Mission and vision of the Department

Vision of Mechanical Department

To establish the state of the art learning center in Mechanical Engineering which will impart global competence, enterprising skills, professional attitude and human values in the student.

Mission of Mechanical Department

1. To impart quality technical education to the students.
2. To develop comprehensive competence in the students through various modes of learning.
3. To enable students for higher studies and competitive examinations.
4. To facilitate students and industry professionals for continuous improvement and innovation.

Program Educational Objectives:

[1] Use core competence acquired in various areas of Mechanical Engineering to solve techno-managerial issues for creating innovative products that lead to better livelihoods & economy of resources.

[2] To establish themselves as effective collaborators and innovators to address technical, managerial and social challenges.

[3] To equip students for their professional development through lifelong learning and career advancement along with organizational growth.

[4] Serve as a driving force for proactive change in industry, society and nation.

PROGRAM SPECIFIC OUTCOMES

Student should have

1) An ability to work professionally in mechanical systems including design, analysis, production, measurement and quality control.

2) An ability to work on diverse disciplinary tasks including manufacturing, materials, thermal, automobile, robotics, mechatronics, engineering software tools, automation and computational fluid dynamics.

1.Lab Exercises:

a)The objective of this exercise is to give the basic introduction of input/output devices used in CAD workstation and familiar the student, the various configuration, models and latest trends input/output devices used in Workstation

Exercise No1 :(2Hrs/Week) - 1Practical

Input, Output and Hardcopy Device for a CAD System

Input devices allow us to enter row data into a computer. The computer processes the information and then produces that we can understand using on output device

Examples of input devices

There are many input formats, which enable us to gather up and collect information, and enter data and instructions into the computer.

Some common input devices

QWERTY keyboard

Mouse

Tracker ball

Joystick

Light pen

Sensors (see the Revision But on computer control)

Barcode reader

0 2 2 5 1 3 2 0 1 5 0 1 4

Barcodes are different groups of vertical bars that can be read by and optical scanner.

Barcodes because the are cheap to produce and very durable

Concept keyboard

This is a flat board that contains a grid of buttons. Each button can be programmed to fallow instructions. As overlay sheet is placed on the grid with an explanation for each button. They are used in primary schools witch young children. Many modern fast food restaurants have overlays with either a description or picture of the meals are available to make ordering easier.

Digital camera

A digital camera allows you to take pictures and to store a digital photographic image that can be read by a computer. You can then transfer the images directly form your camera on to your computer.

Graphics tablet
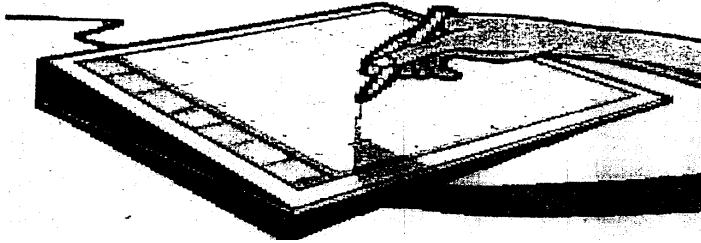
This consists of a flat pad (the table) on which the user draws with a special pen. As the user draws on the pad the image is created on the screen. Using a graphics table a designer can produce very accurate on-screen drawings.

MICR (Magnetic Ink Character Reader)

Magnetic ink characters are the strange looking numbers that appear at the bottom of cheques. These characters are used because they are very difficult to forge or damage Banks use MICR to read the numbers form the bottom of cheques to obtain data such as account numbers and bank sort codes.

Magnetic strip (or stripe) reader
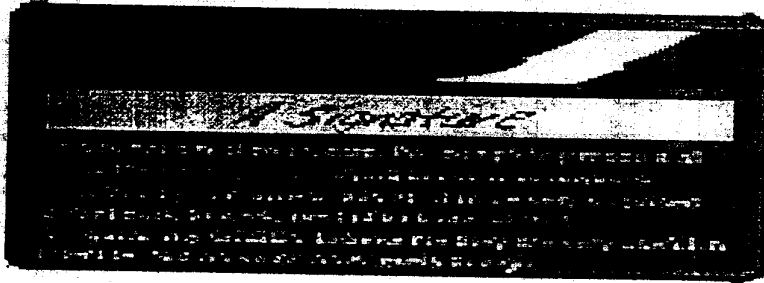
Magnetic strips are built into many plastic cards such as cheque guarantee cords, cash-point cards and personal identity cards. The magnetic strip on the back of the card can hold the personal details of the card owner and, with the necessary PIN , will allow access to access to secure information e.g. bank account details. Data stored on the strip is scanned and input into a computer system by a reader.

MIDI (Musical Instrument Digital Interface)

A MIDI system allows you to attach a musical instrument to your computer, for example a musical keyboard. You can then store a musical sequence on a computer and then have the computer play it back to you.

OMR (Optical Mark Reader)

An OMR read marks made by pencil on a printed form into the computer. OMR systems are suited to reading per-printed forms and check-boxes such as National Lottery number selection sheets and multiple-choice exe papers.
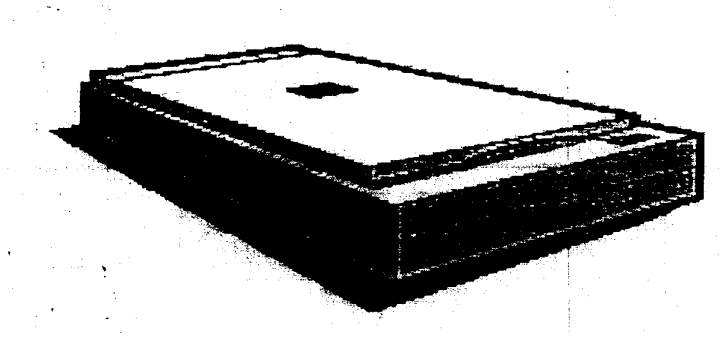
Scanner

Scanners are now a cheap and common way of getting images into a computer. They can also be used with OCR (Optical Character Recognition) software to scan in text.

