Q1. Define engineering drawing. Why drawing is called universal language of engineers?

A1:- A drawing drawn by an engineer having engineering knowledge for the drawing purposes is an engineering drawing. It is meant for communicating his ideas, thoughts and designs to others. Engineering drawing is a starting point of all engineering branches such as Mechanical, Production, Civil, Electrical, Electronics, Computer science, Chemical etc. It is spoken, read, and written in its own way. Engineering drawing has its own grammar in the theory of projections, its idioms in conventional practices, its punctuations in the types of lines, its abbreviations, symbols and its descriptions in the constructions.

Q2. Name different types of drawing instruments.

A2:- Drawing board, T-square, Set Square, Scales, Pencil and sand paper block, Drawing pins or cello tape, Duster or handkerchief, eraser etc.

Q3. Why pencil is rotated in finger while drawing a long line?

A3:- The pencil is rotated in finger while drawing a long line in order to get a line of uniform thickness throughout.

Q4. How will you test the set square and T-square?

A4:- **Testing of T-square** – (i) Check all screw heads and tighten, if necessary (ii) In order to check the T-square, first of all draw a horizontal line. Now reverse the T-square and again draw a horizontal line with working edge. If both the lines coincide with each other, then the working edge of Tsquare is alright. If there is a difference in two lines, then working edge is not correct and the line gives twice the error of the working edge. This error should be rectified by scraping the edge with a scraper or a sharp knife.

Testing of set-squares – The straightness of edges of the set-square can be checked by drawing a vertical line. Then reverse the set-square and draw again vertical line. If there is any difference between the two vertical lines then working edge is not correct and the line gives twice the error. This error can be removed by straightening the edges by means of a scraper or sand paper.

Q5. What are the standard sizes of drawing sheets according to I.S.I. and which is suitable for drawing work?

A5:- The standard size of sheets according to I.S.I. are A0(1189 X 841), A1 (841 X 594), A2(594 X 420), A3(420 X 297), A4(297 X 210) and A5(210 X 148). Drawing sheet of size 594 X 420 i.e. A2 size is generally used by engineering students as it is very handy and easy for drawing work inclass.(sizes in mm)

Q6. What are the ways of sharpening a pencil for good and accurate work and which type of pencil is more suitable for drawing work?

A6:- There are two ways of sharpening a pencil (i) a small piece of sand paper of zero grade, pasted upon a piece of wood. (ii) Sharpeners. Usually hard pencils such as H, 2H etc are used for making the engineering drawing.

Q7. Why cello-tape is used instead of drawing pins, now a day?

A7:- Now a days, cello tapes are used in place of drawing pins for its practical convenience as the drafter, Tsquare and set-squares can be moved easily over the tape.

Q8. What is layout of drawing sheet?

A8:- The selection of suitable scale and allotment of proper space for margin, title block, parts list, revision panel, folding marks etc. on the drawing sheet is known as layout of drawing sheet.

Q9 . Why is the layout of sheet is necessary?

A9:- Layout of the drawing on the drawing sheet is necessary in order to make its reading easy and speedy.The title blocks, parts list etc will provide all the required information.

Q10 . List out the contents of title block and material list

A10:- The title block should contain at least the following informations.

(i) Name of the institution
(ii) Name of title of drawing
(iii) Name, Class and Roll no. of the student
(iv) Scale
(v) Drawing number
(vi) Symbols denoting the method of projection

Q11. What is the necessity of folding a drawing print?

A11:- Folding marks are made on the sheet to facilitate folding of prints for the purposes of filing and binding in the proper and easy manner.

Q12. What do you mean by convention or code?

A12:- The representation of any matter by some sign or mark on the drawing is known as convention or code. The conventions make the drawing simple and easy to draw.

Q13. What do you understand by thickness of lines?

A13:- There are three distinct thickness of lines used in engineering drawing. These lines are specified as thick, medium and thin lines. The line specified as thick is usually 3 times thicker and the line specified as medium is 2 times thicker than a thin line.

Q14 . Where and why a cutting plane is drawn in a drawing?

A14:- The section plane are generally perpendicular planes. The projection of a section plane, to which it is perpendicular, is a straight line. This line will be parallel, perpendicular or inclined to the x-y line. The cutting plane is drawn in a drawing to show the inner details of an object.

Q15. What is the necessity of convention breaks and convention of materials?

A15. Long members of uniform cross-section such as rods, shafts, pipes etc. are generally shown in the middle by the conventional breaks so as to accommodate their view of whole length on the drawing sheet without reducing the scale. The exact length of the member is shown by the dimension.

Q16. Why the conventional representation of common features are adopted on the drawing?

A16:- The conventional representation of common features are adopted on the drawing to save the unnecessary time or space on the drawing.

Q17. What are the main requirements of lettering?

A17:- 1) The knowledge of shape and proportion of each letter.

2) The knowledge of the order and direction of the strokes used in making letters.
3) The knowledge of the general composition of letters.
4) The knowledge of rules for combining letters into words and words into sentences.

Q18 . What is lettering?

A18:- The art of writing the alphabets A, B, C,…….Z and numbers such as 1, 2, 3……0 etc. is known as lettering.

Q19. What do you mean by composition of letters?

A19:- The composition means the composing of letters into words and words into sentences. The letters are so arranged that the open area between two letters of a word appears equal to the eye judgement.

Q20. What do you mean by uniformity of letters?

A20:- The uniformity of lettering means keeping the height, inclination, spacing and strength of letters to be same. It is very essential for good lettering in engineering drawing.

Q21 . What do you mean by normal, compressed and extended lettering?

A21:- **Normal lettering: -** The normal lettering have normal height and width and are used for general purposes. The width of the normal letter is about 0.67 times of the height of the letter.

