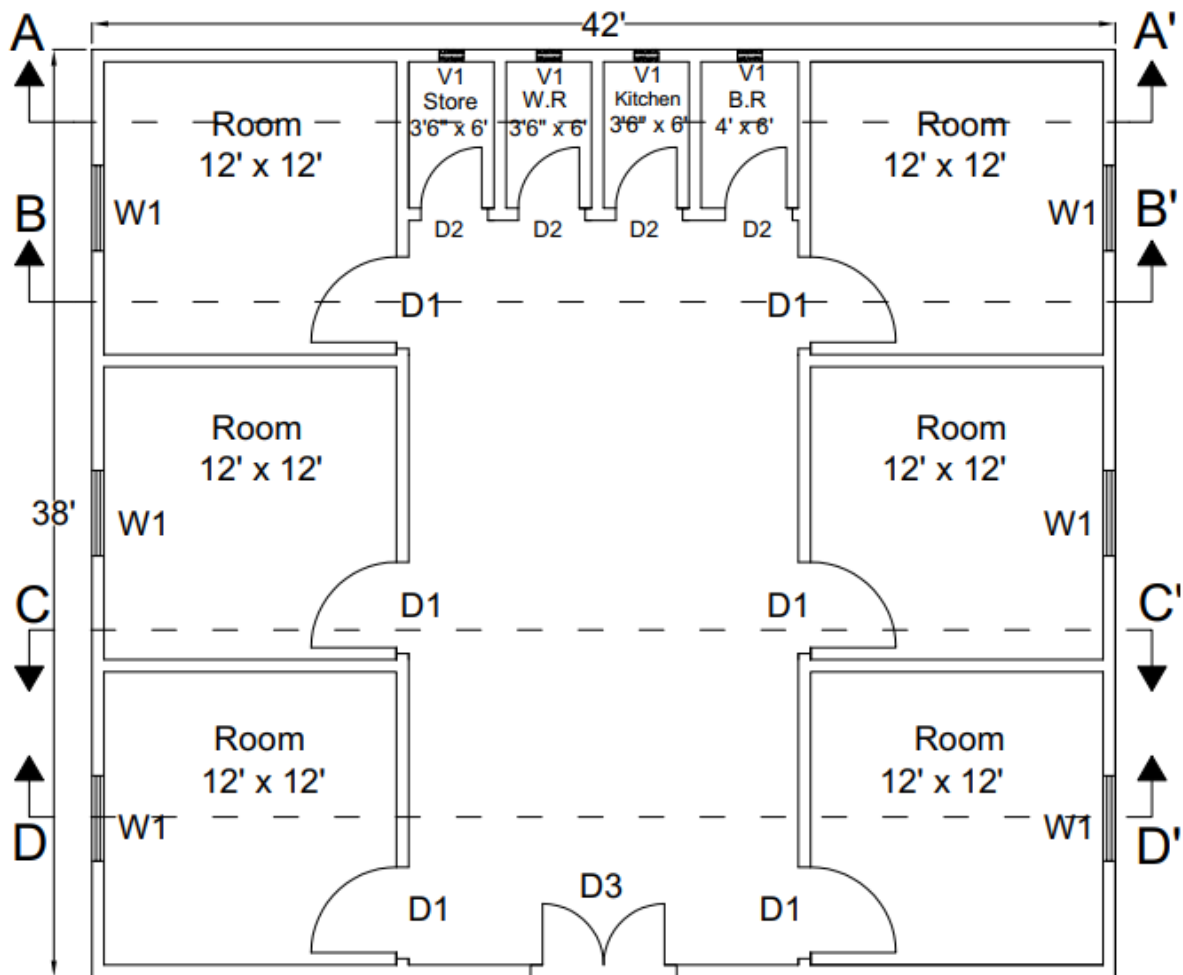
**LAB SESSION 04****Section View and Elevation Plan****OBJECTIVE**

*To understand the section views and Elevation plans*

**Location: Computer Lab**

**Lab Practice**

Draw the elevation plan of section A-A' of civil layout plan.



Size of doors, windows and ventilators are same as mentioned in Lab session 3.

D1 = 3.5' x 7'

D2 = 2.5' x 7'

D3 = 5' x 7'

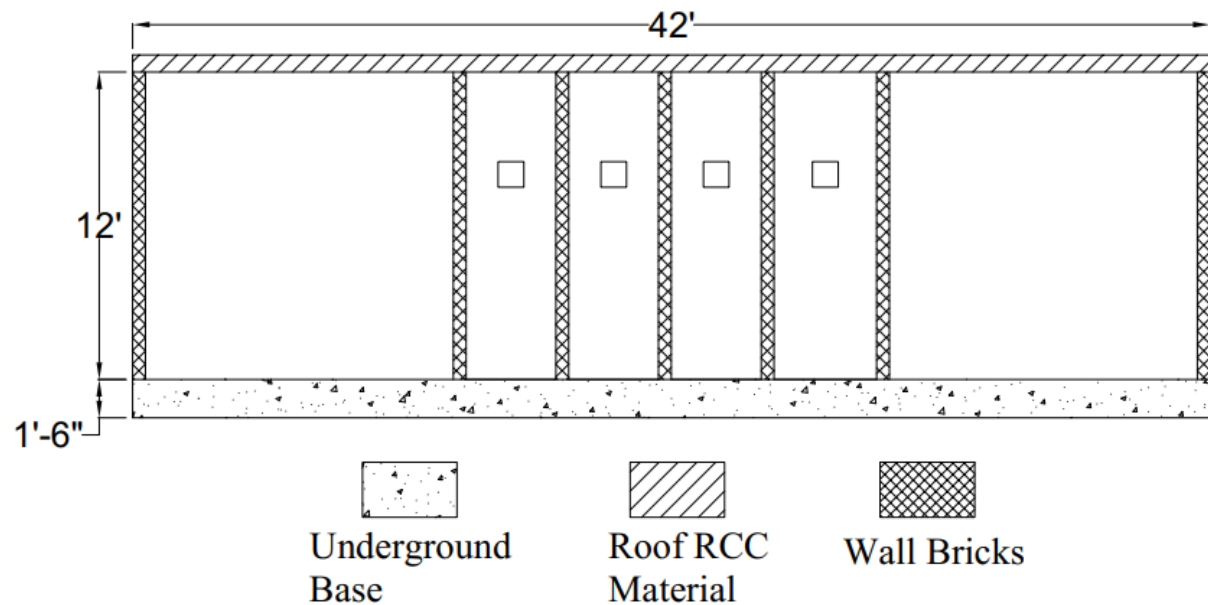
W1 = 3.5' x 4'

V1 = 1' x 1'

Height of area is 12' while show 1.5' base underground.

**Learning Outcomes**

1. Practice of AutoCAD 2015
2. Use following new commands to make above civil layout plan
  - Layers to represent section line
  - Hatch
3. Understanding of Section Views
4. Understanding of Elevation plans

**Elevation Plan for Section A - A'****Exercise**

1. Make elevation plan of Section B-B', C-C' and D-D'
2. Make three random section lines on your house layout (one vertically and two horizontally), and then make their elevation plan.

Mention following information.

- i. Dimensions
- ii. Hatch pattern and its marking

**Note**

Take print out of task and attach it in your Engineering Drawing portfolio.

## **LAB SESSION 05**

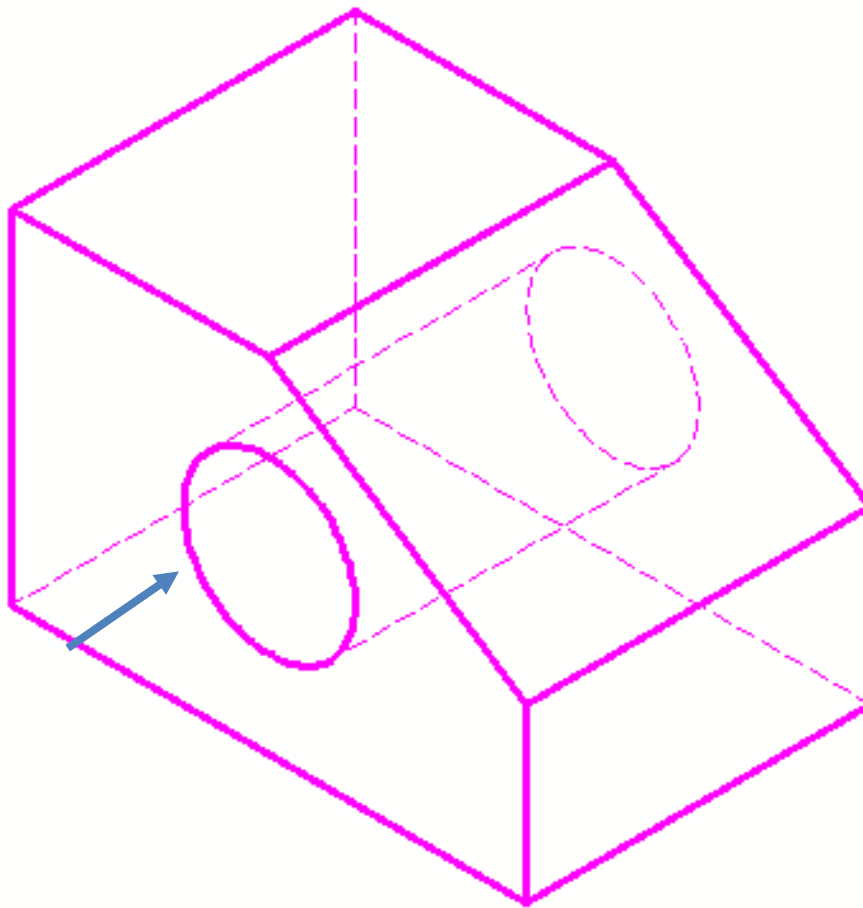
### **Orthographic View**

#### **OBJECTIVE**

*To draw and understand sheet spacing and location of orthographic views by Third Angle Projection*

