DSSSB AE/JE 2026

COMPLETE ENGINEERING GRAPHICS

Complete Theory • Detailed Hinglish Explanation • Worked Examples & Shortcuts
Solved Examples • Practical Applications • Practice Questions

Prepared By

CIVILGYAN WITH SATISH

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Accuracy note: Drawing conventions are stated at exam level. Where standards or office practices differ, the book identifies the general rule and avoids presenting illustrative sizes or symbols as universal requirements.

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Preface

This book develops engineering graphics from instruments, lines, dimensioning and projection principles through orthographic, isometric, sectional and building drawings. The sequence connects spatial reasoning, construction steps, conventions, diagrams and exam decisions.

The scope follows the five prescribed DSSSB AE/JE chapters. Advanced detail is included only where it clarifies projection, construction or drawing interpretation.

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How to Use This Book

Read the technical explanation first, then the Hinglish Explanation. Redraw every projection diagram and construction in sequence with labels. Attempt each view mentally before checking the explanation, then solve all twenty questions at the end of the chapter.

For every answer, verify viewing direction, projection method, scale, alignment, line type, dimensioning and section convention. Maintain a short error log and revise the chapter formula sheet after one day, one week and before the examination.

Practice rule: Questions are original DSSSB-style practice. Each solution explains only the correct answer, as requested.

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Table of Contents

How to use this book: Read Complete Theory, reinforce it with the Hinglish Explanation, review every formula and derivation row, then attempt all twenty questions without viewing the solutions. Questions are original DSSSB-style practice, not claimed verbatim previous-year questions.

Drawing Conventions and Scale Shortcuts

1. All dimensions are normally stated in millimetres unless noted
2. RF=drawing length/actual length in the same units
3. visible outlines are thick
4. construction, dimension and hatching lines are thin
5. always state projection method and scale.

CHAPTER 1 — FUNDAMENTALS OF ENGINEERING GRAPHICS, CONVENTIONS AND PROJECTION PRINCIPLES

1. Introduction

Engineering graphics is a standardized visual language for communicating shape, size, location, material and construction intent. A useful drawing must be geometrically meaningful and conventionally readable, not merely attractive. This chapter establishes instruments, sheets, lines, lettering, dimensions, scales and the projection principles needed for every later view.

2. Complete Theory

Engineering graphics as technical communication

A freehand sketch records an idea quickly and approximately; an engineering drawing communicates controlled geometry using agreed conventions; a diagram explains functional relationships and may not preserve exact shape or scale. Drawings coordinate designers, estimators, fabricators, site engineers and inspectors.

They reduce verbal ambiguity by fixing views, dimensions, levels, materials and references. A drawing is not automatically complete because it looks realistic: it must contain enough independent information to manufacture, construct or inspect the intended object without conflicting dimensions.

Civil work uses plans, elevations, sections and details; mechanical work uses multiview and sectional drawings; CAD changes the tool, not the geometric logic.

Hinglish Explanation

Drawing ko picture mat samjho. Picture appearance dikhati hai, engineering drawing measurable instructions deti hai.

Site par mason, engineer aur estimator same sheet ko alag purpose se read karte hain, isliye line, scale, dimension aur symbols consistent hone chahiye.

Instruments, pencils and sheet preparation

A drawing board provides a flat reference. A T-square or mini-drafter establishes horizontal and controlled angular directions; set squares commonly supply 30, 45, 60 and 90 degree lines.

A compass draws circles and arcs, a divider transfers distances, a scale measures or sets lengths, a protractor measures angles, and French curves or templates guide noncircular curves and repeated shapes. Harder pencils produce lighter thin construction lines; softer grades produce darker final outlines, subject to institutional practice.

Instruments must be clean, points sharp, sheet fixed without distortion and the working edge undamaged. CAD object snaps perform a digital version of precise geometric location but do not replace projection knowledge.

Hinglish Explanation

Pehle light construction, baad mein final darkening. Divider se distance transfer karo, scale edge ko compass point se damage mat karo.

Mini-drafter angle aur parallel lines control karta hai. CAD mein bhi wrong geometry ko software automatically correct nahi karta.

Sheet sizes, borders and title information

ISO A-series sheets preserve the aspect ratio √2 when halved parallel to the shorter side. A0 has an area of approximately one square metre; successive sizes are obtained by halving.

Borders define the usable drawing field, while binding margins may be larger according to office or institutional rules. The title block normally identifies drawing title, number, scale, sheet, revision, dates, drafter and checker.

A revision block records controlled changes. Sheet orientation should suit the drawing and filing system.

Exact title-block layouts and margins vary, so an examination answer should distinguish the accepted purpose from a local template.

Hinglish Explanation

A-series ka special feature aspect ratio same rehna hai, isliye half karne par shape proportion maintain hota hai. Title block drawing ki identity card hai.

Local college ya department layout vary kar sakta hai; purpose universal hai.

Line types and hierarchy

A continuous thick line represents visible outlines and edges. Thin continuous lines serve dimensions, extensions, leaders, hatching and construction, with construction lines especially light.

Dashed thin lines indicate hidden edges. A chain thin line with long dash and short dash indicates centres and symmetry.

Cutting-plane indications are emphasized and carry arrows plus labels. Short and long break lines show removed portions; phantom or alternate-position lines use the specified chain pattern.

Lines must start and end cleanly and should not be made thick by repeated uncertain strokes. When lines coincide, visible outlines generally take precedence over hidden and centre lines under standard hierarchy.

Hinglish Explanation

Line type drawing ka grammar hai. Solid thick = visible, dashed = hidden, chain thin = centre, thin continuous = dimension/hatching.

Har line ko same darkness denge to drawing read karna mushkil ho jayega.

Lettering and dimensioning

Single-stroke lettering means each character stroke is drawn once with uniform thickness; it may be vertical or inclined. Consistent height, spacing and legibility matter more than decoration.

Dimension lines are thin and terminated by arrowheads; extension lines project from the feature with a small gap; leaders connect notes to features. Dimensions should normally be stated once, placed on the view showing the feature clearly, and arranged to avoid crossing.

The drawing should not be scaled to obtain a missing manufacturing dimension. Diameter, radius, angle, chamfer and repeated-feature notation must be unambiguous.

Chain dimensioning can accumulate tolerances, while baseline or parallel dimensioning references a common datum.

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Hinglish Explanation

Dimension repeat karna extra help nahi; conflicting value ka risk hai. Circle ko diameter, arc ko radius se dimension karo.

Object line ko dimension line ke roop mein use karna avoid karo. Reader ko figure measure karne ki need nahi honi chahiye.

Scales and representative fraction

Scale is the ratio between drawing length and actual length in the same units. Representative fraction RF equals drawing length divided by actual length.

RF=1 is full size, RF below one is reducing, and RF above one is enlarging. A plain scale reads a unit and one subdivision; a diagonal scale permits finer subdivisions through similar triangles.

Construction begins by converting all lengths to common units, calculating the drawing length, choosing convenient scale divisions and labelling zero correctly. Stated scale and printed or digital resizing must be distinguished: a scan may no longer preserve the original physical scale.

Hinglish Explanation

RF calculate karne se pehle units same karo. 1:50 ka matlab drawing par 1 unit actual 50 same units.

PDF zoom ya photocopy size change kar de to printed length original scale ko represent nahi karegi; written dimensions priority hain.

Projection principles and reference planes

Projection maps points of an object onto a plane using projectors. In orthographic projection, projectors are perpendicular to the plane, so a plane surface parallel to the projection plane appears in true shape.

Oblique projection uses parallel inclined projectors; perspective uses projectors converging at an observer or station point. Principal reference planes are the horizontal plane HP and vertical plane VP, intersecting in the XY reference line; a profile plane supports side views.

Quadrants describe an object's position relative to HP and VP. Engineering multiview drawings conceptually rotate projection planes into the sheet so related views can be arranged and aligned.

Hinglish Explanation

Projection ko controlled shadow samjho. Object, viewing direction aur projection plane fix karo.