Compressed lettering: - The compressed lettering are those which are written in the narrow space. These are used when the space is limited. The widths of the condensed letters are less than height.

Extended lettering: - The extended lettering are those which are wider than noramal letters but of the same height.

Q22. What are the guidelines and why they are necessary in lettering?

A22:- The lines which are used to regulate the height and inclination to the letters and numerals are known as guidelines. These are to be drawn at random. The guidelines are used to regulate the uniformity of the letters.

Q23. What do you mean by single stroke letters?

A23:- Single stroke letters means that the thickness of the line of the letter should be such as is obtained in one stroke of the pencil. Single stroke letters are of two types.

1) Vertical
2) Inclined (75deg. With horizontal)

Q24. What is the gothic and roman lettering?

A24:- **Gothic lettering –** The lettering in which all the alphabets are of uniform width or thickness is known as gothic lettering. It can be divided into following groups.

(i) Vertical or Upright vertical gothic lettering
(ii) Inclined or Italic gothic lettering

Roman lettering – The lettering in which all the alphabets are composed of thick and thin elements is known as roman lettering and can either be vertical or inclined.

Q25. What do you mean by freehand lettering?

A25:- The art of writing the alphabets without the use of drawing instrument is called freehand lettering. The freehand lettering is of the following types.

(a) Vertical or upright freehand gothic lettering.

(i) Single stroke vertical freehand gothic lettering.

(ii) Lowercase vertical freehand gothic lettering.

(b) Inclined or italic freehand gothic lettering.

(iii) Single stroke italic freehand gothic lettering.

(iv) Lower case italic freehand gothic lettering.

Q26. What should be the grade of pencil used for lettering?

A26:- HB and H grade pencils sharpened to a conical point should be used for lettering. To keep the stroke of the letters uniform, the pencils should be rotated between the thumb and fingers while lettering. Hard pencils such as 2H or 3H should be used to draw guidelines.

Q27. What is the importance of dimensioning?

A27:- 1) Dimensioning expresses all the sizes and other information necessary to define the object.

2) It must be done with due regard to manufacturing processes and inspection requirements.

3) The dimensioning also includes expression of tolerances necessary for the correct functioning of the part given to be assembled.

Q28. What is dimensioning?

A28:- The art of writing the various sizes or measurements on the finished drawing of an object is known as dimensioning.

Q29. What do you understand by the term notation of dimensioning?

A29:- The notation of dimensioning consists of dimension lines, extension lines, arrow heads, dimension figures, notes, symbols etc.

Q30. What is a leader or pointer line? How a leader should be drawn?

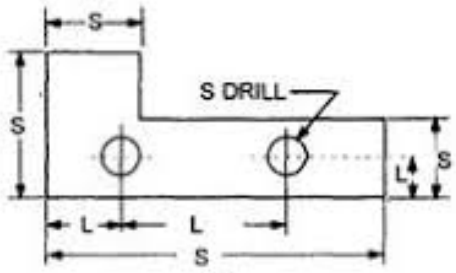
A30:- A leader is a thin continuous line drawn from note of the figure to show where it applies. It is terminated by an arrow head or a dot. The arrow head touches the outline, whereas the dot is placed within the outline of the object.

The leader is generally drawn at any convenient angle, usually 30º, 45º, and 60º but not less than 30º.

Q31. Explain with the help of a simple sketch (i) size dimensions (ii) location dimensions.

A31:- **Size dimension –** The dimensions which indicate the various sizes of the object such as length, breadth, diameter etc. are known as size dimensions. These dimensions are represented by letter 'S'.in figure below.

Location dimension – The dimensions which locate the position of one feature w.r.t. the other feature are known as location dimensions. Distances between the centre lines of the holes from the edges are given by location dimensions. These dimensions are marked by letter 'L'in figure below.

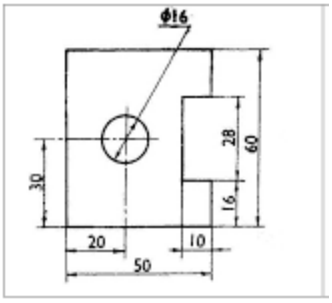


Q32. What are the aligned system and unidirectional system of dimensioning?

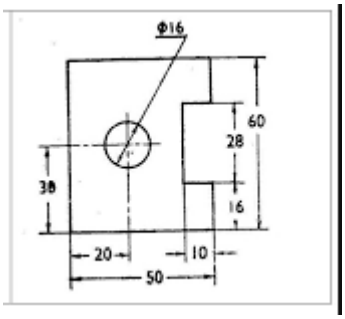
Or

What are the different methods of dimensioning?

A32:- 1) **Aligned Method**: - In aligned system, the dimensions shall be placed parallel to and above the dimension lines, preferably in the middle and not by interrupting the dimension lines. Here the dimensions can be read from the bottom or from the right side of the drawing.



2) **Unidirectional Method**: - In this system dimensions shall be horizontally placed so that they can be read from the bottom of the drawing sheet. Here the dimension lines may be interrupted preferably near the middle for the insertion of dimensions.



Q33. What are the general rules of dimensioning?

A33:- 1) Every dimension must be given, but no single dimension should be repeated.

2) Dimensions should be placed outside the views.

3) Avoid dimensioning to hidden lines wherever possible.

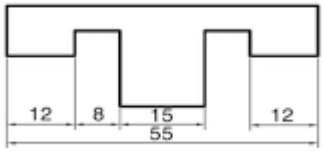
4) Dimension lines should not cross any other line of the drawing.

5) Aligned system of dimensioning is recommended.