**Location: Drawing Hall**

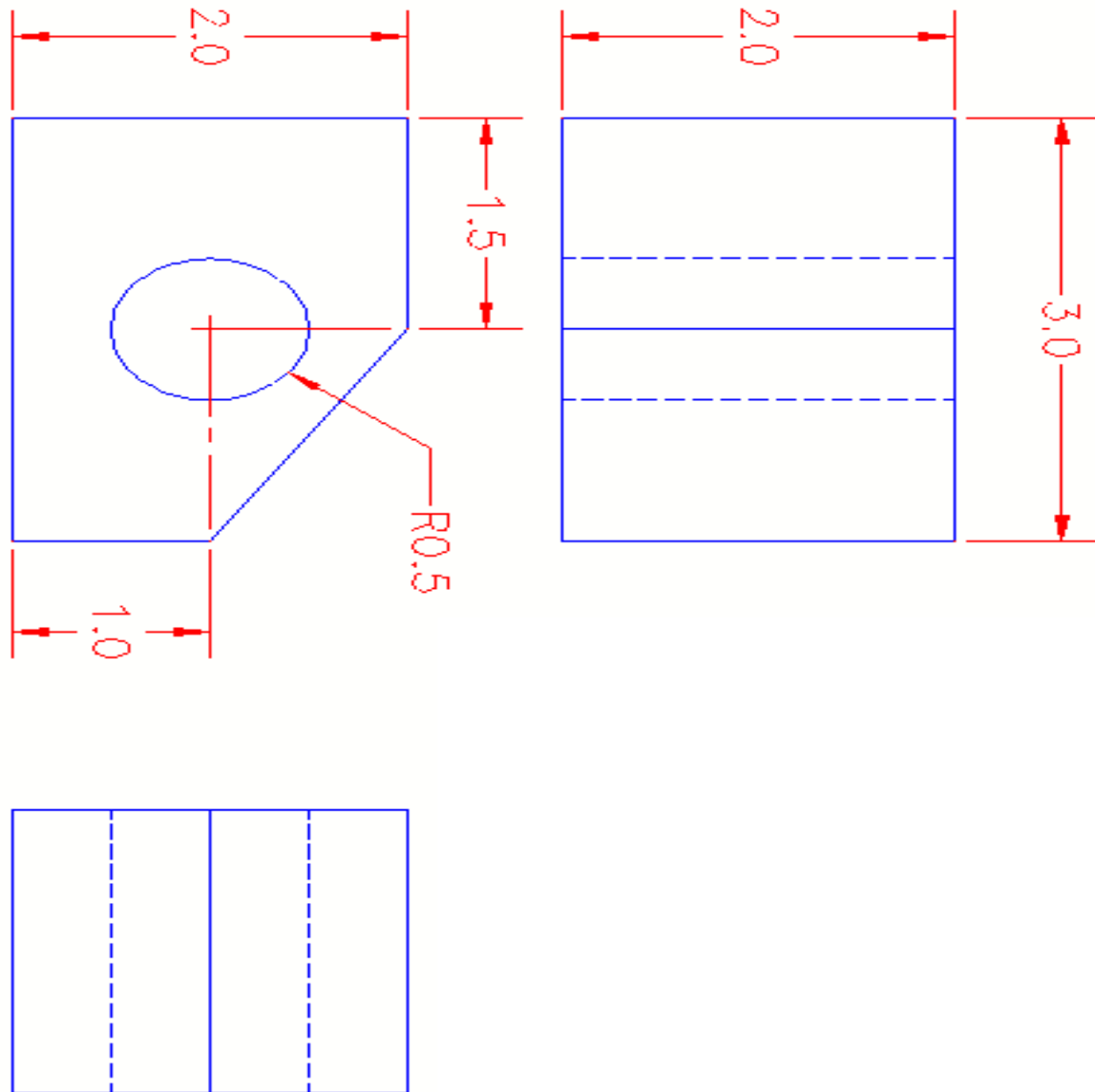
#### **Lab Practice**



#### **Learning Outcomes**

- Familiarity with Drawing hall and usage of drawing instrument
- Apply third angle projection
- Find horizontal spacing
- Find vertical spacing
- Divide your sheet
- Draw orthographic Views

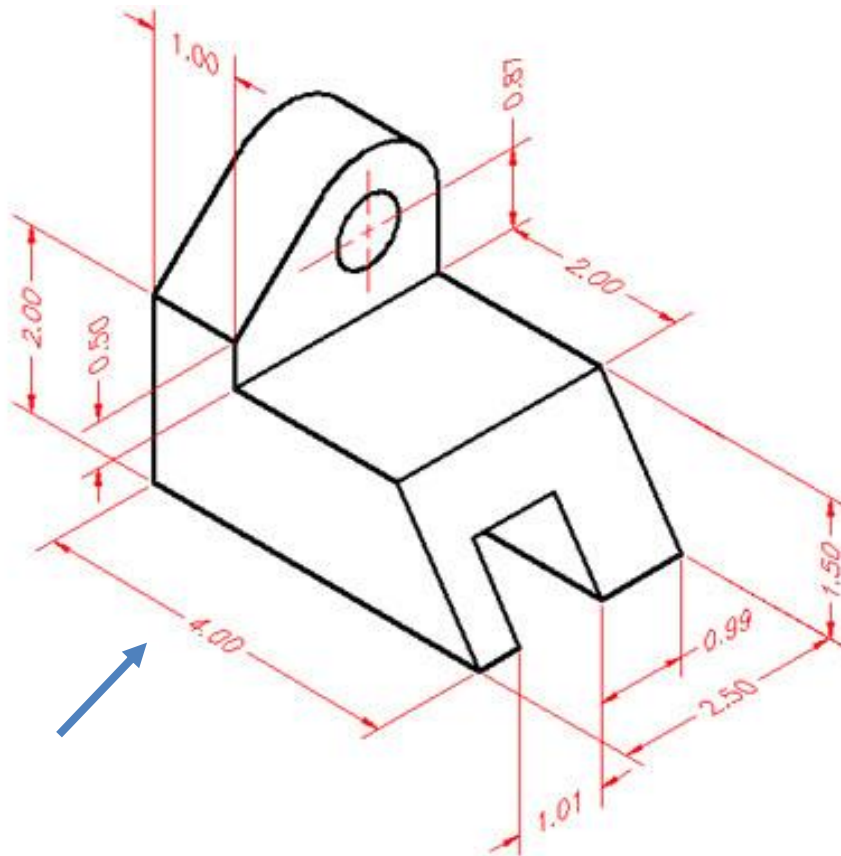
**Orthographic View**





**Exercise**

Draw orthographic view of following object by Third Angle Projection.

**Note**

- Use A3 drawing sheet
- Scale your drawing as per object size
- Attach it in your Engineering Drawing portfolio.

**NED University of Engineering & Technology**  
**Department of Electrical Engineering**



Course Code: **EE-156**

Course Title: **Engineering Drawing**

Laboratory Session No.: \_\_\_\_\_

Date: \_\_\_\_\_

<b>Psychomotor Domain Assessment Rubric for Laboratory (Level P3)</b>					
Skill(s) to be assessed	Extent of Achievement				
	0	1	2	3	4
<b>Clarity of design</b>  10%	Drawing is incorrect.  0	Drawing is not clear and is not obvious about what the product is.  10	Drawing is clear but not reflective of what the product is.  20	Drawing is clear and reflects what product is.  30	Drawing is clear and reflects what the product is.  40
<b>Proper Spacing</b>  10%	Space is not properly used.  0	25% Space is used properly to display drawing.  10	50% Space is used properly to display drawing.  20	80% Space is used to display the final drawing in a professional manner.  30	Drawing has an excellent appearance. Space is used to display the final drawing in a professional manner.  40
<b>Proper Scaling</b>  10%	Not drawn to scale.  0	Few dimensions are drawn according to scale  10	Half of dimensions are drawn according to scale  20	Many of the dimensions are drawn according to scale  30	All dimensions are drawn according to scale  40
<b>Dimensions</b>  10%	Improper and/or unnecessary dimensioning  0	25% of dimensions are done correctly.  10	50% of dimensions are done correctly.  20	80% of dimensions are done correctly.  30	All-important dimensions are shown on the drawing. Dimensions are correct.  40
<b>Orthographic/ Isometric/ section view</b>  40%	Views are not projected.  0	All views are projected, but are incorrect.  40	2 views are projected incorrectly  80	1 view is projected incorrectly.  120	All views are projected correctly.  160
<b>Graphically accurate</b>  20%	The drawing views provided are incorrect.  0	25% drawing views provided are sufficient, correct or appropriate.  20	50% of drawing views provided are sufficient, correct or appropriate.  40	80% of Drawing views provided are sufficient, correct or appropriate.  60	Drawing views provided are sufficient, correct and appropriate.  80