Orthographic mein rays plane par 90 degree aati hain. HP top view, VP front view, profile plane side view deta hai; XY un reference planes ka intersection represent karta hai.

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4. Drawing Rules and Construction Shortcuts

Rule / Shortcut Sheet
1. A-series aspect ratio=1:√2
2. RF=drawing length/actual length in same units
3. full-size RF=1
4. reducing RF<1
5. enlarging RF>1
6. drawing length=RF x actual length
7. 1:50 means 1 drawing unit=50 actual units
8. visible outline=continuous thick
9. hidden edge=dashed thin
10. centre line=chain thin
11. dimension and hatching=continuous thin
12. orthographic projectors are perpendicular to plane

5. Construction Logic and Solved Drawing Examples

Scale example: represent 4.5 m at 1:50. Convert 4.5 m to 4500 mm, then drawing length=4500/50=90 mm. For a plain scale, construct a convenient main length, divide into metres, subdivide the first division and label zero between main units and subdivisions. Final checking covers units, RF, maximum range and labelled reading direction.

6. Practical Applications

- Design communication and approvals.
- Construction setting-out and inspection.
- Quantity take-off and estimation.
- Fabrication and manufacturing.
- CAD drafting and drawing control.

7. Short Tricks

- Visible beats hidden when coincident.
- RF uses the same units.
- A plane parallel to the projection plane shows true shape.
- Dimensions, not measured print lengths, define size.

8. Concept Diagram

PROJECTION ELEMENTS
Observer ---> Object ---> Plane of projection
| |
+--projectors--+--> View
HP and VP intersect at XY; profile plane supports side view.

9. Comparison Table

Feature	Appearance	Use
Visible outline	continuous thick	seen edge
Hidden line	dashed thin	concealed edge
Centre line	chain thin	axis/symmetry
Dimension line	continuous thin with arrows	size/location
Cutting plane	emphasized chain with arrows	section location

10. Common Mistakes

• Mixing line weights.

• Duplicating dimensions.

• Calculating RF with unlike units.

• Using object outlines as extension lines.

• Assuming a resized print retains scale.

11. Important DSSSB Exam Points

• Line identification, dimensioning rules, A-series logic, RF numericals and projection terminology are frequent.

12. Chapter Revision Sheet

Prepare the sheet and line hierarchy before geometry. State projection method and scale, construct lightly, verify alignment and dimensions, then darken only the required final lines.

13. Practice Questions with Solutions

Attempt each question first. The explanation discusses only the correct answer.

Q1. Engineering drawing is primarily

(A) a standardized technical communication
(B) sketch
(C) a dashed thin line
(D) a reducing scale

Correct Answer: (A)

It conveys geometry and construction intent through conventions.

Q2. A quick approximate representation is a

(A) transfer distances
(B) sketch
(C) a thin chain line
(D) 1

Correct Answer: (B)

A sketch records form without full instrument-controlled accuracy.

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Q3. A divider is used mainly to

(A) draw circles and arcs
(B) thin continuous lines
(C) transfer distances
(D) finer subdivisions

Correct Answer: (C)

Its two points compare or transfer lengths.

Q4. A compass is used mainly to

(A) 1:√2
(B) once
(C) perpendicular to the projection plane
(D) draw circles and arcs

Correct Answer: (D)

Its centre point and pencil describe a radius.

Q5. The ISO A-series preserves an aspect ratio of

(A) 1:√2
(B) drawing identification and control information
(C) the stated dimension
(D) converge at a station point

Correct Answer: (A)

Halving produces a similar rectangle.

Q6. A title block primarily provides

(A) a continuous thick line
(B) drawing identification and control information
(C) drawing length divided by actual length
(D) XY reference line

Correct Answer: (B)

It records title, number, scale and revision data.

Q7. A visible outline is drawn as

(A) a dashed thin line
(B) a reducing scale
(C) a continuous thick line
(D) true shape

Correct Answer: (C)

Visible boundaries receive the strongest normal line weight.

Q8. A hidden edge is represented by

(A) a thin chain line
(B) 1
(C) a standardized technical communication
(D) a dashed thin line

Correct Answer: (D)

Dashes indicate geometry concealed in that view.

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Q9. A centre line is normally

(A) a thin chain line
(B) thin continuous lines
(C) finer subdivisions
(D) sketch

Correct Answer: (A)

It marks axes and symmetry.

Q10. Section hatching is drawn using

(A) once
(B) thin continuous lines
(C) perpendicular to the projection plane
(D) transfer distances

Correct Answer: (B)

Hatching is subordinate to outlines.

Q11. A dimension should normally be stated

(A) the stated dimension
(B) converge at a station point
(C) once
(D) draw circles and arcs

Correct Answer: (C)

Duplication can create conflict.

Q12. The preferred source of size is

(A) drawing length divided by actual length
(B) XY reference line
(C) 1:√2
(D) the stated dimension

Correct Answer: (D)

A drawing print may be scaled or distorted.

Q13. RF is calculated as

(A) drawing length divided by actual length
(B) a reducing scale
(C) true shape
(D) drawing identification and control information

Correct Answer: (A)

Both lengths must use the same unit.

Q14. A scale of 1:50 is

(A) 1
(B) a reducing scale
(C) a standardized technical communication
(D) a continuous thick line

Correct Answer: (B)

The drawing is one-fiftieth actual size.

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Q15. A full-size scale has RF

(A) finer subdivisions
(B) sketch
(C) 1
(D) a dashed thin line

Correct Answer: (C)

Drawing and object lengths are equal.

Q16. A diagonal scale permits

(A) perpendicular to the projection plane
(B) transfer distances
(C) a thin chain line
(D) finer subdivisions

Correct Answer: (D)

Similar triangles provide an additional decimal reading.

Q17. Orthographic projectors are

(A) perpendicular to the projection plane
(B) converge at a station point
(C) draw circles and arcs
(D) thin continuous lines

Correct Answer: (A)

This defines orthogonal projection.

Q18. Perspective projectors

(A) XY reference line
(B) converge at a station point
(C) 1:√2
(D) once

Correct Answer: (B)

Perspective models visual convergence.

Q19. HP and VP intersect in the

(A) true shape
(B) drawing identification and control information
(C) XY reference line
(D) the stated dimension

Correct Answer: (C)

XY represents the fold/intersection of reference planes.

Q20. A surface parallel to a projection plane appears in

(A) a standardized technical communication
(B) a continuous thick line
(C) drawing length divided by actual length
(D) true shape

Correct Answer: (D)

No foreshortening occurs on that plane.

Quick Revision: Re-read the formula box, cover the answers, and explain each exam point aloud. A drawing rule is ready only when its projection method, view direction, scale, line type and construction conditions are clear.

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CHAPTER 2 — ORTHOGRAPHIC PROJECTION

1. Introduction

Orthographic projection represents a three-dimensional object by coordinated two-dimensional views. Each view shows two dimensions directly and suppresses the dimension parallel to the viewing direction. Accuracy depends on selecting a descriptive front view, maintaining projector alignment and applying the correct first-angle or third-angle arrangement.

2. Complete Theory

Multiview logic and view selection

A front view normally presents the most characteristic shape with minimum hidden detail. The top view shows width and depth, while the front shows width and height; therefore width aligns vertically between them.

A side view shows depth and height, so its height aligns horizontally with the front and its depth corresponds to the top. One view may be ambiguous because many solids share the same silhouette.

Two views often define prismatic objects, while a third resolves depth or hidden features. Views must be mutually consistent: every vertex, edge, hole and centre appearing in one view must project logically into the others.

Hinglish Explanation

Front view choose karte waqt object ka maximum information aur minimum hidden lines target karo. Front aur top mein width common, front aur side mein height common, top aur side mein depth common.

Ye three shared-dimension relations missing view solve karne ki key hain.

First-angle projection

In first-angle projection the object lies between the observer and the projection plane. After the planes are unfolded, the top view is placed below the front view.