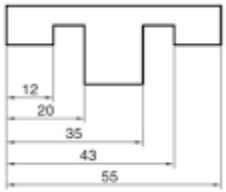
6) Dimension line should be 5-8 mm away from visible edges/outlines and away from each other.

Q34. Explain with the help of sketches (i) chain dimensioning (ii) parallel dimensioning and (iii) combined dimensioning.

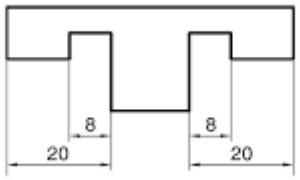
A34:- Chain(Continous) Dimensioning – In this system, dimensions are arranged in a straight line.



Parallel(Progressive) dimensioning – In this arrangement, all the dimensions are given from common base line. The smaller dimensions are placed nearer the view and the larger further away so that the extension lines do not cross dimensions lines.



Combined dimensioning – Combined dimensioning is the result of the simultaneous use of chain and parallel dimensioning.



Q35. What is the difference between a quadrilateral and a polygon?

A35:- Quadrilateral – A quadrilateral is a plane figure bounded by four straight lines and containing four angles.

Polygon – A polygon is a plane figure bounded by more than four straight lines and containing more than four angles.

Q36. What is the difference between a parallelogram and a rhombus?

A36:- Parallelogram – A parallelogram is a quadrilateral in which the opposite sides are equal and parallel.

Rhombus – A rhombus is a quadrilateral in which all the sides are equal and the angles are not right angles. However, in this case the opposite angles are equal.

Q37. What is the difference between regular and irregular polygons?

A37:- Regular polygon – A regular polygon is a plane figure in which all the sides and angles are equal.

Irregular polygon – An irregular polygon is a plane figure in which all the sides and angles are not equal.

Q38. Name the principal planes of projections.

A38:- There is two planes employed for projection and are known as reference planes or principle planes of projections. These planes intersect at right angles to each other. These are

1) Vertical plane: - The plane which is vertical in position is called vertical plane and is denoted by V.P. Vertical plane is also known as Frontal Plane as front view is projected on this plane.

2) Horizontal plane:-The plane which is horizontal in position and at right angle to the V.P is called Horizontal Plane and it is denoted by H.P.

Q39. What is the principle of projection?

A39:- If straight lines are drawn from various points on the contours of an object to meet a plane, the object is said to be projected on that plane. The figure formed by joining in correct sequence the points at which these lines meet the planes is called the projection of the object.

Q40. What is ground line (G.L.) or intersection or reference line?

A40:- The line of intersection of two principle planes of projections i.e. VP and HP is called reference or intersection or ground line and is denoted by x-y line.

Q41. What is an auxiliary view?

A41:- The view obtained on the auxiliary plane which is parallel to the inclined surface of an object is called auxiliary view.

Q42. What do you understand by missing lines?

A42:- The lines which are added in the given orthographic projection in order to complete the drawing of an object are called missing lines.

Q43. What do you understand by missing views?

A43:- The view which is added in the given orthographic projections in order to complete the drawing of an object is called missing views.

Q44. What is a sectional view? Why sectional views are used in drawing?

A44:- The view obtained after cutting the object in order to show the inner details by an imaginary cutting plane is known as sectional view. Sectional views are used in drawing to show the interior details of the object, which are not visible to the observer from outside.

Q45. What is a cutting plane or section plane?

***A45*:-** The imaginary plane by which the object is assumed to be cut is called the cutting plane or sectional plane. They may be perpendicular or parallel to one of the principle planes and either perpendicular or inclined to the other plane. These planes are represented by their traces.

Q46. What are section or hatching lines?

A46:- The lines used to represent the material which has been cut by the cutting plane are called section lines. They are also called hatchings or crosshatchings. These are equally spaced lines inclined at 45^{o} to the horizontal.

Q47. What do you mean by sections of solids?

A47:- The solids which are cut by the section planes to visualize the internal constructional details of the invisible features are known as section of solids.

Q48. What is apparent section?

***A48*:-** The projection of the section on the plane to which it is inclined is called as apparent section.

Q49. What is true section?

***A49*:-** The projection of the section on a plane parallel to the plane will show the true shape of the section.

Q50. How will you classify sections of solids?

Or

What are the different positions of a section plane w.r.t. two reference lines?

Or

What are the types of sections of solids?

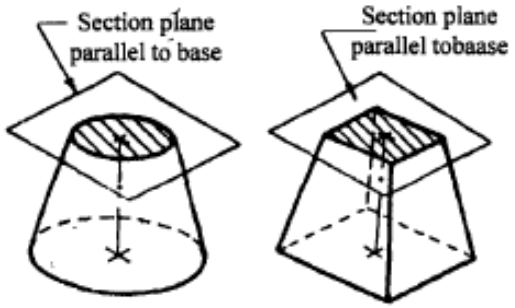
A50:- 1) Section of solids obtained by horizontal planes. (Parallel to HP perpendicular to VP).
2) Section of solids obtained by vertical planes. (Parallel to VP perpendicular to HP).
3) Section of solids obtained by auxiliary inclined planes (AIP) (Inclined to HP perpendicular to VP).
4) Section of solids obtained by auxiliary vertical planes.(AVP) (Inclined to VP perpendicular to HP).
5) Section of solids obtained by profile plane.

Q51. What do you understand by V.T. and H.T. of section plane?

A51:- **Horizontal trace (H.T)** – H.T. of a section plane is a line in which the plane meets the H.P.
Vertical trace (V.T.) – V.T. of a section plane is a line in which the plane meets the V.P.