Total Points (out of 400)	
Weighted CLO (Psychomotor Score)	(Points/4)
Remarks	
Instructor's Signature with Date	

## **LAB SESSION 06**

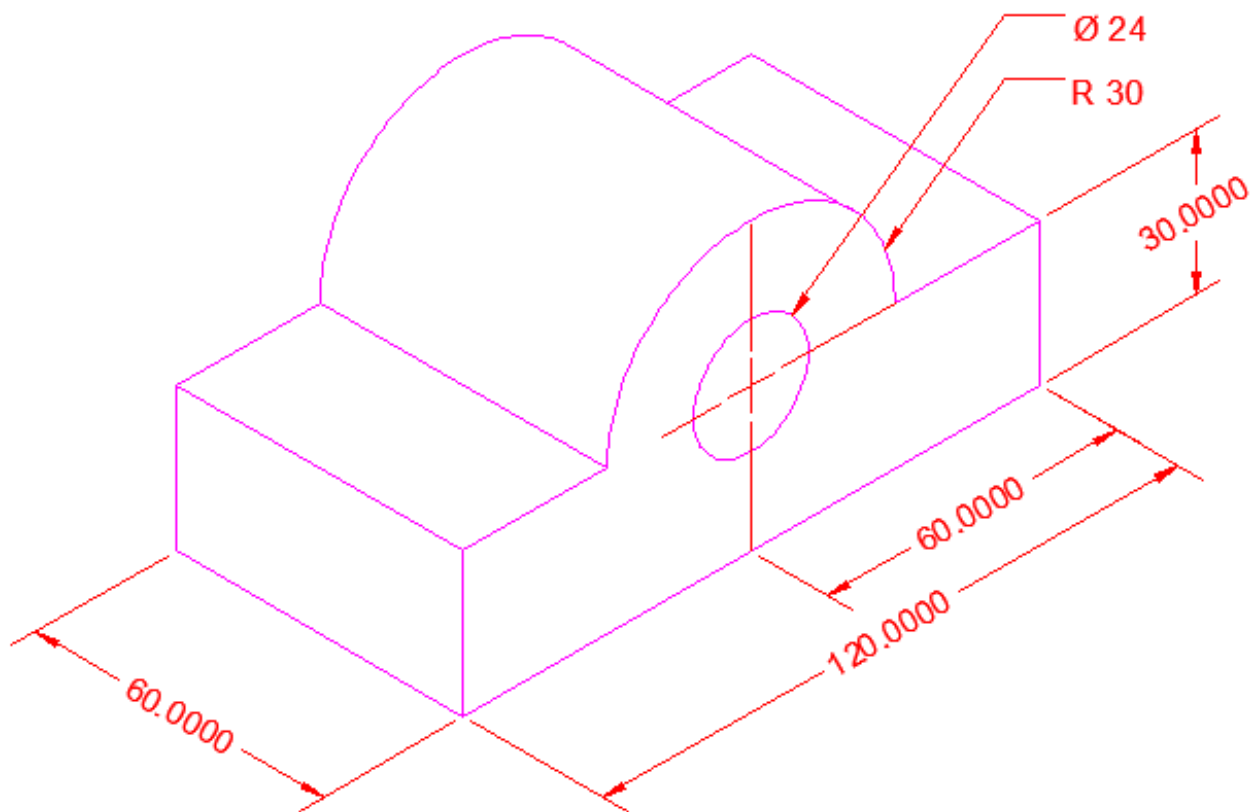
### **Orthographic Views**

#### **OBJECTIVE**

*To draw orthographic views of curved planes by Third Angle Projection*

**Location: Drawing Hall**

#### **Lab Practice**

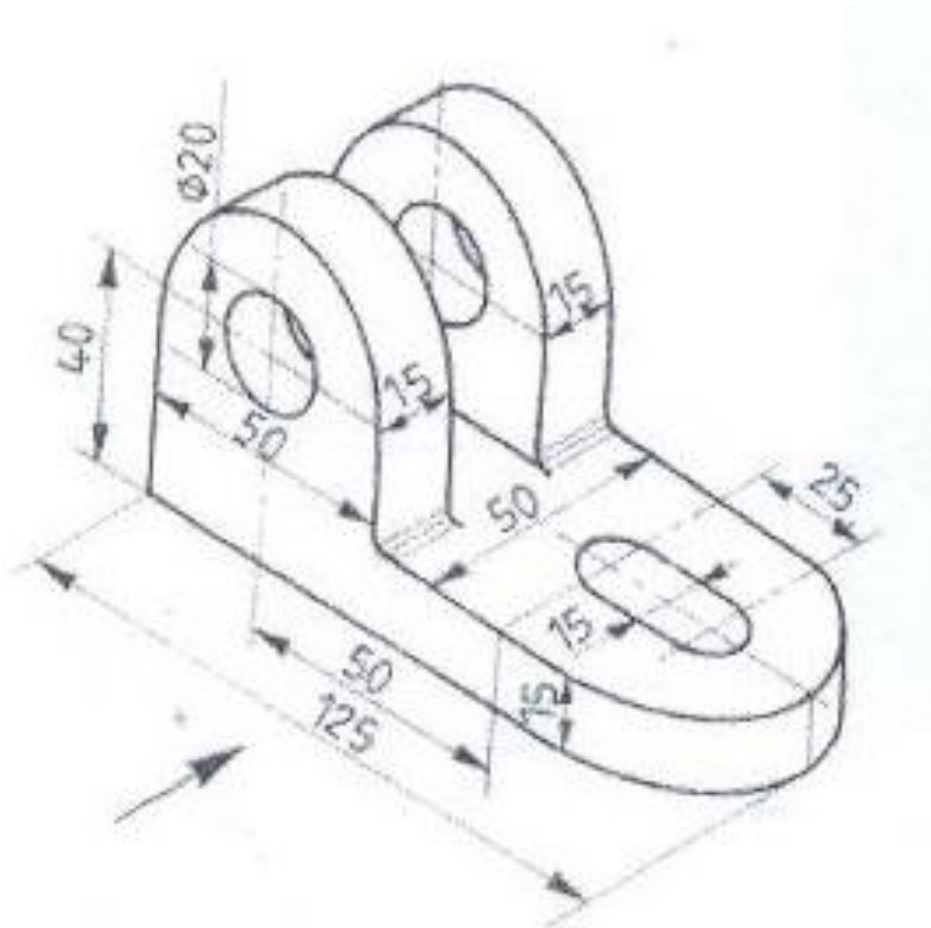


#### **Learning Outcomes**

- Practice of orthographic view
- Understanding of hidden lines
- Understanding of curved surfaces from Isometric views

**Exercise**

Draw orthographic view of following object by third Angel Projection



**Note**

- Use A3 drawing sheet
- Scale your drawing as per object size
- Attach it in your Engineering Drawing portfolio.

**NED University of Engineering & Technology**  
**Department of Electrical Engineering**



Course Code: **EE-156**

Course Title: **Engineering Drawing**

Laboratory Session No.: \_\_\_\_\_

Date: \_\_\_\_\_

<b>Psychomotor Domain Assessment Rubric for Laboratory (Level P3)</b>					
Skill(s) to be assessed	Extent of Achievement				
	0	1	2	3	4
<b>Clarity of design</b>  <div>10%</div>	Drawing is incorrect. <div>0</div>	Drawing is not clear and is not obvious about what the product is. <div>10</div>	Drawing is clear but not reflective of what the product is. <div>20</div>	Drawing is clear and reflects what product is. <div>30</div>	Drawing is clear and reflects what the product is. <div>40</div>
<b>Proper Spacing</b>  <div>10%</div>	Space is not properly used. <div>0</div>	25% Space is used properly to display drawing. <div>10</div>	50% Space is used properly to display drawing. <div>20</div>	80% Space is used to display the final drawing in a professional manner. <div>30</div>	Drawing has an excellent appearance. Space is used to display the final drawing in a professional manner. <div>40</div>
<b>Proper Scaling</b>  <div>10%</div>	Not drawn to scale. <div>0</div>	Few dimensions are drawn according to scale <div>10</div>	Half of dimensions are drawn according to scale <div>20</div>	Many of the dimensions are drawn according to scale <div>30</div>	All dimensions are drawn according to scale <div>40</div>
<b>Dimensions</b>  <div>10%</div>	Improper and/or unnecessary dimensioning <div>0</div>	25% of dimensions are done correctly. <div>10</div>	50% of dimensions are done correctly. <div>20</div>	80% of dimensions are done correctly. <div>30</div>	All-important dimensions are shown on the drawing. Dimensions are correct. <div>40</div>
<b>Orthographic/ Isometric/ section view</b>  <div>40%</div>	Views are not projected. <div>0</div>	All views are projected, but are incorrect. <div>40</div>	2 views are projected incorrectly <div>80</div>	1 view is projected incorrectly. <div>120</div>	All views are projected correctly. <div>160</div>
<b>Graphically accurate</b>  <div>20%</div>	The drawing views provided are incorrect. <div>0</div>	25% drawing views provided are sufficient, correct or appropriate. <div>20</div>	50% of drawing views provided are sufficient, correct or appropriate. <div>40</div>	80% of Drawing views provided are sufficient, correct or appropriate. <div>60</div>	Drawing views provided are sufficient, correct and appropriate. <div>80</div>