The right-side view is placed to the left of the front view, and the left-side view to the right. The arrangement is opposite the viewing direction because the receiving plane lies beyond the object.

A standard projection symbol identifies the method and should be read rather than guessed from regional habit. First-angle is widely used in ISO-oriented practice, but an examination problem controls the required convention.

Hinglish Explanation

First angle mein object observer aur plane ke beech. Right se dekhoge to right-side view front ke left placed hota hai.

Top view front ke below. Memory: first angle mein view opposite side shift hota hai.

Third-angle projection

In third-angle projection the projection plane lies between observer and object. After unfolding, the top view is above the front view; the right-side view is to the right and the left-side view to the left.

The arrangement follows the viewing direction and often feels like a transparent box surrounding the object. It is common in North American practice and some industries.

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The geometry of each individual view is the same as the corresponding first-angle view; what changes is the arrangement on the sheet and the projection symbol.

Hinglish Explanation

Third angle ko transparent glass box samjho. Jis side se view liya, same side place hota hai: top above, right-side right.

Object geometry nahi badalti, sheet arrangement badalta hai.

Points, lines, planes and simple solids

A point projects as a point on each plane; its distances from HP and VP determine distances of the views from XY. A line parallel to a projection plane shows true length there; if inclined, it appears foreshortened.

An edge perpendicular to a plane projects as a point. Plane figures show true shape when parallel to the plane and edge view when perpendicular.

Prisms, pyramids, cylinders and cones are first positioned relative to HP and VP, then their bases, axes and generators are projected. Circular features seen obliquely appear as ellipses.

Construction must preserve correspondence between named vertices.

Hinglish Explanation

Line agar viewing direction ke parallel hai to end view mein point ban sakti hai. Plane parallel ho to true shape, inclined ho to foreshortened.

Solid ko blindly copy mat karo; pehle axis, base aur reference planes ke relation identify karo.

Construction workflow and miter-line transfer

Read the object and mark front-view direction. Draw XY and establish the selected front view lightly.

Project perpendiculars to locate the top view at the conventionally correct side of XY. For a side view, transfer heights from the front and depths from the top.

A 45-degree miter line provides a convenient geometric turn for transferring depth between top and side views. It does not create a new dimension; it redirects projectors.

Add circles, centre lines and hidden edges, compare correspondence, erase excess construction and darken visible outlines last.

Hinglish Explanation

Miter line depth ko 90 degree turn karne ka tool hai. Top view se depth miter tak le jao, side-view projector mein turn karo; height front view se direct aayegi.

Miter line measurement replace nahi, transfer assist karti hai.

Hidden lines, curved surfaces and missing views

Hidden lines represent real edges or boundaries concealed from the observer. They should be used only when required for clarity and aligned with the same feature in other views.

Centre lines extend slightly beyond circles and symmetric features. A cylinder parallel to a viewing plane may appear as a rectangle in one view and a circle in an end view; the circular view controls the curved-surface interpretation.

In missing-view problems, project common dimensions, identify visible versus concealed features from the viewing direction and test whether the resulting views can belong to one

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solid. A valid set cannot contain contradictory widths, heights or hole locations.

Hinglish Explanation

Missing view guessing puzzle nahi. Front-top se width match karo, front-side se height, top-side se depth.

Hole kis direction mein axis rakhta hai ye circular view se samjho, then hidden lines decide karo.

Dimensioning orthographic views

Place each dimension on the view that best shows its feature. Locate holes from datums or centre lines and specify diameter; do not dimension to hidden lines when a clearer view exists.

Avoid over-dimensioning and closed chains that conflict. Overall size, feature size and feature location must be sufficient.

Extension and dimension lines remain thin and separated from outlines. Symmetry may reduce repeated dimensions.

Dimensions must describe the finished object, while construction projectors are removed or kept extremely light. A view can be geometrically correct yet technically incomplete if its dimensions or projection symbol are missing.

Hinglish Explanation

Hole ka diameter circular view par clear hota hai, location centre lines se do. Hidden line ko dimension karne ke badle better visible view choose karo.

Geometry aur dimensions dono mutually consistent hone chahiye.

4. Drawing Rules and Construction Shortcuts

Rule / Shortcut Sheet
1. front view shows width x height
2. top view shows width x depth
3. side view shows depth x height
4. first-angle: top below front
5. first-angle: right-side view left of front
6. third-angle: top above front
7. third-angle: right-side view right of front
8. miter line commonly 45 degrees
9. true length appears on a plane parallel to the line
10. plane parallel to projection plane shows true shape

5. Construction Logic and Solved Drawing Examples

Solved construction: for a rectangular block with a through hole normal to the front face, draw the front rectangle and true circle first. Project width downward or upward according to the stated method to obtain the top rectangle; the hole becomes two hidden parallel lines in top view. Transfer depth through the 45-degree miter line for the side view and project heights from the front. Verify that circle centre, hidden boundaries and overall dimensions correspond.

6. Practical Applications

- Component manufacturing drawings.
- Structural and fabrication details.
- Service layouts and equipment coordination.
- CAD model documentation.
- Inspection and measurement.

7. Short Tricks

- Front-top share width.
- Front-side share height.
- Top-side share depth.
- Read the projection symbol before arranging views.

8. Concept Diagram

9. Comparison Table

Feature	First angle	Third angle
Object/plane	object between observer and plane	plane between observer and object
Top view	below front	above front
Right-side view	left of front	right of front
Individual view geometry	unchanged	unchanged

10. Common Mistakes

- Placing first-angle side views on the same side.
- Selecting an uninformative front view.
- Failing to align common dimensions.
- Drawing every concealed feature as visible.
- Using the miter line as a measuring scale.

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11. Important DSSSB Exam Points

• First-versus-third angle, view arrangement, common dimensions, hidden lines and missing-view reasoning are central.

12. Chapter Revision Sheet

Fix the method and viewing arrow first. Construct one descriptive view, project shared dimensions, transfer depth carefully, classify edges by visibility and perform a three-view consistency check.

13. Practice Questions with Solutions

Attempt each question first. The explanation discusses only the correct answer.

Q1. Orthographic projectors meet the plane at

(A) 90 degrees
(B) width and height
(C) between observer and plane
(D) depth between top and side views

Correct Answer: (A)

Orthographic projection uses perpendicular projectors.

Q2. A front view normally shows

(A) width and depth
(B) width and height
(C) below the front view
(D) true length

Correct Answer: (B)

Depth is along the front viewing direction.

Q3. A top view normally shows

(A) depth and height
(B) left of the front view
(C) width and depth
(D) an edge view

Correct Answer: (C)

Height is suppressed.

Q4. A side view normally shows

(A) width
(B) between observer and object
(C) a circle
(D) depth and height

Correct Answer: (D)

Width is suppressed.

Q5. Front and top views share

(A) width
(B) height
(C) above the front view
(D) a dashed thin line

Correct Answer: (A)

Corresponding widths align.

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Q6. Front and side views share

(A) depth
(B) height
(C) right of the front view
(D) maximum shape information with minimum hidden detail

Correct Answer: (B)

Corresponding heights align.

Q7. Top and side views share

(A) between observer and plane
(B) depth between top and side views
(C) depth
(D) consistent corresponding dimensions

Correct Answer: (C)

The miter construction can transfer depth.

Q8. In first-angle projection, the object is

(A) below the front view
(B) true length
(C) 90 degrees
(D) between observer and plane

Correct Answer: (D)

The plane receives projectors beyond the object.

Q9. In first-angle projection, top view is

(A) below the front view
(B) left of the front view
(C) an edge view
(D) width and height

Correct Answer: (A)

Unfolding places it below.

Q10. In first-angle projection, right-side view is

(A) between observer and object
(B) left of the front view
(C) a circle
(D) width and depth

Correct Answer: (B)

Views are placed opposite the viewing direction.

Q11. In third-angle projection, the plane is

(A) above the front view
(B) a dashed thin line
(C) between observer and object
(D) depth and height

Correct Answer: (C)

The transparent-box model explains the arrangement.