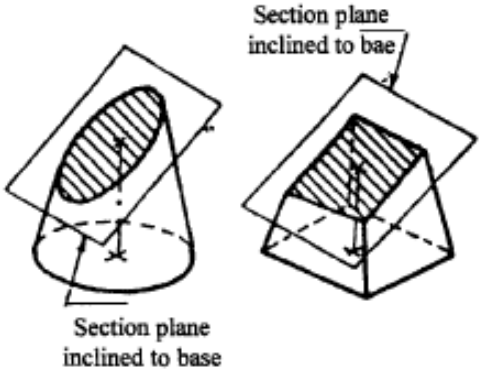
Q52. What do you mean by Frustum?

A52:- When the section plane is parallel to the base plane of a cone or pyramid, it will form a frustum.



Q53. What do you mean by truncated?

A53:- When the section plane is inclined to the base plane of a solid, it will form a truncated.



Q54. What do you mean by development of surfaces?

A54:- A layout of the complete surface of a three dimensional object on a plane surface is called its development or pattern.

Q55. What is stretch out or girth line?

A55:- The stretch out or girth line is the length of the pattern or development and is given by the perimeter of the object measured in a plane at right angles to the axis. This term is used in patterns of objects having a constant cross section for their full length. e.g. prisms and cylinders.

Q56. What is the principle of development?

A56:- The development is based on the principle which indicates that every line on the development must show the true length of the corresponding line on the surface of the object for which development is required.

Q57. What are the different methods of development of surfaces?

A57:- 1) Parallel line development
2) Radial line development
3) Triangulation development
4) Approximate method

Q58. Why the true lengths of slant edges are determined?

A58:- The true length of slant edges are determined because every line on the development must show the true length of the corresponding line on the surface of the object to be developed.

Q59. What are the applications of development of surfaces?

A59:- It is used in the fabrication of simple to highly complicated shapes from flat surfaces in sheet metal shops, in the construction of boilers, pattern making, tunnels, buckets, chimney etc.

Q60. What is a point?

A60:- A point is that which has simply position but no magnitude. It is generally represented by a very small circle or dot.

Q61. What do you mean by octants?

A61:- When the three planes i.e. H.P., V.P. and P.P. divide the entire space into eight quadrants, then these quadrants are known as octants.

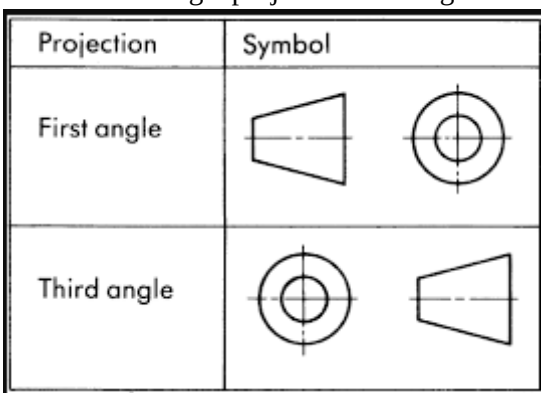
Q62. What is the difference between first angle and third angle projection? Which angle projection is recommended by B.I.S. now a days?

Or

What are the types of orthographic projections?

A62:- First angle projection:-In this projection the object is assumed to be situated in first quadrant, i.e. in front of V.P and above HP the projections obtained on these planes is called first angle projection. The symbol for the first angle projection is in Figure below.

Third angle projection: - In this Projection the object is assumed to be situated in the third quadrant that is below HP and behind VP .The front view comes below the XY line and the top view above it. The symbol for the third angle projection is in Figure below.



Now a day we are working with first angle projection because it is recommended by the B.I.S and it is adopted by almost all the countries of the world since 1983.

Q63. Why the projections of an object is not drawn in second and fourth quadrants?

A63:- The projections of an object is not drawn in second and fourth quadrants because the overlapping of front and top views will take place and It will become very difficult to understand both the views.

Q64. When the auxiliary planes are used?

A64:- The auxiliary planes are used in order to view the true shape of an inclined surface. The projection drawn on the auxiliary plane is known as the auxiliary view and gives the true shape of the inclined surface.

Q65. What are the types of auxiliary planes?

A65:- The plane placed at any angles to the principle planes is called auxiliary plane. Auxiliary planes are of two types.

1) **Auxiliary vertical plane (A.V.P.)**:-It is perpendicular to the HP and inclined to the VP. Projection on an AVP is called auxiliary front view.

2) **Auxiliary inclined plane (A.I.P.)**:-It is perpendicular to the VP and inclined to the HP. Projection on AIP is called auxiliary top view.

Q66. Define a straight line.

A66:- A straight line is defined as the shortest distance between the two points.

Q67. What is true length of a line?

A67:- When a straight line is inclined to one plane and parallel to the other, its projections on the plane to which it is parallel will show its true length.

Q68. What do you mean by projections of a straight line?

A68:- To draw the front view, top view and side view of a straight line is called projection of a straight line.

Q69. What is inclination of a straight line?

A69:- It is defined as the angle which the line makes with the plane. As such a line has two inclinations i.e. inclination with the HP is represented by an angle Θ^o and inclination of a line with VP is represented by an angle ϕ^o.

Q70. What are the apparent angles of inclinations?

A70:- The angle made by the front view of a line with reference line (x-y line) is called apparent angle of inclination α^0. The angle made by the top view of a line with reference line (x-y line) is called apparent angle of inclination β^0.

Q71. Name the methods to determine the true length and true inclinations of a straight line.

A71:- The following methods are used when the line is inclined to both the reference planes.

1) Rotation method
2) Auxiliary plane method
3) Trapezoid method.

Q72. What are skew lines?

A72:- Any two lines that are not parallel with each other and do not intersect are called skew lines.

Q73. What is the trace of a straight line?

