Auto CAD

Q.1.   What is CAD?
Ans. The process of constructing the drawings on the computer screen with the help of specially developed softwares and hardwares is called *Computer Aided Drafting.*

Q.2.   Name various softwares used for CAD?
Ans. Various softwares used for CAD are AutoCAD, Pro/ENGINEER, NX Unigraphics, IronCAD, Catia, SOLIDEDGE, SOLIDWORKS, 3Ds Max and Visio.

Q.3.   What are advantages of CAD?
Ans. CAD offer following advantages

1. Accuracy: CAD helps to achieve very high degree of accuracy that is impossible to achieve manually. For example, a line 22.532 mm long or an angle of 53.27 can be precisely drawn in CAD software.
2. Speed: With sufficient practice, a user can create drawings speedily. Similar objects can be copied or mirrored or arrayed which saves time required for duplication. Automatic hatching, texting and dimensioning save time.
3. Easy Editing: Drawings once constructed can be easily edited or modified as and when needed. Component drawings from one drawing file can be inserted in another drawing file.
4. Space Effectiveness: A computer can store several thousand drawing files over a long period of time. Equal no. of drawing sheets, drawn manually, will need a big go down to store.
5. Standard libraries: CAD softwares have libraries containing drawings of standard parts, such as gears, valves, pulleys, electrical and electronic components, civil and architectural components that can be directly used.
6. Scaling: A drawing can be enlarged or reduced by any scale factor. Dimensions change automatically. Further printing can be made to any scale.
7. Better visualization: Use of different colours helps avoiding confusion. A 3D view of the object can be easily created to boost imagination.
8. Freedom from using drawing instruments: A simple Cad system needs a computer with a mouse and a keyboard to draw. The draftsman need not use bulky drawing instruments like drawing board, drafter, set square etc.

Q.4.   What are limitations of CAD?
Ans. CAD has following limitations:

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

Q.5.   ***What are main components of CAD?***

Ans.   Main components of CAD are:

1. Title Bar: The colour strip displayed at the top of the AutoCAD window is called the title bar. In the title bar the file name is indicated within [ ].
2. Menu Bar: The menu bar, located below the title bar, provides pull down menus from which one can choose commands.
3. Tool Bar: There are many toolbars on the screen like draw tool bar, edit tool bar etc. Each tool bar contains number of buttons, from which one can activate command by clicking the button.
4. Status Bar: The status bar located at the bottom of the screen shows the coordinates of the screen cursor as well as the current setting of various AutoCAD program.
5. Command Window: The command window is one component of AutoCAD that does not have an equivalent in most other windows programs. One can activate any AutoCAD command by typing the command and pressing enter.
6. Document Window: The document window or drawing area, occupies most of the screen. This is the area where one can actually create the drawing.

Q.6.   ***Write any five edit (or Modify) commands used in CAD?***

Ans.   Some important edit commands are**:** ERASE (e), COPY(co or cp), MIRROR (mi), OFFSET (o), ARRAY (ar), MOVE (m), ROTATE (ro), SCALE (sc), TRIM (tr), EXTEND (ex), BREAK (br), JOIN (j), CHAMFER (cha), FILLET (f), EXPLODE(x), LENGTHEN (len)

➤ **Erase -** Select this button then a drawing element to erase it permanently from the drawing.
➤ **Copy -** The copy command will copy any selected drawing elements and reposition where specified by the user, without affecting the original elements.
➤ **Mirror -** The mirror command will create a mirror image of any selected drawing elements along any line of symmetry specified by the user.
➤ **Offset -** Offset will make a copy of a line or series of selected lines by a specified distance in the direction specified.
➤ **Array -** The array command quickly creates copies of a selected object(s) to a specified spacing. The array command can save lots of drawing time when used correctly. There are two types of array; rectangular and polar. A rectangular array would create copies of an object in rows and columns at specified spacing. A polar array would create copies of an object in a circular pattern based on a specified centre point.
➤ **Move -** The move command works exactly the same as the copy command described above, except instead of creating a copy of the selected objects, the second objects are moved.
➤ **Rotate -** The rotate command rotates any selected objects about a defined point by the angle specified. By default AutoCAD will rotate objects anticlockwise when an angle is entered.
➤ **Scale -** The scale command scales the size of a selected object(s) by a defined scale factor from a selected base point. The selected objects can be scaled up to increase size or down to reduce the size. For example:

Entering a scale factor of 2 would result in the object being doubled in size.