Total Points (out of 400)	
Weighted CLO (Psychomotor Score)	(Points/4)
Remarks	
Instructor's Signature with Date	

## **LAB SESSION 07**

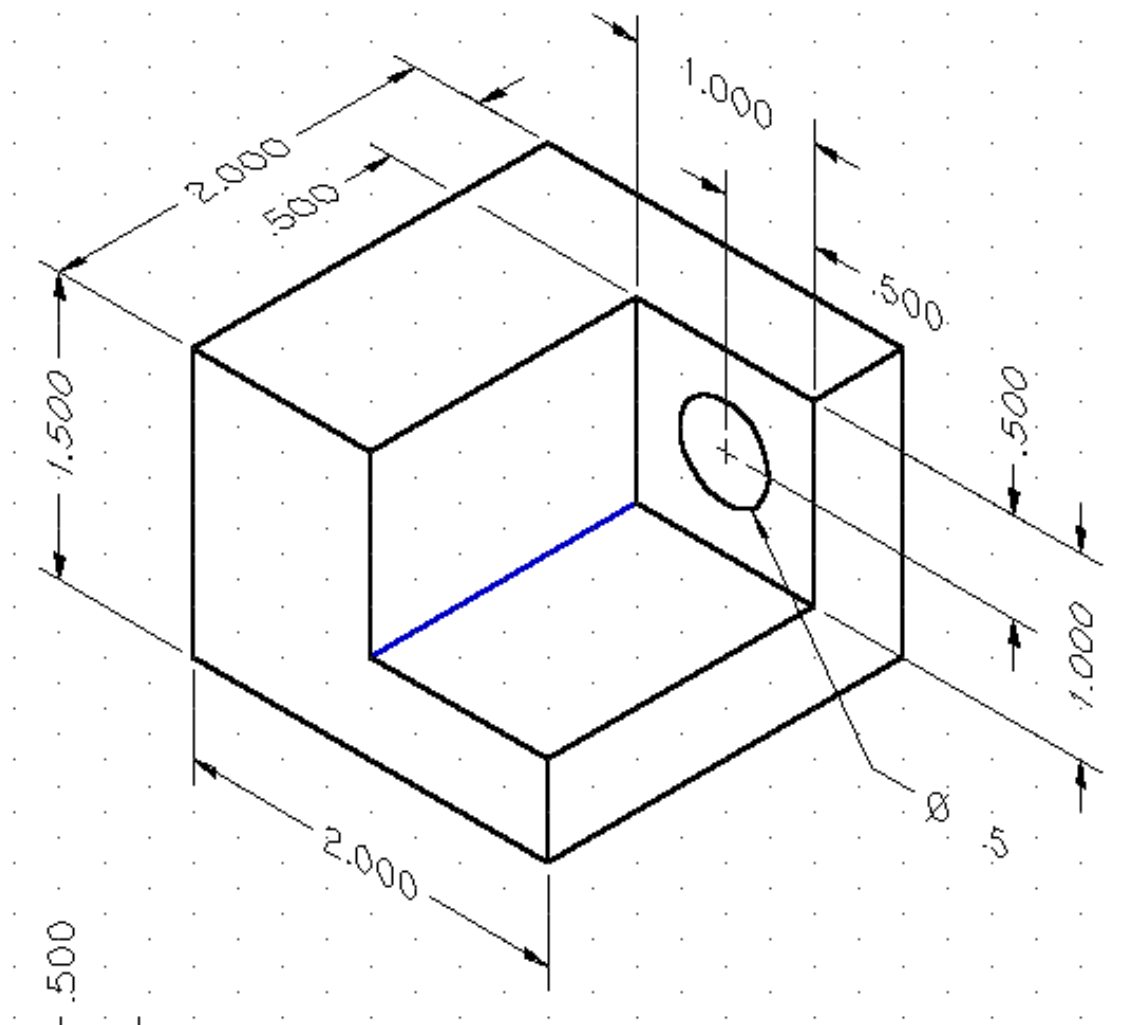
### **Isometric View**

#### **OBJECTIVE**

*To draw Isometric view of object using parallel lines concept*

**Location: Drawing Hall**

#### **Lab Practice**

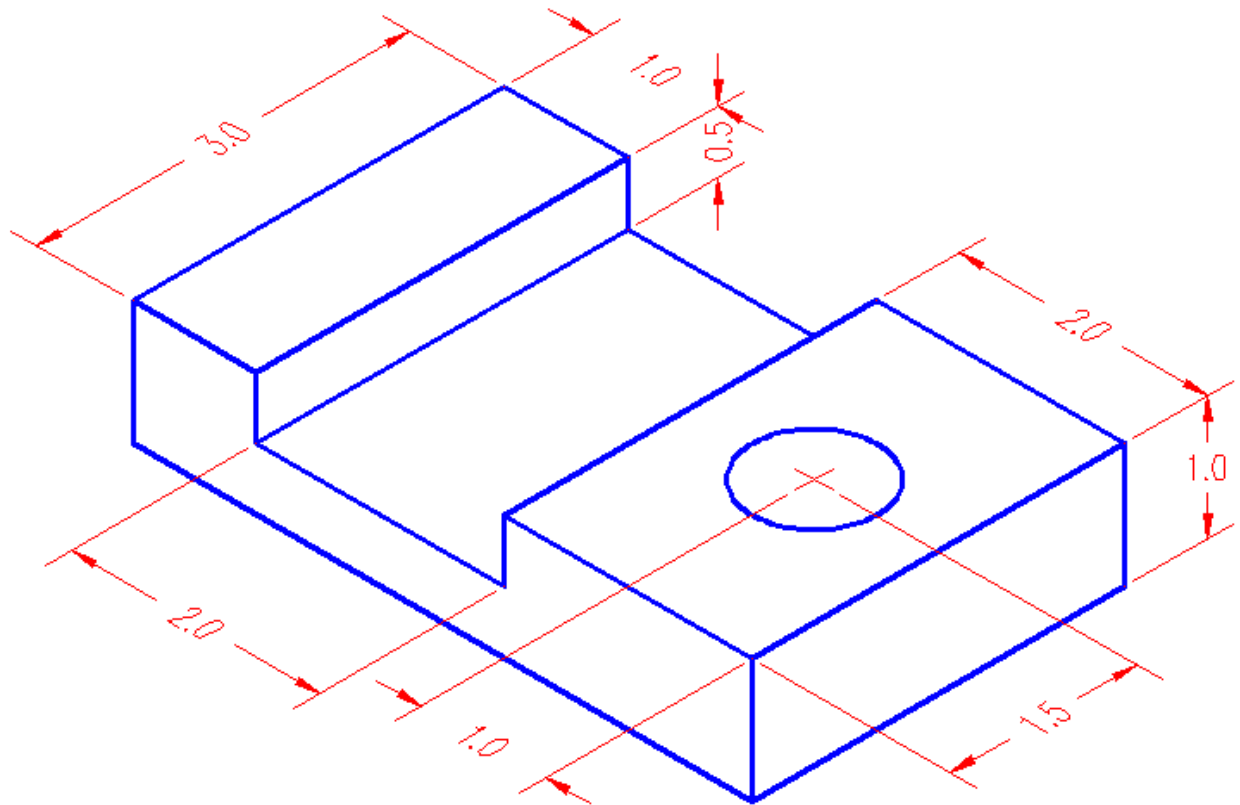


#### **Learning Outcome**

- Practice of Isometric view with drawing instruments
- Practice of parallel lines using T-Square and Set-Square
- Understand and Practice of Dimensions on Drawing Sheet

**Exercise**

Draw Isometric View of following object



**Note**

- Use A3 drawing sheet
- Scale your drawing as per object size
- Attach it in your Engineering Drawing portfolio.