A73:- When a straight line is inclined to a plane, it will meet that plane, produced if necessary. The point in which the line or line produced meets the plane is called its trace.

1) Horizontal trace:-The point of intersection of the line with the HP is called the horizontal trace.
2) Vertical trace:-The point of intersection of the line with the VP is called the vertical trace.

Q74. Define a plane.

A74:- A flat surface generated by moving a straight line in space is called a plane. A plane fig. has only two dimensions i.e. length and breadth.

Q75. What is the difference between a plane and a lamina?

A75:- Plane:-A plane has no boundary and it extends to infinity in all directions.
Lamina:-The plane which has limited boundry is also known as lamina.

Q76. What are the types of planes?

A76:- There are two types of planes.

1) Perpendicular planes:-The planes which are perpendicular to one or both the reference i.e. VP and HP are called perpendicular planes.
2) Oblique planes:-The planes which are inclined to both the reference planes i.e. VP and HP are called oblique planes.

Q77. What is the trace of a plane?

A77:- The lines in which the planes meet the reference planes i.e. HP and VP are called the traces of the planes. There are two types of traces of planes.

1) Horizontal trace:-The intersection of a plane with the horizontal plane is called the horizontal trace.

2) Vertical trace:-The intersection of a plane with the vertical plane is called the vertical trace.

Q78. What is a solid?

A78:- An object having three dimensions i.e. length, breadth and height is called a solid. E.g. Prisms, Pyramids, cone, cylinder etc.

Q79. What are different types of solids?

A79:- Solids may be divided into two main groups.

1) Polyhedra or polyhedron: - A polyhedra is defined as a solid bounded by planes called faces. Whichmeet in straight lines called edges.

2) Solids of revolution: - The solids which are formed by the revolution of plane figures are known as solids of revolution. e.g. Cylinders, cones, sphere etc**.**

Q80. What are right solids?

A80:- A solid is said to be a right solid if its axis is perpendicular to its base or its end faces.

Q81. What are oblique solids?

A81:- If the axis of a solid is inclined at an angle other than 90º to its base or end faces, it is called as an oblique solid.

Q82:- What are regular solids?

A82:- If all the edges of the base or the end faces of a solid are equal in length and form regular plane figures, it is said to be a regular solid.

Q83. What is the difference between prism and pyramid?

A83:- 1) Prism:- A prism is a polygon having two equal and similar end faces, called bases, parallel to each other and joined by other side faces which are rectangles or parallelograms.

2) Pyramid: - A pyramid is a polyhedron, having a polygon as its base and a number of triangular faces, equal to the number of sides of the base polygon, meeting at a common point called the apex or vertex.

Q84. What are the various positions which a solid can take w.r.t. the reference planes?

A84:- The following are the different positions which a solid can take w.r.t. the reference planes.

(i) The solid resting on base on H.P., with its axis perpendicular to H.P., and parallel to V.P.

(ii) The solid resting on face on H.P., with its axis perpendicular to V.P., and parallel to H.P.

(iii) The solids resting on face on H.P., with its axis parallel to H.P. and V.P.

(iv) The solid with its axis inclined to one plane and parallel to the other.

(v) The solid with its axis inclined to both the reference planes i.e., H.P. and V.P.

Q85. What is an isometric view?

A85:- If the projection of an object is so drawn that all the three axis of the object are equally inclined to the plane of projection then it is called an isometric view.

Q86. What is an isometric scale?

A86:- The proportion by which the actual length is converted to isometric length is called as isometric scale. Isometeric Length is equal to 0.8165 times actual length.

Q87. What are isometric axis?

A87:- The three lines OA, OB and OC meeting at a point and making 120º angles with each other are termed as isometric axis.

Q88. What are isometric and non isometric lines?

A88:- The lines which are parallel to isometric axis are called as isometric lines. The lines which are not parallel to isometric axis are called non isometric lines.

Q89. What are iso-metric planes?

A89:- The planes representing the faces of an isometric view of the cube as well as the other planes parallel to these planes are called isometric planes.

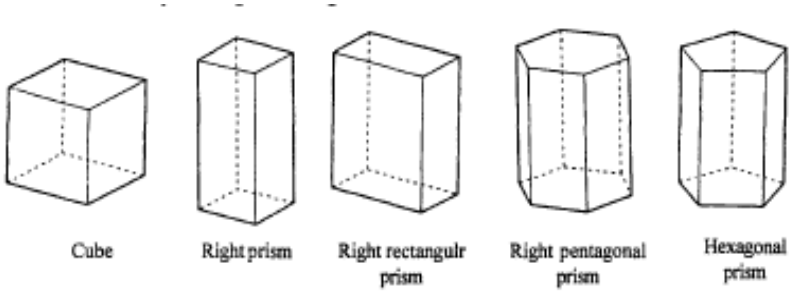


Fig. 6.2

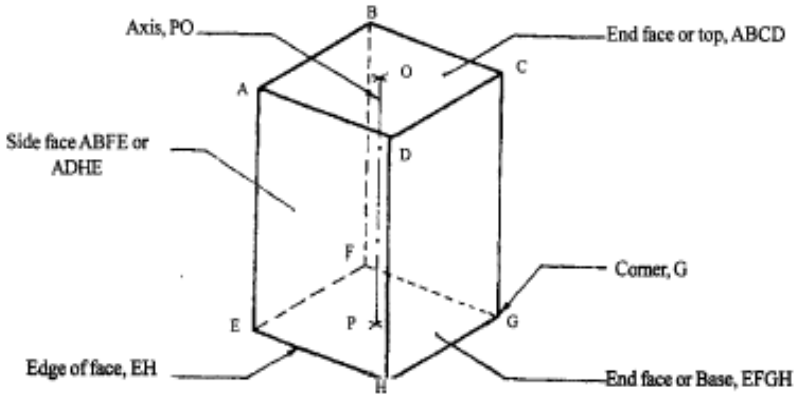


Fig. 6.3 Nomenclature of a Square Prism

Different types of Commonly Used prisms in Engineering drawing and Various Elements Associated with Prisms

