



ENGINEERING DRAWING FOR CIVIL ENGINEERS

LECTURE # 4

FREE HAND SKETCHING

DEPARTMENT OF CIVIL ENGINEERING



SKETCHING OR FREEHAND

Sketching or freehand is a first step to the preparation of a scale-drawing, i.e., a drawing drawn with the aid of instruments. A designer records his ideas initially in the form of sketches which are later converted into drawings. Similarly, views of actual objects are in the first instance, sketched freehand. Scale-drawings are then prepared from these sketches. Ideas and objects can be described in words, but the description is made more expressive with the aid of sketches. Thus sketching is of great importance in engineering practice



SKETCHING OR FREEHAND

Sketching is always done freehand. It is in fact a freehand drawing made in correct proportions, but not to scale. A sketch should be so prepared as to give to others a clear idea, complete information and true impression of the object to be constructed. It should never be drawn too small. The size of a sketch should be such that all the features of the object, together with their dimensions, explanatory notes etc. are clearly incorporated in it. Proficiency in sketching can be achieved with constant practice only.



SKETCHING MATERIALS

1. A soft-grade pencil, preferably HB or H sharpened to a conical point.
2. A soft rubber-eraser.
3. A paper in form of a sketch-book or a pad.

Above the *three* things are absolutely essential for sketching.

Sometimes, cross-sectioned graph paper ruled with light lines is also used instead of a plain paper. These lines and squares help in drawing straight lines and also maintaining proportions. As such papers may not always be readily available, it is advisable to learn sketching without their aid.



TO SKETCH STRAIGHT LINES

Horizontal lines are sketched with the motion of the wrist and the forearm. They are sketched from left to right [Fig (i)]. To sketch a horizontal line, mark the end points. Hold the pencil at about 30 mm distance from the lead point. Swing it from left to right and backwards, between the two points and without touching the surface of the paper, till the correct direction is achieved. Then begin to draw the line (with the wrist-motion) with short and light strokes. Shift the hand after each stroke. Keep your eyes on the point at which the line is to end. Finish finally with a dark and firm line. Take proper care to maintain straightness and correct direction of the line.



TO SKETCH STRAIGHT LINES

Vertical lines are sketched downwards [Fig. 1 (i)] with the movement of fingers. They may also be sketched by converting them into horizontal lines by revolving the paper as shown in Fig. 1 (ii). Vertical or horizontal lines near the edges of a sketch-book may be drawn by sliding fingers along those edges, thus using them as guides. Inclined lines, when they are nearly horizontal, are sketched from left to right. When they are nearly vertical, they are sketched downwards [Fig. 1 (iii)]. These lines also may be sketched as horizontal lines by revolving the paper as shown in Fig. 1 (iv) and Fig. 1 (v).