Touch screen

A touch screen is a special type of VDU which has a grid of light beams or fine wires criss-crossing the screen. When the screen is touched (usually to choose an on-screen option). The computer senses where you have pressed. Due to the vast amount of information they can store. Touch screen operated computer are generally used in the provision of public information and are found in public as airports.

Video digitizer

A Video digitizer takes an image from a video camera or television & converts it so that it can be used by, & stored on a computer. Video sequences capture using a video digitizer is often used in multimedia presentations.

Voice recognition system

A microphone is used with Voice recognition system. This can be used with a word processing program to enter text. It can also be used as part of security system – only certain digitally stored voices have access.

Output Devices

Common output formats are printed –paper, saved disk file, sound, video & on screen documents. They are all of those things that let your computer 'talk' back to you & present information.

Examples of devices for these formats are:

Monitors or Visual Display Units (VDUs)

These are the most common output device & include desktop monitors & Liquid Crystal Displays (LCDs)

Printers
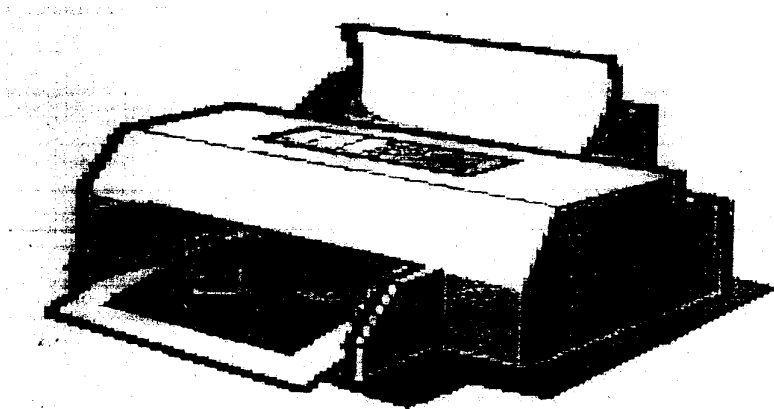
Laser printers produce a very high quality output, are very quiet &very fast although quite expensive to buy.

Ink jet printers are cheaper to buy, offering black and white or colour printing with reduced levels of quality and speed.

Dot- matrix printers are not so common today. They are comparatively noisy & low quality but are cheap to run and ideal for draft copies.

Plotters

A plotter can be used to produce high quality, accurate, A3 size or bigger drawings. They are usually used for Computer Aided Design (CAD) & Computer Aided Manufacturing (CAM)

Applications such as printing out plans for houses or car parts .

Other devices

Speakers

LCD projectors

2. LAB EXERCISES

Exercise No1 :(2Hrs/Week)-1Practical

INTRODUCTION TO AUTOCAD

2- Dimensional Modeling by using AUTOCAD package

a) Auto CAD is a general purpose Computer Aided Design Program that can be used to prepare a wide verity of 2-Dimentional drawings and 3-Dimentional models. AutoCAD stores the created drawings in data files, which can be retrieved at any time for viewing, editing or plotting. It is a powerful drawing tool that can be highly customized to suit a specific application. It improves productivity of creating drawings because of increased speed accuracy as compare to traditional methods.

APPLICATION AREAS

There is a virtually no limit to the kinds offline drawings that can be drawn by using AutoCAD. Here are just a few of the applications:

- Work flow charts and organizational diagrams
- Graphs of all kinds
- Proposal and presentation
- Technical illustration and assembly drawings
- Line drawings for the fine arts
- Plots & other representation of mathematical and scientific functions
- Interior design & facility planning
- Architectural drawings of all kinds
- Greeting cards & company logos
- Drawing of electronic, chemical, civil, mechanical, automotive, manufacturing and interactive displays
- Manipulation of complex objects as a whole & so many other applications.

DRAWING ENTITIES

An entity is a predefined element that you place in & drawing by means of single command. The following are the entity types one frequently uses in AutoCAD:

1) LINES – Lines can be drawn with various dot-dash line types. When drawing a segment, you can provide either 2D (x, y) coordinates or 3D (x, y, z) coordinates.
2) ARC & CIRCLES – Arcs & circles can be drawn with various dot-dash line types. Several methods are provided for drawing arcs & circles.

3) <u>POINTS</u> – points can appear as dots, squares, and circles, X's or any combination of these. You can locate point entities using either 2D or 3D coordinates

4) <u>TEXT</u> – Text can appear in a verity of fonts, with any size & orientation you wish. In addition, you can create text styles to apply mirroring, oblique, or a horizontal expansion or compression factor to the text characters.

5) <u>Traces</u> – Traces are two – dimensional, solid – filled lines of any width you specify.

6) <u>Solids</u> – Solids are two-Dimensional, solid – filled lines triangular or quadrilateral Object.

7) <u>Shapes</u> – Shapes are small object you can define outside Auto CAD and place in the drawing with a specified scale and rotation.

8) <u>Blocks</u> – Blocks are compound entities formed from groups of other entities.

9) <u>Attributes</u> – Attributes attach constant or variable text information to each instance of a Block. You can choose whether or not they are visible.

10) <u>Dimension</u> – Dimensions (generated when associated dimensioning is enabled)are compound entities similar to Block containing all the lines, arcs, arcs, arrows and text comprising a dimensioning annotation.

11) <u>Polylines</u>- Polylines is 2D connected line and arc segment with optional dot– dash line types, width and taper. Compound is provided to construct ellipses', regular polygons, filled circles and "doughnuts" using polylines.

12) <u>3D – Polylines</u> -3D polyline is fully general three – dimensional objects composed of straight – line segments (but no arcs, width, taper or line types.)

13) <u>3d Face</u> – 3D faces are three- dimensional triangular or quadrilateral plane section.

14) <u>3D – Meshes</u> – 3D Meshes are three – Dimensional polygon meshes. You can specify the size of the mesh and the location of its vertices. Commend are provided to construct ruled surface surfaces of revolution and tabulated cylinders using 3D meshes.

