

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING
ANDHRA PRADESH :: VIJAYAWADA**



DIPLOMA IN ELECTRICAL & ELECTRONICS ENGINEERING

III SEMESTER

ELECTRICAL CAD LABORATORY (EE-309B)

MANUAL (AS PER C-20 CURRICULUM)

INTRODUCTION

1.0 INTRODUCTION

The Curriculum of Technical Education should invariably provide for knowledge, attitudes and skills required by the technicians /technologists in the country. In this context the laboratory courses form a vital portion in the entire curriculum of technician education. The laboratory courses shall therefore be so designed and delivered that they help the students acquire attitudes and motor skills that are essential to function effectively as technicians/technologists.

The planning, organization and implementation of lab courses need a detailed description of tasks to be performed by the students. Well thought out instructional objectives to a large extent give these descriptions. The analysis of tasks (by identifying the activities the students are expected to do) help prepare the objectives meticulously. In other words the objectives would be clearer, when the task analysis is done to spell out the sub tasks for each objective.

A survey of the practices currently followed in the technical/technician education shows an urgent need to plug in gaps in instructional procedures. The reasons for these gaps are ambiguity in the minds of the teachers regarding tasks to be performed, levels of competency to be achieved by the students and the weightage to be allocated for each task. This aids in scientific design of instructional plan (optimizing the resources, budgeting the time & content).

The task analysis, teaching points and the structured scheme of evaluation are very important in focusing the instruction on specific skill of desired outcome and in evaluating the same. The Instruction and evaluation in Laboratory courses are different from that of cognitive lessons in the sense that adequate importance and hence weightage needs to be given for all three domains of learning viz. cognitive, psychomotor and affective. Since both training and evaluation of traits of affective domain are practically difficult, a few traits (called values) most relevant and essential to occupations/professions after the Course may be identified for the purpose. It is imperative to integrate these values during instruction and evaluation and also overtly notify the same to the students.

A technician, in addition to performing a skill needs to prepare a report of testing that includes the description of procedure, details of measurements made, reasoning based inferences and so on.,. The current practice of record writing has failed to achieve this purpose as most of the time students end up with making copies of available material.

Therefore, for sensitizing the need for the changes in laboratory instruction, the present hand book has been prepared to meet the above requirements. As such the hand book comprises four parts that intend to :

- Present task analysis, teaching points which can be used for effective design of instruction
- Provide a scheme of evaluation with rationally allocated weightage to each significant skill component
- Offer a set of questions designed at different levels of competencies for assessment enabling the teacher to set the question paper with balanced levels of competencies
- Present pre set worksheets that cultivate the habit of systematic recording of observations and writing the technical report.
- Provide all important data related to particular laboratory activity at one point in the form of annexure

1.1. STRUCTURE OF THE BOOK

The hand book is presented in four parts viz., Laboratory sheets, Worksheet, Experimental Methodology and Annexure. The description of each part is given in the following sections

Part I. Laboratory Sheet

The information provided in this part is useful for the teacher for designing the instruction, planning & organization of the experiment and for scientific evaluation of the students. The major features of the Laboratory sheet are further explained below.

1. Objective

It indicates the **Task** to be performed and completed by the student during the specified duration of time.

2. Task Analysis

It is the process of identifying the component activities (sub tasks) to be carried out by the student in order to achieve the stipulated objective. As the task analysis aim at fitting the instructional objectives into various classes of behaviour, it would help the teacher to determine any particular type of behaviour the student has learnt / failed to perform.

The task analysis would help the teacher in identifying the specific activities to be performed by the students. This could also be used as some kind of check list to compare with activities planned for the laboratory. Further it would give clue to the teacher to make students think originally & act independently. It includes both psychomotor learning and the related cognitive information and hence the task analysis is presented as Knowledge and skill parts.

A. Knowledge Part: That includes the cognitive aspects of the task.

B. Skill Part: That includes Psychomotor & Affective aspects of the task.

3. Teaching Points:

This includes the points based on the SKILL identified with suggested duration for each point and total duration which helps the teacher for the time and content budgeting during instruction.

4. Need and Scope:

The purpose, application and scope of the task to be performed are normally included in this sub section.

5. Planning and Organisation:

It lists actions to be taken to perform various activities and hence useful in planning the instruction and organizing the resources and equipment

6. Scheme of Valuation:

The information provided in this section helps the teacher to devise a tool for rational measurement assessment of the competencies accomplished by the student.

Part II. Work Sheet

It is designed for the student, where in the student enters his personal data of identification, details of the experiment, stepwise procedure, observations made during experiment, a sample calculation, free hand typical graph, graph from experimental data and inference with discussion.

Part III. Experimental Methodology

This section furnishes information with regard to standard procedure to conduct the experiment along with the description of equipment/apparatus and the basic theory/concept involved in the conduct of the experiment. Thus this section is very useful for both teacher and student as well to conduct the experiment systematically. Thus this section is presented in four sub section as described below:

➤ **Description**

It gives the detailed description of apparatus / tools / equipment / materials to be used for the task.

➤ **Theory / Concept**

It gives the concept of the task to be performed with formulae and units.

➤ **Procedure**

It provides the idea of step wise procedure to perform the task.

➤ **Observation and Calculation**

It includes sample observation, sample graph, sample calculation for reference

Part IV. Annexure

All important and useful information that may help in accomplishment of tasks like conversion tables for units, technical & scientific data like material properties, standard trend or characteristic curves (graphs) etc are compiled and presented at one place in this section.

1.2. WHO IS TO USE AND HOW TO USE.

The hand book is so designed that it can be beneficially used by different sections of the technical education viz., the teacher, the student, the examiner and the administrator convenient to individual's requirements. A few uses of this hand book each stakeholder could make is outlined in the following sections.

1. Teacher

A. The **laboratory sheet** is designed keeping the teacher in mind for the teacher has key responsibility of imparting the skills to the student and hence the information given in the lab sheets may be useful for planning & organizing the experimental set up and designing an effective instruction. Thus the teacher may

Plan and organize as per *section 4*,

Instruct the students as per *section 2*,

Demonstrate each sub task as per *section 1.B* and

Evaluate the students as per *section 5*, according to the level of competency.

Values: The values in a person are an important personality trait that needs to be nurtured in the learning environment. Further it is also a driving component in any individual to deliver the best and hence this component is also included in the evaluation. However only five key dimensions, that are important in the teaching-learning environment, are taken into consideration for nurturing and evaluation. A little information about these five dimensions is given below as a guideline for the teacher while assessing students.

1. **Co-operation:** It is the voluntary arrangement in which two or more students engage in a mutually beneficial exchange, instead of competition. Cooperation can happen where resources adequate for both students exist or are created by their interaction.

2. **Co-ordination:** It is the unification, integration, synchronization of the effect of group members so as provide unity of action in the pursuit of common goals. It is an integral element and required in each & every function and at each & every stage & therefore it cannot be separated.

3. **Communication;** Communication skill is the set of skills that enables a student to convey information so that it is received and understood.
4. **Sharing:** A part or portion belonging to, distributed to, contributed by, owed by a person or a group **Or** To participate in, use, enjoy or experience jointly or in turns.

5. **Leadership:** Students with the following leadership qualities are almost always the ones that rise above the crowd.
 1. Trustworthiness: This refers to integrity.
 2. Inspiration: Guides, leads and inspiring others to want to participate in the process of moving towards the vision.
 3. Self awareness: It is the individual awareness of him or her self – their abilities and the impact that they have on others.
 4. Acceptance of responsibility: True leaders are accepting responsibility for all that comes their way and taking ownership and responsibilities for getting things back on track. Blaming, justifying and excuse making just is not in their responsibility.

B. The Experimental methodology is designed for both teacher and student. The teacher can refer the experimental methodology for the details of equipment/apparatus/ materials/tools, procedure to be followed, observations to be made, graphs to be drawn and calculations to be done for the task to be performed

2. Student

The Worksheet is designed keeping in view the needs, deficiencies and the adolescent characteristics of the student for student.

The students submit the filled in work sheet given by the teacher on the day of experiment after referring to experimental methodology and listening to instructions of teacher. The design of the worksheet is made user friendly and the contents are so logically sequenced that the student finds it easy to understand and develop the skill of recording and report writing skill. It also helps the student to actively participate in skill learning. More importantly the student gets immediate meaningful feedback of his performance since the competency wise assessment is done and that too on the same day.

3. Examiner

The examiner may find this hand book very useful as Laboratory sheets and Scheme of evaluation provides information with regard to various competencies (skills) the students is expected to acquire during the course of study and the relative weightages of each competency. This information helps him to design a well balance question paper/measurement tool for assessment.

LABSHEET

1. Exercise on various tool bars, menus and standard commands

Objective of the experiment :

1. To Study components in menu bar, tool bar, Display the drawing created in the working area
2. To Study the user coordinate system (UCS), Increase or decrease layouts
3. To Give the inputs in the command bar, Display name and purpose of the tools, Study cross hair to locate the cursor
4. To Invoke the commands, Getting started with AutoCAD, Create a new file, Open a file, Save a file, Close a file
5. To Delete , Copy , Paste , zoom objects, text and entities

Resources Required :

1. Desktop pc
2. Auto cad /proge cad

Task Analysis :

(a) Knowledge:

1. Manual drawing
2. Advantages of CAD in drawing

(b) Skill

1. Starting up autodesk/progeCAD
2. Interfacing
 - a) Creating drawing window
 - b) Familiarizing drawing window
 - c) Customizing menu bar, tool bars
 - d) Drawing units setup
 - e) Drawing area setup
 - f) Identifying UCS
 - g) Drawing environment

Teaching Points :

Sno	Teaching Point	Suggested Time (mins)
1	Introduction to CAD	1
2	Opening the drawing window	1
3	Explain the components in menubar,toolbar,command bar	2
4	Customizing menubar,toolbar,ucs,command bar	3
5	Setting drawing units and drawing area	2
6	Discussing grid,snap,cursor,tracking,Esnap settings	3
7	Drawing environment,aliases>window selection	2
8	Saving and closing files	1
	Total Time (mins)	15

Precautions :

- a) Set drawing units correctly
- b) Set proper drawing environment

Need and Scope of : It is necessary for the student to understand the

Experiment

various customizations required while drawing in the CAD package, editing and saving a file

Planning and Organization :

- a) Check whether all the computers are installed with same version of CAD package
- b) Let students follow the instructions and allow them to practice after every instruction

Scheme of Evaluation :

Sub Task	Individual Competency Level Weightage	Marks Awarded
Starting up autodesk/progeCAD	5	
Creating drawing window	5	
Familiarizing drawing window	5	
Customizing menu bar, tool bars	10	
Drawing units setup	5	
Drawing area setup	5	
Creating drawing environment and setting ucs	10	
Saving and closing a new file	5	
total	50	

Viva Questions :

- 1 . What are the benefits of CAD
- 2 . How many units are available in CAD
- 3 . What is the default size of CAD drawing window
- 4 . What is the default grid spacing in both X and Y directions
- 5 . How can you copy a closed drawing
- 6 . what are different types of coordinating systems in CAD and what is default system

Assessment Questions :

- 1 How will you set up drawing units in CAD
- 2 Write the steps involved in setting up drawing area ?
- 3 What are different co-ordinate systems in CAD. Define them .
- 4 What is relative co-ordinate system and absolute co-ordinate system ?