TO SKETCH STRAIGHT LINES

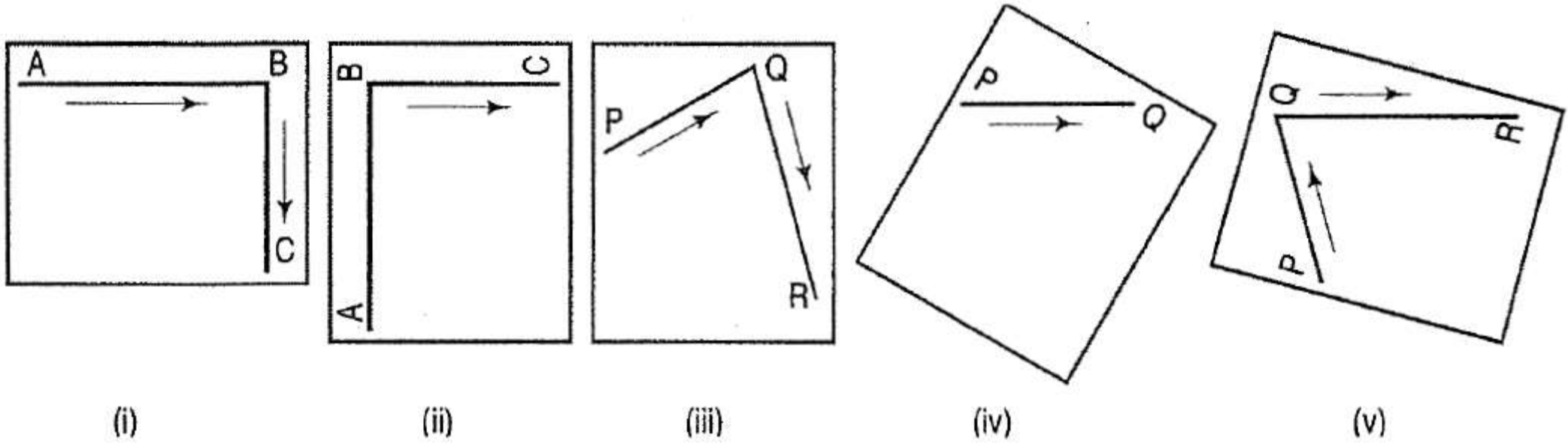


FIGURE 1



TO SKETCH CIRCLES AND ARCS

Mark the centre and through it, draw horizontal and vertical centre lines [Fig. 2 (i)]. Add four radial lines between them. Mark points on these lines at radius-distance from the centre, judging by the eye or using a slip of paper as a trammel, on which the radius-distance has been approximately marked [Fig. 2 (i)]. Complete the circle with light strokes. The paper may be revolved after about each quarter-circle for easy wrist motion. Erase the additional radial lines completely. Dim all the lines before fairing the circle with a thin and black outline [Fig. 2 (iii)]. Keep the centre lines thin and light.



TO SKETCH CIRCLES AND ARCS

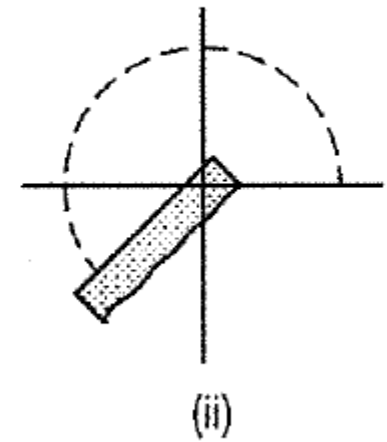
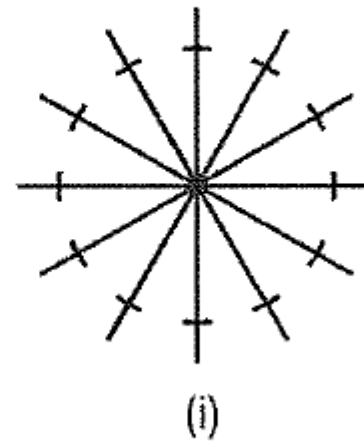
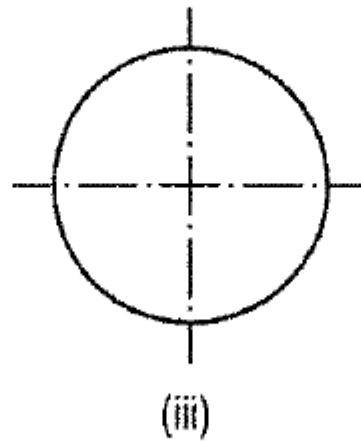
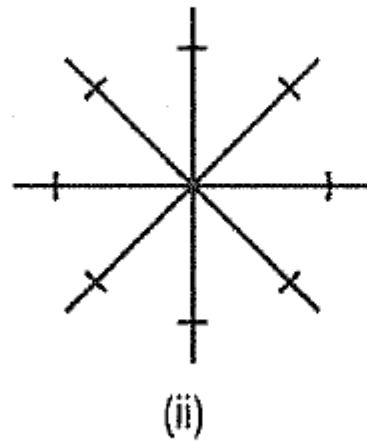
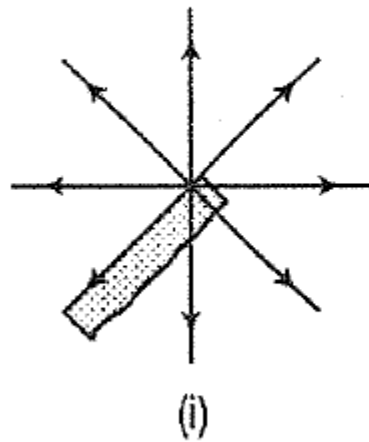