Co-ordinate System Overview

A rectangular coordinate system called the world coordinate system or WCS is used to locate objects in the drawing. This system contains X and Y axes which are perpendicular to one another. The X-coordinate specifies a horizontal distance and the Y-coordinate specifies a vertical distance the origin point (o,o) indicates the location where the two axes meet and is usually located are the lower left corner of the drawlingly is fixed and be altered in Auto CAD

3. LAB EXERCISES

Exercise No1 :(2Hrs/Week)-1Practical

SETTING THE DRAWING ENVIRONMENT

After entering the AutoCAD drawing editor, one is ready to create drawing environment. No matter what type of drawing is to be prepared, the followings are the steps, in general to set up the drawing environment:

- Determine the units of measure needed.
- Determine the limits of the drawing
- Decide what drawing aids will be usefull.
- Create the layers needed to control the visibility & colour of objects in the drawing.

THE MAIN MENU

AutoCAD's Main menu appears on the text display screen and it provides access to various parts of AutoCAD. The main menu looks like this:

Main menu

1.   Begin a NEW drawing
2.   Edit an EXISTING drawing
3.   Plot a drawing
4.   Printer plot a drawing
5.   Configure AutoCAD
6.   File utilities
7.   Compile shape/ font description file
8.   Convert old drawing file
9.   Exit AutoCAD

FEW COMMANDS

ARC

PURPOSE: allows you to draw an arc using a varity of methods to draw an arc *
From the keyboard :Arc .J * From the screen menu: Draw-arc * from the pull-down menu: Draw-Arc Then completes the following step:

Centre/ (start point): C or use the mouse to pick the start point of the Arc. If you select Arc from the screen menu, the arc menu appears, with uveral present Arc options.

AREA

PURPOSE; Carries out an area calculation based on dimensions that you specify by defining line segments, by selecting lings and polylines, or both.

Sequence of steps;

- From the keybord; Area.J
- From the screenmenu; Inquiry-Area
- From the pull-down menu; Utility-Area (11) Then follow thes steps;
1. First point>/Entity/Add/Subritract; Pick the first oint or enter the option.
2. Each time you select a point the following prompt oppears, Next point;

 Pick the next point continue picking point unit you have defined the area , then press

COLOUR

PURPOSE: Set the colour of objects being drawn. Ones you select a colour with the colour command, all objects will be given the selected colour regardless of their layers, unless you specify by layers as the colour. Objects you drew before using the colour command are not affected.

To set the colour of objects:

- From the keyboard: Colour.1
- From the screen menu: setting –colour
- From the pull down menu. Modes-EntityCreation\"1on (9), Setting-EntityCreation(10), Option-EntityCreation(11)
  Then corr. plete the following step:
  New entity colour current default: enter the colour when using the pul down menu, you will get the dialog box with a colour input box. You can enter the name or number of colour in this dialog box.
  COPY
  PURPOSE: copies a single object or set of objects
  To copy
- From the keyboard: Copy
- From the screen menu: edit –copy
- From the pull down menu: edit –copy(9) Modify-copy(10,11)
  Then follow these steps:
  1 select objects : select objects to be copied.
  2 <Base point or displacement > multiple pick the reference or "base" point for the copy or enter M for multiple copies:
  3 Second point of displacement : pick the copy distance & direction in relation to base point or enter the displacement value.

DTEXT/ TEXT

PURPOSE: Allows you to enter several lines of text at ones. It also displays the text on the drawing area as you type. At the first prompt, you can set the justification or set the current text style. Using either the fit or Align options, you can tell AutoCAD to fit the text between two points.

To enter text using Dtext

- From the keyboard: Dtext or text
- From the screen menu: Draw –Dtext or Draw –next-Text
- From the pull down menu: Draw –Dtext

Then follow these steps:

1 Justify/Style/<start point >: Enter the desired option or pick a start point for your text.

If you pick a point to indicate the beginning location on your text, you get the following prompts:

2 height<default height> : enter the desired text height or press ENTER to accept the default.

END

VERSION: All Version

PORPOSE; Simultaneously exits and saved a file Edits mode prior to the End command and saved

Sequence of steps

- From the keyboard; End ENTER

- From the screen menu; Utility-End-Yes

- From the pull down menu; File-End

HATCH

VERSIONS;l All versions

PURPOSE; Fills an area a defined by lines, arcs, circles; and polylines with either step; a predefined pattern or a simple hatch pattern.

Sequence of Steps

- From the keyboard; Hatch ENTER
- From the screen menu; Draw-Hatch
- From the pull down menu; Draw-Hatch Then completed the following step.

- Pattern (? Or name/U, style)<default pattern>; Enter the pattern name or enter U to Create a simple crosshatch pattern.

HELP/?

PURPOSE; Gives a brief description in information about that command. Used Help in the middle of another command to get specific information about command, Enter Help preceded by an apostrophe at any prompt in the command. You can use a question mark in place of the word Help.

To Access Help

- From the keyboard Help ENTER or help ENTER or? ENTER
- From the screen menu Inquiry-Help
- From the pull down menu Help-Help (9,10),Assist Help (11) Then complete the following step

Command name (RETURN for List); enter the name of the command in question or press ENTER for a list of command and a brief description of point selection.

LAYER

PURPOSE; Creates new layers assigns colours and line types to layers and set the current layer allows you to control which layers are displayed.

- from the keyboards; Layer J
- From the screen menu Layer

LIMITS

PURPOSE; determines the drawing boundaries. If you use a grid it swill appear only within the limits.

 In version 11 Limits steps the limits for paper space and model specs independently. To Establish Drawing Boundaries

- Form the keyboards Limit Enter
- From the screen menu; Settings Limit
- From the pull-down menu Utility-Limits(11)Then complete the following step

ON/OFF/<lower left comer><0.0000, 0.0000>; Enter the coordinate for the lower left corner or select the ON/OFF option.