**NED University of Engineering & Technology**  
**Department of Electrical Engineering**



Course Code: **EE-156**

Course Title: **Engineering Drawing**

Laboratory Session No.: \_\_\_\_\_

Date: \_\_\_\_\_

<b>Psychomotor Domain Assessment Rubric for Laboratory (Level P3)</b>					
Skill(s) to be assessed	Extent of Achievement				
	0	1	2	3	4
<b>Clarity of design</b>  <div>10%</div>	Drawing is incorrect. <div>0</div>	Drawing is not clear and is not obvious about what the product is. <div>10</div>	Drawing is clear but not reflective of what the product is. <div>20</div>	Drawing is clear and reflects what product is. <div>30</div>	Drawing is clear and reflects what the product is. <div>40</div>
<b>Proper Spacing</b>  <div>10%</div>	Space is not properly used. <div>0</div>	25% Space is used properly to display drawing. <div>10</div>	50% Space is used properly to display drawing. <div>20</div>	80% Space is used to display the final drawing in a professional manner. <div>30</div>	Drawing has an excellent appearance. Space is used to display the final drawing in a professional manner. <div>40</div>
<b>Proper Scaling</b>  <div>10%</div>	Not drawn to scale. <div>0</div>	Few dimensions are drawn according to scale <div>10</div>	Half of dimensions are drawn according to scale <div>20</div>	Many of the dimensions are drawn according to scale <div>30</div>	All dimensions are drawn according to scale <div>40</div>
<b>Dimensions</b>  <div>10%</div>	Improper and/or unnecessary dimensioning <div>0</div>	25% of dimensions are done correctly. <div>10</div>	50% of dimensions are done correctly. <div>20</div>	80% of dimensions are done correctly. <div>30</div>	All-important dimensions are shown on the drawing. Dimensions are correct. <div>40</div>
<b>Orthographic/ Isometric/ section view</b>  <div>40%</div>	Views are not projected. <div>0</div>	All views are projected, but are incorrect. <div>40</div>	2 views are projected incorrectly <div>80</div>	1 view is projected incorrectly. <div>120</div>	All views are projected correctly. <div>160</div>
<b>Graphically accurate</b>  <div>20%</div>	The drawing views provided are incorrect. <div>0</div>	25% drawing views provided are sufficient, correct or appropriate. <div>20</div>	50% of drawing views provided are sufficient, correct or appropriate. <div>40</div>	80% of Drawing views provided are sufficient, correct or appropriate. <div>60</div>	Drawing views provided are sufficient, correct and appropriate. <div>80</div>

Total Points (out of 400)	
Weighted CLO (Psychomotor Score)	(Points/4)
Remarks	
Instructor's Signature with Date	



## **LAB SESSION 08**

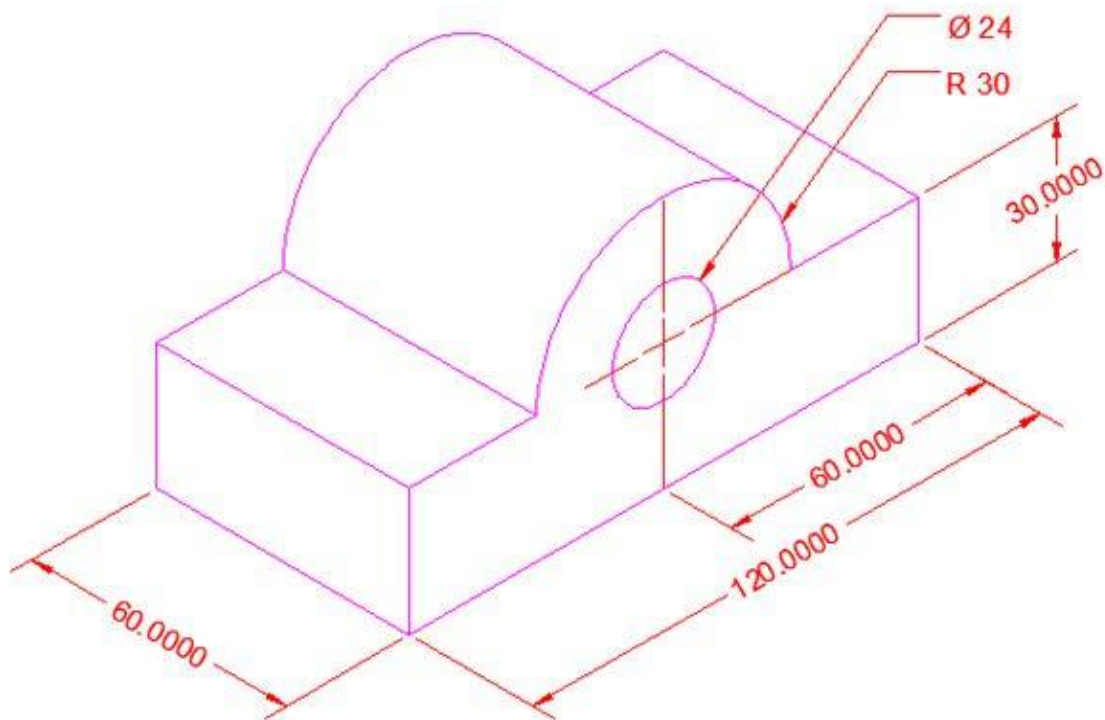
### **Isometric View**

#### **OBJECTIVE**

*To draw Isometric view of curved surfaces using circle projections and layers concept*

**Location: Drawing Hall**

#### **Lab Practice**

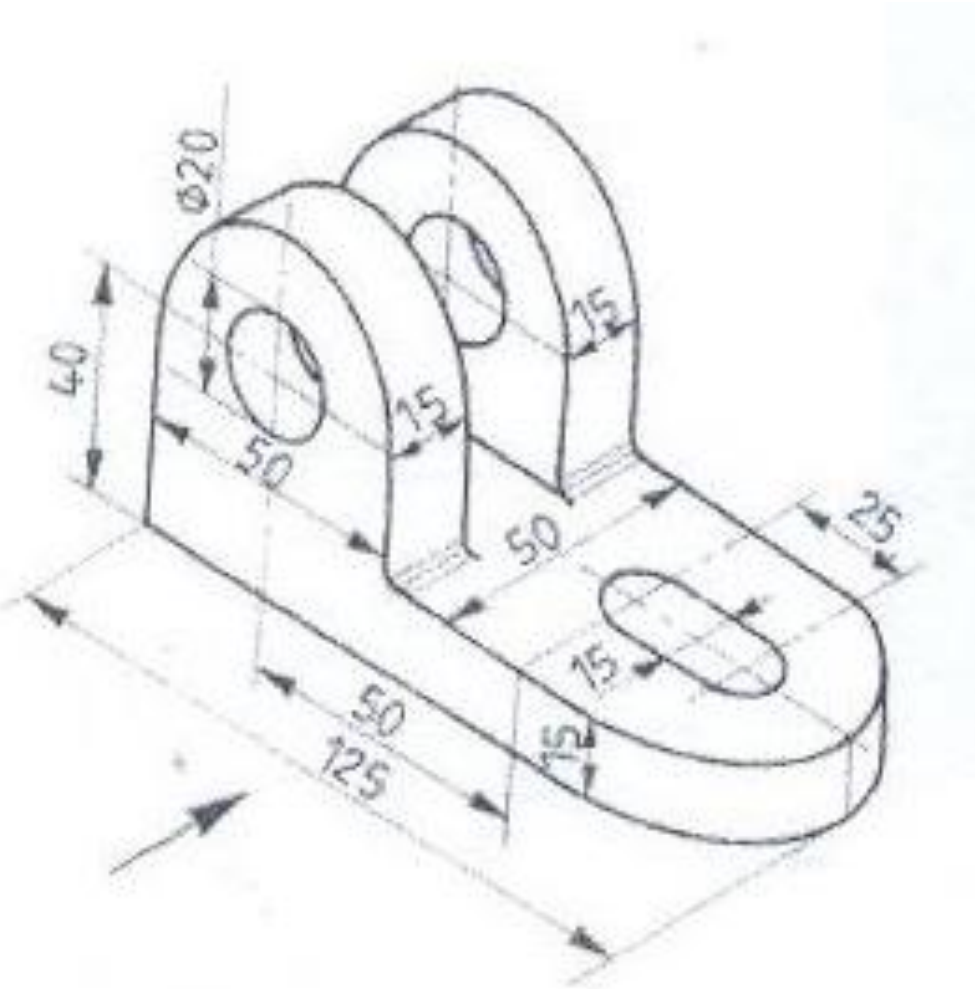


#### **Learning Outcomes**

- Understanding and practice of projections using parallel layers Concept
- Practice of Isometric views on Curved planes

**Exercise**

Draw Isometric View of following object



**Note**

- Use A3 drawing sheet
- Scale your drawing as per object size
- Attach it in your Engineering Drawing portfolio.

## **LAB SESSION 09**

### **Oblique View**

#### **OBJECTIVE**

*To convert an draw Isometric view into oblique view*

**Location: Drawing Hall**

#### **Theory**

Angle of projection in Isometric view is 30 degrees as shown in figure 9.1.

Angle of Projection is 45 degrees in oblique view as shown in Figure 9.2.