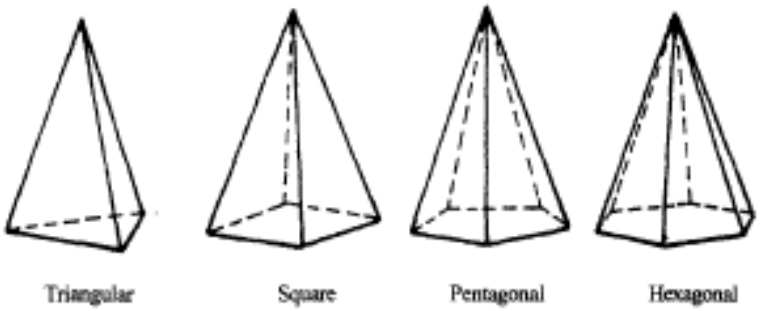


Fig. 6.4(a) Pyramids

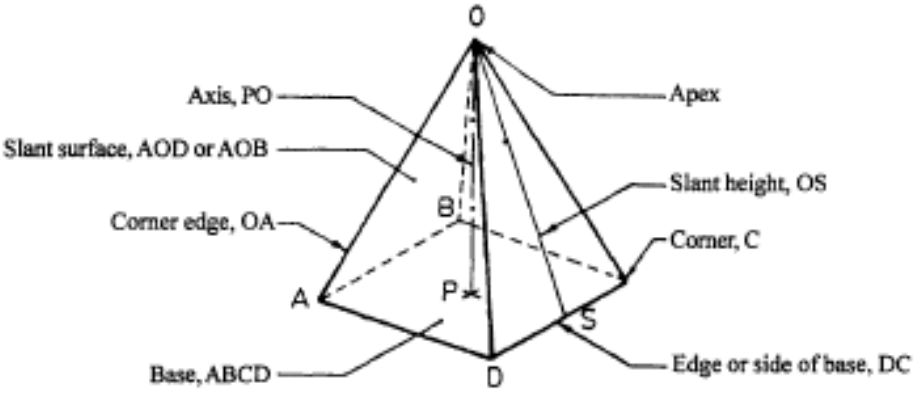


Fig. 6.4(b) Nomenclature of a Square Pyramid

Different types of Commonly Used Pyramids in Engineering drawing and Various Elements Associated with Pyramid

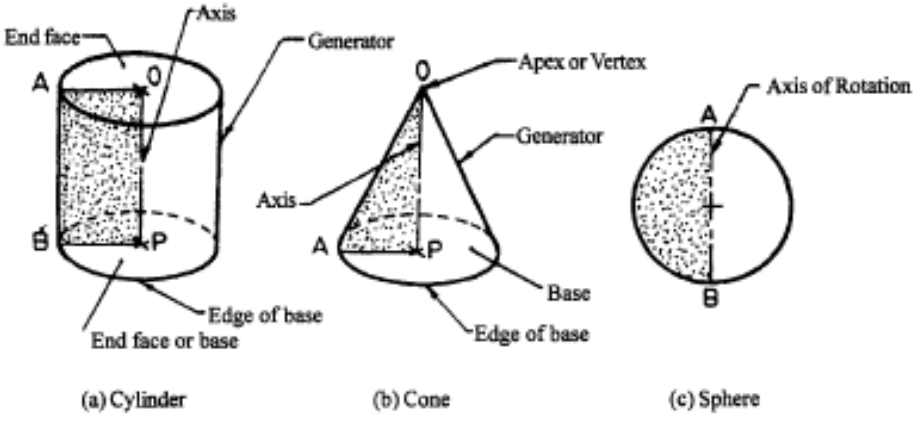


Fig. 6.5 Solids of Revolution

Various Elements Associated with Solids of Revolution

Sheet No. 1

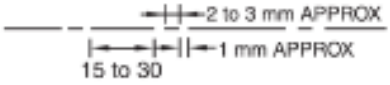
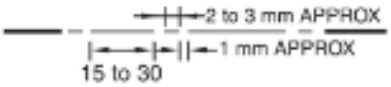
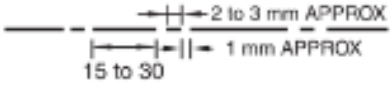
Q1. Draw the alphabetical letter writing in upper case, assuming letter height 35 mm.

Q2. Draw the numerical letter writing in upper case, assuming letter height 35 mm.

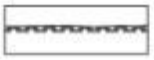
Q3. Write the sentence “A QUICK BROWN FOX JUMPS OVER THE LAZY DOG” in upper case letter as well as in lower case taking height of letter 14 mm. (Using Guidelines)

Q4. Draw the following tables and figures on your drawing sheet and to study their uses in Engineering Drawing. (Text to be written in Tables and Figures must be as per standards of technical letter writing. Assume letter height 7 mm).