LINE

PURPOSE: Draws simple lines, either a single line or series of lines end-to-end.

To Draw a Line

- From the keyboard: Line ENTER

- From the screen menu: Draw-Line

- From the pull-down menu: Draw-Line

Then follow these steps:

1. from point: Select a point to begin the line

2. to point: Select the line end point.

3. to point: Continue to select point to draw consecutive lines or J>res~ to exit Line command

ORTO

PUROPOSE: Ortho forces line to be drawn in exactly vertical or horizontal directions.

Sequence of steps

- Form keyboard Ortho J F8 Ctrl-o

- From the pull-down menu: Setting Ortho On/off

POINT

 PURPOSE: Point draws a point entity. Points can be used as unobtrusive markers that you can snap to using the node o snap override.
Sequence of steps
- From the keyboard: point ENTER
- From the screen menu: Draw-next-point
Then complete the following step:
Points: enter the point location.

QUIT

PURPOSE: exit a drawing without saving the most recent edits. The file reverts to the condition it was in following the last save or end command. If you pick Quit from the Utility men\J the Quit menu appears. Quit is not issued until you pick yes from the Quit menu. A yes response is automatically entered at the really want to discard file prompt, & you exit the drawing.
To exit without saving

- From the keyboard: Quit ENTER

- From the screen menu: Utility - Quit

- From the pull-down menu: File-Quit
  Then completes the following step:
  Really want to discard all changes to drawing? Enter Y to exit or ENTER to abort the Quit command.

SAVE

PURPOSE: stores your currently open file to disk. Sequence of steps

- From the keyboard: Save ENTER

- From the screen menu: Save

- From the pull-down menu: File-Save
  Then completes the following step:
  I version 11, a dialog box appear with a verity of options & a list of files. Other version displays the following prompt.
  File name<current File name >:
  Enter the file name or press J to accept the default current file name.
  SCALE
  PURPOSE: changes the size of object in drawing. You can also scale object by reference Sequence of steps

- From the keyboard: Scale ENTER

- From the screen menu: Edit next Scale

- From the pull-down menu: Modify Scale (11)
    Then follow these steps:

  1.Select object : Pick the object to be scaled.
  2.Base point :Pick a point of reference for scaling.
  3.<Scale factor>/Reference:Enter the scale Factor, move the cursor to visually select new scale,or nter Rto select the Reference option.

UCS

PURPOSE: The User coordinate system, or UCS, is a tool for creating and editing three-dimensional drawings. A UCS can be described as a plane in three-dimensional space on which you can draw. Using the UCS command, you can create and shift between as many UCS planes as you like.

There are specialized three-dimensional drawing commands for creating three-dimensional surfaces. You can issue these three-dimensional commands independently of the UCS. In general, however, objects are drawn on parallel to the plane of a UCS

To Modify a UCS

- From the keyboard: UCS
- from the screen menu: UCS-UCS then completes the following step:

Origin/Zasis/3point t/Entity /view / X/Y/Z/Priv /restore/save/Del/?
Words: Enter an option.

UNITS

PURPOSE: Sets AutoCAD to the unit format appropriate to the drawing.
For example, If you are drawing an architecture floor plan, you can set I.1p AutoCAD to accept and display distance using feet, inches,& fractional inches. You can also set up AutoCAD to accept and display angle as degree, minutes, &second of arc rather than the decimal degrees.

To change drawing units

- From the keyboard: Units ENTER
- from the screen menu: Settings-next Units
  Then follows these steps:

I. With the expectation of the Engineering & architectural modes, you can use the modes listed below with any basic unit of mesurment. For example. Decimal mode is perfect for metric units as well as decimal English units
  Report formats: (Examples)

1. Scientific 1.55E+ 012.
2. Decimal 15.50
3. Engineering I` -3.50"
   Enter choice 1 to 3 < 2 > : Enter the number corresponding to the desired unit system.
   2 Number of digits to right of decimal point (0 to 8) : < 4 >: Enter a number.
   3 The: following listing appears:
   System of angle measure: (Example)
   1 Decimal ~ degrees 45.000
   2 Degrees/minutes/seconds 45do`o`
   3 Grads 50.0000g 4 Radians 0.785 r
   4 Surveyor's units N 45d o`o`E
   Enter choice, 1 to 5 <1>: enter the number corresponding to the desired angle mesure system.
   5 Number of fractional places for display of angle (0 to 8) <0>: Enter a number.
   6 The following listing appears:

Direction for angle 0 : East 3 o` clock = 0
North 12 o` clock = 90
West 9 o` clock = 160
South 6 o` clock = 270
Enter direction for angle 0 <0>: Enter the desired. Angle for the 0 degree direction.
7 Do, you want angle measured clockwise <N>: Enter y if you want angles measured clockwise, otherwise press ENTER

VIEW

PURPOSE: Allows you to save views of your drawing. Instead of using the Zoom command to zoom in & out of your drawing, you can save views of the areas you need to edit, and then recall them using the Restore option of the view command, View become. A transparent command that can be used in the middle of another command.

To save view . of your Drawing
- From the keyboard: 'view' ENTER
- from the screen menu: Display- View

Then complete the following step:

?/Delet/Restore/Save/Window: Enter the capitalized letter of the desired option or pick an option from the menu.

ZOOM

PURPOSE: Zoom controls. The display of your drawing. Zoom can be used transperantly)

When issued from the menu system or when an apostrophe is entered in front of the command.

Sequence of steps
- From the keyboard: Zoom .J
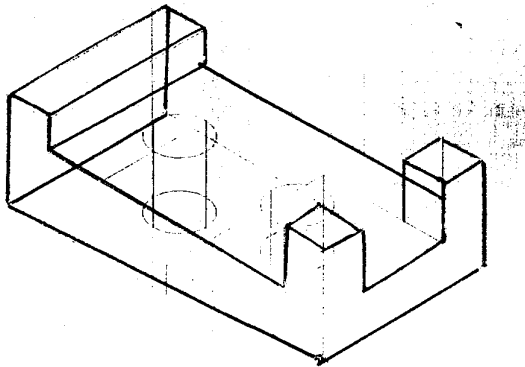- from the screen menu: Display- Zoom

4. Lab Exercises

Exercise No1: (2HRS/week) – 1practical
To plot a 3 Dimensioal Drawing for a given object by using Auto CAD.