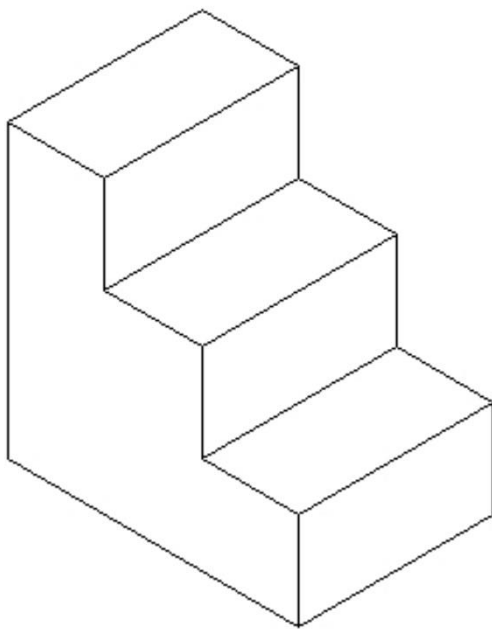


Fig 9.1: Isometric View

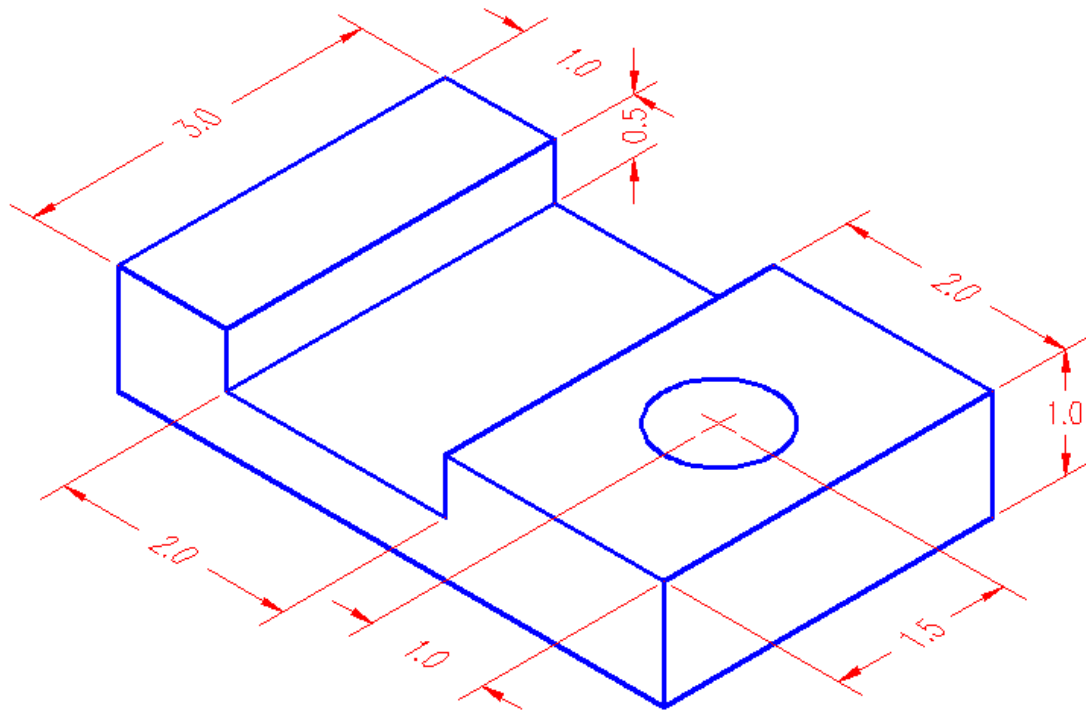
**Lab Practice**

Fig 9.2: Oblique View

**Learning Outcomes**

- Understanding on Pictorial drawings on 45 degree
- Practice of Oblique view

**Exercise**

Draw oblique view of an object of Lab session 08.

**Note**

- Use A3 drawing sheet
- Scale your drawing as per object size
- Attach it in your Engineering Drawing portfolio.

## LAB SESSION 10

### Home Electrical Layout Plan

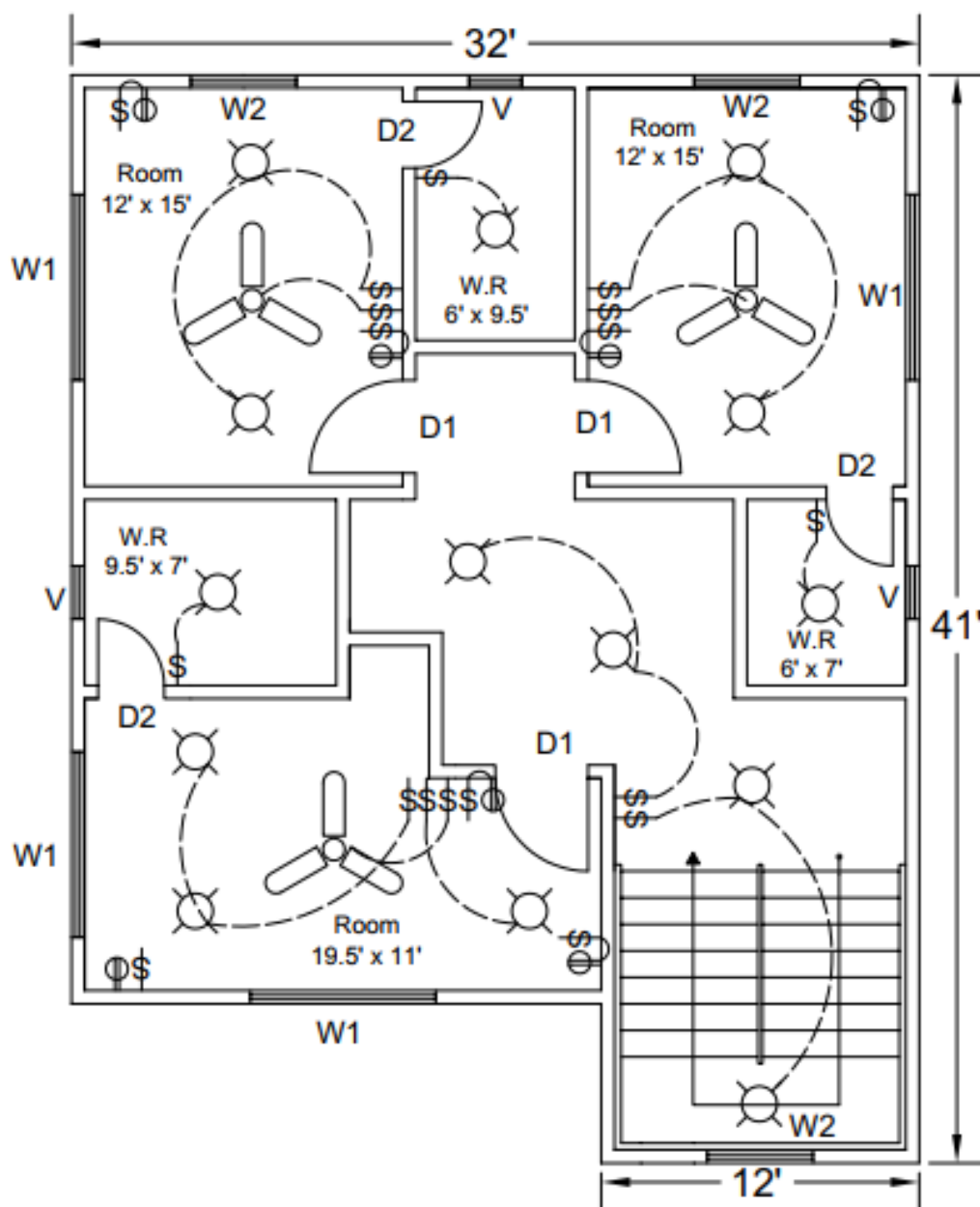
#### **OBJECTIVE**

*To understand and draw electrical wiring of home*

**Location: Computer Lab**

#### **Lab Practice**

Make electrical wiring diagram of following layout plan.



Size of doors, windows and ventilators are mentioned below,

D1 = 3.5' x 7'

D2 = 2.5' x 7'

W1 = 7' x 4'

W2 = 4' x 4'

V = 2' x 2'

**Learning Outcomes**

- Understanding of electrical wiring
- Understanding lighting circuits and switching
- Understanding of power plans and sockets outlets

**Exercise**

Electrify the civil layout plan of your house.

**Note**

- Mention legends of electrical symbols used
- Take print out of task and attach it in your Engineering Drawing portfolio.