LABSHEET

2. Practice Exercises on 2D drawing commands and modify tools.

Objective of the experiment	:	<ol style="list-style-type: none"> 1. To Use LINE command, MLINE command, POLYLINE command 2. To Draw a circle using CIRCLE command, with centre point and radius, POLYGON command, HELIX command. 3. To Draw a rectangular, Triangular and quadrilateral areas filled with a solid, colour with the help of plane tool. 4. To Understand SPLINE command, ELLIPSE command, DIV command. 5. To Understand INSERT command, HATCH command, MIRROR command, ARRAY command. 6. To Understand STRETCH command, TRIM command, BREAK command, JOINT command, 7. To Understand FILLET command, CHAMFER command, EXPLODE command, GROUP command
Resources Required	:	<ol style="list-style-type: none"> 1. Desktop pc 2. Auto cad /proge cad
Task Analysis	:	
<p>(a) Knowledge:</p> <ol style="list-style-type: none"> 1. Starting up autodesk/progeCAD 2. Interfacing <ol style="list-style-type: none"> a) Creating drawing window b) Familiarizing drawing window c) Customizing menu bar, tool bars d) Drawing units setup e) Drawing area setup f) Identifying UCS g) Drawing environment 		
<p>(b) Skill</p> <ol style="list-style-type: none"> 1. Using LINE command, MLINE command, POLYLINE command 2. Using CIRCLE command, with centre point and radius, POLYGON Command, HELIX command. 3. Using and Drawing a rectangular, Triangular and quadrilateral areas filled with a solid, colour with the help of plane tool. 4. Using SPLINE command, ELLIPSE command, DIV command. 5. Using INSERT command, HATCH command, MIRROR command, ARRAY command. 6. Using STRETCH command, TRIM command, BREAK command, JOINT command 7. Using FILLET command, CHAMFER command, EXPLODE command, GROUP command. 8. Using of cursor, command bar & keyboard shortcuts 9. Using absolute rectangular co-ordinate method, relative rectangular co-ordinate method and relative polar coordinating method 		

Teaching Points :

Sno	Teaching Point	Suggested Time (mins)
1	Explain LINE command, MLINE command, POLYLINE command with examples.	4
2	Explain absolute rectangular co-ordinate method, relative rectangular co-ordinate method and relative polar coordinating method with examples.	5
3	Explain CIRCLE command, POLYGON Command (inscribe and circumscribe), HELIX command with examples.	9
4	Explain Drawing a rectangular, Triangular and quadrilateral areas filled with a solid, colour with the help of plane tool with examples.	4
5	Explain SPLINE command, ELLIPSE command, DIV command with examples.	5
6	Explain INSERT command, HATCH command, MIRROR command, ARRAY command with examples.	5
7	Explain FILLET command, CHAMFER command, EXPLODE command, GROUP command with examples.	5
8	Explain STRETCH command, TRIM command, BREAK command, JOINT command with examples.	3
Total Time (mins)		40

Precautions :

- Set drawing units correctly
- Set proper drawing environment
- Set ORTHO / POLAR ON where ever necessary.

Need and Scope of Experiment : Understanding drawing and modify commands is very important in technical drawing. this helps in creating different models

Planning and Organization :

- Check whether all the computers are installed with same version of CAD package
- Let students follow the instructions and allow them to practice after every instruction

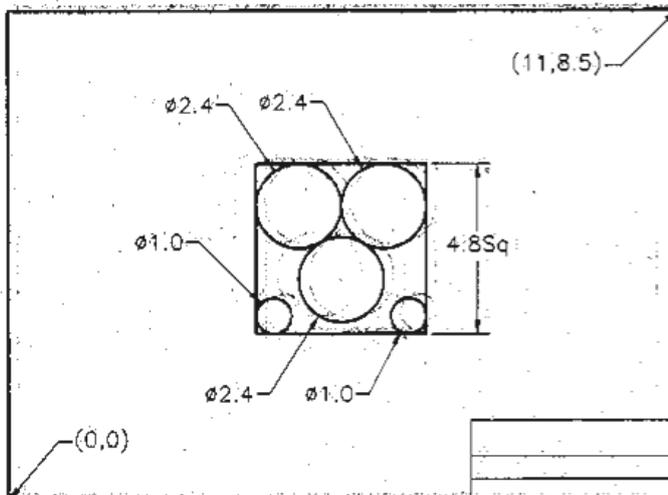
Scheme Of Evaluation

Sub Task	Individual Competency Level Weightage	Marks Awarded
Drawing diagrams using absolute rectangular coordinate method, relative rectangular coordinate method and relative polar coordinating method	5	
identifying different tools	10	
Drawing diagrams using drawing commands	20	
applying modify commands	15	
Total	50	

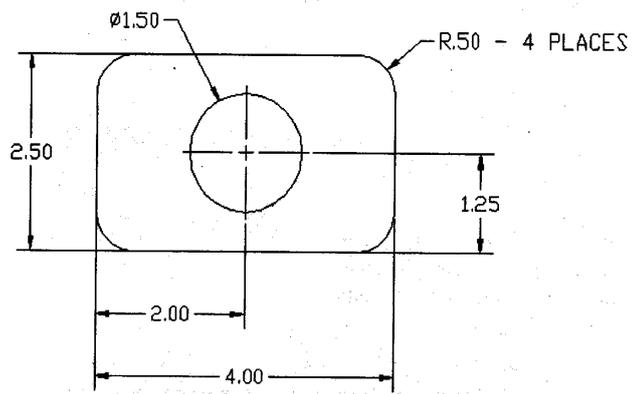
Viva Questions :		
1. What is difference between line command and polyline command		
2. What are different circle commands		
3. what is difference between inscribe and circumscribe circle polygon		
4. what is ortho mode		
5. what is mirror command		
6. what is difference between chamfer and fillet command		

Assessment Questions :

1. Draw the following



2. Draw the following



LABSHEET

3. Practice on dimensioning commands and formatting commands

Objective of the experiment	:	<ol style="list-style-type: none"> 1. To use QDIM command, Practice LINEAR ALIGNED and COORDINATE dimensions RADIUS or DIAMETER commands, ANGULUR dimension command, ARC LENGTH command BASELINE command, CENTREMARK command, LAYER command. 2. To Control the visibility of objects and assigned properties to objects. 3. To Practice the locking & unlocking of layers 4. To Write a text to drawing, change font size and style, Create a standard naming convention to a text styles, table styles, layer styles, dimension styles .
Resources Required	:	<ol style="list-style-type: none"> 1. Desktop pc 2. Auto cad /proge cad
Task Analysis	:	
(a) Knowledge: <ol style="list-style-type: none"> 1. Starting up autodesk/progeCAD 2. Interfacing <ol style="list-style-type: none"> a) Creating drawing window b) Familiarizing drawing window c) Customizing menu bar, tool bars d) Drawing units setup e) Drawing area setup f) Identifying UCS g) Drawing environment 3. Drawing and modify commands 		
(b) Skill <ol style="list-style-type: none"> 1. Using QDIM command, Practice LINEAR ,ALIGNED and COORDINATE dimensions RADIUS or DIAMETER commands, ANGULUR dimension command, ARC LENGTH command BASELINE command, CENTREMARK command, LAYER command. 2. Controlling the visibility of objects and assigned properties to objects. 3. Practice the locking & unlocking of layers 4. To Write a text to drawing, change font size and style, Create a standard naming convention to a text styles, table styles, layer styles, dimension styles. 		

Teaching Points:

Sno	Teaching Point	Suggested Time (mins)
1	Explain To use QDIM command, Practice LINEAR, ALIGNED and COORDINATE dimensions RADIUS or DIAMETER commands, ANGULUR dimension command, ARC LENGTH command BASELINE command, CENTREMARK command, LAYER command with examples.	10
2	Explain To Control the visibility of objects and assigned properties to objects with examples.	5
3	Explain To the locking & unlocking of layers with examples.	10
4	Explain To Write a text to drawing, change font size and style, Create a standard naming convention to a text styles, table styles, layer styles, dimension styles with examples.	5
Total Time (mins)		30

Precautions:

- Set drawing units correctly
- Set proper drawing environment
- Set ORTHO / POLAR ON where ever necessary.
- Carefully lock and unlock layers when ever necessary

Need and Scope of Experiment : Understanding dimensioning commands and layering is very important in technical drawing. This helps in creating different models

Planning and Organization :

- Check whether all the computers are installed with same version of CAD package
- Let students follow the instructions and allow them to practice after every instruction

Scheme of Evaluation:

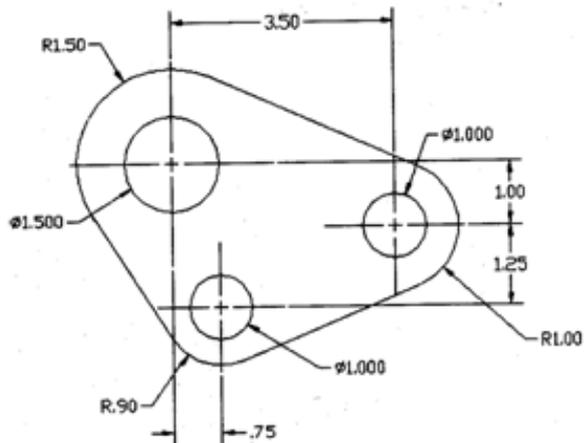
Sub Task	Individual Competency Level Weightage	Marks Awarded
Dimensioning different drawings with different dimension commands	10	
Using layer commands and creating multiple layers	15	
Locking and unlocking of layers	5	
Controlling the visibility of objects and assigned properties to objects	10	
Writing a text to drawing, changing font size and style, Creating a standard naming convention to a text styles, table styles, layer styles, dimension styles	10	
Total	50	

Viva Questions:

1. What is difference between linear dimension and aligned dimension
2. What is the purpose of layer
3. What is Bylayer?
4. Define angular dimension?

Assessment Question

1. Dimension as shown in the diagram



LABSHEET

4. Practice on Insert commands and view commands

Objective of the experiment	:	1. To Insert blocks into current drawing file using INSERT command 2. To Understand ATTACH RASTER IMAGE command, REDRAW command 3. To Draw the orthographic views (side view, top view, front view) of any object 4. To Draw the isometric views of any object, SHADE command, HIDE command.
Resources Required	:	1. Desktop pc 2. Auto cad /proge cad

Task Analysis:

(a) Knowledge:

1. Starting up autodesk/progeCAD
2. Interfacing
 - h) Creating drawing window
 - i) Familiarizing drawing window
 - j) Customizing menu bar, tool bars
 - k) Drawing units setup
 - l) Drawing area setup
 - m) Identifying UCS
 - n) Drawing environment
3. Drawing and modify commands
4. Dimensioning and formatting commands

(b) Skill

1. Using INSERT command.
2. Using ATTACH RASTER IMAGE command, REDRAW command
3. Drawing the orthographic views (side view, top view, front view) of any object
4. Drawing the isometric views of any object, SHADE command, HIDE command.

Teaching Points:

Sno	Teaching Point	Suggested Time (mins)
1	Explain To use INSERT command into current drawing file .	10
2	Explain ATTACH RASTER IMAGE command, REDRAW command with examples.	5
3	Explain To Draw the orthographic views (side view, top view, front view) of any object with examples.	10
4	Explain To Draw the isometric views of any object, SHADE command, HIDE command with examples.	5
	Total Time (mins)	30

Precautions:

- a) Set drawing units correctly
- b) Set proper drawing environment
- c) Set ORTHO / POLAR ON where ever necessary.
- d) Carefully lock and unlock layers when ever necessary

Need and Scope of Experiment : Understanding Insert commands and view commands is very important in technical drawing. This helps in creating different models

Planning and Organization :

- a) Check whether all the computers are installed with same version of CAD package
- b) Let students follow the instructions and allow them to practice after every instruction

Scheme of Evaluation:

Sub Task	Individual Competency Level Weightage	Marks Awarded
Inserting blocks into existing drawing file using INSERT command	5	
Using ATTACH RASTER IMAGE command, REDRAW command	10	
Drawing the orthographic views (side view, top view, front view)	15	
Drawing the isometric views of any object SHADE command, HIDE command	10	
Using SHADE command, HIDE command	10	
Total	50	

Viva Questions:

1. What is insert command
2. What is redraw command
3. What are the basic object-selection methods? How many types of selection windows

Assessment Questions:

LABSHEET

5. Practice on isometric drawings in 2D

Objective of the experiment	:	1. Visualise the isometric view SW,NE isometric views, Isometric SNAP and GRID 2. Use set snap spacing, Change the default axis colours, size of the crosshair display by using crosshair tab 3. Create an isometric circle on the current isometric plane using Ellipse Isocircle
Resources Required	:	1. Desktop PC 2. Auto CAD / proge CAD

Task Analysis:

(a) Knowledge:

1. Starting up Autodesk / proge CAD
2. Interfacing
 - a) Creating drawing window
 - b) Familiarizing drawing window
 - c) Customizing menu bar, tool bars
 - d) Drawing units setup
 - e) Drawing area setup
 - f) Identifying UCS
 - g) Drawing environment
3. Drawing and modify commands
4. Dimensioning and formatting commands
5. Insert and view commands

(b) Skill

1. Visualising the isometric view SW,NE isometric views, Isometric SNAP and GRID
2. Using set snap spacing, Changing the default axis colours, size of the crosshair display by using crosshair tab
3. Creating an isometric circle on the current isometric plane using Ellipse Isocircle

Teaching Points:

S.no	Teaching Point	Suggested Time (mins)
1	Explain how to Visualise the isometric view SW,NE isometric views, Isometric SNAP and GRID with example	10
2	Explain set snap spacing with examples.	5
3	Explain how to Change the default axis colours, size of the crosshair display by using crosshair tab of any object with examples.	5
4	Explain how to Create an isometric circle on the current isometric plane using Ellipse Isocircle with examples.	10
	Total Time (mins)	30

Precautions:

- a) Set drawing units correctly
- b) Set proper drawing environment
- c) Set ORTHO / POLAR ON where ever necessary.
- d) Carefully lock and unlock layers when ever necessary
- e) Check whether isometric snap is ON or OFF

Need and Scope of Experiment

Planning and Organization

- a) Check whether all the computers are installed with same version of CAD package
- b) Let students follow the instructions and allow them to practice after every instruction

Scheme of Evaluation:

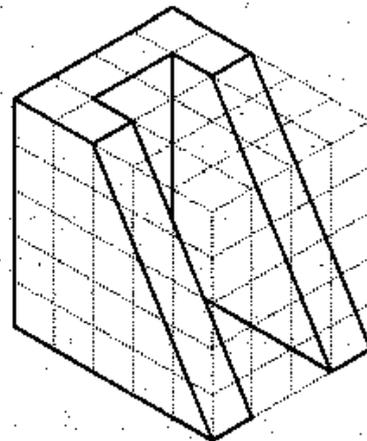
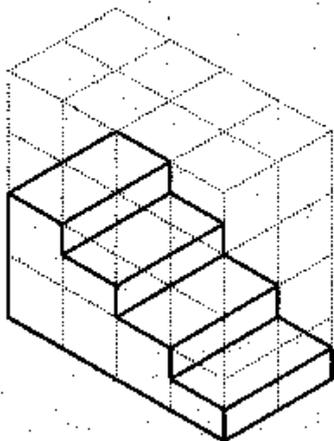
Sub Task	Individual Competency Level Weightage	Marks Awarded
Visualising the isometric view SW,NE isometric views, Isometric SNAP and GRID	15	
Using set snap spacing	10	
Changing the default axis colours, size of the crosshair display by using crosshair tab	15	
Creating an isometric circle on the current isometric plane using Ellipse Isocircle	10	
Total	50	

Viva Questions:

- 1. What is cross hair cursor?
- 2. What is isocircle ?
- 3. What is isometric snap ?