(The purpose of this ecpercise to draw 3 Dimensional drawing by AUTOCAD Commands)
3 Dimensional Model for a given object

Commands for 3 Dimensional Modeling

Command:_shademode Current Mode: 3D wireframe
Enter potion[2D wireframe/3D
Wire frame/Hidden/flat/Gouraud/flat edges/gOuraud+edges]<3D wireframe>:_f
Command:_shademade Current mode:flat
Enter option [2D wireframe/3D
Wire frame/Hidden/flat/Gouraud/fLat+edges /gOuraud+edges]<Flat>:_3
Command:_subtract select solids and regions to subtract from..
Select solids and regions to subtract.
Select object:1fonud
Command:_shademode Current mode:3D wireframe
Enter option[2D wireframe/3D
Wire frame/Hidden/flat/Gouraud/flat edges/gOuraud+edges]<3D wireframe>:_f
Command:_shademade Current mode:flat
Enter option [2D wireframe/3D
Wire frame/Hidden/flat/Gouraud/fLat+edges /gOuraud+edges]<Flat>:_3
Command:_Erase 1 fonud
Command:_u ERASE
Command:_box
Specify corner of box or [Center]<0,0,0>:
Specify corner of[Cube/Length]:
Specify length:-15
Specify width:60

Specify height:10
Command:_.Exase 1 found
Command:_.subtract Select solids and regions to subtract from
Select object: 1 found
Select solids and regions to subtract.
Select object: 1 found
Command:_shademode Current mode:3D wireframe
Enter potion[2D wireframe/3D
Wire frame/Hidden/flat/Gouraud/flat edges/gOuraud+edges]<3D wireframe>:_f
Command:_shademade Current mode:flat
Enter option [2D wireframe/3D
Wire frame/Hidden/flat/Gouraud/fLat+edges /gOuraud+edges]<Flat>:_3
Command:_shademode Current Mode: 3D wireframe
Enter potion[2D wireframe/3D
Wire frame/Hidden/flat/Gouraud/flat edges/gOuraud+edges]<3D wireframe>:_f
Command:_ucs
Current ucs name:*NO NAME*
Enter an option [New/Move/orthographic/Prev/Restore/Save/Del/Apply/?World]
<World>:M
Specify new origin point or [Z depth]<0,0,0>:
Command:_shademade Current mode:flat
Enter option [2D wireframe/3D
Wire frame/Hidden/flat/Gouraud/fLat+edges /gOuraud+edges]<Flat>:_3
Command:_line Specify first point :
Specify next point or [Undo]:20
Specify next point or [Undo]:*Cancel*
Command:_Shademode current moad:3D wireframe
Enter potion[2D wireframe/3D
Wire frame/Hidden/flat/Gouraud/flat edges/gOuraud+edges]<3D wireframe>:_f
Command:_shademade Current mode:flat
Enter option [2D wireframe/3D
Wire frame/Hidden/flat/Gouraud/fLat+edges /gOuraud+edges]<Flat>:_3
Command:_line Specify first point :
Specify next point or [Undo]:<Ortho on>20
Specify next point or [Undo]:30
Command:_Shademode current moad:3D wireframe
Enter potion[2D wireframe/3D
Wire frame/Hidden/flat/Gouraud/flat edges/gOuraud+edges]<3D wireframe>:_f
Command:_shademade Current mode:flat
Enter potion[2D wireframe/3D
Wire frame/Hidden/flat/Gouraud/flat edges/gOuraud+edges]<3D wireframe>:_f
Command:_shademade Current mode:flat
Enter option [2D wireframe/3D
Wire frame/Hidden/flat/Gouraud/fLat+edges /gOuraud+edges]<Flat>:_3

Command:_circle Specify center for circle or [3p/2p/T+r(tan tan radius)]:
Specify radius of circle or [Diameter]:r
Requires numeric radius,point on circumference,or"D"
Specify radius of circle or [Diameter]:10
Command:extrude
Current wire frame density:ISOLINES=4
Select object: 1 found
Select object:
Specify height of extrusion [path]:25
Specify angle of taper for extrusion<0>:*Cancel*
Command: extrude
Current wire frame density:ISOLINES=4
Select object: 1 found
Specify height of extrusion [path]:25
Specify angle of taper for extrusion<0>:
Command:_Shademode current moad:3D wireframe
Enter potion[2D wireframe/3D
Wire frame/Hidden/flat/Gouraud/flat edges/gOuraud+edges]<3D wireframe>:_f
Command:_shademade Current mode:flat
Enter option [2D wireframe/3D
Wire frame/Hidden/flat/Gouraud/fLat+edges /gOuraud+edges]<Flat>:_h
Command: _subtract select solids & regions to subtract from..
Select objects: 1found
Select solids & regions to subtract.
Select objects: 1found
Command:_specify first point:
Specify next point or [Undo]: 45
Specify next point or [Undo]:*cancel*
Command :_circle specify center point for circle or [3P/2P/Ttr(tan tan radius)]:
Specify radius of circle or [Diameter]<10.0000>: r
Requires numeric radius, point on circumference, or "D"
Specify radius of circle or [Diameter]<10.0000>: 10
Command : extrude
Current wire frame density: ISOLINES = 4
Select objects: 1 found
Select objects:
Specify height of extrusion or [Path]: 15
Specify angle of taper for extrusion<0>: *cancle*
Current wire frame density: ISOLINEs=4
Select objects: 1 found
Specify height of extrusion or [Path]: -15
Specify angle of taper for extrusion<0>:
Command :_shademode current mode: Hidden
Enter option [2D wire frame/3D]