FIGURE 2

FIGURE 3



TO SKETCH CIRCLES AND ARCS

Large circles may be sketched as described above by adding a few extra radial lines [Fig. 3 (i)]. An easier method is to mark a number of points by means of a trammel (at radius-distance from the centre) and to sketch the circle through these points [Fig. 3 (ii)]. Large circles can also be drawn by making a compass of fingers and a pencil. Keep the little finger as a pivot at the centre. Hold the pencil stationary so that its point is at radius-distance from the centre and touches the paper. Rotate the paper with the other hand. The pencil-point **will** mark the circle on the paper. Two pencils may also be used as a compass. One pencil is held as a pivot, while the other describes the circle as the paper is rotated.



TO SKETCH CIRCLES AND ARCS

A circle of small radius can be sketched within a square. Sketch the circumscribing square (length of the side equal to the diameter of the circle) and mark the diagonals [Fig. 4 (i)]. Mark the mid-points of the sides of the square and four points on the diagonals at radius-distance from the centre [Fig. 4 (ii)]. Sketch a neat circle through the eight points [Fig. 4 (iii)].



TO SKETCH CIRCLES AND ARCS

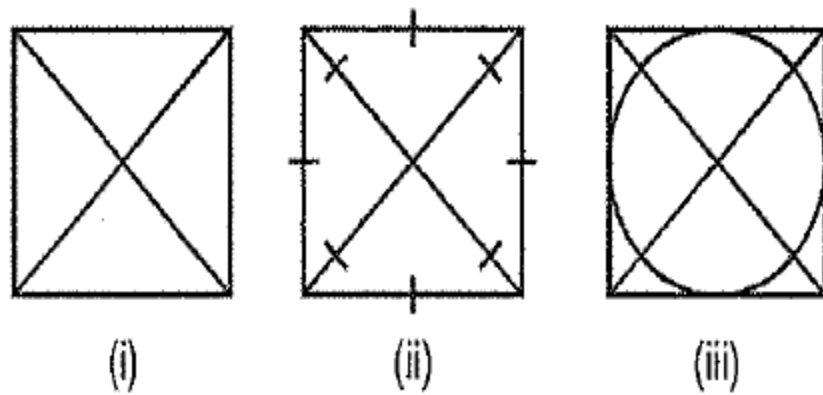


FIGURE 4

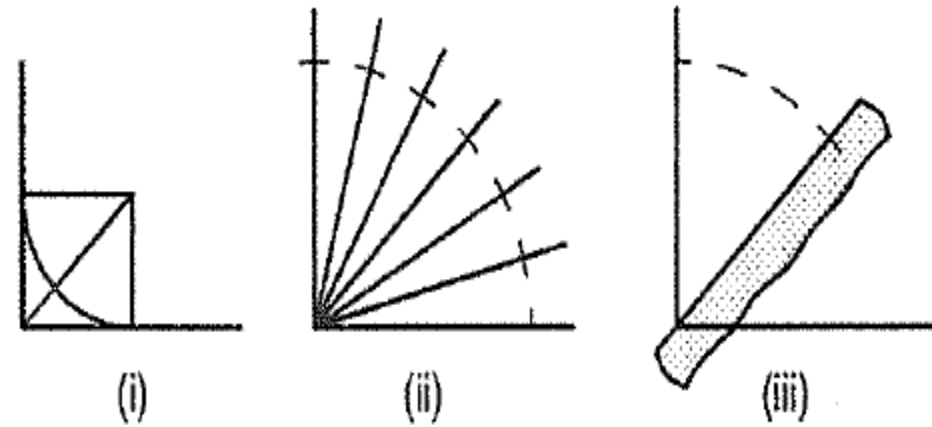


FIGURE 5



TO SKETCH CIRCLES AND ARCS

Arcs of small radii are conveniently drawn by constructing squares [Fig. 5 (i)]. Large-radii arcs may be drawn by one of the methods described above for large circles. Radial-line and trammel methods are shown in Fig. 5 (ii) and Fig. 5 (iii) respectively.