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Q12. In third-angle projection, top view is

(A) right of the front view
(B) maximum shape information with minimum hidden detail
(C) width
(D) above the front view

Correct Answer: (D)

It remains on the same viewing side.

Q13. In third-angle projection, right-side view is

(A) right of the front view
(B) depth between top and side views
(C) consistent corresponding dimensions
(D) height

Correct Answer: (A)

Views follow the viewing direction.

Q14. A 45-degree miter line transfers

(A) true length
(B) depth between top and side views
(C) 90 degrees
(D) depth

Correct Answer: (B)

It turns corresponding projectors.

Q15. A line parallel to a projection plane appears in

(A) an edge view
(B) width and height
(C) true length
(D) between observer and plane

Correct Answer: (C)

It is not foreshortened on that plane.

Q16. A plane perpendicular to a projection plane appears as

(A) a circle
(B) width and depth
(C) below the front view
(D) an edge view

Correct Answer: (D)

Its area collapses along the viewing direction.

Q17. A cylinder viewed along its axis appears as

(A) a circle
(B) a dashed thin line
(C) depth and height
(D) left of the front view

Correct Answer: (A)

The circular base is normal to the observer.

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Q18. A hidden edge is drawn using

(A) maximum shape information with minimum hidden detail
(B) a dashed thin line
(C) width
(D) between observer and object

Correct Answer: (B)

It exists but is concealed in that view.

Q19. The preferred front view gives

(A) consistent corresponding dimensions
(B) height
(C) maximum shape information with minimum hidden detail
(D) above the front view

Correct Answer: (C)

This improves clarity and reduces ambiguity.

Q20. A valid set of views must have

(A) 90 degrees
(B) depth
(C) right of the front view
(D) consistent corresponding dimensions

Correct Answer: (D)

Widths, heights and depths must agree.

Quick Revision: Re-read the formula box, cover the answers, and explain each exam point aloud. A drawing rule is ready only when its projection method, view direction, scale, line type and construction conditions are clear.

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CHAPTER 3 — ISOMETRIC PROJECTION AND ISOMETRIC VIEWS

1. Introduction

Isometric drawing provides a single pictorial representation in which three principal directions are equally inclined. It improves visualization but must not replace orthographic dimensions. The key exam distinction is that an isometric projection uses reduced isometric lengths, while an isometric view or drawing commonly uses true lengths along the isometric axes.

2. Complete Theory

Isometric axes, planes and non-isometric lines

The three isometric axes are 120 degrees apart. On paper, one axis is vertical and the other two are commonly drawn at 30 degrees to the horizontal.

Lines parallel to these axes are isometric lines and may be measured directly using the chosen scale. A face bounded by two axes is an isometric plane.

Lines not parallel to any isometric axis are non-isometric; their lengths and angles are not set directly from the stated true angle. Instead, locate their endpoints by coordinates or enclosing-box construction.

Parallel object edges remain parallel, so isometric is an axonometric parallel projection rather than perspective.

Hinglish Explanation

Isometric mein vertical line vertical, receding lines 30 degree. Sirf axis-parallel lines ko direct measure karo.

Sloping non-isometric edge ka angle protractor se same true angle draw karna usually wrong; endpoints box se locate karo.

Isometric projection versus isometric view

An isometric projection is theoretically obtained by equally inclining the principal axes to the projection plane, so all three principal lengths are foreshortened by approximately 0.816. An isometric scale converts true lengths to isometric lengths.

In common engineering practice, an isometric view uses full true lengths along the isometric axes, producing a picture about 1/0.816 times the theoretical projection. The problem statement controls which is required.

Dimensions written on a pictorial view still state true object size even if the geometric construction uses an isometric scale.

Hinglish Explanation

Question mein 'isometric projection' ho to isometric scale use karo; 'isometric view' ho to true lengths. Ye single word DSSSB trap ban sakta hai.

Written dimension hamesha actual size communicate karti hai.

Box method and simple solids

Begin with the overall isometric box using length, width and height along the three axes. Locate major planes and cut-outs by offsets from box corners, then join corresponding points.

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This method controls proportion and is especially reliable for stepped blocks and pyramids. A prism uses its base within an isometric plane and generators parallel to the third axis.

A cylinder is enclosed by a square or rhombus representing its bounding square; cones and pyramids are constructed from base centres to apex. Visible final edges are darkened after all intersections are checked.

Hidden lines are generally omitted in pictorial views unless needed for interpretation.

Hinglish Explanation

Object ko pehle bounding box mein fit karo. Step ya notch ko box se subtract karo.

Direct final outline draw karoge to depth direction ya proportion miss ho sakta hai. Construction light rakho, final visible edges last mein dark karo.

Circles, ellipses and four-centre method

A circle lying in an isometric plane appears as an ellipse. First draw the isometric rhombus whose side equals the circle's diameter using the applicable scale.

Mark side midpoints and construct the ellipse accurately with an ellipse template or geometrically. The four-centre method uses four circular arcs to approximate the ellipse and is suitable for manual drawings when constructed in the correct rhombus orientation.

For holes or cylinders, both near and far ellipses must align along the cylinder axis. A sphere remains a circle in outline and its apparent diameter in an isometric view is normally drawn as the true diameter.

Hinglish Explanation

Circle ko isometric mein circle mat banao. Pehle diameter ka rhombus, then ellipse.

Top, left aur right isometric planes ke rhombus orientations different honge. Cylinder ki both ellipses same axis par align honi chahiye.

Inclined surfaces, cut-outs and combined solids

For an inclined face, establish every vertex through distances measured along isometric axes, then connect endpoints. Do not transfer an orthographic angle directly unless the line itself is isometric.

Cut-outs are constructed by subtractive box logic: draw the complete parent solid lightly, locate cutting planes and retain the resulting boundary. Combined solids require a common centre line or contact plane so cylinders, prisms and pyramids do not float or intersect inconsistently.

Tangency points and circular centres are projected in coordinate directions. The final drawing should communicate visible form without unnecessary hidden clutter.

Hinglish Explanation

Inclined face ka true angle isometric sheet par same nahi dikhega. Coordinates se corners locate karo.

Combined object mein pehle common axis/centre establish karo, warna cylinder block ke centre se shift ho jayega.

Dimensioning and conversion between views

Isometric dimensions are aligned with the corresponding isometric directions, with extension lines and numerals readable according to the adopted convention. Crowding inside the pictorial outline should be avoided.

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To convert orthographic views into isometric, identify overall extents, choose a suitable near corner, build the box and transfer feature coordinates from the views. To recover orthographic views from an isometric picture, do not measure sloping paper distances blindly; identify principal directions and stated dimensions.

Curves require enough construction points. Final verification compares extents, axes, holes, steps and symmetry.

Hinglish Explanation

Orthographic se isometric: length-width-height pehle, then features. Isometric se orthographic: pictorial sloping edge ko ruler se actual length assume mat karo; given dimensions aur principal directions use karo.

4. Drawing Rules and Construction Shortcuts

Rule / Shortcut Sheet
1. isometric axes separation=120 degrees
2. receding axes commonly=30 degrees to horizontal
3. isometric length approximately 0.816 x true length
4. true length approximately isometric length/0.816
5. isometric projection uses isometric lengths
6. isometric view uses true lengths
7. circle in an isometric plane appears as ellipse
8. non-isometric line endpoints are located by coordinates
9. sphere outline remains circular

5. Construction Logic and Solved Drawing Examples

Isometric-scale construction: draw a horizontal reference. From one point draw a 45-degree line carrying true lengths and a 30-degree line representing isometric direction; project perpendicular/vertical transfers as specified by the graphical construction to obtain reduced readings, whose ratio is approximately 0.816. Example: a 100 mm true edge becomes about 81.6 mm in isometric projection but remains 100 mm in an isometric view.

6. Practical Applications

- Pictorial visualization for clients and site teams.
- Assembly and fabrication explanation.
- CAD axonometric documentation.
- Pipe and equipment layouts.
- Interpretation of complex orthographic views.