Assessment Questions:

- 1. Draw the following figs a to f in grid mode.



LABSHEET

6. Draw various electrical symbols

Objective of the experiment	:	Draw various electrical symbols
Resources Required	:	1. Desktop PC 2. Auto CAD / proge CAD

Task Analysis:

(a) Knowledge:

1. Starting up Autodesk / proge CAD
2. Interfacing
 - a) Creating drawing window
 - b) Familiarizing drawing window
 - c) Customizing menu bar, tool bars
 - d) Drawing units setup
 - e) Drawing area setup
 - f) Identifying UCS
 - g) Drawing environment
3. Drawing and modify commands
4. Dimensioning and formatting commands
5. Insert and view commands
6. Isometric drawings

(b) Skill

1. Drawing various electrical symbols

Teaching Points:

S.no	Teaching Point	Suggested Time (mins)
1	Different types of symbols used in electrical wiring	10
2	Creation and saving of each symbol as block	5
Total Time (mins)		15

Precautions:

- a) Set drawing units correctly
- b) Set proper drawing environment
- c) Set ORTHO / POLAR ON where ever necessary.
- d) Instruct students to create each symbol as block

Need and Scope of Experiment

Planning and Organization

- a) Check whether all the computers are installed with same version of CAD package
- b) Let students follow the instructions and allow them to practice after every instruction

Scheme of Evaluation:

Sub Task	Individual Competency Level Weightage	Marks Awarded
Drawing all the electrical symbols	30	
Creating each symbol as a block	20	
Total	50	

LABSHEET

7. Drawing of electrical wiring

Objective of the experiment	:	1. Drawing of electrical wiring of a house . 2. Drawing of electrical wiring circuit of multi storied building 3. Drawing of electrical wiring circuit of godown wiring 4. Drawing of electrical wiring circuit of commercial complex
Resources Required	:	1. Desktop PC 2. Auto CAD / proge CAD

Task Analysis:

(a) Knowledge:

1. Starting up Autodesk / proge CAD
2. Interfacing
 - a) Creating drawing window
 - b) Familiarizing drawing window
 - c) Customizing menu bar, tool bars
 - d) Drawing units setup
 - e) Drawing area setup
 - f) Identifying UCS
 - g) Drawing environment
3. Drawing and modify commands
4. Dimensioning and formatting commands
5. Insert and view commands
6. Isometric drawings

(b) Skill

1. Drawing of electrical wiring of a house.
2. Drawing of electrical wiring circuit of multi storied building
3. Drawing of electrical wiring circuit of godown wiring
4. Drawing of electrical wiring circuit of commercial complex

Teaching Points:

S.no	Teaching Point	Suggested Time (mins)
1	Explain house wiring layout	5
2	Explain wiring circuit of multi storied building	10
3	Explain wiring circuit of godown	5
4	Explain wiring circuit of commercial complex	5
	Total Time (mins)	25

Precautions:

- a) Set drawing units correctly
- b) Set proper drawing environment
- c) Set ORTHO / POLAR ON where ever necessary.
- d) Instruct students to create each symbol as block
- e) Zoom and check for any overlaps or open end connections

Need and Scope of Experiment : Electrical wiring layout diagrams helps in estimating the quantity of material requirement

Planning and Organization :

- a) Check whether all the computers are installed with same version of CAD package
- b) Let students follow the instructions and allow them to practice after every instruction
- c) Ask students to use the electrical symbols saved as blocks in previous sessions

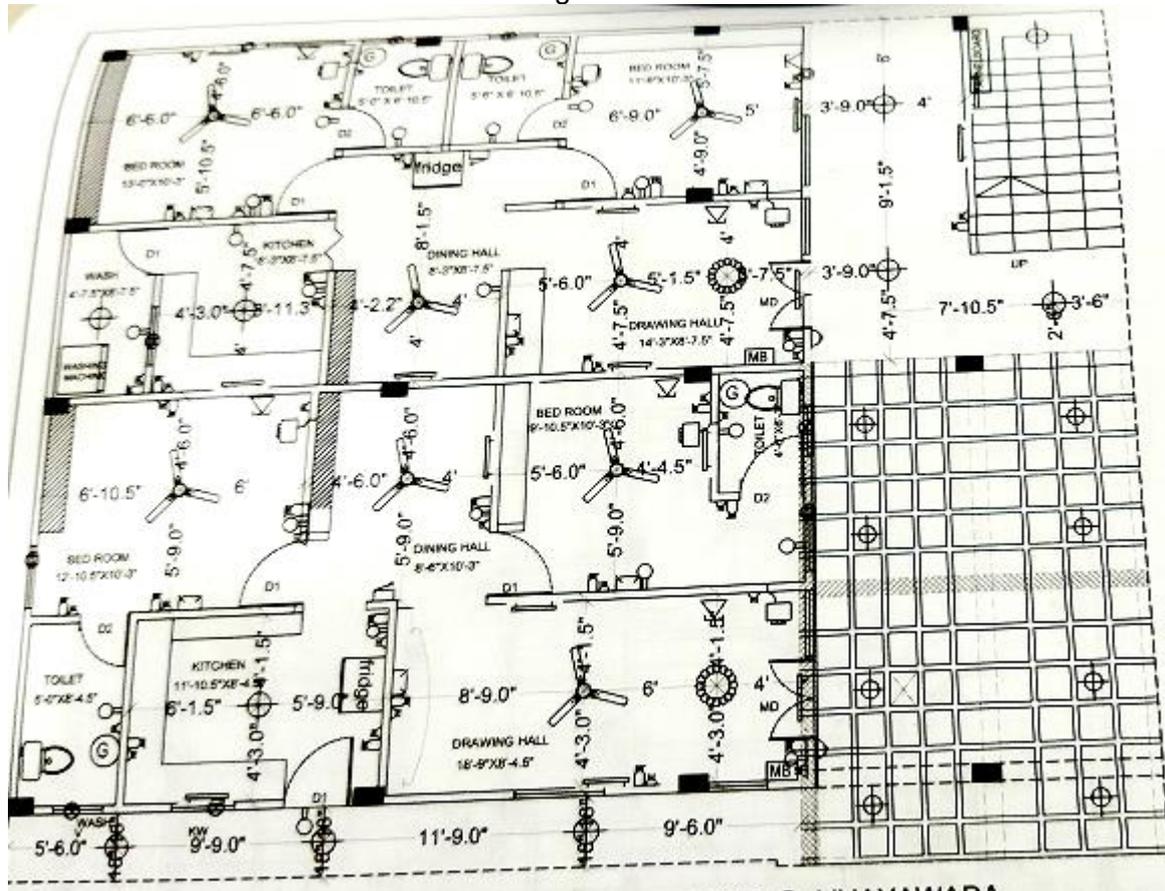
Scheme of Evaluation:

Sub Task	Individual Competency Level Weightage	Marks Awarded
Drawing of electrical wiring of a house. storied building	10	
Drawing of electrical wiring circuit of multi	15	
Drawing of electrical wiring circuit of godown wiring	10	
Drawing of electrical wiring circuit of commercial complex	15	
Total	50	

Viva Questions:

- 1. What is a block
- 2. How to insert a block

Assessment Questions: Draw the following



LABSHEET

8. Drawing of Electrical poles and towers

Objective of the experiment	:	1. Drawing of different electrical poles with cross-arms, insulators and stay sets 2. Drawing of transmission towers
Resources Required	:	1. Desktop PC 2. Auto CAD / proge CAD

Task Analysis:

(a) Knowledge:

1. Starting up Autodesk / proge CAD
2. Interfacing
 - a) Creating drawing window
 - b) Familiarizing drawing window
 - c) Customizing menu bar, tool bars
 - d) Drawing units setup
 - e) Drawing area setup
 - f) Identifying UCS
 - g) Drawing environment
3. Drawing and modify commands
4. Dimensioning and formatting commands
5. Insert and view commands
6. Isometric drawings

(b) Skill

1. Drawing of different electrical poles with cross-arms, insulators and stay sets
2. Drawing of transmission towers

Teaching Points:

S.no	Teaching Point	Suggested Time (mins)
1	Explain drawing of insulator stacks and creating a block and inserting the block	10
2	Recall snap techniques	5
	Total Time (mins)	15

Precautions:

- a) Set drawing units correctly
- b) Set proper drawing environment
- c) Set ORTHO / POLAR ON where ever necessary.
- d) Instruct students to create each symbol as block
- e) Zoom and check for any overlap or open end connections

Need and Scope of Experiment :

Planning and Organization :

- a) Check whether all the computers are installed with same version of CAD package
- b) Let students follow the instructions and allow them to practice after every instruction

Scheme of Evaluation:

Sub Task	Individual Competency Level Weightage	Marks Awarded
Drawing of different electrical poles with cross-arms and insulators	15	
Drawing of different stay sets	10	
Drawing of transmission towers	15	
Dimensioning of towers and poles	10	
Total	50	

Assessment Question:

LABSHEET

9. Earthing systems with dimensions

Objective of the experiment	:	1. Drawing of pipe earthing showing the dimensions 2. Drawing of plate earthing showing the dimensions
Resources Required	:	1. Desktop PC 2. Auto CAD / proge CAD

Task Analysis:

(a) Knowledge:

1. Starting up Autodesk / proge CAD
2. Interfacing
 - a) Creating drawing window
 - b) Familiarizing drawing window
 - c) Customizing menu bar, tool bars
 - d) Drawing units setup
 - e) Drawing area setup
 - f) Identifying UCS
 - g) Drawing environment
3. Drawing and modify commands
4. Dimensioning and formatting commands
5. Insert and view commands
6. Isometric drawings

(b) Skill

1. Drawing of pipe earthing showing the dimensions
2. Drawing of plate earthing showing the dimensions

Teaching Points:

S.no	Teaching Point	Suggested Time (mins)
1	Recall hatching commands	10
2	Recall dimensioning commands	5
	Total Time (mins)	15

Precautions:

- a) Set drawing units correctly
- b) Set proper drawing environment
- c) Set ORTHO / POLAR ON where ever necessary.
- d) Hatching should be different for different layers

Need and Scope of Experiment : Drawing layout helps in estimating the material requirement

Planning and Organization :

- a) Check whether all the computers are installed with same version of CAD package
- b) Let students follow the instructions and allow them to practice after every instruction

Scheme of Evaluation:

Sub Task	Individual Competency Level Weightage	Marks Awarded
Drawing of pipe earthing showing the dimensions	25	
Drawing of plate earthing showing the dimensions	25	
Total	50	

Assessment Questions:

LABSHEET

10. Drawing Core sections of transformer

Objective of the experiment	:	Drawing of plan and elevation of different stepped cores of single phase transformer
Resources Required	:	1. Desktop PC 2. Auto CAD / proge CAD

Task Analysis:

(a) Knowledge:

1. Starting up Autodesk / proge CAD
2. Interfacing
 - a) Creating drawing window
 - b) Familiarizing drawing window
 - c) Customizing menu bar, tool bars
 - d) Drawing units setup
 - e) Drawing area setup
 - f) Identifying UCS
 - g) Drawing environment
3. Drawing and modify commands
4. Dimensioning and formatting commands
5. Insert and view commands
6. Isometric drawings

(b) Skill

Drawing of plan and elevation of different stepped cores of single phase transformer

Teaching Points:

S.no	Teaching Point	Suggested Time (mins)
1	Recall circle commands	5
2	Recall fillet and chamfer commands	5
	Total Time (mins)	10

Precautions:

- a) Set drawing units correctly
- b) Set proper drawing environment
- c) Set ORTHO / POLAR ON where ever necessary.
- d) Hatching should be different for different layers

Need and Scope of Experiment : Drawing layout helps in designing, developing and estimating.