Entering a scale factor of 0.5 would result in the selected object being halved in size.

➢ **Stretch** - The stretch command will stretch a selected part of an object, and can be used to lengthen or shorten a particular object.

➢ **Trim** - The trim command is an extremely useful tool which will erase all parts of an object beyond or within its intersection with another object.

➢ **Extend** - The extend command is similar to the trim command in how it functions, except it extends a selected line to a point of intersection of another selected object. In order to successfully use the command, you have to make sure that when the line is extended it will actually intersect the object selected which the line is to extend to.

➢ **Break at Point** - The break at point command enables the user to break an object at a specific point, creating two separate objects.

➢ **Break** - The break command is identical to the above break at point command, except the break line isn't as neat as when using the above command i.e the break point leaves a significant gap between what is now two separate objects:

➢ **Explode-** The explode command is very straightforward. It simply breaks down an object down to its basic line entities.

For example, a rectangle drawn with the **rectangle** command is drawn as a polyline, the separate lines making the rectangle can't be selected or edited. If we choose the **explode** button 🪄, then select the rectangle object, it will be broken down (or exploded!) into its 4 separate lines.

➢ **Chamfer -** The chamfer command will chamfer the intersection of two lines to a specified distance. This is best shown with the example below:
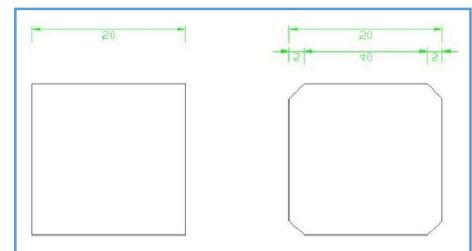
➢ **Fillet -** The fillet command is very similar to the chamfer command above, except instead of creating a straight line chamfer, AutoCAD creates a radius between the two points.
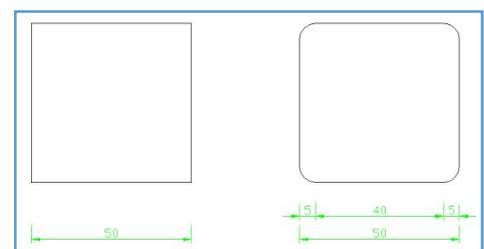
Q.7.   *Write any five standard tool bar commands used in CAD?*

Ans. Some important standard tool bar commands are**:** NEW, OPEN, SAVE, UNDO (u), REDO,CUTCLIP, COPYCLIP, PROPERTIES(ch or mo or props), MATCHPROP(match properties) (ma), PAN (p), ZOOM(z)

Q.8.   *Write any five commands used for dimensioning in CAD?*

Ans. Some important dimensioning commands are: DIMALIGNED (dal or dimali), DIMRADIUS (dra or dimrad), DIMDIAMETER (ddi or dimdia), DIMANGULAR (dan or dimang), LEADER(ql)

Q.9.   Write commands to draw a regular pentagon of sides 30 mm?

Ans.   POLYGON   ↵
      enter no. of sides   5   ↵
      specify center of polygon or [Edge]   E   ↵
      specify first end point of edge   10,10   ↵
      specify second end point of edge   40,10   ↵

Q.10.   Write commands to draw a right cylinder of base 40 mm and height 60 mm?

Ans.   CYLINDER   ↵
      specify center point for base of cylinder [0.0.0]   30,30,0   ↵
      specify radius for base of cylinder or [DIAMETER]   D   ↵
      specify diameter for base of cylinder   40   ↵
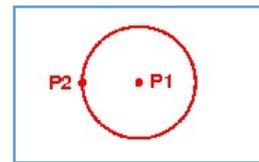   specify height of cylinder or center of other end   60   ↵

Q.11.   Explain various commands of drawing circles in AUTOCAD system?

Ans. Various commands of drawing circles in AUTOCAD system are as follows:

    1.   Using centre and radius:

The command for drawing a circle having centre at (30, 31) and radius 20 are as follows.
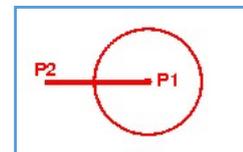
    Command   :Circle   ↵
    3P/ 2P /TTR /< center point>   :30, 31   ↵
    Diameter /<radius>   :20   ↵

    2.   Using centre and diameter:

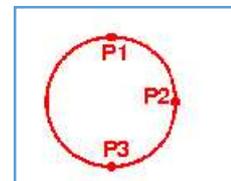The command for drawing a circle having centre at (30, 31) and diameter 40 are as follows.