7. Short Tricks

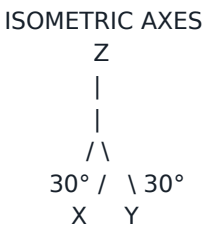
• Projection: reduced lengths.

• View: true lengths.

• Circle becomes ellipse.

• Box method controls steps and cut-outs.

8. Concept Diagram



Angles between X, Y and Z are 120°; no perspective convergence.

9. Comparison Table

Feature	Isometric projection	Isometric view
Axis geometry	same	same
Lengths used	about 0.816 true	true lengths
Result size	smaller	larger
Circle on isometric plane	ellipse	ellipse

10. Common Mistakes

• Using true lengths for a requested projection.

• Drawing circles as circles.

• Measuring non-isometric lines directly.

• Applying true angles on inclined faces.

• Showing excessive hidden lines.

11. Important DSSSB Exam Points

• Axis angles, isometric scale, projection-versus-view, ellipse construction and non-isometric lines are expected.

12. Chapter Revision Sheet

Identify whether projection or view is required. Build a bounding box, locate features along axes, construct ellipses in correct planes, omit needless hidden lines and compare all three extents with the orthographic data.

13. Practice Questions with Solutions

Attempt each question first. The explanation discusses only the correct answer.

Q1. The three isometric axes are separated by

(A) 120 degrees
(B) 30 degrees to horizontal
(C) an ellipse
(D) parallel

Correct Answer: (A)

Equal angular separation defines the axes.

Q2. Receding isometric axes are commonly drawn at

(A) an isometric line
(B) 30 degrees to horizontal
(C) rhombus
(D) do not converge with distance

Correct Answer: (B)

This gives the standard paper orientation.

Q3. A line parallel to an isometric axis is

(A) locating its endpoints
(B) an approximate ellipse using four arcs
(C) an isometric line
(D) 81.6 mm

Correct Answer: (C)

It can be measured along the applicable scale.

Q4. A non-isometric line should be drawn by

(A) 0.816
(B) a circle
(C) coordinate offsets to its vertices
(D) locating its endpoints

Correct Answer: (D)

Its true angle and length are not directly transferred.

Q5. The isometric-length factor is approximately

(A) 0.816
(B) isometric lengths
(C) overall length, width and height
(D) ellipses in bounding rhombi

Correct Answer: (A)

Principal lengths are equally foreshortened.

Q6. An isometric projection uses

(A) true lengths along isometric axes
(B) isometric lengths
(C) omitted unless essential
(D) the centre of its base ellipse

Correct Answer: (B)

The theoretical projection is reduced.

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Q7. An isometric view uses

(A) an ellipse
(B) parallel
(C) true lengths along isometric axes
(D) whether true or isometric lengths are used

Correct Answer: (C)

This is the common full-length pictorial convention.

Q8. A circle in an isometric plane appears as

(A) rhombus
(B) do not converge with distance
(C) 120 degrees
(D) an ellipse

Correct Answer: (D)

Parallel projection foreshortens one diameter direction.

Q9. The bounding figure for an isometric circle is a

(A) rhombus
(B) an approximate ellipse using four arcs
(C) 81.6 mm
(D) 30 degrees to horizontal

Correct Answer: (A)

It represents the square enclosing the true circle.

Q10. The four-centre method draws

(A) a circle
(B) an approximate ellipse using four arcs
(C) coordinate offsets to its vertices
(D) an isometric line

Correct Answer: (B)

It is a manual construction.

Q11. A sphere appears in outline as

(A) overall length, width and height
(B) ellipses in bounding rhombi
(C) a circle
(D) locating its endpoints

Correct Answer: (C)

Its silhouette is circular from any direction.

Q12. The box method begins with

(A) omitted unless essential
(B) the centre of its base ellipse
(C) 0.816
(D) overall length, width and height

Correct Answer: (D)

Features are located inside the bounding box.

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Q13. Hidden lines in an isometric view are generally

(A) omitted unless essential
(B) parallel
(C) whether true or isometric lengths are used
(D) isometric lengths

Correct Answer: (A)

The pictorial view should remain uncluttered.

Q14. Parallel object edges in isometric remain

(A) do not converge with distance
(B) parallel
(C) 120 degrees
(D) true lengths along isometric axes

Correct Answer: (B)

Isometric is a parallel projection.

Q15. Isometric is different from perspective because isometric lines

(A) 81.6 mm
(B) 30 degrees to horizontal
(C) do not converge with distance
(D) an ellipse

Correct Answer: (C)

Perspective has vanishing behaviour.

Q16. A 100 mm edge in theoretical isometric projection is about

(A) coordinate offsets to its vertices
(B) an isometric line
(C) rhombus
(D) 81.6 mm

Correct Answer: (D)

Multiply true length by 0.816.

Q17. An inclined non-isometric face is constructed using

(A) coordinate offsets to its vertices
(B) ellipses in bounding rhombi
(C) locating its endpoints
(D) an approximate ellipse using four arcs

Correct Answer: (A)

Direct true-angle transfer is unreliable.

Q18. A cylinder is built by first constructing

(A) the centre of its base ellipse
(B) ellipses in bounding rhombi
(C) 0.816
(D) a circle

Correct Answer: (B)

The circular ends project as ellipses.

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Q19. A cone apex should align with

(A) whether true or isometric lengths are used
(B) isometric lengths
(C) the centre of its base ellipse
(D) overall length, width and height

Correct Answer: (C)

The solid axis joins base centre to apex.

Q20. The problem wording controls

(A) 120 degrees
(B) true lengths along isometric axes
(C) omitted unless essential
(D) whether true or isometric lengths are used

Correct Answer: (D)

Projection and view are not interchangeable terms.

Quick Revision: Re-read the formula box, cover the answers, and explain each exam point aloud. A drawing rule is ready only when its projection method, view direction, scale, line type and construction conditions are clear.

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CHAPTER 4 — SECTIONING AND SECTIONAL VIEWS

1. Introduction

Sectional views reveal internal geometry by imagining that a cutting plane passes through the object and the material in front is removed. The remaining cut material is hatched. The cutting-plane path, viewing arrows and section label control the interpretation; hatching must never be used as decoration.

2. Complete Theory

Purpose and cutting-plane representation

Hidden lines can make an object with cavities or holes difficult to read and dimension. A section replaces selected hidden information with visible cut boundaries.

The cutting plane is an imaginary plane indicated in another view by a standardized emphasized line, arrows showing the viewing direction and identifiers such as A-A. The sectional view shows the object remaining after the portion between observer and plane is conceptually removed.

It is not a physical removal unless the part is actually manufactured that way. Features behind the plane may appear if visible in the stated viewing direction.

Hinglish Explanation

Section ko object ka actual broken piece mat samjho. Imagine knife plane pass karti hai, observer-side portion remove hota hai, then remaining object ko arrows ki direction se dekhte hain.

Jahan solid material cut hua wahi hatch hoga.

Hatching and material indication

Section lines are thin, evenly spaced and commonly inclined at 45 degrees to a principal outline or axis. If 45 degrees would be parallel to a dominant boundary, another suitable angle is selected.

Adjacent components in an assembly are distinguished by direction or spacing. Hatching stops at boundaries and does not cross holes or voids.

Large areas may be hatched near the boundary only where permitted by convention. General hatching indicates cut material; specialized material symbols may be used when the drawing practice requires them, but notes and specifications remain authoritative.

Hinglish Explanation

Hatching uniform thin rakho. Hole ke andar hatch nahi.

Adjacent parts ka angle ya spacing change karo. Dark, uneven ya boundary-crossing hatching drawing ko confusing banati hai.

Full, half and offset sections

A full section uses one cutting plane through the entire object and is suitable when internal features lie in one plane. A half section uses two mutually perpendicular cutting planes through a symmetric object and combines one half exterior with one half section, usually separated by a centre line.