Planning and Organization :

- a) Check whether all the computers are installed with same version of CAD package
- b) Let students follow the instructions and allow them to practice after every instruction

Scheme of Evaluation:

Sub Task	Individual Competency Level Weightage	Marks Awarded
Drawing of plan and elevation of single stepped cores of single phase transformer	15	
Drawing of plan and elevation of two stepped cores of single phase transformer	15	
Drawing of plan and elevation of two stepped cores of single phase transformer	20	
Total	50	

Assessment Questions:

LABSHEET

11. Drawing Pole mounted substations

Objective of the experiment	:	Drawing of Pole mounted substation with dimensions
Resources Required	:	1. Desktop PC 2. Auto CAD / proge CAD

Task Analysis:

(a) Knowledge:

1. Starting up Autodesk / proge CAD
2. Interfacing
 - a) Creating drawing window
 - b) Familiarizing drawing window
 - c) Customizing menu bar, tool bars
 - d) Drawing units setup
 - e) Drawing area setup
 - f) Identifying UCS
 - g) Drawing environment
3. Drawing and modify commands
4. Dimensioning and formatting commands
5. Insert and view commands
6. Isometric drawings

(b) Skill

Drawing of Pole mounted substation with dimensions

Teaching Points”

S.no	Teaching Point	Suggested Time (mins)
1	Recall necessary drawing commands	5
2	Recall necessary view and format commands	5
Total Time (mins)		10

Precautions:

- a) Set drawing units correctly
- b) Set proper drawing environment
- c) Set ORTHO / POLAR ON where ever necessary.
- d) Instruct students to create each symbol as block

Need and Scope of Experiment :

Planning and Organization :

- a) Check whether all the computers are installed with same version of CAD package
- b) Let students follow the instructions and allow them to practice after every instruction

Scheme of Evaluation:

Sub Task	Individual Competency Level Weightage	Marks Awarded
Drawing of Pole mounted substation	25	
dimensioning	10	
Labelling all parts	15	
Total	50	

Viva Questions:

Assessment Questions:

LABSHEET

12. Drawing sectional view of a DC Machine

Objective of the experiment	:	Drawing of end view of DC Machine
Resources Required	:	1. Desktop PC 2. Auto CAD / proge CAD

Task Analysis:

(a) Knowledge:

1. Starting up Autodesk / proge CAD
2. Interfacing
 - a) Creating drawing window
 - b) Familiarizing drawing window
 - c) Customizing menu bar, tool bars
 - d) Drawing units setup
 - e) Drawing area setup
 - f) Identifying UCS
 - g) Drawing environment
3. Drawing and modify commands
4. Dimensioning and formatting commands
5. Insert and view commands
6. Isometric drawings

(b) Skill

Drawing of end view of DC Machine

Teaching Points:

S.no	Teaching Point	Suggested Time (mins)
1	Recall necessary drawing commands	5
2	Recall necessary modify and format commands	5
	Total Time (mins)	10

Precautions:

- a) Set drawing units correctly
- b) Set proper drawing environment
- c) Set ORTHO / POLAR ON where ever necessary.
- d) Instruct students to create each symbol as block

Need and Scope of Experiment :

Planning and Organization :

- a) Check whether all the computers are installed with same version of CAD package
- b) Let students follow the instructions and allow them to practice after every instruction

Scheme of Evaluation:

Sub Task	Individual Competency Level Weightage	Marks Awarded
Drawing of end view of DC Machine	15	
Drawing of sectional side view of DC Machine	15	
Dimensioning	10	
Labeling all parts	10	
Total	50	

Assessment Questions:

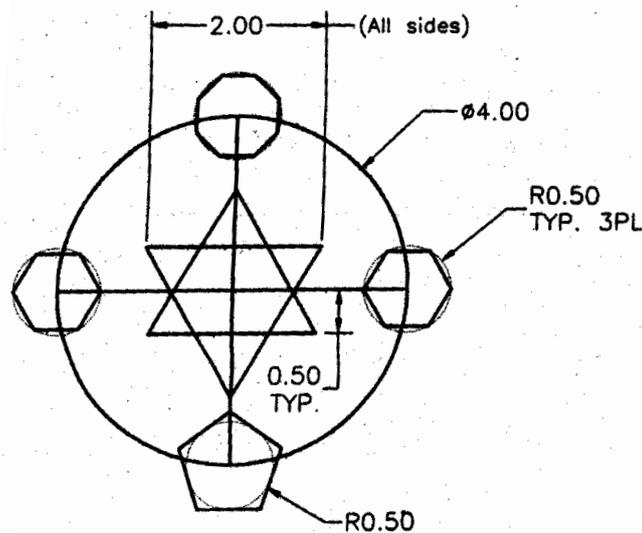
STATE BOARD OF TECHNICAL EDUCATION AND TRAINING ,AP,VIJAYAWADA.
 DIPLOMA PRACTICAL EXAMINATIONS (SUMMATIVE ASSESSMENT)
 EE-309(B):: ELECTRICAL CAD LAB

TIME: 90 MIN

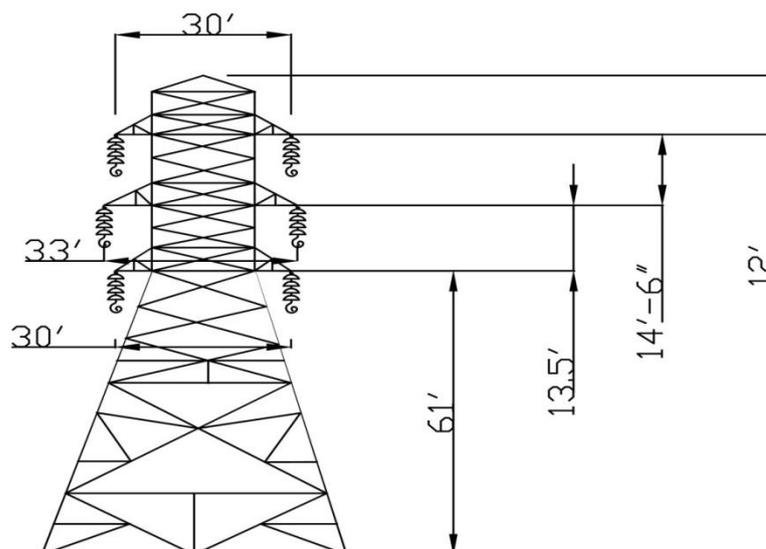
MAX MARKS:30

MODEL QUESTION PAPER

1. A. How do you setup drawing units in proge CAD (4M) CO1
- B. Draw the figure using line, circle and polygon commands (12M) CO1



- C. Draw 132kv double circuit steel tower showing all the dimensions given below. (11M) CO3



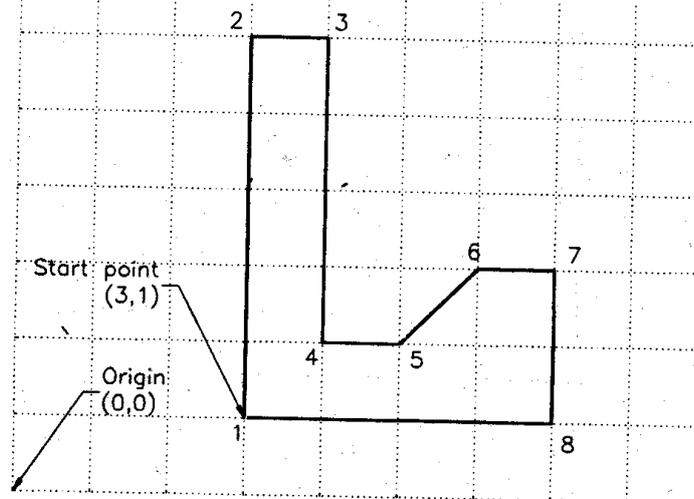
2. A. Explain any two circle commands

(4M)

CO1

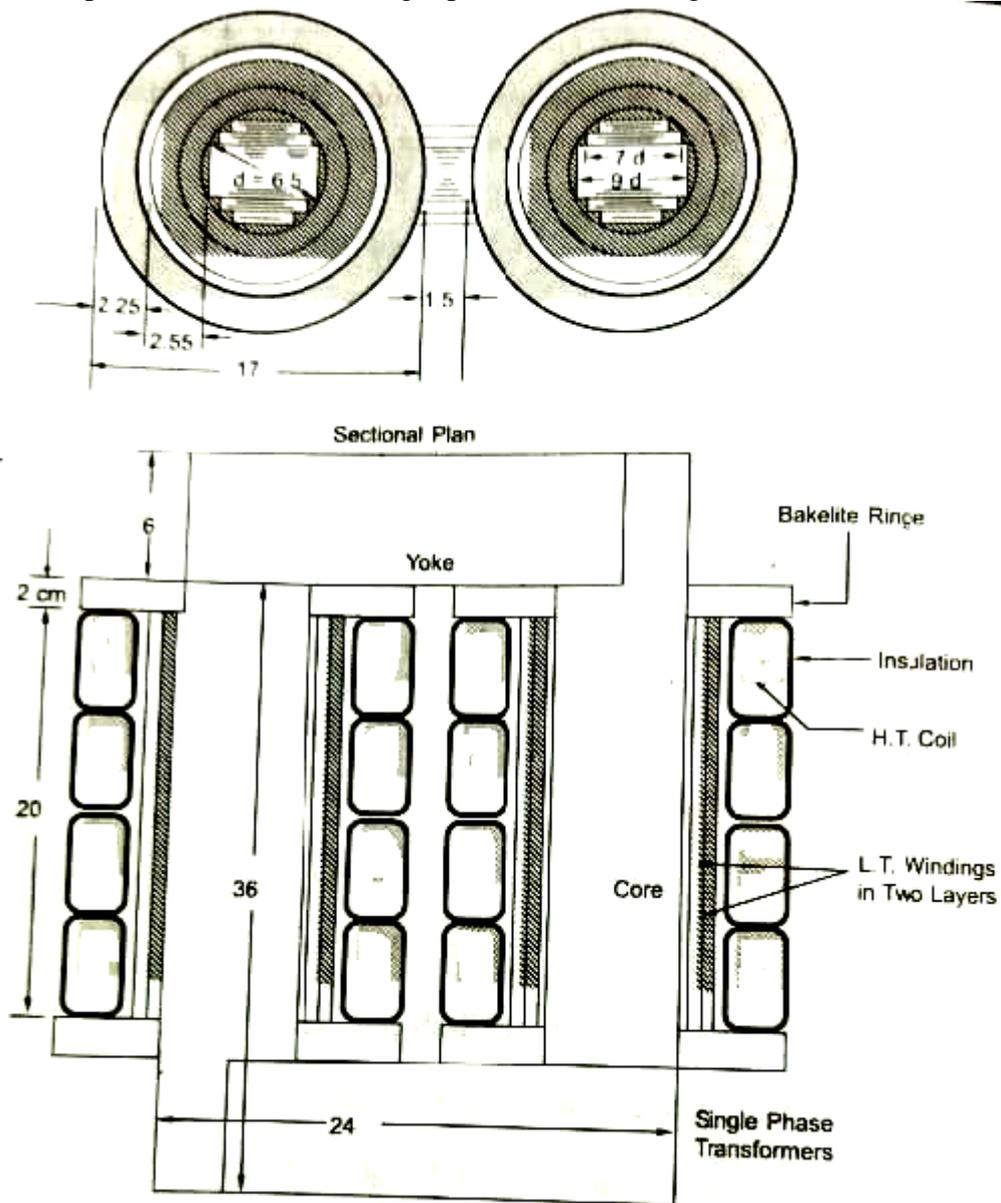
B. Drawing the figure using absolute rectangular coordinate system (8M)