**NED University of Engineering & Technology**  
**Department of Electrical Engineering**



Course Code: **EE-156**

Course Title: **Engineering Drawing**

Laboratory Session No.: \_\_\_\_\_

Date: \_\_\_\_\_

**Psychomotor Domain Assessment Rubric for Laboratory (Level P3)**

Skill(s) to be assessed	Extent of Achievement				
	0	1	2	3	4
<b>Software Menu Identification and Usage:</b> Ability to initialise, configure and <u>operate</u> software environment <u>under supervision</u> , using menus, shortcuts, instructions etc. [10%]	Unable to understand and use software menu 0	Little ability and understanding of software menu operation, makes many mistake 10	Moderate ability and understanding of software menu operation, makes lesser mistakes 20	Reasonable understanding of software menu operation, makes no major mistakes 30	Demonstrates command over software menu usage with frequent use of advance menu options 40
<b>Transforming Physical Specifications into CAD Parameters:</b> Ability to <u>perceive</u> conversion of physical dimensions into CAD software parameters [15%]	Completely unable to understand and transform physical dimensions into CAD parameters 0	Slightly able to understand and transform physical dimensions into CAD parameters 15	Somewhat able to understand and transform physical dimensions into CAD parameters 30	Moderately able to understand and transform physical dimensions into CAD parameters 45	Fully able to understand and transform physical dimensions into CAD parameters 60
<b>Use of Input and Output Devices:</b> Receiving <u>Sensory</u> input from computer screen and effectively <u>handling</u> input devices for software interface [15%]	Not able to use mouse and keyboard effectively in accordance of visual input from screen 0	Rarely uses mouse and keyboard effectively in accordance of visual input from screen 15	Occasionally uses mouse and keyboard effectively in accordance of visual input from screen 30	Often uses mouse and keyboard effectively in accordance of visual input from screen 45	Handles mouse and keyboard effectively in accordance of visual input from screen 60
<b>Detecting and Removing Errors:</b> <u>Detect</u> Errors/Exceptions and in CAD model and remove them [15%]	Unable to check and detect error messages and indications in software 0	Able to find error messages and indications in software but no understanding of detecting those errors and their types 15	Able to find error messages and indications in software as well as understanding of detecting some of those errors and their types 30	Able to find error messages/indication in software as well as understanding of detecting all of those errors and their types 45	Able to find error messages/indication in software along with the understanding to detect and rectify them 60

Psychomotor Domain Assessment Rubric for Laboratory (Level P3)					
Skill(s) to be assessed	Extent of Achievement				
	0	1	2	3	4
<b>Understanding CAD Symbols and their Interconnection:</b> <u>Recognise</u> and <u>recall</u> CAD symbols and their interconnection 15%	Unable to recognise and recall any CAD symbol and their inter-connection 0	Recognises and recalls only a few CAD symbols and their inter-connection 15	Recognises and recalls many CAD symbols and their inter-connection 30	Recognises and recalls most CAD symbols and their inter-connection 45	Recognises and recalls all CAD symbols and their inter-connection 60
<b>Following step-by-step procedure to complete lab work:</b> <u>Observe, imitate and operate</u> software to complete the provided sequence of steps 10%	Inability to recognise and perform given lab procedures 0	Able to recognise given lab procedures and perform them but could not follow the prescribed order of steps 10	Able to recognise given lab procedures and perform them by following prescribed order of steps, with frequent mistakes 20	Able to recognise given lab procedures and perform them by following prescribed order of steps, with occasional mistakes 30	Able to recognise given lab procedures and perform them by following prescribed order of steps, with no mistakes 40
<b>Recording/Saving Visual Output from CAD Software:</b> <u>Recognise</u> the prescribed output file format and manipulate software features to save and print required output file 10%	Inability to recognise prescribed output file format 0	Able to recognise prescribed output file format but does not record according to given instructions 10	—	Able to recognise prescribed output file format but records it incompletely or erroneously 30	Able to recognise prescribed output file format and records it completely and error free 40
<b>Incorporating Civil Plan and Electrical SLD in CAD Software:</b> <u>Demonstrate</u> skills to incorporate knowledge of Civil Plans and Electrical SLD into CAD Software 10%	Unable to remember or recall concepts of Civil Plan and Electrical SLD 0	Able to remember and recall most concepts of Civil Plan and Electrical SLD, but unable to design them in CAD 10	—	Able to remember and recall most concepts of Civil Plan and Electrical SLD, also unable to design them in CAD with some mistakes and errors 30	Able to remember and recall most concepts of Civil Plan and Electrical SLD, also able to design them in CAD with no mistakes or errors 40

Total Points (out of 400)	
Weighted CLO (Psychomotor Score)	(Points/4)
Remarks	
Instructor's Signature with Date	



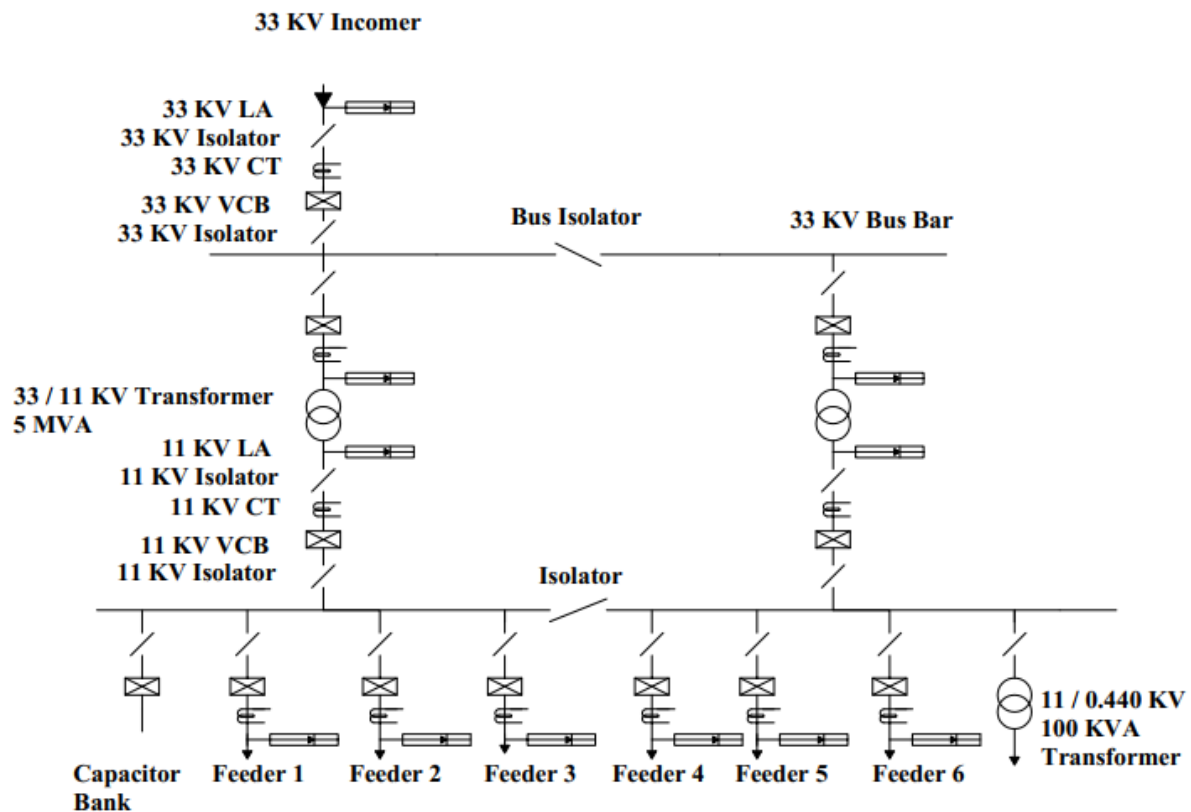
**LAB SESSION 11****Single Line Diagram****OBJECTIVE**

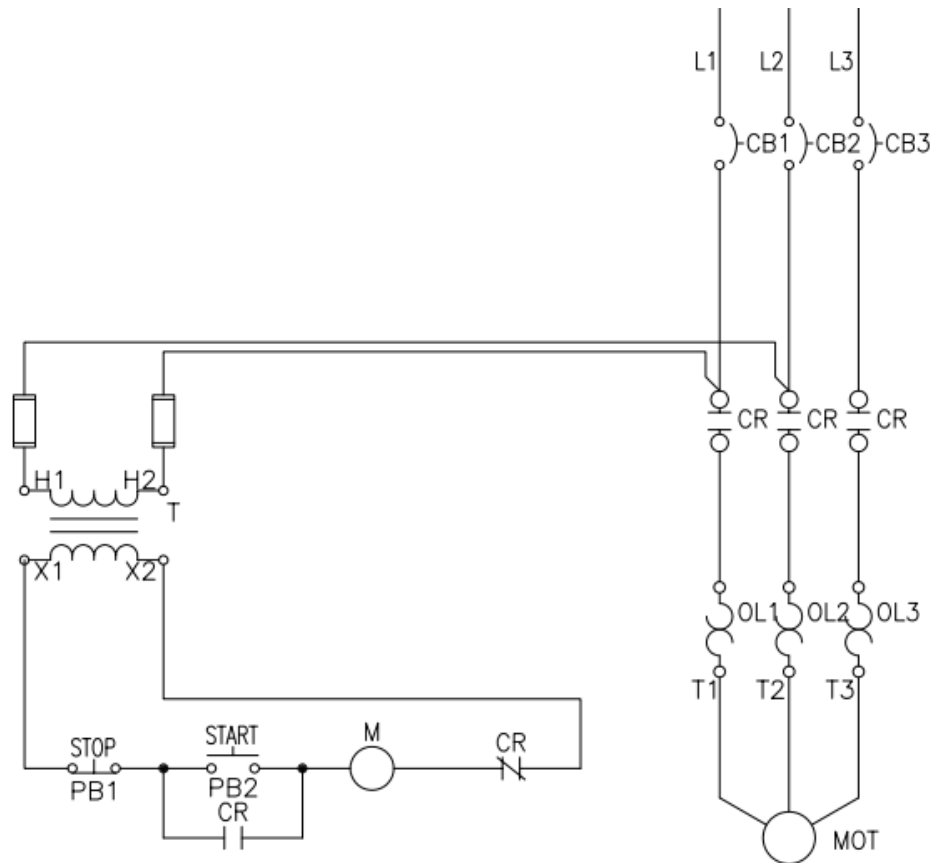
*To understand the purpose of Single Line Diagram*

**Location: Computer Lab**

**Theory**

It is diagram that uses single lines and graphic symbols to indicate the path and components of an electrical circuit.