It simultaneously communicates outside and inside. An offset section bends the cutting plane to pass through several important features; the sectional view is normally drawn as

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though the offsets were in one plane, and the bends themselves are not shown as edges.

Every bend must be represented on the cutting-plane indication.

Hinglish Explanation

Full section straight complete cut. Half section symmetric object ke liye half outside plus half inside.

Offset plane jog karke multiple holes se pass karti hai, but final section flattened single plane jaisa draw hota hai.

Broken-out, revolved and removed sections

A broken-out section exposes a small local area without a full cutting-plane line; an irregular freehand break boundary defines its extent. A revolved section rotates a cross-section in place on the member and is useful for elongated bars or spokes where the local shape must be shown.

A removed section is drawn away from the main view, labelled and may be placed at a convenient scale. A thin or uniform member can be represented clearly without creating a full large section.

The selected section type should reveal required information with minimum drawing clutter.

Hinglish Explanation

Sirf local cavity dikhani ho to broken-out. Long rod ka cross-section same place rotate karke dikhana revolved.

View se alag labelled section banana removed section. Type purpose se choose karo.

Conventions for ribs, webs, shafts and fasteners

Certain features are not hatched when the cutting plane passes longitudinally through them because hatching would falsely suggest thickness or a separate cut shape. Common examples include ribs, webs, spokes, shafts, pins, bolts, nuts, washers and similar standard fasteners in assembly sections, subject to the drawing context.

If a rib is cut transversely, it is sectioned. Hidden lines are usually omitted in sectional views unless their inclusion is essential.

Centre lines remain where needed. These conventions improve readability and must not be misread as indicating empty material.

Hinglish Explanation

Rib ko lengthwise cut kiya ho to generally hatch nahi, warna rib ki thickness misleading lagegi. Same rib transverse cut ho to hatch hoga.

Fasteners assembly section mein commonly unsectioned convention follow karte hain.

Sections of solids and true shape

For a prism or cylinder cut by a plane, locate where the plane intersects every edge or generator in a view where the cutting plane is seen clearly. Project these points into the sectional view in correct sequence and join them.

A cone may produce different conic curves depending on the cutting-plane orientation. The apparent section on a principal plane may be foreshortened.

To obtain true shape, introduce an auxiliary plane parallel to the cutting plane, project intersection points perpendicular to the new reference and transfer distances from a related view. The true shape is the actual geometry of the cut surface.

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Hinglish Explanation

Cutting plane har generator/edge ko jahan cross karti hai, points number karo. Same order mein project aur join karo.

Principal view par section foreshortened ho sakta hai; plane ke parallel auxiliary view true shape deta hai.

Sectional isometric and checking

A sectional isometric removes part of a pictorial solid to reveal internal geometry. Construct the complete isometric lightly, define the cutting planes, locate their intersection boundaries and retain the visible remainder.

Hatch cut faces with parallel lines lying visually in each isometric plane; hatch directions on differently oriented faces should follow those planes. Do not hatch voids.

Check the sectional isometric against the orthographic cutting-plane arrows, hole axes, wall thickness and remaining external surfaces. It is a visualization aid and must remain consistent with the dimensioned multiview drawing.

Hinglish Explanation

Sectional isometric mein pehle full box/solid light banao, then cut subtract karo. Different faces par hatch orientation un isometric planes ke according badlegi.

Internal hole ko hatch nahi karna.

4. Drawing Rules and Construction Shortcuts

Rule / Shortcut Sheet
1. cutting plane carries arrows+section label
2. full section=single complete cutting plane
3. half section=quarter removed from symmetric object
4. offset section=stepped plane through multiple features
5. broken-out section=local irregular break
6. section lines=thin,uniform,commonly 45 degrees
7. voids are not hatched
8. adjacent parts vary hatch direction/spacing
9. longitudinal ribs and common fasteners are generally not hatched
10. true shape requires an auxiliary plane parallel to cutting plane

5. Construction Logic and Solved Drawing Examples

Solved method for an offset section through three holes: draw the cutting path in the parent view so each offset crosses a hole axis, add arrows and A-A labels, then project every boundary into the sectional view as though the cutting segments formed one plane. Draw visible hole boundaries, omit offset-bend lines from the section, hatch only cut solid regions and retain centre lines. Finally verify that every hatched zone corresponds to material crossed by the path.

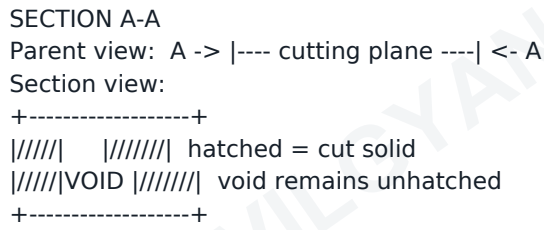
6. Practical Applications

- Internal machine and structural details.
- Hollow blocks, ducts and pipe components.
- Foundation and wall sections.
- Assembly interpretation.
- Sectional CAD documentation.

7. Short Tricks

- Hatch only cut material.
- Half section needs symmetry.
- Offset section is drawn flattened.
- True shape uses plane parallel to the cut.

8. Concept Diagram



9. Comparison Table

Type	Cutting arrangement	Use
Full section	one plane through object	general internal detail
Half section	two perpendicular planes	symmetric inside+outside
Offset section	bent plane	several nonaligned features
Broken-out	local irregular boundary	small local detail
Removed section	section drawn separately	clear cross-section

10. Common Mistakes

- Hatching holes.
- Showing offset bends as edges.
- Omitting cutting-plane arrows.
- Hatching a longitudinal rib.
- Using thick irregular section lines.

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11. Important DSSSB Exam Points

• Section identification, hatching rules, unsectioned conventions and cutting-plane interpretation are high-yield.

12. Chapter Revision Sheet

Trace the cutting plane before drawing the section. Classify every region as removed space, cut material or visible material behind the plane, then hatch only cut material and verify the viewing arrows.

13. Practice Questions with Solutions

Attempt each question first. The explanation discusses only the correct answer.

Q1. A sectional view is used primarily to

(A) reveal internal geometry clearly
(B) viewing direction for the section
(C) a symmetrical object
(D) away from the main view

Correct Answer: (A)

It reduces dependence on numerous hidden lines.

Q2. The cutting-plane arrows indicate

(A) the cutting plane and its view
(B) viewing direction for the section
(C) a centre line
(D) not hatched

Correct Answer: (B)

They control which remaining portion is seen.

Q3. Section labels such as A-A identify

(A) thin and evenly spaced
(B) include several nonaligned features
(C) the cutting plane and its view
(D) hatched

Correct Answer: (C)

They connect the parent view to the section.

Q4. Section lines are normally

(A) 45 degrees
(B) not drawn as object edges
(C) left unsectioned
(D) thin and evenly spaced

Correct Answer: (D)

They should remain subordinate to outlines.

Q5. The common hatching angle is

(A) 45 degrees
(B) left unhatched
(C) a local internal area
(D) omitted unless essential

Correct Answer: (A)

Another angle is chosen if this causes ambiguity.

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Q6. A hole crossed by a cutting plane is

(A) one cutting plane through the object
(B) left unhatched
(C) rotated in place on the member
(D) an auxiliary plane parallel to the cut

Correct Answer: (B)

It is void, not cut material.

Q7. A full section uses

(A) a symmetrical object
(B) away from the main view
(C) one cutting plane through the object
(D) the orientation of each isometric cut face

Correct Answer: (C)

It reveals the complete internal profile along that plane.

Q8. A half section is best suited to

(A) a centre line
(B) not hatched
(C) reveal internal geometry clearly
(D) a symmetrical object

Correct Answer: (D)

It combines half exterior and half interior.

Q9. The dividing line in a half section is generally

(A) a centre line
(B) include several nonaligned features
(C) hatched
(D) viewing direction for the section

Correct Answer: (A)

Symmetry controls the boundary.

Q10. An offset section is used to

(A) not drawn as object edges
(B) include several nonaligned features
(C) left unsectioned
(D) the cutting plane and its view

Correct Answer: (B)

The cutting plane bends through their axes.