CO1

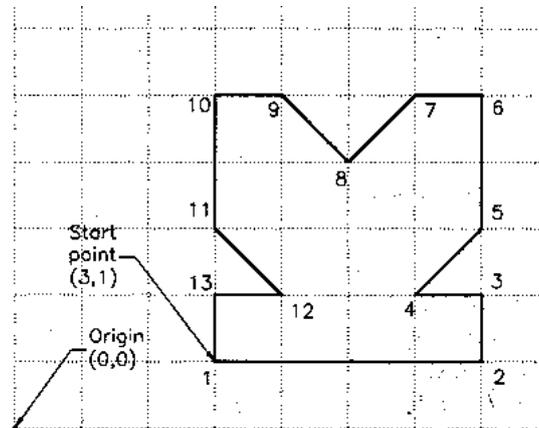


C. Draw the plan and elevation of single phase transformer given below (15M)

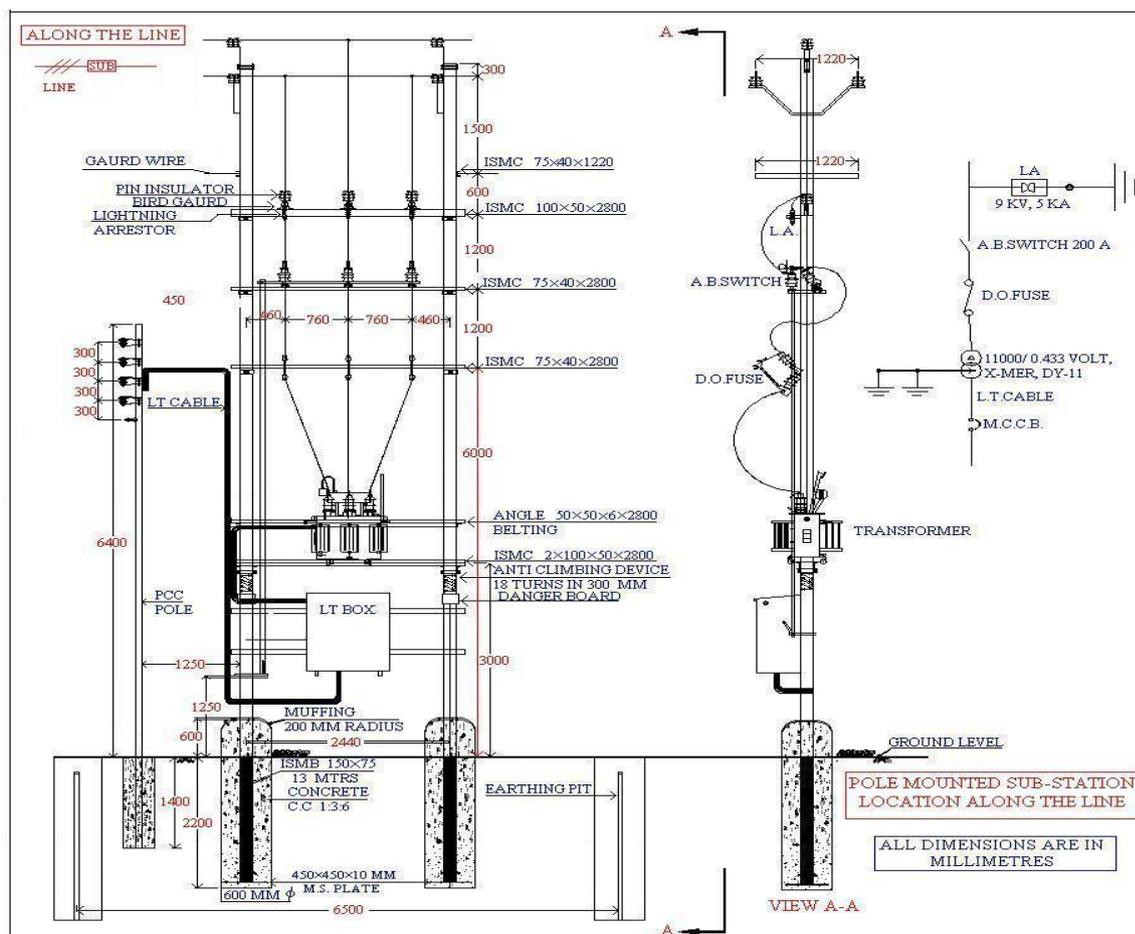
CO4



3. A. Explain polyline and spline commands (4M) CO1
 B. Drawing the figure using relative rectangular coordinate system (8M) CO1