### **Learning Outcomes**

- Understanding of electrical symbols used in Single line diagram
- Understanding of purpose of Single line Diagram
- Understanding of single line diagrams of industrial buildings and substations as explained during Lab.
- Understanding of control diagrams and their operation

### **Exercise**

Draw Single line diagram of your home from utility connection to final electrical load.

**NED University of Engineering & Technology**  
**Department of Electrical Engineering**



Course Code: **EE-156**

Course Title: **Engineering Drawing**

Laboratory Session No.: \_\_\_\_\_

Date: \_\_\_\_\_

**Psychomotor Domain Assessment Rubric for Laboratory (Level P3)**

Skill(s) to be assessed	Extent of Achievement				
	0	1	2	3	4
<b>Software Menu Identification and Usage:</b> Ability to initialise, configure and <u>operate</u> software environment <u>under supervision</u> , using menus, shortcuts, instructions etc. <b>10%</b>	Unable to understand and use software menu <b>0</b>	Little ability and understanding of software menu operation, makes many mistake <b>10</b>	Moderate ability and understanding of software menu operation, makes lesser mistakes <b>20</b>	Reasonable understanding of software menu operation, makes no major mistakes <b>30</b>	Demonstrates command over software menu usage with frequent use of advance menu options <b>40</b>
<b>Transforming Physical Specifications into CAD Parameters:</b> Ability to <u>perceive</u> conversion of physical dimensions into CAD software parameters <b>15%</b>	Completely unable to understand and transform physical dimensions into CAD parameters <b>0</b>	Slightly able to understand and transform physical dimensions into CAD parameters <b>15</b>	Somewhat able to understand and transform physical dimensions into CAD parameters <b>30</b>	Moderately able to understand and transform physical dimensions into CAD parameters <b>45</b>	Fully able to understand and transform physical dimensions into CAD parameters <b>60</b>
<b>Use of Input and Output Devices:</b> Receiving <u>Sensory</u> input from computer screen and effectively <u>handling</u> input devices for software interface <b>15%</b>	Not able to use mouse and keyboard effectively in accordance of visual input from screen <b>0</b>	Rarely uses mouse and keyboard effectively in accordance of visual input from screen <b>15</b>	Occasionally uses mouse and keyboard effectively in accordance of visual input from screen <b>30</b>	Often uses mouse and keyboard effectively in accordance of visual input from screen <b>45</b>	Handles mouse and keyboard effectively in accordance of visual input from screen <b>60</b>
<b>Detecting and Removing Errors:</b> <u>Detect</u> Errors/Exceptions and in CAD model and remove them <b>15%</b>	Unable to check and detect error messages and indications in software <b>0</b>	Able to find error messages and indications in software but no understanding of detecting those errors and their types <b>15</b>	Able to find error messages and indications in software as well as understanding of detecting some of those errors and their types <b>30</b>	Able to find error messages/indication in software as well as understanding of detecting all of those errors and their types <b>45</b>	Able to find error messages/indication in software along with the understanding to detect and rectify them <b>60</b>

Psychomotor Domain Assessment Rubric for Laboratory (Level P3)					
Skill(s) to be assessed	Extent of Achievement				
	0	1	2	3	4
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<b>Following step-by-step procedure to complete lab work:</b> <u>Observe, imitate and operate</u> software to complete the provided sequence of steps 10%	Inability to recognise and perform given lab procedures 0	Able to recognise given lab procedures and perform them but could not follow the prescribed order of steps 10	Able to recognise given lab procedures and perform them by following prescribed order of steps, with frequent mistakes 20	Able to recognise given lab procedures and perform them by following prescribed order of steps, with occasional mistakes 30	Able to recognise given lab procedures and perform them by following prescribed order of steps, with no mistakes 40
<b>Recording/Saving Visual Output from CAD Software:</b> <u>Recognise</u> the prescribed output file format and manipulate software features to save and print required output file 10%	Inability to recognise prescribed output file format 0	Able to recognise prescribed output file format but does not record according to given instructions 10	—	Able to recognise prescribed output file format but records it incompletely or erroneously 30	Able to recognise prescribed output file format and records it completely and error free 40
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Total Points (out of 400)	
Weighted CLO (Psychomotor Score)	(Points/4)
Remarks	
Instructor's Signature with Date	

## **LAB SESSION 12**

### **Extension Board**

**Task 1: Prepare** the extension board that

1. can run at least 10A load in total.
2. can run at least three loads at a time
3. must have current protection device
4. contain safety measures in order to prevent electrical hazards

**Task 2: Sketch** the wiring diagram of the above extension board.

## Cover Page for Each PBL/OEL

<b>Course Code:</b>	EE-156
<b>Course Name:</b>	Engineering Drawing
<b>Semester:</b>	Spring
<b>Year:</b>	FE
<b>Section:</b>	
<b>Batch:</b>	
<b>Lab Instructor name:</b>	
<b>Submission deadline:</b>	

### PBL or OEL Statement:

1. Prepare the Extension board.
2. Sketch the wiring diagram of above extension board.

### Deliverables:

The extension board,

1. can run at least 10A load in total.
2. can run at least 3 loads at a time
3. must have current protection device.
4. contain safety measures to prevent electrical hazards.

### Methodology:

Calculate the load current and then select the appropriate wire, switches, sockets, and other required equipment accordingly.

### Guidelines:

Check the wiring connection 2 to 3 times to avoid any electrical hazard.

**Rubrics:**

Standard lab rubrics for ED lab. Evaluation through demonstration & viva.

**NED University of Engineering & Technology**  
**Department of Electrical Engineering**



Course Code: **EE-156**

Course Title: **Engineering Drawing**

Laboratory Session No.: \_\_\_\_\_

Date: \_\_\_\_\_

**Psychomotor Domain Assessment Rubric for Laboratory (Level P3)**

Skill(s) to be assessed	Extent of Achievement				
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Psychomotor Domain Assessment Rubric for Laboratory (Level P3)					
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Remarks	
Instructor's Signature with Date	

**NED University of Engineering & Technology**  
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Course Code: **EE-156**

Course Title: **Engineering Drawing**

Laboratory Session No.: \_\_\_\_\_

Date: \_\_\_\_\_

<b>Psychomotor Domain Assessment Rubric for Laboratory (Level P3)</b>					
Skill(s) to be assessed	Extent of Achievement				
	0	1	2	3	4
<b>Clarity of design</b>  <div>10%</div>	Drawing is incorrect. <div>0</div>	Drawing is not clear and is not obvious about what the product is. <div>10</div>	Drawing is clear but not reflective of what the product is. <div>20</div>	Drawing is clear and reflects what product is. <div>30</div>	Drawing is clear and reflects what the product is. <div>40</div>
<b>Proper Spacing</b>  <div>10%</div>	Space is not properly used. <div>0</div>	25% Space is used properly to display drawing. <div>10</div>	50% Space is used properly to display drawing. <div>20</div>	80% Space is used to display the final drawing in a professional manner. <div>30</div>	Drawing has an excellent appearance. Space is used to display the final drawing in a professional manner. <div>40</div>
<b>Proper Scaling</b>  <div>10%</div>	Not drawn to scale. <div>0</div>	Few dimensions are drawn according to scale <div>10</div>	Half of dimensions are drawn according to scale <div>20</div>	Many of the dimensions are drawn according to scale <div>30</div>	All dimensions are drawn according to scale <div>40</div>
<b>Dimensions</b>  <div>10%</div>	Improper and/or unnecessary dimensioning <div>0</div>	25% of dimensions are done correctly. <div>10</div>	50% of dimensions are done correctly. <div>20</div>	80% of dimensions are done correctly. <div>30</div>	All-important dimensions are shown on the drawing. Dimensions are correct. <div>40</div>
<b>Orthographic/ Isometric/ section view</b>  <div>40%</div>	Views are not projected. <div>0</div>	All views are projected, but are incorrect. <div>40</div>	2 views are projected incorrectly <div>80</div>	1 view is projected incorrectly. <div>120</div>	All views are projected correctly. <div>160</div>
<b>Graphically accurate</b>  <div>20%</div>	The drawing views provided are incorrect. <div>0</div>	25% drawing views provided are sufficient, correct or appropriate. <div>20</div>	50% of drawing views provided are sufficient, correct or appropriate. <div>40</div>	80% of Drawing views provided are sufficient, correct or appropriate. <div>60</div>	Drawing views provided are sufficient, correct and appropriate. <div>80</div>

Total Points (out of 400)	
Weighted CLO (Psychomotor Score)	(Points/4)
Remarks	
Instructor's Signature with Date	