    Command   :Circle   ↵
    3P/ 2P /TTR /< center point>   :30, 31   ↵
    Diameter /<radius>   :D   ↵
    Diameter   :40   ↵

    3.   Using three given point (3P) :

The command for drawing circle with three known given points on the circumference of the circle is as follows
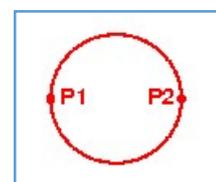
    Command   :Circle   ↵
    3P/2P/TTR <center point>   :3P   ↵
    First point   :5, 20   ↵
    Second point   :3, 30   ↵
    Third point   :6, 25   ↵


    4.   Using two given point (2P) :

The command for drawing circle of diameter 40 with two known given points (end points of the diameter of the circle) on the circumference of the circle is as follows

    Command   :Circle   ↵
    3P/2P/TTR <center point>   :2P   ↵
    First point   :5, 20   ↵
    Second point   :5, 40   ↵

5.   *Using tangent, tangent and radius (TTR) :*
In this method a circle can be drawn by specifying two lines or two circles or combination of a circle and a line, and also radius of circle. Lines and circles acts as tangents to the circle.
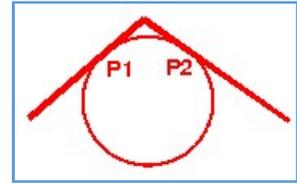
Q.12.   Write a short note on polygon command in Auto CAD?

Ans. The polygon command of Auto CAD draw regular 2D polygons with 3 to 1024 sides following three methods can be used to draw any polygon by using polygon command.

1.   *Inscribing polygon in a circle :-*
Command for inscribing a polygon of 5sides in a circle with centre of (30, 30) and radius 20 unit is as follows:

Command	*:polygon*
Number of sides	*:5*
Edge < centre of polygon >	*: 30, 30*
Inscribed in a circle <circumscribed about circle (I / C)	*:I*
Radius of circle	*:20*

2.   *Circumscribe a polygon of 5 sides about a circle:*

Command	*:polygon*
Number of sides	*:5*
Edge < centre of polygon >	*: 30, 30*
Inscribed in a circle <circumscribed about circle (I / C)	*:C*
Radius of circle	*:20*

3.   *Using edge method:-*
A regular polygon can be drawn by defining end point of an edge of the polygon. Commands are as follows:

Command	*: polygon*
No. of sides	*: 8*
Edge/ <centre of polygon>	*:E*
First end point of edge	*:10,10*
Second end point of edge	*:@20,0*

Q.13.   Explain Basic Object Selection Methods used in CAD?

Ans. AutoCAD provides following three ways of selecting an object:
   1.   Individual selection.
   2.   Window selection.
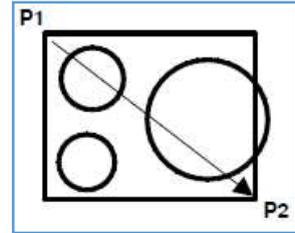   3.   Cross-Window selection.

Individual selection:
Also called Pick box Selection, this method allows to select an individual objects by simply clicking on the object with mouse. We can continue selecting additional objects as needed, each object selected will change appearance to dashed lines.

Window Selection:

This method allows selecting several objects at the same time. To make a window selection, need to specify opposite corners, from P1 to P2, that define a window area.

Only objects that are entirely within the window area are selected and change to dashed lines. If any part of an object is outside the window, that object is not selected and will not change appearance.

Cross Window Selection:

Cross window selection allows selecting several objects at the same time. To make a window selection, need to specify opposite corners, from P1 to P2, that define a window area.

Any objects that are inside or touched by the crossing window are selected. The cross window has a dashed appearance as shown in the figure
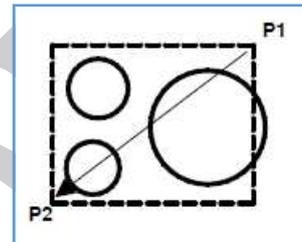
Q.14. *Write any five draw commands used in CAD?*

Ans. Some important draw commands are **:** LINE (L), PLINE (polyline) (PL), POINT (PO), POLYGON (POL), RECTANG (rectangle)(rec), ARC (A), CIRCLE(C), SPLINE(SPL), ELLIPSE (EL), HATCH (H), MTEXT(multiline text) (t or mt), XLINE (xl), RAY