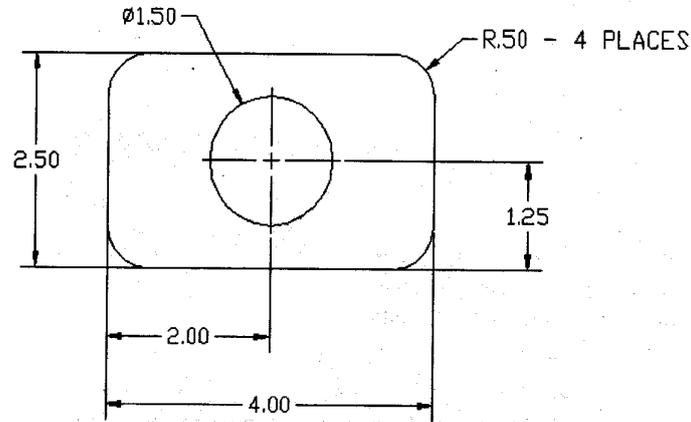


- C. Draw pole mounted substation with dimensions given below (15M) CO4

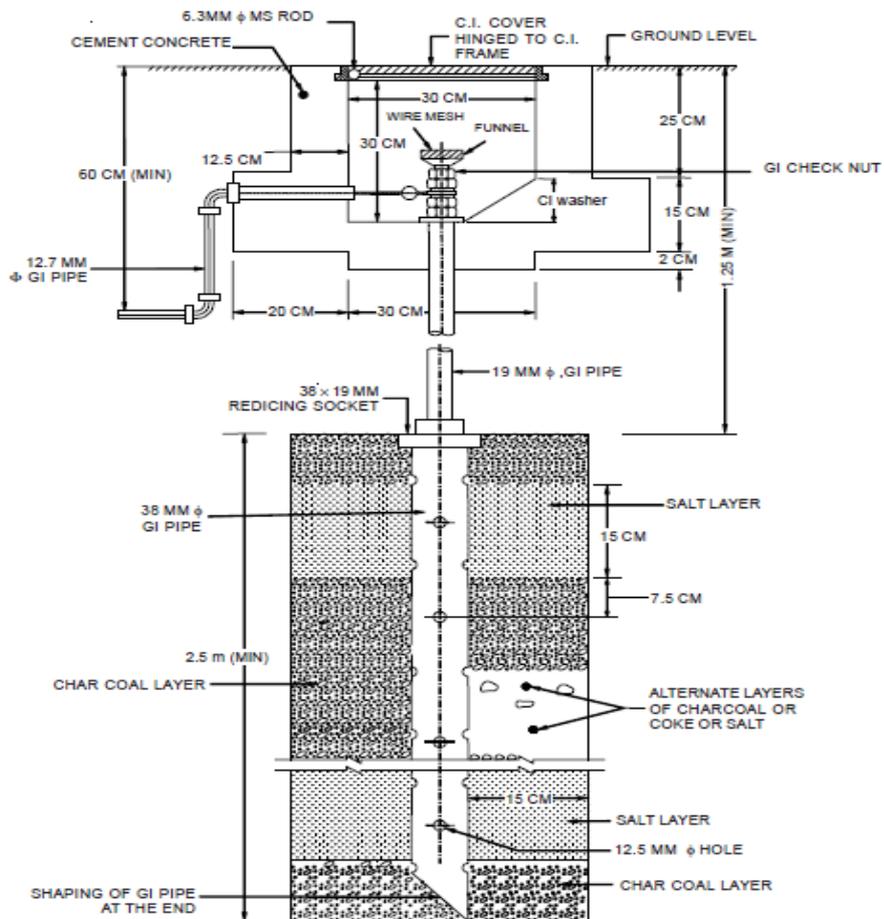


4. A. Explain any two modify commands (4M) CO1

B. Draw the figure using rectangle command (8M) CO1

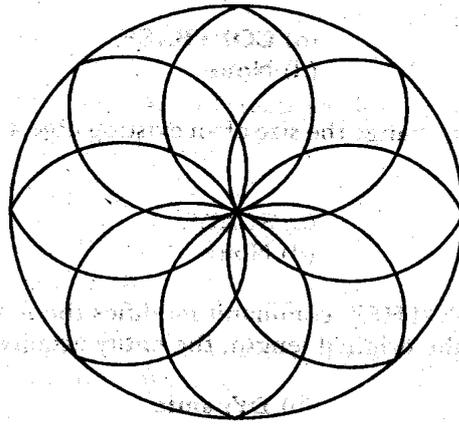


C. Draw pipe earthing layout with dimensions given below (15M) CO3

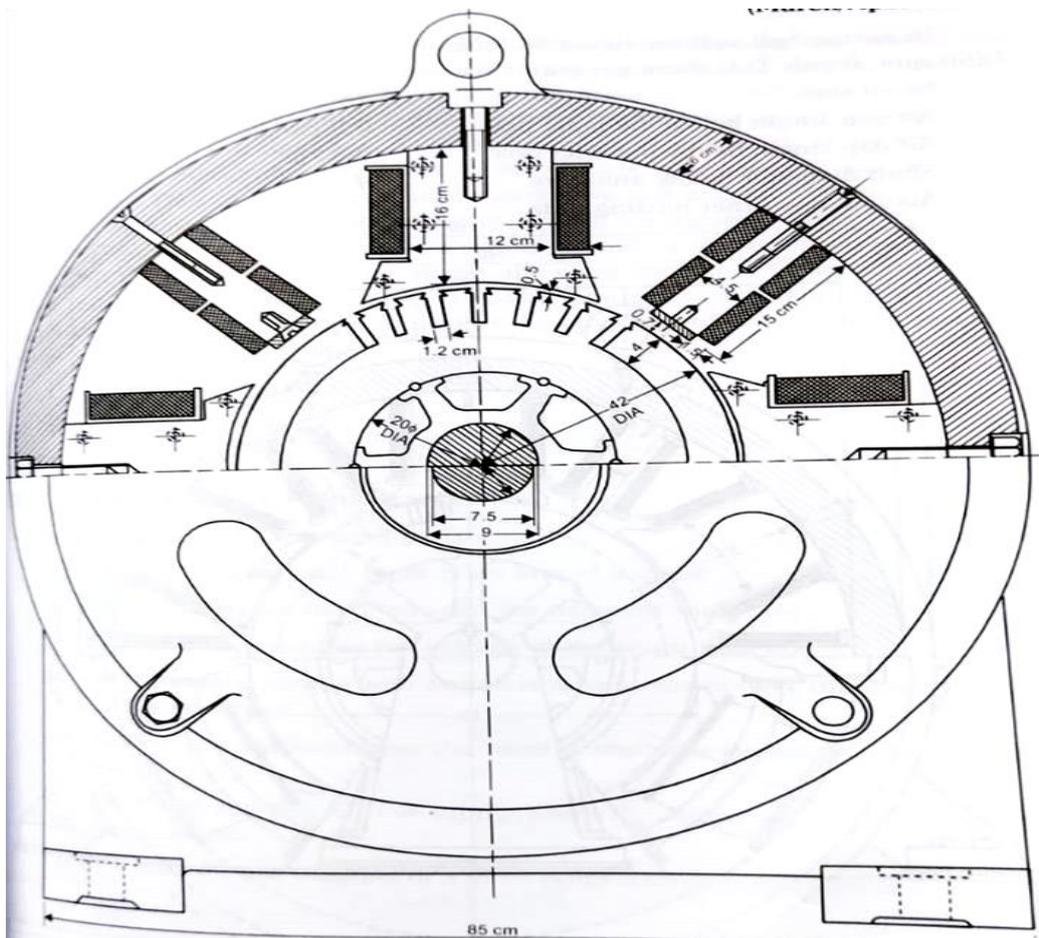


5. A. Explain trim and extend commands (4M) CO1

B. Use divide command & node osnap and draw the figure (8M) CO1

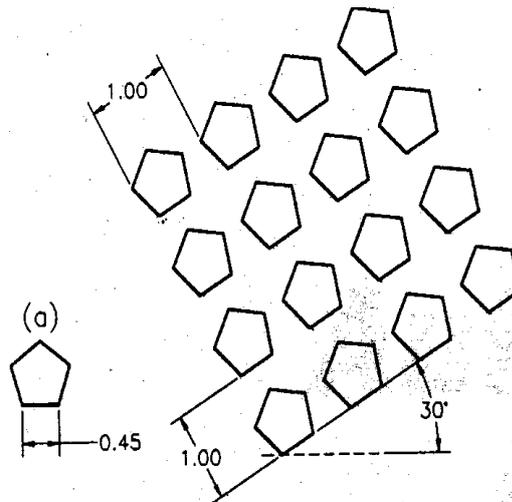


C. Draw end view of dc machine given below . (15M) CO5



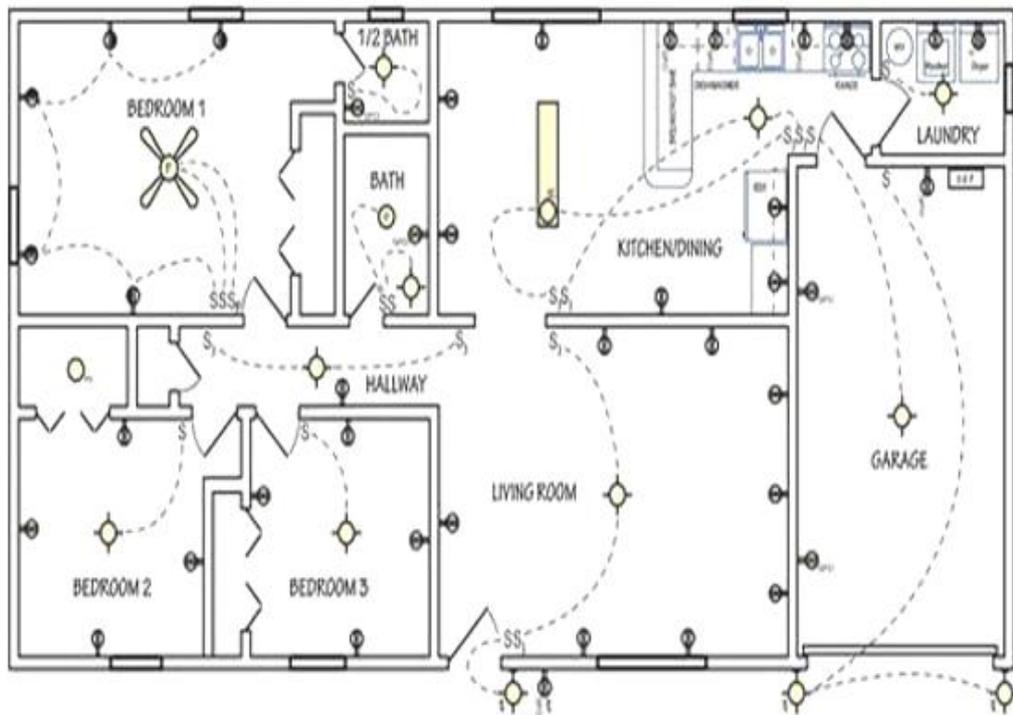
6. A. Explain any two ellipse commands (4M) CO1

B. using rectangular array, draw the following figure (8M) CO1



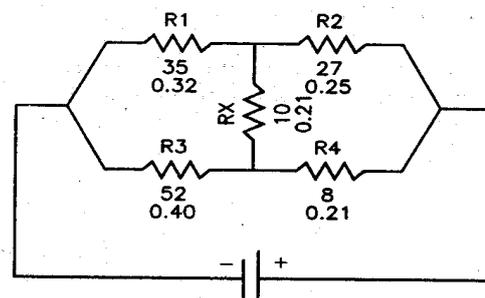
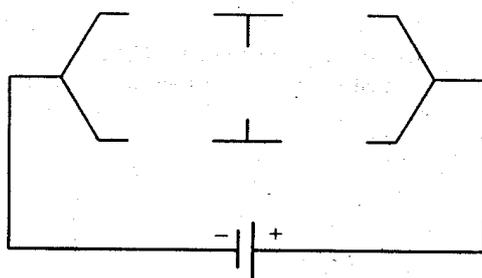
C. Draw electrical wiring of a house with 3 bed rooms , living room and kitchen. (15M)

CO2



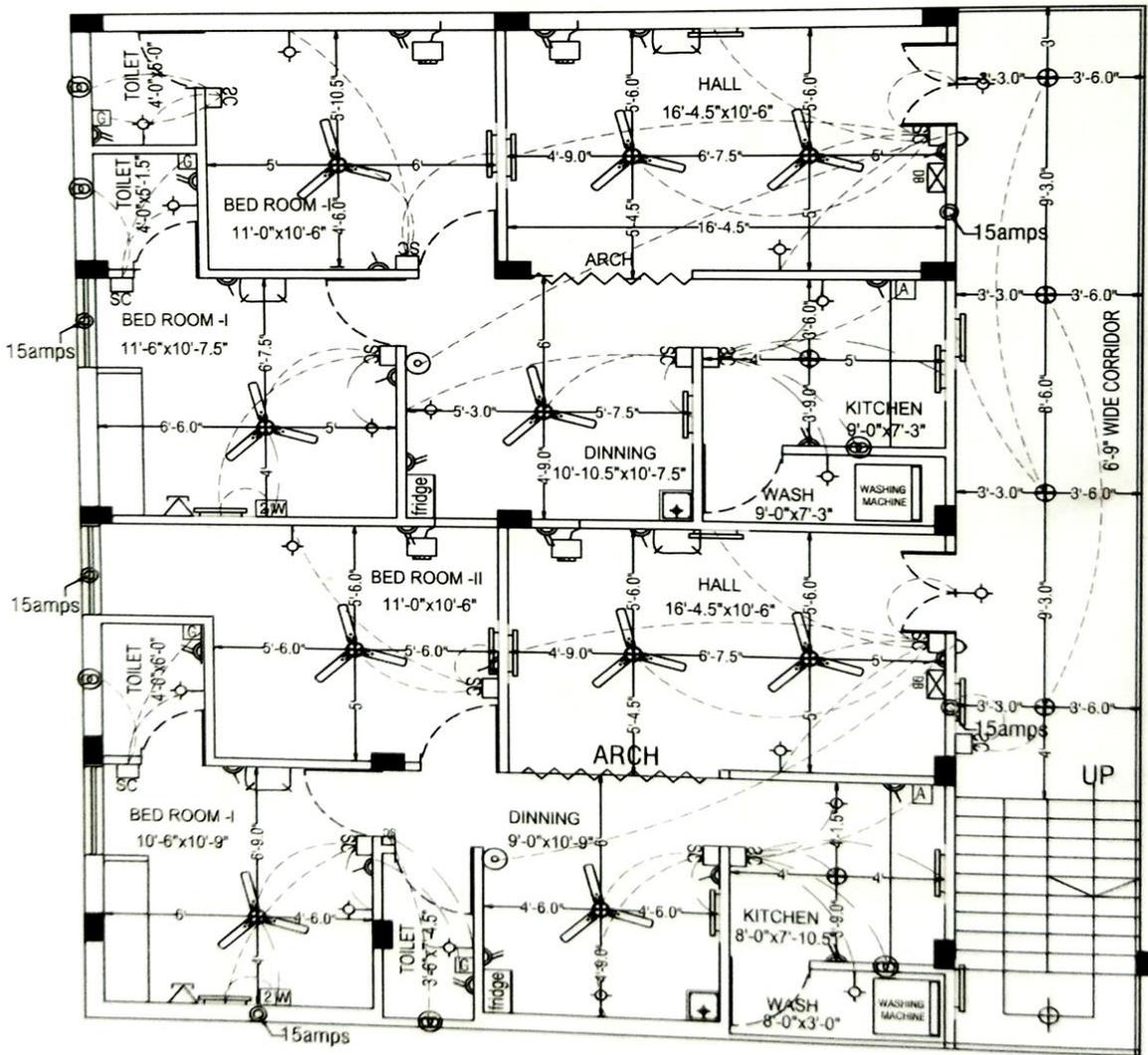
7. A. Explain any two view commands (4M) CO1

B. Using break command, block command and text command, draw the following figures (6M) CO1



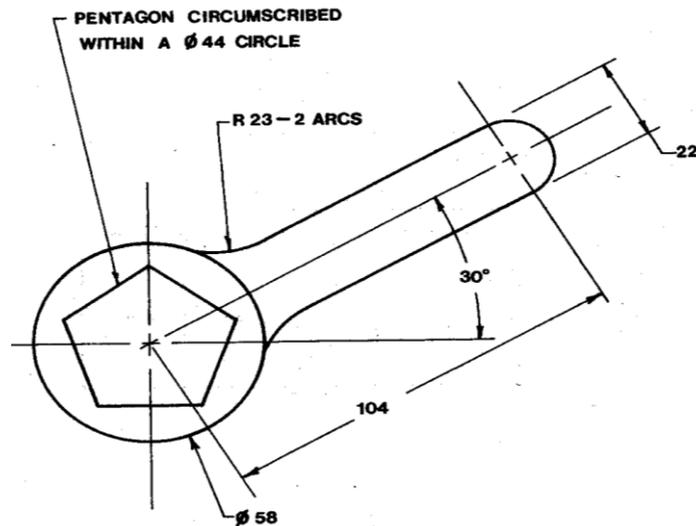
C. Draw electrical wiring circuit of a multi storied building with 2 floors. (17M) CO2

LEGEND							
DESCRIPTION	HEIGHTS From F.F.L	DESCRIPTION		DESCRIPTION		DESCRIPTION	
MAIN DISTRIBUTION BOARD	8'-0"	TUBE POINT	8'-0"	FRIDGE	4'-6"	INTERNET	2'-6"
SWITCH CONTROL	4'-6"	CEILING FAN	C	AQUA GUARD	4'-6"	A.C POINT WITH 15AMP	8'-0"
TWO WAY SWITCH	2'-6"	CEILING POINT	C	GYSER POINT	5'-0"		
BRACKET LIGHT	8'-0"	TELEVISION	2'-6"	BUZZER	8'-0"		
5 AMP	4'-6"	TELEPHONE POINT	2'-6"	BELL PUSH	4'-6"		
15 AMP	4'-6"	EXHAUST FAN	8'-0"	CHANDLIER	C		

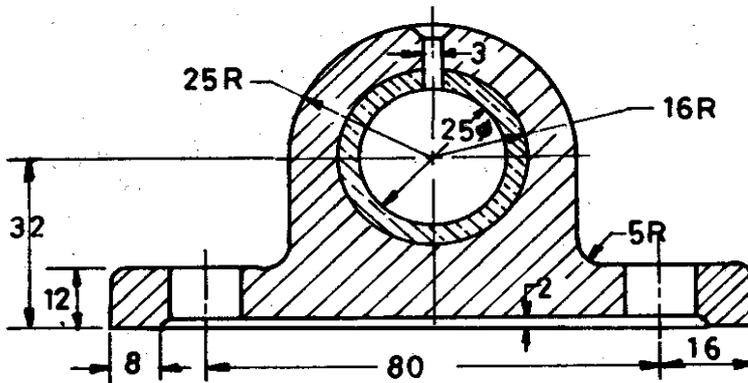


MODEL QUESTION PAPER

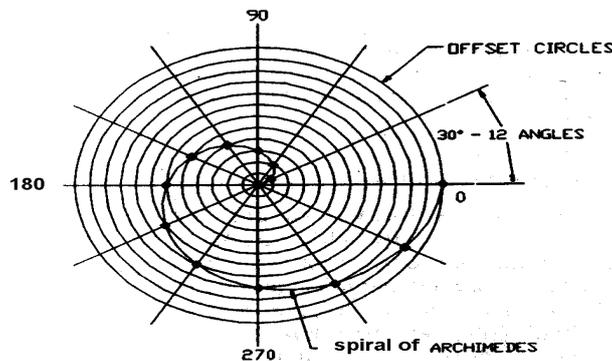
1. A. Write the steps involved in setting up drawing area ? (4M) CO1
 B. Draw the following figure ? (10M) CO1



- C. Draw the following (13M) CO1

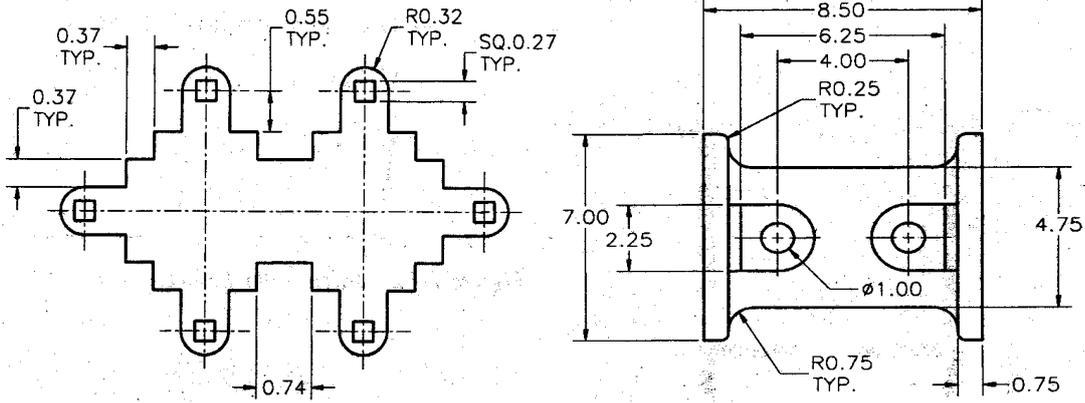


2. A. Explain basic methods of accessing ESNAP (4M) CO1
 B. Draw spiral using offset, point, and spline commands (8M) CO1



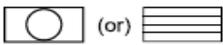
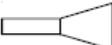
C. Using mirror command draws the following fig. units –inches (15M)