Q11. Offset bends in the final sectional view are

(A) a local internal area
(B) omitted unless essential
(C) not drawn as object edges
(D) thin and evenly spaced

Correct Answer: (C)

The cut is represented as one flattened plane.

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Q12. A broken-out section reveals

(A) rotated in place on the member
(B) an auxiliary plane parallel to the cut
(C) 45 degrees
(D) a local internal area

Correct Answer: (D)

An irregular break limits the section.

Q13. A revolved section is

(A) rotated in place on the member
(B) away from the main view
(C) the orientation of each isometric cut face
(D) left unhatched

Correct Answer: (A)

It shows a local cross-section compactly.

Q14. A removed section is drawn

(A) not hatched
(B) away from the main view
(C) reveal internal geometry clearly
(D) one cutting plane through the object

Correct Answer: (B)

It is labelled for correspondence.

Q15. A rib cut longitudinally is generally

(A) hatched
(B) viewing direction for the section
(C) not hatched
(D) a symmetrical object

Correct Answer: (C)

Hatching would misleadingly imply section thickness.

Q16. A rib cut transversely is generally

(A) left unsectioned
(B) the cutting plane and its view
(C) a centre line
(D) hatched

Correct Answer: (D)

The cutting plane crosses its actual thickness.

Q17. Common fasteners in an assembly section are often

(A) left unsectioned
(B) omitted unless essential
(C) thin and evenly spaced
(D) include several nonaligned features

Correct Answer: (A)

This is a conventional readability rule.

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Q18. Hidden lines in sectional views are usually

(A) an auxiliary plane parallel to the cut
(B) omitted unless essential
(C) 45 degrees
(D) not drawn as object edges

Correct Answer: (B)

The section already reveals internal geometry.

Q19. The true shape of a section is found on

(A) the orientation of each isometric cut face
(B) left unhatched
(C) an auxiliary plane parallel to the cut
(D) a local internal area

Correct Answer: (C)

A parallel plane avoids foreshortening.

Q20. In a sectional isometric, hatching must follow

(A) reveal internal geometry clearly
(B) one cutting plane through the object
(C) rotated in place on the member
(D) the orientation of each isometric cut face

Correct Answer: (D)

Different planes require visually consistent directions.

Quick Revision: Re-read the formula box, cover the answers, and explain each exam point aloud. A drawing rule is ready only when its projection method, view direction, scale, line type and construction conditions are clear.

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CHAPTER 5 — BUILDING DRAWINGS AND ARCHITECTURAL REPRESENTATION

1. Introduction

Building drawings coordinate spatial planning, structure, services, approvals and construction. A plan, elevation and section are linked projections of the same building and must agree at every wall, opening and level. Symbols and illustrative dimensions vary by office and code; written notes, legends and current statutory requirements control actual work.

2. Complete Theory

Drawing types and terminology

A working drawing provides construction information; a submission or approval drawing supports authority review; a record or as-built drawing documents completed conditions; detail drawings enlarge specific junctions. A key plan locates a site broadly, while a site plan shows plot boundary, road, north, building position, setbacks and services.

A floor plan is a horizontal section looking downward, a foundation plan locates supports below, a roof plan shows roof geometry and drainage, and an elevation is an exterior vertical view. A building section is a vertical cut showing hidden construction and levels.

A schedule tabulates repeated items such as doors and windows.

Hinglish Explanation

Plan sirf top photo nahi; horizontal cut ke baad downward view hai. Elevation outside face, section vertical cut ke through construction.

Key plan broad location, site plan plot-level detail. Working aur as-built drawings ka time/purpose different hai.

Building components and vertical sequence

Foundations transfer loads to soil. The plinth raises the building above surrounding ground; a damp-proof course limits rising moisture.

Walls enclose or carry loads; columns, beams and slabs form framed systems. Sill is the level at the bottom of a window, lintel spans an opening, and a chajja projects above for weather protection.

Floors include structural and finish layers. Roofs may be flat or sloping; parapets guard exposed edges and coping protects their top.

Stairs connect levels through flights and landings. Drains, rainwater pipes and sanitary lines remove water.

Every component shown in section must align with its plan location.

Hinglish Explanation

Foundation se load soil mein, plinth ground se building raise, DPC moisture stop, lintel opening ke upar load bridge karta hai. Plan mein wall/opening position aur section/elevation mein same location/level match honi chahiye.

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Plans, elevations and sections

A plan is produced by an imaginary horizontal cut, commonly at a height that passes through doors and windows for informative representation; exact convention can vary. Cut walls are shown strongly, openings and door swings are represented symbolically, rooms are named and dimensions plus north direction are supplied.

Elevations are projected from the plan and show plinth, sill, lintel, roof and parapet levels. Sections pass through informative locations such as stairs or openings and show foundations, floors and vertical construction.

Horizontal coordinates transfer from plan, while levels control vertical projection. Conflicting opening widths or levels indicate an error.

Hinglish Explanation

Plan se horizontal positions lo, elevation/section mein vertical levels add karo. Door plan mein swing arc dikhata hai; elevation shutter appearance.

Section line ko aisi jagah choose karo jahan foundation, opening ya stair ka useful detail mile.

Symbols, doors, windows and schedules

Material hatching and component symbols simplify representation, but legends should accompany office-specific conventions. Door plan symbols show opening and swing direction; windows interrupt the wall and are identified by marks linked to a schedule.

A schedule can list mark, quantity, width, height, type and remarks. North arrows, level markers, section arrows and grid or centre lines must be distinct.

Sanitary symbols commonly represent WC, wash basin, sink, traps and inspection chambers; service lines require a legend. Typical sizes are design examples, not universal standards, and statutory or project requirements must be verified.

Hinglish Explanation

Symbol ko guess mat karo; legend read karo. D1, W1 marks schedule se exact size/type connect karte hain.

Door swing circulation check karne mein help karta hai. Typical size ko building code ka universal value mat declare karo.

Stairs and foundations

A stair flight contains successive treads and risers between landings. Nosing projects at the tread edge; headroom is vertical clearance; a reinforced-concrete stair may have a waist slab.

Plan arrows commonly indicate upward movement, and a break distinguishes portions above the plan cut. In a dog-legged stair, adjacent flights reverse direction with no large open well; an open-well stair surrounds an opening.

Foundation plans use centre lines to locate wall or column footings. Sections show stepped wall footings or isolated column footings, depths, widths and levels.

Plan and section dimensions must correspond.

Hinglish Explanation

Stair arrow ka UP direction check karo. Plan se flight width, landing aur direction; section se riser, tread, waist slab aur headroom.

Foundation plan location deta hai, section depth aur stepped profile.

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Site, roof, drainage and services

A site plan shows plot boundary, adjoining road, access, north, building footprint, setbacks, open areas and service routes at an appropriate scale. A key plan only provides broader location context.

Current setback values must be taken from the applicable authority, not memorized as universal. Roof plans show slopes with arrows, ridges or valleys where applicable, outlets and rainwater pipes.

Plumbing drawings distinguish soil, waste, vent and water-supply lines and locate traps or inspection chambers. The drawing legend, line convention and invert or level notes control interpretation.

Hinglish Explanation

Site plan property-level coordination hai; key plan city/locality mein location clue. Roof arrow water flow/slope direction show kar sakta hai.

Soil, waste, vent aur water lines ko one generic line mat samjho; legend and labels follow karo.

Dimensioning, levels and reading workflow

Building plans typically provide overall, centre-line or structural, room and opening dimensions in organized strings. Levels may include ground, plinth, finished floor, sill, lintel, roof and parapet, usually referenced to a datum or reduced level.

Read a set by checking title block, drawing number, revision and scale; locate north and section marks; identify wall and structural grids; read room arrangement and openings; verify dimensions; then correlate plan, elevations, sections, details and schedules. Written dimensions and levels override scaled measurements.

Missing north, inconsistent revisions or unmatched openings require clarification.