Wireframea/hidden/Flate/Gouraud/flat+edges/gOuraud+edges <Hidden>:_3
Command :_shademode currentmode: 3Dwireframe
Enter option[2D wire frame/3D]
Wireframea/hidden/Flate/Gouraud/flat+edges/gOuraud+Edges] <3D wireframe>:_f
Command :_shademode currentmode: Flat
Enter option[2D wire frame/3D]
Wireframea/hidden/Flate/Gouraud/flat+edges/gOuraud+Edges] <Flat>:_3
Command :_shademode currentmode: 3D wireframe
Enter option[2D wire frame/3D]
Wireframea/hidden/Flate/Gouraud/flat+edges/gOuraud+Edges] <3D wireframe>:_h
Command:_substract select solids and regions to substract from.
Select objects: 1 found
Select objects:
select solids and regions to substract from.
Select objects: 1 found
Select objects:*Cancel*
Command:_ subtract select solids and regions to subtract from.
Select objects: 1 found
Select objects:
select solids and regions to subtract from.
Select objects:*Cancel*
Command :_shademode currentmode:Hidden
Enter option [2D wireframe/3D]
Wireframea/hidden/Flate/Gouraud/flat+edges/gOuraud+Edges] <Flat>:_3
Command:_ subtract select solids and regions to subtract from.
Select objects: 1 found
select solids and regions to subtract from.
Select objects: 1 found
Command :_shademode currentmode: 3Dwireframe
Enter option[2D wire frame/3D]
Wireframea/hidden/Flate/Gouraud/flat+edges/gOuraud+Edges] <3D wireframe>:_f

5. Lab Exercises:

Exercise No.1 (2Hrs/Week) – 1Proctical

1 Basic Faction of Graphics

These are the graphics functions used in the C- Language

1.1   "intigraph" function

This function is used to initialize the graphics system and load the appropriate specified graphics driver and the video mode used by the graphics func

 The general form

   Initgraphy (&driver, &mode, "x")

Where

 x- Path where the graphics drivers are to be searched

1.2"restorcrtmode" function

This function restores the screen to the mode that it had prior to the operation of initgraph

   Restorecrtmode ();

1.3"detectgraph"function

These functions detect the driver and mod of the system. It is written as Detect graph (&x, &y);

Where   x- graphic driver

   y- graphic mode of the system

1.4 "closegraph" function

 This function dislocates all the memory allocated by the graphic system. It restores the screen to the mode in which it was before execution of the initgraph. Closegraph ();

1.5 "getch" function

  This function is used to obtain the view of the graphic screen when the program is being executed it is written as

Getch ();

This function can be obtained by including the file "conio.h" in program.

1.6 " ste palette " function

This function closes an index for Palette and matches the colour with the index and this colour sets the background.

setPalette (0, GREEN);

1.7 " setcolor" function

This function sets the drawing colour specified by the variable.

setcolor (n);

Where n is the number of the colour

1.8 "PutPixel" function

This function illuminates the pixel represented by x and y co-ordinates in the given colour.

Put pixel (1 o,20,RED);

1.9 "gutPixel" function

This function returns the colour in which the pixel (x, y) is illuminated

i= getpixel (10, 20);

The colour number of the pixel at (10.20) location is stored in "I" variable.

1.10 "moveto" function

This function positions the current cursor into the pixel (x,y)

Move to (100, 150)'

This moves the cursor control to pixel at location (100,150)'

2. Drawings

While preparing the drawing their different types of elements used. These elements are prepared a computer screen using the algorithms or ready mode function.

The drawings are prepared by using four different types of elements.

1) Line drawing
2) Curve drawing

3) Text
4) Filling tool

Readymade function on line drawing

There are readymade functions available of drawing og and related figures using lines in the "graphics.h" library

2.2 "Lineto" function

These function draws a line form the current cursor position to (x, y). Line(x1, y1, x2, y2);

2.3 "bar" function

This function draws a rectangle from diagonal co-ordinates (x1,y1,) to (x2,y2)

Rectangle (x1, y1, x2.y2);

2.4 "bar3d" function

These function provides a 3 – dimensional view rectangular boxes with diagonal from (x1,y1) to (x2,y2) depth and top flag

Bar3d (x1, x2, x2, y2, h, x);

Where

h   -   Depth

x   -   Top fiog if non-zero then ti is provided

2.5 "drawpoly" function

This function draws a polygan outline with given points line style and color. It is written as

Drewpoly (n,x)

Where

N   - on of points

X   -   array inicating postistion of points.

3. CURVE DRAWING

There are four different types of curves used in graphics

a) Circle
b) Ellipse
c) Arc
d) Regular or irregular curves

3.1 READYMADE FUNCTION FOR CIRCLE

Using readymade function available in the "graphics.h" libray can draw a circle . Thise functions drawa circle with center at (xc,yc)and radius R

Circle (xc, yc,r);

3.2 REASYMADE FUNCTION FOR ELLIPES

A ELLIPSE CAN BE DRAWN BY USING READYMODE FUNCTION AVAILABLE IN THE "GRAPHICS.H" LIBRAY.

This function draws ellipse with center at (xc,yc) and majar axis is A and minor axis is

B. The start angle is "thi" and end angle is "the"

Ellipse (xc,yc, thi,the,A,B)

3.3 READYMADE FUNCTION FOR ARC

Thise function draws arc with center at (xc,yc) and radius "r" The start angle is "thi" and the end angle tis 'the'

Arc (xc,yc,thi,the,r);

4. FILLING OF OBJECTS

This process of coloring a definite area or region or given area of the diagram or fig. completely filled with colour.

READYMADE FUNCTION FILLING OF OBJECTS

These are different readymade function available for filling of objects. These functions can be used directly for filling of the object in two dimensions.

4.1 "Setfillstyle" Function

This sets the pattern in which the closed boundaries can be filled and the color to fill the boundary.