DESCRIPTION AND USES OF VARIOUS LINES [ACCORDING TO I.S.I. 1972]

S. NO.	TYPE OF LINE	ILLUSTRATION	APPLICATION
A	CONTINUOUS THICK		VISIBLE OUTLINES
B	CONTINUOUS THIN		DIMENSION LINES, LEADER LINES, EXTENSION LINES, CONSTRUCTION LINES, OUTLINES OF ADJACENT PARTS, HATCHING AND REVOLVED SECTION
C	CONTINUOUS THIN-WAVY		IRREGULAR BOUNDARY LINES, SHORT BREAK LINES
D	SHORT DASHES MEDIUM		HIDDEN OUTLINES AND EDGES
E	LONG CHAIN THIN		CENTRE LINES, LOCUS LINES, EXTREME POSITIONS OF THE MOVEABLE PARTS, PITCH CIRCLES AND PARTS SITUATED INFRONT OF THE CUTTING PLANES
F	LONG CHAIN THICK AT ENDS & THIN ELSEWHERE		CUTTING PLANE LINES
G	LONG CHAIN THICK		TO INDICATE SURFACES WHICH ARE TO RECEIVE ADDITIONAL TREATMENT
H	RULED LINE AND SHORT ZIG-ZAG THICK		LONG BREAK LINES

CONVENTION FOR VARIOUS MATERIALS

S. NO.	MATERIALS	CONVENTION
1.	STEEL, CAST IRON, COPPER ALUMINIUM AND ITS ALLOYS, ETC.	
2.	LEAD, ZINC, TIN, WHITE METAL, ETC.	
3.	BRASS, BRONZE, GUN METAL, ETC.	
4.	GLASS	
5.	PORCELAIN, STONE WARE, MARBLE, SLATE, ETC.	
6.	ASBESTOS, FELT, PAPER, MICA, CORK, RUBBER, LEATHER WAX, INSULATING MATERIALS	
7.	WOOD, PLYWOOD, ETC.	
8.	EARTH	
9.	BRICK WORK, MASONRY, FIRE BRICKS, ETC.	
10.	CONCRETE	
11.	WATER, OIL, PETROL, KEROSENE, ETC.	

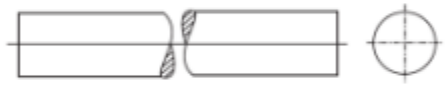
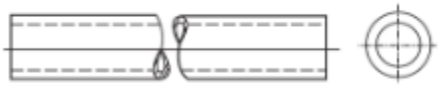
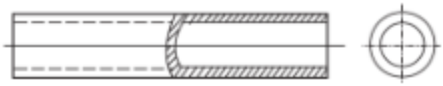
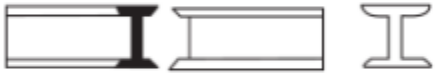
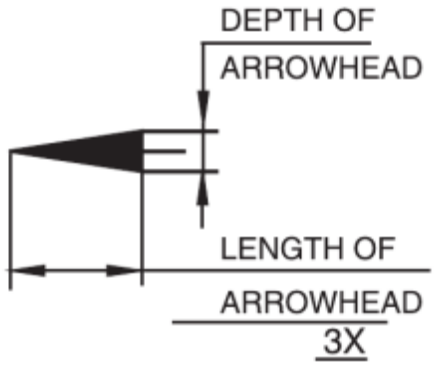
S. NO.	OBJECT	CONVENTION
1.	RECTANGULAR SECTION	
2.	ROUND SECTION	
3.	PIPE OR TUBING	
4.	PIPE OR TUBING	
5.	WOOD RECTANGULAR SECTION	
6.	ROLLED SECTION	
7.	CHANNEL SECTION	