CO1

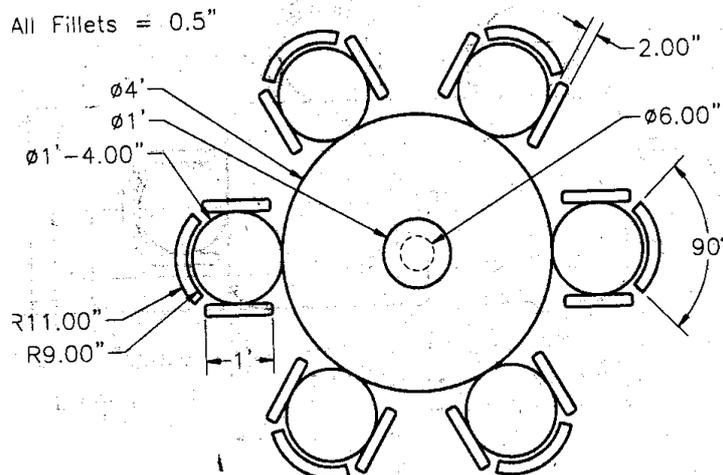


3. A. Explain polyline and polygon commands (4M)
 B. Draw the following electrical symbols (8M)

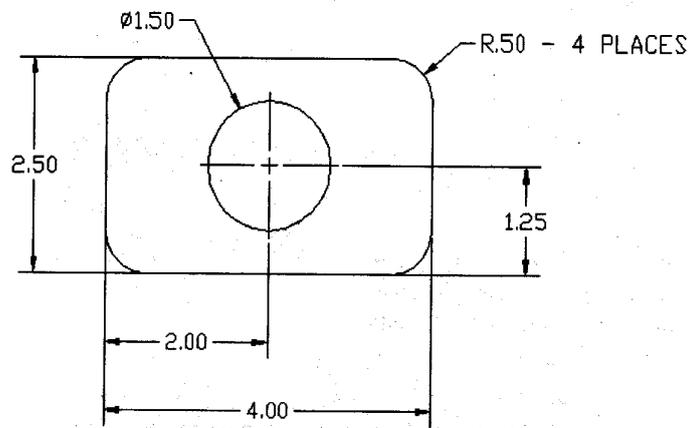
CO1
 CO2

Electric Heater	
Thermostat	
Ceiling Fan	
Bracket Fan	
Bell	
Siren	
Bell Connected to Fire Alarm	
Bell with Indicator	
Loud speaker	

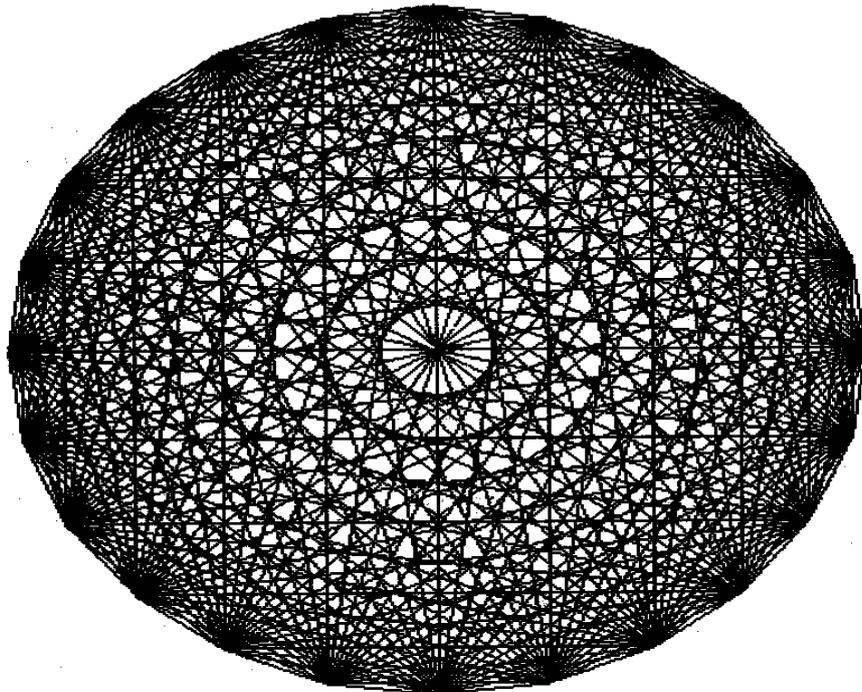
C. using polar array command and block command, draw the following fig. (15M) CO1



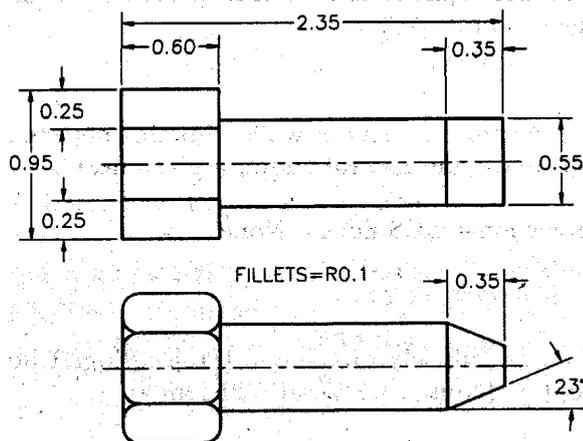
4. A. what are boundary and region commands Explain (6M) CO1
 B. Draw the figure using rectangle command (8M) CO1



- C. Draw the figure given below (13M) CO1



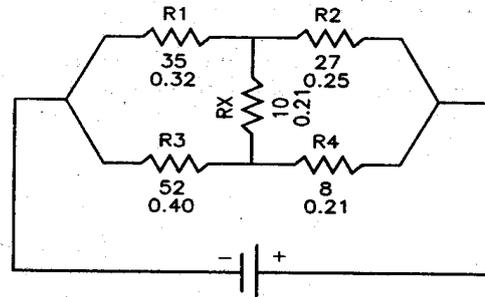
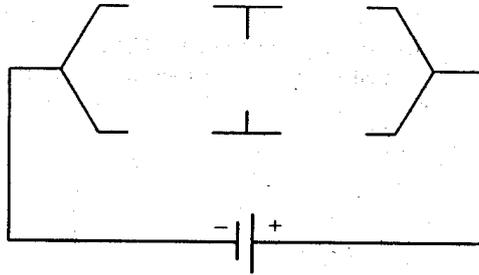
5. A. Explain offset and array commands (6M) CO1
 B. Using fillet, chamfer and trim commands draw the below fig (8M) CO1



7. A. Explain any two view commands (4M)

CO1

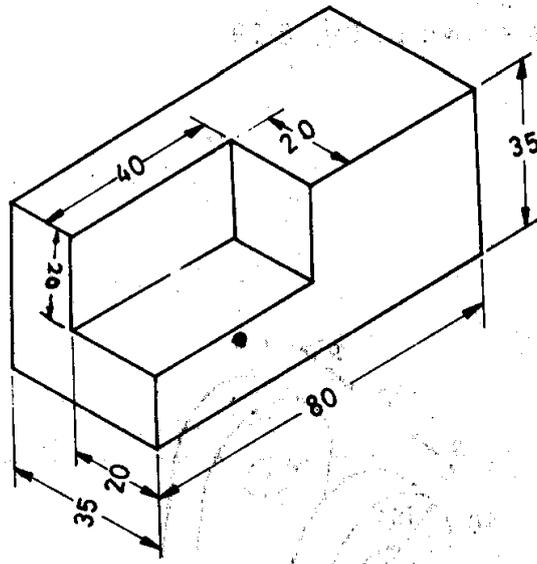
B. Using break command, block command and text command, draw the following figures (10M) CO1



C. Using Subtract command, produce the following solid (13M)

(13M)

CO1



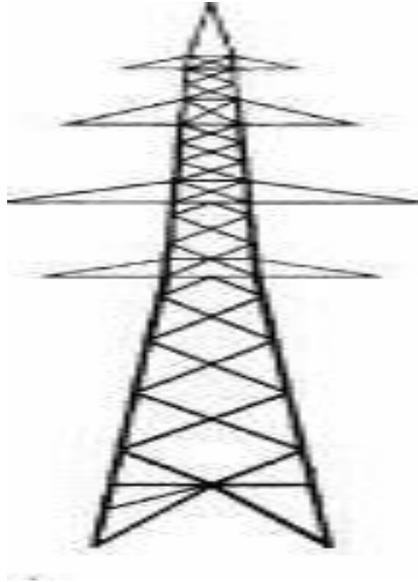
STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, AP, VIJAYAWADA.
DIPLOMA PRACTICAL EXAMINATIONS (FORMATIVE ASSESSMENT-2)
EE-309(B):: ELECTRICAL CAD LAB