Hinglish Explanation

Drawing read karte hi room names se start mat karo. Pehle title/revision/scale, then north and section marks, walls/grids, openings, dimensions, levels, schedules.

Plan mein W1 ho to schedule aur elevation dono se verify karo.

CAD interpretation and drawing control

CAD layers separate walls, dimensions, text, centres, services and other categories so visibility, colour and line type can be controlled. Object snaps locate endpoints, centres, intersections and perpendiculars accurately.

Dimension styles standardize text, arrows and units; blocks reuse symbols; model space contains geometry, while paper space or layouts arrange views and title blocks for plotting. Plot scale converts model geometry to sheet representation.

CAD improves editing and coordination but can propagate copied errors rapidly. Revision control, reference files, layer discipline and plotted line weights remain essential.

Hinglish Explanation

CAD fast hai, automatically correct nahi. Wrong layer ya copied block multiple sheets par error spread kar sakta hai.

Model space generally full-size geometry, paper space sheet layout; viewport/plot scale se printed size control hota hai.

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4. Drawing Rules and Construction Shortcuts

Rule / Shortcut Sheet
1. plan=horizontal section looking downward
2. elevation=exterior vertical projection
3. section=vertical cut
4. key plan=broad location
5. site plan=plot and surroundings
6. stair relation 2R+T is commonly used as a comfort guideline,subject to code/design
7. slope=vertical rise/horizontal run
8. plan horizontal positions must match elevation/section
9. written dimensions override scaled measurement
10. model space geometry is commonly drawn full size
11. paper space arranges plotted sheets

5. Construction Logic and Solved Drawing Examples

Basic single-storey workflow: establish plot and orientation; choose an illustrative wall grid; place rooms and circulation; draw walls and openings; mark door-window tags; add room names and dimension strings; project a front elevation using plan widths and stated levels; select a section cutting through an informative opening or stair; show foundation, plinth, floor, lintel, roof and parapet; prepare schedules, notes, title block and revisions. All example sizes must be labelled illustrative and checked against the applicable brief and authority.

6. Practical Applications

- Approval and submission sets.
- Construction and site coordination.
- Quantity estimation and billing.
- Structural and MEP coordination.
- As-built records and facility management.

7. Short Tricks

- Plan horizontal; section vertical.
- Written dimensions control.
- Door marks connect to schedules.
- Model space and paper space have different roles.

8. Concept Diagram

PLAN - ELEVATION - SECTION RELATION
PLAN: [Room]--D1--[Room] horizontal locations
| section A-A |
ELEVATION: GL__PL__SILL__LINTEL__ROOF exterior levels
SECTION: footing -> plinth -> floor -> wall -> slab -> parapet
All openings and dimensions must correspond across views.

9. Comparison Table

Drawing	Cut/view	Main purpose
Floor plan	horizontal cut, look down	layout and openings
Elevation	external vertical view	appearance and levels
Building section	vertical cut	construction and internal levels
Site plan	plot scale	boundary, access, setbacks, services
Key plan	small broad-area scale	location context

10. Common Mistakes

• Treating plan as an uncut top view.

• Using universal setback values without authority.

• Mismatching door/window positions across views.

• Omitting north or section arrows.

• Scaling a resized print instead of reading dimensions.

11. Important DSSSB Exam Points

• Plan-elevation-section relation, component levels, symbols, stair terms, site-versus-key plan and CAD layers are frequent.

12. Chapter Revision Sheet

Read drawing control information first, then correlate every horizontal location with every vertical level. Treat symbols through their legend, sizes as project-specific and statutory requirements as authority-controlled.

13. Practice Questions with Solutions

Attempt each question first. The explanation discusses only the correct answer.

Q1. A floor plan is primarily

(A) a horizontal section viewed downward
(B) an external vertical projection
(C) the bottom of a window opening
(D) upward direction

Correct Answer: (A)

The cut reveals layout and openings.

Q2. An elevation is

(A) a vertical cut through the building
(B) an external vertical projection
(C) limit rising damp
(D) walls or column footings

Correct Answer: (B)

It shows facade appearance and levels.

Q3. A building section is

(A) broad location context
(B) an exposed roof or balcony edge
(C) a vertical cut through the building
(D) direction of fall

Correct Answer: (C)

It reveals foundations and vertical construction.

Q4. A key plan shows

(A) plot boundary, access, building position and services
(B) opening direction
(C) the applicable authority
(D) broad location context

Correct Answer: (D)

It helps locate the site within a wider area.

Q5. A site plan shows

(A) plot boundary, access, building position and services
(B) completed construction conditions
(C) a schedule
(D) scaled measurement from the print

Correct Answer: (A)

It works at property scale.

Q6. An as-built drawing records

(A) above an opening
(B) completed construction conditions
(C) adjacent flights reversing direction
(D) organize objects and control display properties

Correct Answer: (B)

It reflects verified final work.

Q7. A lintel is located

(A) the bottom of a window opening
(B) upward direction
(C) above an opening
(D) arrange sheet layouts for plotting

Correct Answer: (C)

It spans the door or window.

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Q8. A sill is located at

(A) limit rising damp
(B) walls or column footings
(C) a horizontal section viewed downward
(D) the bottom of a window opening

Correct Answer: (D)

It forms the lower window level.

Q9. A DPC is intended to

(A) limit rising damp
(B) an exposed roof or balcony edge
(C) direction of fall
(D) an external vertical projection

Correct Answer: (A)

It interrupts capillary moisture movement.

Q10. A parapet is normally provided at

(A) opening direction
(B) an exposed roof or balcony edge
(C) the applicable authority
(D) a vertical cut through the building

Correct Answer: (B)

It forms a protective low wall.

Q11. A door swing symbol indicates

(A) a schedule
(B) scaled measurement from the print
(C) opening direction
(D) broad location context

Correct Answer: (C)

It assists circulation and clearance interpretation.

Q12. Door and window marks are linked to

(A) adjacent flights reversing direction
(B) organize objects and control display properties
(C) plot boundary, access, building position and services
(D) a schedule

Correct Answer: (D)

The schedule supplies size, type and quantity.

Q13. A dog-legged stair has

(A) adjacent flights reversing direction
(B) upward direction
(C) arrange sheet layouts for plotting
(D) completed construction conditions

Correct Answer: (A)

The flights typically run in opposite directions.

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Q14. The stair arrow commonly indicates

(A) walls or column footings
(B) upward direction
(C) a horizontal section viewed downward
(D) above an opening

Correct Answer: (B)

It communicates movement through levels.

Q15. A foundation plan primarily locates

(A) direction of fall
(B) an external vertical projection
(C) walls or column footings
(D) the bottom of a window opening

Correct Answer: (C)

Centre lines control support positions.

Q16. A roof-plan slope arrow indicates

(A) the applicable authority
(B) a vertical cut through the building
(C) limit rising damp
(D) direction of fall

Correct Answer: (D)

It supports drainage interpretation.

Q17. Current setback values should come from

(A) the applicable authority
(B) scaled measurement from the print
(C) broad location context
(D) an exposed roof or balcony edge

Correct Answer: (A)

They vary by jurisdiction and project.

Q18. Written dimensions should take priority over

(A) organize objects and control display properties
(B) scaled measurement from the print
(C) plot boundary, access, building position and services
(D) opening direction

Correct Answer: (B)

Printing and scanning can alter scale.

Q19. CAD layers are used to

(A) arrange sheet layouts for plotting
(B) completed construction conditions
(C) organize objects and control display properties
(D) a schedule

Correct Answer: (C)

They separate walls, text, dimensions and services.

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Q20. Paper space is commonly used to

(A) a horizontal section viewed downward
(B) above an opening
(C) adjacent flights reversing direction
(D) arrange sheet layouts for plotting

Correct Answer: (D)

Viewports present model geometry at controlled scales.

Quick Revision: Re-read the formula box, cover the answers, and explain each exam point aloud. A drawing rule is ready only when its projection method, view direction, scale, line type and construction conditions are clear.

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