Fig. 3.6. *Conventional breaks as given by I.S.I.*



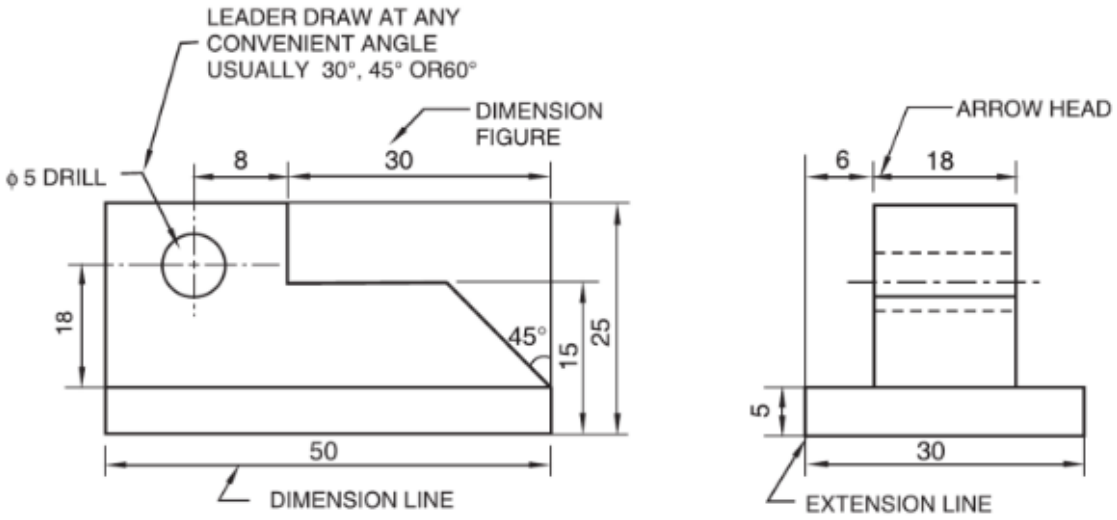


Fig. 5.1. *Notation of dimensioning*

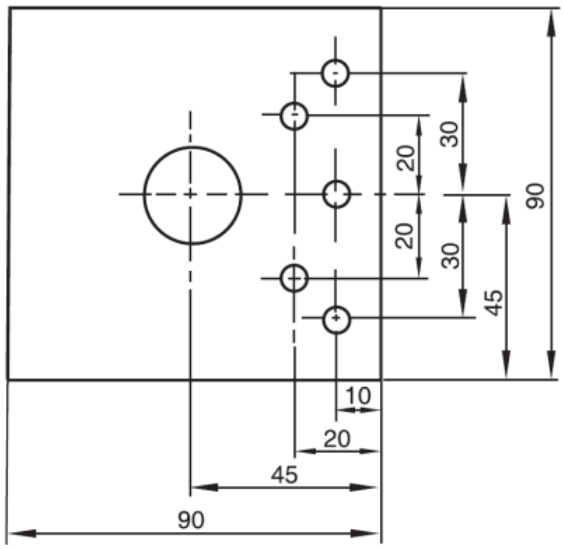


Fig. 5.6.(a) *Aligned system*

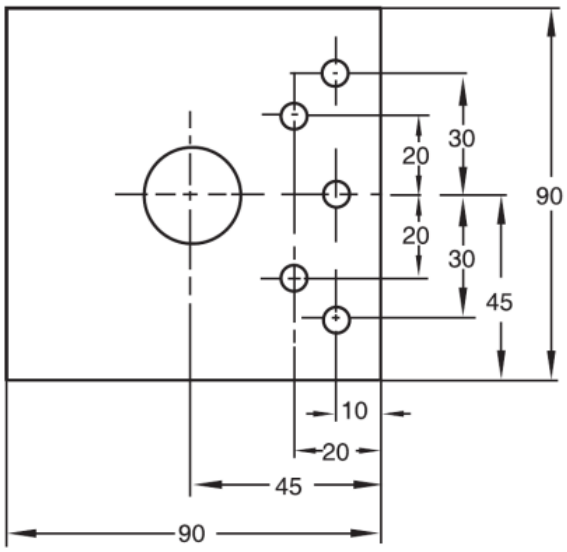


Fig. 5.6.(b) *Unidirectional system*

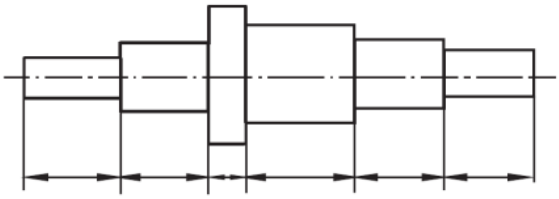


Fig. 5.24. *Chain dimensioning*

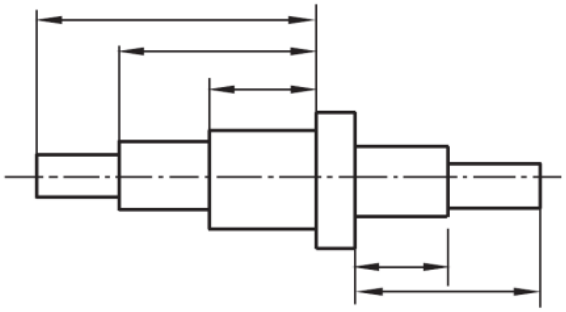
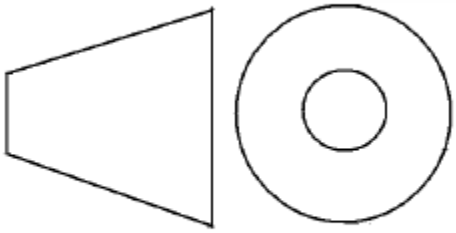


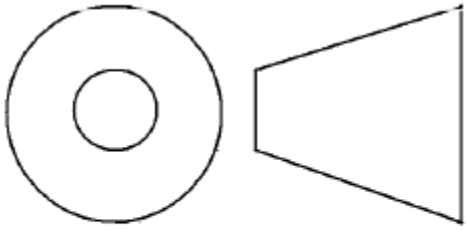
Fig. 5.25. *Parallel dimensioning*

FI



FRONT VIEW LEFT VIEW

FIRST ANGLE PROJECTION



LEFT VIEW FRONT VIEW

THIRD ANGLE PROJECTION

Sheet No. 2

Q1. Draw the orthographic projections of the following points.

a. Point P is 30 mm. above H.P and 40 mm. in front of VP
b. Point Q is 25 mm. above H.P and 35 mm. behind VP
c. Point R is 32 mm. below H.P and 45 mm behind VP
d. Point S is 35 mm. below H.P and 42 mm in front of VP
e. Point T is in H.P and 30 mm. is behind VP
f. Point U is in V.P. and 40 mm. below HP
g. Point V is in V.P. and 35 mm. above H.P
h. Point W is in H.P and 48 mm. in front of VP

Also find the shortest distance of the following points from the origin considering the above conditions:

a) Point P
b) Point Q
c) Point R
d) Point S

Q2. Point A is 35 mm above HP and its shortest distance from origin is 60 mm. Find its distance from VP, if it lies in first quadrant. Also draw its projections.

Sheet No. 3

Q1. A line AB 70 mm long is perpendicular to VP and parallel to HP. Its end A is 20 mm in front of VP and the line is 40 mm above HP. Draw the projections of the line.Also locate its traces.

Q2. A line PQ 70 mm long is perpendicular to HP and parallel to VP. Its end P is 15 mm in front of VP and 25 mm above HP. Draw the projections of the line. Also locate its traces.

Q3. A line CD 60 mm long is parallel to both the planes. The line is 40 mm away from HP and 20 mm away from VP. Draw its projection in all the quadrants.

Q4. A line CD 40 mm long is parallel to VP and inclined at an angle of 30^0 to HP. The end C is 15 mm away from HP and 20 mm in away from VP. Draw the projections of the line. Also locate its traces.

Q5. Draw the projections of straight line AB 60 mm long parallel to HP and inclined at an angle of 40^0 to VP. The end A is 30 mm above HP and 20 mm in front of VP. Also locate its traces.