SKETCHING PROCEDURE

Sketches should never be prepared with the aid of a scale or a straight-edge. All lines must be absolutely free-hand and their measurements must be in proportion only. A sketch is considered to be good when its features are shown in correct proportions. Its outlines must be black and thin but rigidly firm. Dimension lines and centre lines should be comparatively light. Dimension figures must be inserted with good care, as if they are printed. Lettering also should be done in a similar manner.



STEPS IN SKETCHING

Following are the steps in sketching three orthographic views of a shaft-support, shown (in pictorial view) in Fig. 6.

- (i) Determine the over-all dimensions of the views and sketch rectangles for the same in good proportions and correct projection, keeping sufficient space between them and from the border lines [Fig. 7(i)].
- (ii) Insert centre lines for arcs and circles, and block-in the main shapes [Fig. 7 (ii)].
- (iii) Sketch arcs and circles, and build up the details [Fig. 7 (iii)].
- (iv) Erase all construction lines. Dim all the lines and then make them bold and firm [Fig. 7 (iv)] starting with the curves. Keep the centre lines fainter. Insert all dimensions. Print the title.



STEPS IN SKETCHING

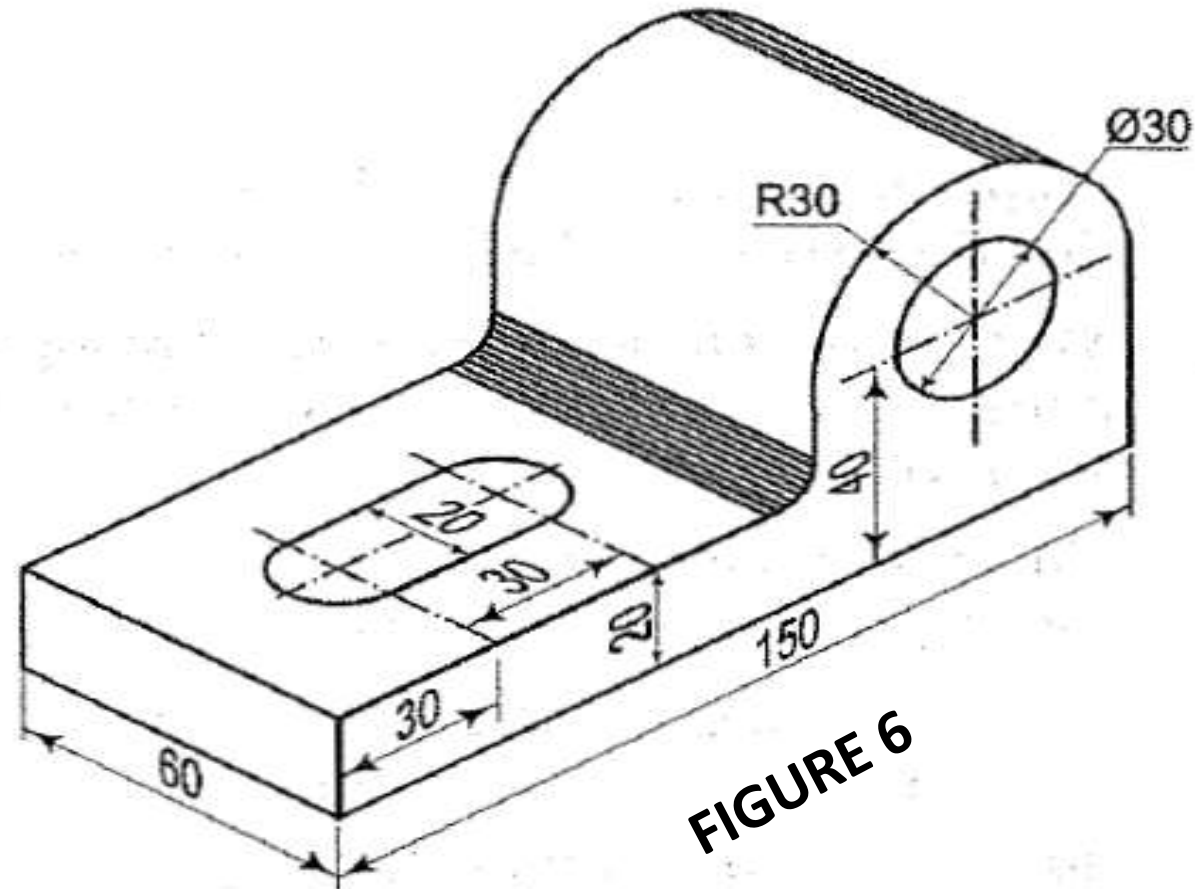


FIGURE 6



STEPS IN SKETCHING

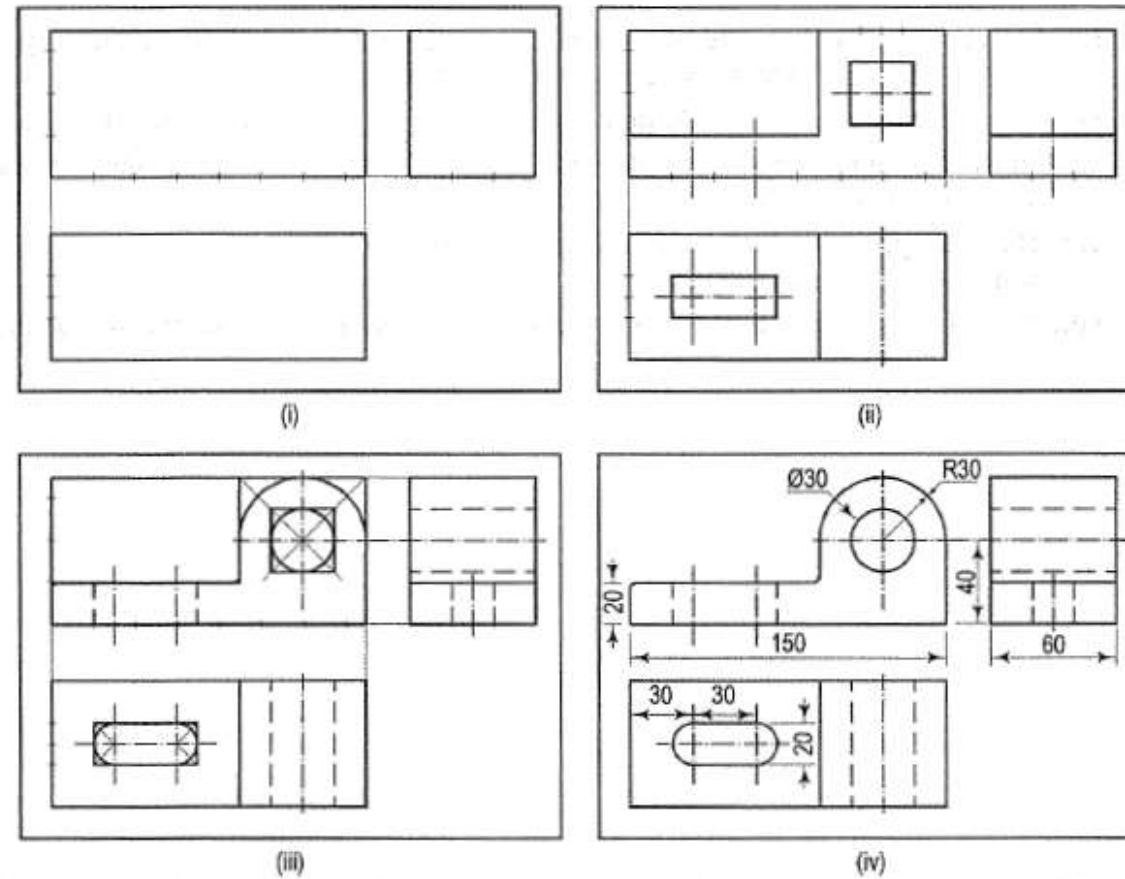


FIGURE 7

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Thank You