Setfillstyle (a,b);

Where-

a   -   pattern being set

b   -   fills the colour

4.2 "Setfillpattern" function

This function helps the tilling and half taning It sets the filling pattern

Setfilllllpattern (p.q)

Where,   p   -   Pointer indicating the matter

q -   Colour

4.3"floodfillstyle" function

This function fill the area bounded by the colour border

Flood fill (x,y,n)

Where

X,y)   -   lacation of the seed point

n   - Colour number

5.TYPE OF LINE

There are differents type of lines used in drawing used in drawing center line dorted line doshwd line etc. for setting different line styles flowing function is used.

5.1 "setlinestyle" function

This function fixes the linestyle of all future line drawan by using resdymade fucnction in dreawing.

Setlinestyle (p,q,r)

6.TEX

The text can be printed in the graphics drawing by use of text function The text is required in the drawing for the title of drawing,name of the parts, dimensions os parts scale of drawing etc. For printing of text matter indrawing following function isused;

<u>6.1" outtext;fuction</u>

The text can be printed at the secified location(x,y)

1.   Outtext (x,y,)"

This displays "dimension sre mm" statement at x,y location

2. moveto (x,y)

       Outtex ("dimensions are in mm");

This print the text "Dimension are in mm "

This print the text "Dimension are in mm" on the screen at location (x,y)

6.2"settextstyle" function

This function sets set font, direction and size of character for "outtext" command

            Settextistyle (f,d,s);

Where

                f   - Type of font or character(0-11)

                d   - Direction (0-harizontul,1-Vertical)

<u>7 Two dimensional drawing</u>

7The dimensional drawing of machine parts or element can seveloped uding basics elements

1. Curves
2.   Lines
3. Text

4 filling tool

There are different types of curves used aided Design C- Graphics like circle ellipse are and to her regular and irregular cure. There are different types of lines used for drawing like dotted line etc. The text with different font style size and width. The text is writing a title, name plate, part list and dimension text.

The two dimensional drawing are used in variety of application such as drawing application such as machine drawing civil drawing artistic drawing mining drawing plant layouts maps et c. All the variety of 2D drawing used above element for drawing.

The 2D drawings in engineering g are used as orthogonal projections means the view of the object obtain by looking the in perpendicular direction. The orthogonal projections are obtained in different planes and are called as front view, plan and side view. In additional the drawing of machine parts consists of part list dimensions, tolerances etc. The orthogonal projection can be draw with first angle projection method.

6. Lab Exercises:

[Purpose of these exercises to make students to understand how to implement the 2-D transformation a given object.]

Exercise No. 1: (2 hours) – 1 practical
Study of 2-D transformation like translation, scaling, rotation.

Algorithm:
A] Take the coordinate of an object
B] Write 2 separate functions for identity matrix & matrix multiplications.
Translation:
1: take translation vectors tx & ty & place them in the matrix shown below:

```
1  0  tx
0  1  ty
0  0  1
```

2: use matrix multiplication routine to get new coordinates, equation is

```
X`     1  0  tx   x
Y` =   0  1  ty   y
1      0  0  1    1
```

Rotation:
a) Rotation at origin:
1: take rotation angle ɵ (thita) & convert it in to radians.
2: calculate cos ɵ & sin ɵ& place them in the matrix given below.

```
cos ɵ    - sin ɵ   0
sin ɵ      cos ɵ   0
0            0     1
```

3: use matrix multiplication routine to get new coordinates.

```
X`     cos ɵ    - sin ɵ   0   x
Y`     sin ɵ      cos ɵ   0   y
1       0          0      1   1
```

b) Rotation at pivot point:
1: take rotation angle ɵ & convert it into radians.
2: calculate cos ɵ & sin ɵ & place them in the matrix given below

```
cos ɵ     - sin ɵ   0
sin ɵ       cos ɵ   0
    0          0    1
```

3: take coordinates for pivot point rotation xr yr.
4: from the following matrix

```
cos ɵ    - sin ɵ   xr(1- cos ɵ)+yr(sin ɵ)
sin ɵ      cos ɵ   yr(1- cos ɵ)- xr(sin ɵ)
```

0   0   1

5: use matrix multiplication routine to get new coordinates.
        X`   cos ө   - sin ө   xr(1- cos ө)+yr(sin ө)
        Y` = sin ө   cos ө   yr(1- cos ө)- xr(sin ө)
        1   0   0   1
Scaling:
a) General scaling
  1: take scaling factor (sx,sy) & place them in the matrix given below
        sx 0 0
        0 sy 0
        0   0   1
  2:use matrix multiplication routine to get new coordinates
        X`   sx 0 0   x
        Y` = 0 sy 0   y
        1   0 0 1 1

b) General fixed point scaling:
  1: take scaling factor (sx,sy) & place them in the matrix given below
        sx 0 0
        0 sy 0
        0   0   1
2:take fixed point for scaling(xf,yf) & form following matrix
        X`   sx 0   xf(1-sx)   x
        Y` = 0 sy yf(1-sy)   y
        1   0 0   1   1

7. Lab Exercises:

[Purpose of these exercises to make students to understand how to implement the 3-D transformation a given object.]

Exercise No. 1: (2 hours) – 1 practical
Study of 3-D transformation like translation

Algorithm:

1:take an object bar 3D

2:write a routine for matrix multiplication & identity matrix.

3: take translation factor (tx,ty,tz) & place them in the matrix given below.

$$
\begin{matrix}
1 & 0 & 0 & tx \\
0 & 1 & 0 & ty \\
0 & 0 & 1 & 1
\end{matrix}
$$

4: use matrix multiplication routines to get new coordinates, equation is.

$$
\begin{matrix}
X` & 1 & 0 & 0 & tx & x \\
Y` = & 0 & 1 & 0 & ty & y \\
1 & & 0 & 0 & 1 & 1 & 1
\end{matrix}
$$

5:use the values of (x`, y`, z`) for each coordinate & redraw the object.

8. Lab Exercises:

[Purpose of these exercises to make students to understand how to implement the 3-D scaling a given object.]

Exercise No. 1: (2 hours) – 1 practical
Study of 3-D transformation like scaling

Algorithm:

1:take an object bar 3D

2:write a routine for matrix multiplication & identity matrix.