TIME: 90 MIN

MAX MARKS:30

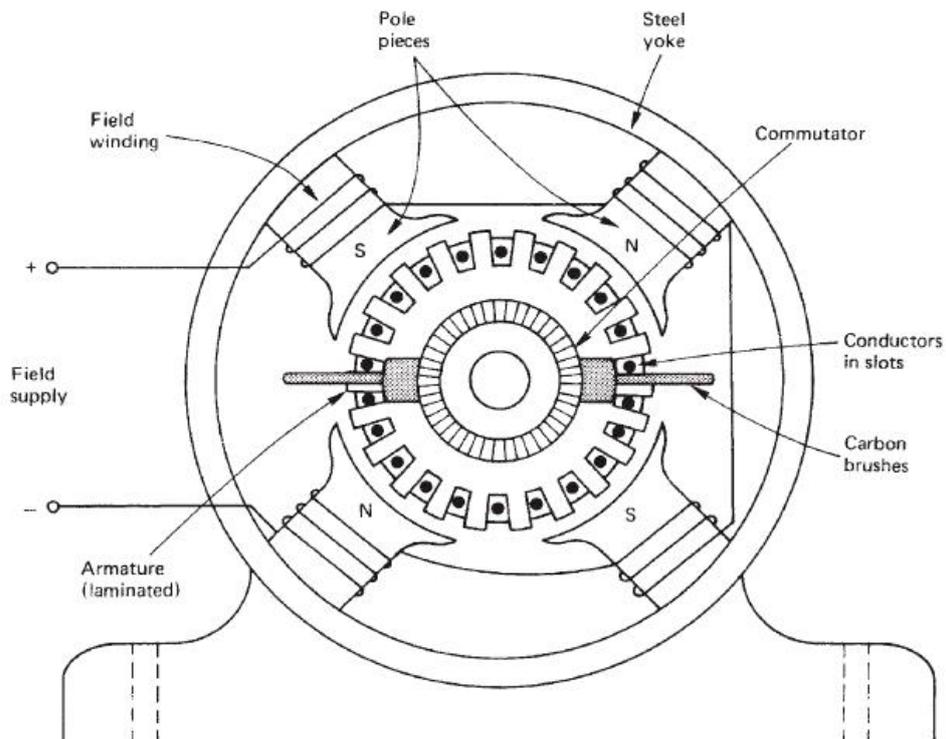
MODEL QUESTION PAPER

1. A. Draw the following diagram (not to scale) (6M) (CO3)



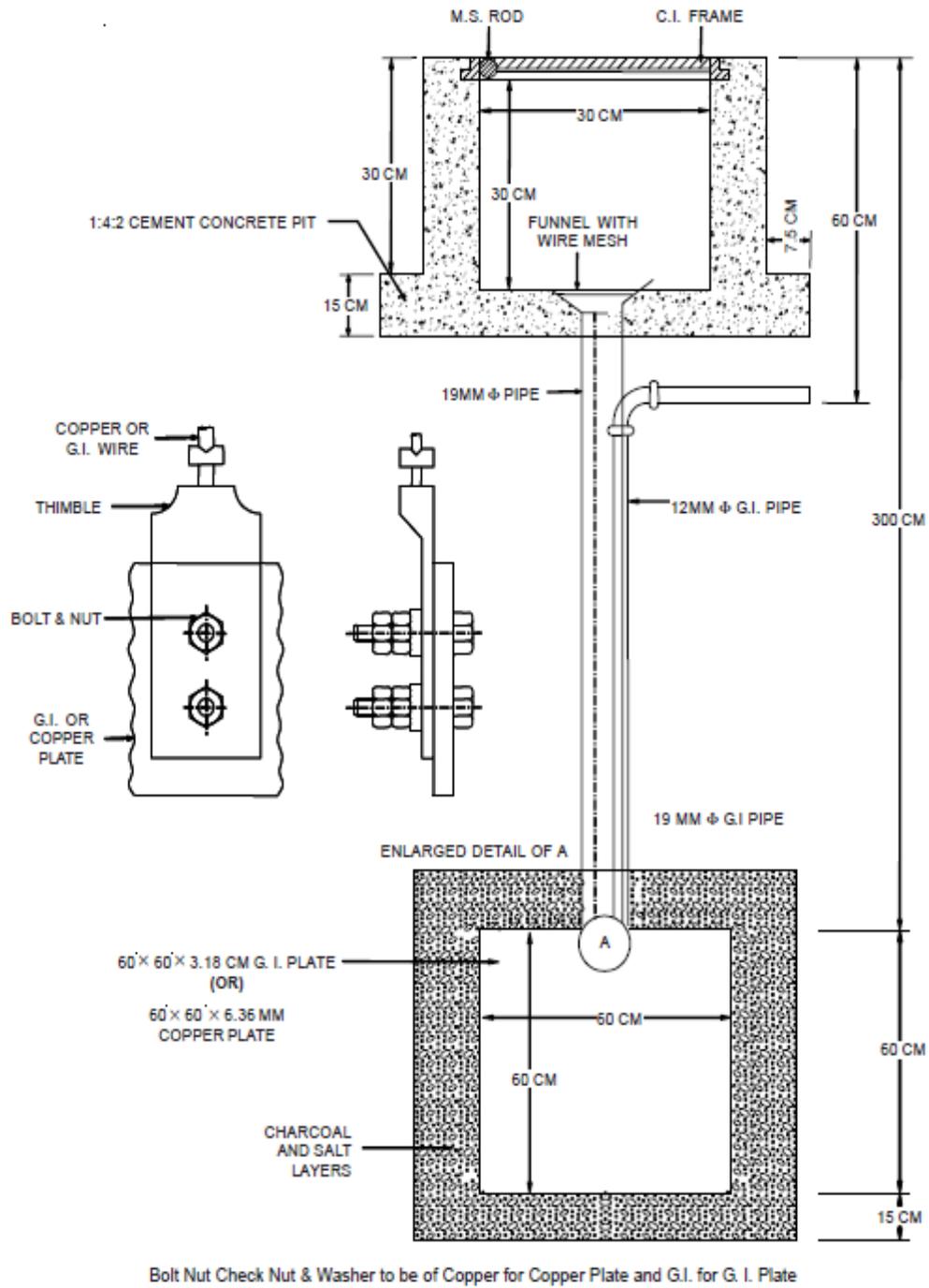
- B. Draw the following diagram (not to scale) (8M)

C05



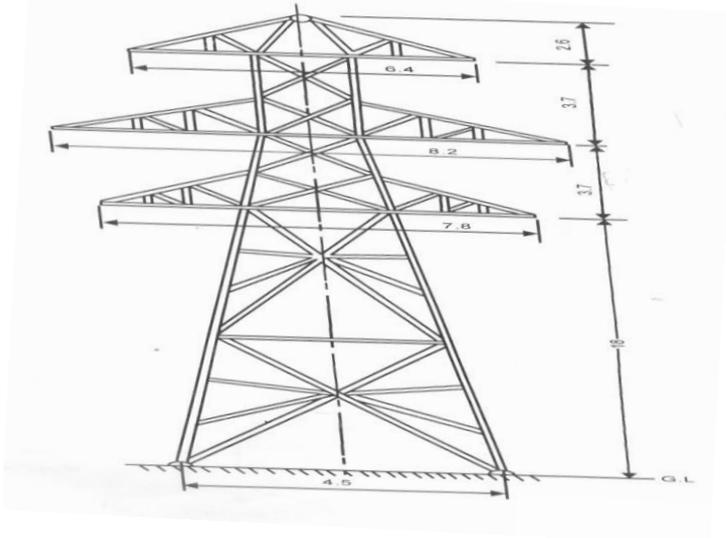
C. Draw the following diagram (13M)

C03



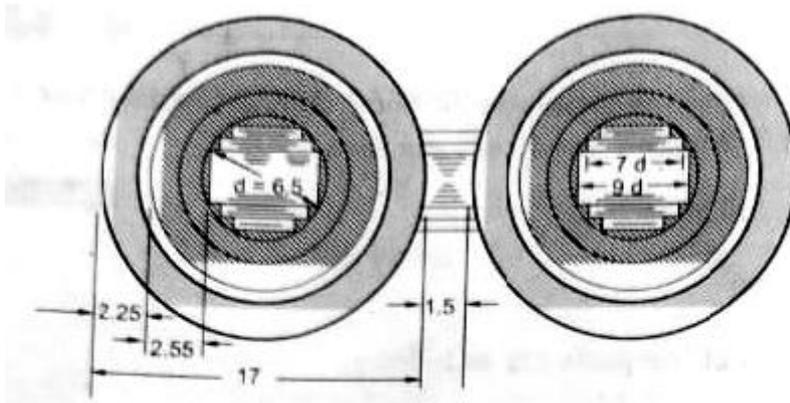
2. A. Draw the following tower (6m)

C03



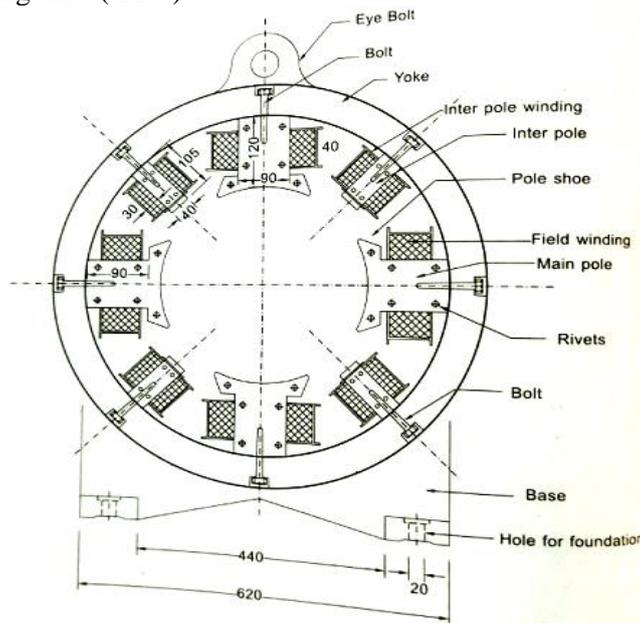
B. Draw the figure given below (9 M)

C04



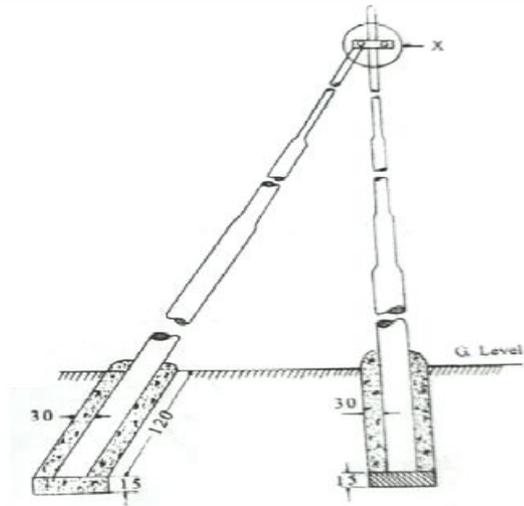
C. Draw the following diagram (12M)

C05



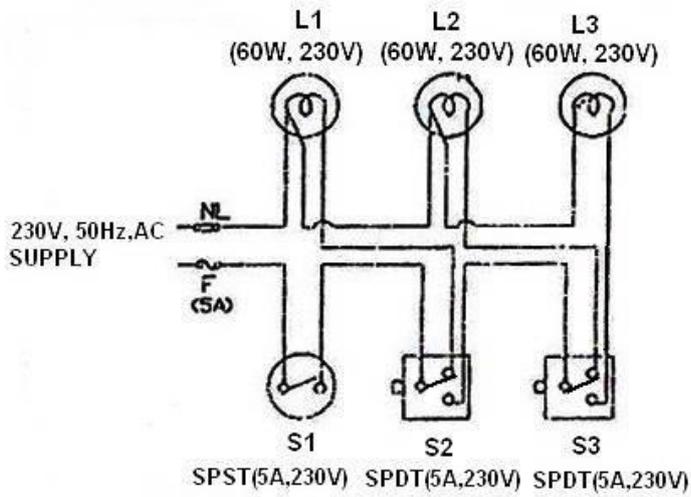
3. A. Draw the following (7M)

CO3



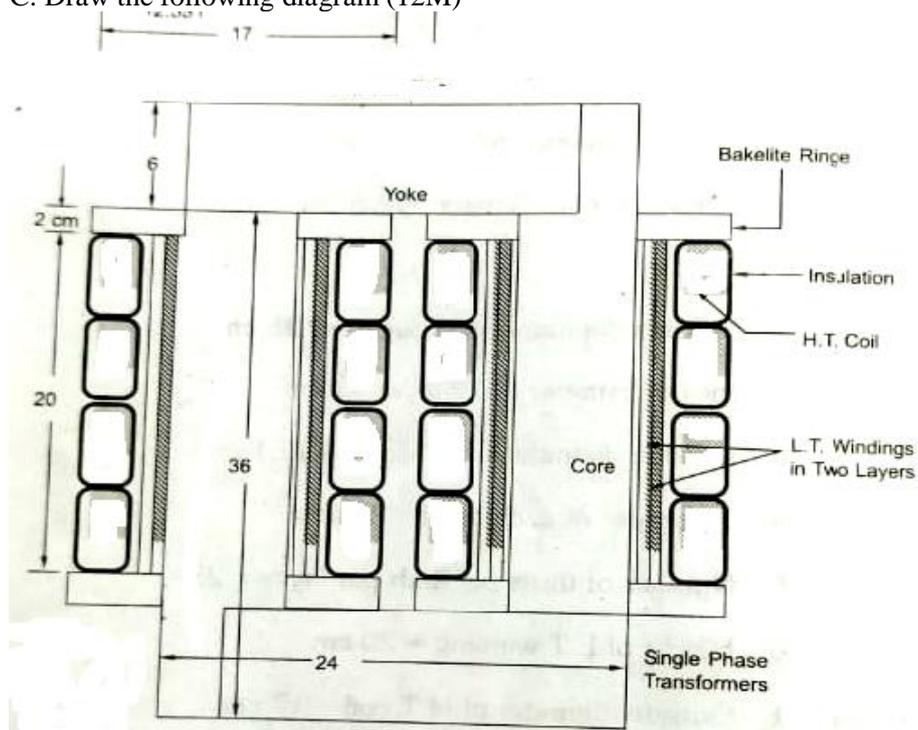
B. Draw the following wiring diagram (8M)

CO2

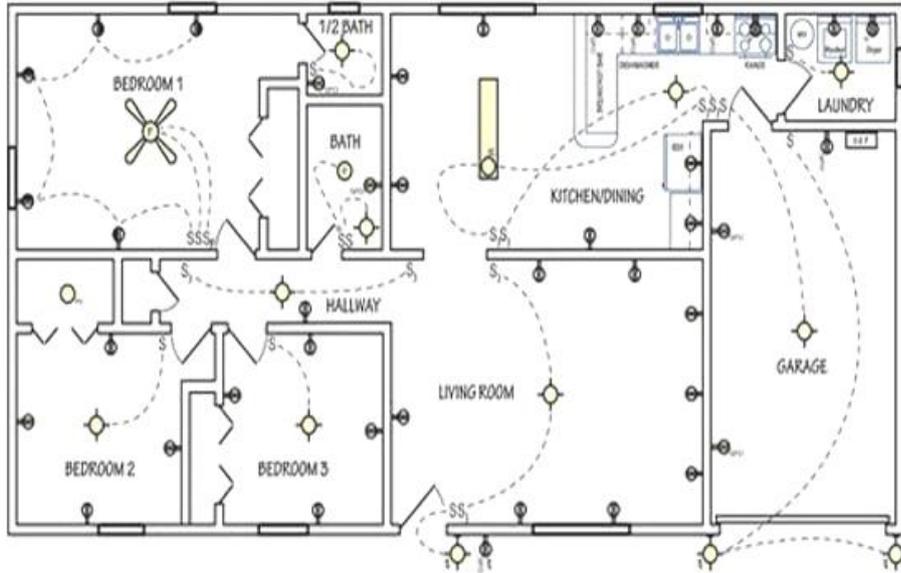


C. Draw the following diagram (12M)

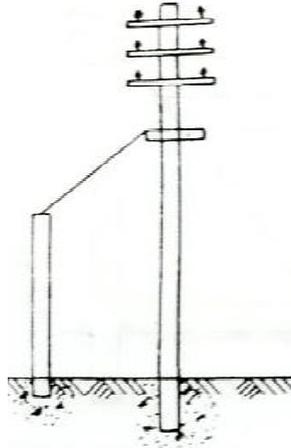
CO4



4. A. C. Draw electrical wiring of a house with 3 bed rooms , living room and kitchen. (15M) CO2



- B. Draw the following (6M) CO3



- C. Draw the following (5m) CO5