3: take scaling factor (tx,ty,tz) & place them in the matrix given below.

```
sx   0   0   0
0   sy   0   0
0   0   sz   0
0   0   0   1
```

4: use matrix multiplication routines to get new coordinates, equation is.

```
X`     sx  0  0  0  x
Y` =  0  sy  0  0  y
Z`     0  0  sz  tz  z
1     0  0  0  1  1
```

5:use the values of (x`, y`, z`) for each coordinate & redraw the object.

9. Lab Exercises:

[Purpose of these exercises to make students to understand how to draw different shapes such as line, circle, rectangle & arc etc. using the different in built graphical function of the C++ language.]

Algorithm:

a) Input the various graphics parameters required for the execution of graphic program.
b) Input the different in- built graphics function such as line, rectangle, circle,arc etc. according to the requirement of model of the CAR.
c) Save the program & execute it. If it is possible try to apply some movement to it.

NEWTON RAPHSON ITERATIVE METHOD:
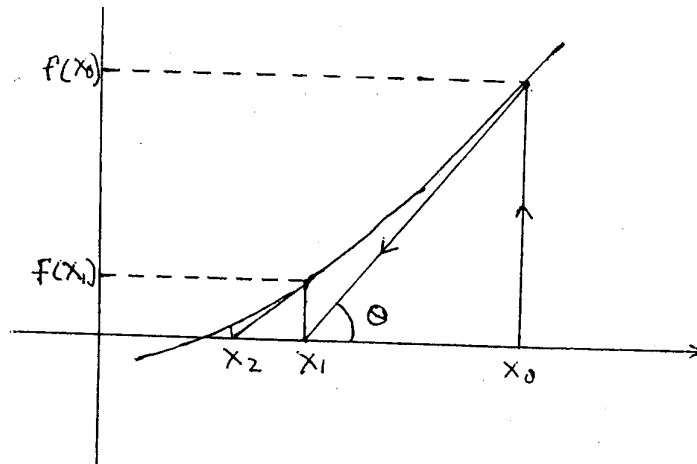
ALGORITHM:
1. Read x0, epsilon, delta, n
   Remark:Xo is the initial guess, epsilon is the prescribed relative error, delta is the prescribed lower bound for f` and n
   The maximum number of iteration to be allowed.
   Statement 3 to 8 repeated until the procedure converges to a robot or interations equal n.
2. For I = to 1 n steps of 1 do
3. fo ← f(Xo)
4. f`o ← f'(Xo)
5. If | f`o | < delta then GOTO 11
6. X1 ← Xo -(fo / f`o)
7. If |(x1 − X0)/ x1| <epsilon then GOTO 13
8. Xo ← X1
   End for
9. Write ` Dose not converge in n iterations`, fo, f`o , i
10. Stop
11. Write 'Slope to small' Xo fo, f`o , i
12. Stop
13. Write 'convergent solution' X1 f(X1), i
14. Stop

The gauss elimination method

To illustrate the method we shall consider the 3 simultaneous equations in 3 unknown:

$a11\ X1 + a12\ X2 + a13\ X3 = a14$
$a21\ X1 + a22\ X2 + a23\ X3 = a24$
$a31\ X1 + a32\ X2 + a33\ X3 = a34$

Algorithm : [Elimination of X1 from3 Equations]

1 for I = 1 to 3 & j = 1to 4 in step of 1 do read aij end for
2   for I = 2 to 3 steps of 1 do
3   u ← ai1/ a11
4   for j = 1 to 4 in steps of 1 do
5   aij ← - ua1j end for

[For Eliminating X2 from third Equation]

1 I = 3
2 u ← ai2/ a22
3 for j = 2 to 4 in steps of 1 do
4 aij ← - ua2j end for

[For eliminating X1 Extended to n Unknows]
     1for i = 1 to n step of 1 & j = 1 to (n + 1) in step of 1 do read aij end for
     2 for I = 2 to nsteps of 1 do
     3   u ← aij/ a11
     4 for j = 1 to (n + 1) in steps of 1 do
     5   aij ← aij – u a1j end for

[Eliminating of Xn - 1 Extended to n Unknows]

1 I = n
2 u ← ai (n-1)/a(n-1) (n-1)
3 for j = (n-1) to (n+1) in step of 1 do
4   aij ← aij – u as (n-1)j end for

[Eliminating Xk from n Equation]

1   for I = (k+1) to n n steps of 1 do
2 u ← aik/ akk
3 for j = k to (n+1) in steps of 1 do
5   aij ← aij - u akj end for

[triangularizing n Equation in n Unknows]

1 for I = 1 to n steps of 1 & j = 1 to (9n + 1) in step of 1 do read aij end for
2   for k = 1 to m-1 in step of 1 do
3   for I = (k+1) to n in steps of 1 do
4   u ← aik/ akk
5   for j = k to (n+1) in step of 1 do
6   aij ← aij – u akj end for
end for

[Back Substitution]

1   xn ← an (N+1)/ a nn
2   for I = (N-1)to 1 in step of – 1 do
3 sum 0 ←
4   For j = (I+1) to n in steps of 1 do
5   sum ← sum + aijxj end for
6   Xi ← (ai(n+1)- sum) aii
    End for
    Ex :- write programme using C

LAGRANGE INTERPOLATION

.

Algorithm:

    1 Read x,n

    2 for I = 1 to(n+1) in step of 1 do read Xi, fi end for

    Remarks: the abou statement reads xis and the corresponding values of fis

    3 sum← 0

    4 for I = 1 to(n+1) in step of 1 do

    5 prodfunc← 1

    6 for j = 1 to(n+1) in step of 1 do

    7 If (j = i)then

       Prodfunc← x(x - xj)(xj - xj)

       End for

    8 sum ← sum + fi x prodfunc

       Remarks: sum is value of f at x

       Endfor

    9 Write x, sum

    10 Stop

Ex :- Write a programme using C