Viva

Unit -1

Question 1: What are the key principles of engineering graphics?

Answer: The key principles include the accurate representation of objects through orthographic projection, using multiple views to describe the shape and dimensions, and adhering to standardized drawing conventions to ensure clear communication.

Question 2: How do engineering drawings benefit from using standardized drawing instruments?

Answer: Standardized drawing instruments ensure uniformity, precision, and scalability in drawings, which are essential for accurate manufacturing and interpretation of engineering plans across different teams and locations.

Question 3: What is the significance of the layout of a drawing sheet?

Answer: The layout of a drawing sheet is significant because it organizes information systematically, using sections like the title block, revision history, and notes area to provide essential drawing details and ensure compliance with design standards.

Question 4: Describe the contents typically found in a title block on an engineering drawing.

Answer: A title block includes the drawing title, part number, author, scale, date, and approval signatures. It may also contain company information and the revision history, which are crucial for document control and tracking.

Question 5: What are BIS conventions in engineering drawing, and why are they important?

Answer: BIS (Bureau of Indian Standards) conventions provide standardized guidelines for drawing practices and procedures, ensuring that engineering drawings are interpretable by all engineers and manufacturers within the jurisdiction, reducing errors and misunderstandings.

Question 6: Explain the importance of proper lettering in engineering drawings.

Answer: Proper lettering is crucial for clarity, legibility, and professionalism in engineering drawings. It ensures that information such as dimensions, notes, and identifiers can be easily read and understood by everyone who uses the drawing.

Question 7: What is dimensioning, and why is it essential in engineering drawings?

Answer: Dimensioning is the process of annotating a drawing with measurements. It is essential because it provides the exact specifications needed to manufacture the parts depicted in the drawing, ensuring that each component fits correctly with others.

Question 8: Discuss the different types of scales used in engineering drawings.

Answer: Scales such as full scale (1:1), reduced scale (e.g., 1:2), and enlarged scale (e.g., 2:1) are used to represent objects in a manageable and measurable size on paper, ensuring that the drawing provides a true representation of physical dimensions.

Question 9: Explain the different standard sheet sizes used in engineering drawings.

Answer: Standard sheet sizes, typically adhering to ISO standards, include sizes A0 through A4. These sizes provide a range of options that accommodate the complexity and detail of the drawing while ensuring usability and standardization.

Question 10: Describe the different types of lines used in engineering drawings and their purposes.

Answer: Types of lines include continuous thick lines (boundaries and visible edges), continuous thin lines (dimension, extension, leader), dashed lines (hidden features), and chain lines (center lines and paths of motion). Each type conveys different information about the object’s features.

Question 11: What are the different types of planes in engineering drawing?

Answer: In engineering drawing, types of planes include horizontal, vertical, and profile planes. These planes are used as references for viewing and dimensioning the various features of an object.

Question 12: Can you explain some of the recent conventions in engineering drawing?

Answer: Recent conventions include the increased use of CAD software, adoption of digital submission formats, and the use of 3D modeling techniques alongside traditional 2D drawings to enhance understanding and visualization.

Question 13: How are engineering drawings updated to reflect changes?

Answer: Engineering drawings are updated through revision blocks in the title area, where changes are logged with corresponding revision numbers, descriptions, dates, and the initials of the person making the changes, ensuring traceability and current information.

Question 14: Why is the orientation of views important in orthographic projection?

Answer: The orientation of views in orthographic projection is important because it directly affects how the dimensions and relationships between different features are perceived and understood, ensuring accurate and unambiguous interpretation.

Question 15: What is the role of a checker in the context of engineering drawings?

Answer: The checker reviews the engineering drawings to ensure all conventions are followed, dimensions are correct and consistent, and no essential information is missing. This role is crucial to maintaining the quality and accuracy of the final drawings used for manufacturing or construction.

Unit -2

Question 1: What is a projection in the context of engineering drawing?

Answer: In engineering drawing, a projection is a method used to represent a three-dimensional object on a two-dimensional plane. It involves projecting lines from the object to the projection plane to create views that accurately depict the object's dimensions and relationships.

Question 2: What is the difference between first-angle and third-angle projection?

Answer: In first-angle projection, the object is situated between the projection plane and the observer, resulting in views that are oriented opposite to the actual layout of the object's features. In third-angle projection, the projection plane is between the observer and the object, creating views that align directly with the object's layout as seen from the respective sides.

Question 3: How can you determine the true length of a line from its projections?

Answer: The true length of a line can be determined if the line is parallel to one of the principal planes or by rotating its projections until they merge into a single line on one of the views. This process involves finding the auxiliary view where the line appears as a point or a line without perspective distortion.

Question 4: What are the horizontal and vertical traces of a plane?

Answer: Horizontal trace (HT) of a plane is where the plane intersects the horizontal projection plane, typically shown as a line in the top view. The vertical trace (VT) is where the plane intersects the vertical projection plane, visible in the front or side views.

Question 5: Explain how to represent a plane that is perpendicular to the horizontal plane.

Answer: A plane perpendicular to the horizontal plane will appear as a true size line in the front view because it intersects the horizontal plane at a right angle. In the top view, it may be seen as a line or not visible at all, depending on its orientation relative to the line of sight.

Question 6: Describe how an inclined plane is represented in engineering drawings.

Answer: An inclined plane is represented by its traces on the principal planes. It will intersect the planes along lines, and these traces will appear inclined at different angles in the different views. The angle of the trace lines in each view provides information about the plane's angle of inclination relative to the principal planes.

Question 7: How do projections differ when a point is located in different quadrants?

Answer: The projection of a point in different quadrants affects its appearance in orthographic views:

- In the first quadrant, the views are oriented opposite to the actual layout.
- In the third quadrant, the views correspond directly to the layout as the observer would see them, with the projection plane intercepting between the observer and the object.

Question 8: Why is it important to understand angles of projection in technical drawing?

Answer: Understanding angles of projection is important because it affects how dimensions and orientations are interpreted in the drawings. Correct angles ensure that the designs are accurately realized in manufacturing and that components fit together as intended.

Question 9: What method would you use to find the true length of a line which is inclined to both the horizontal and vertical planes?

Answer: To find the true length of a line inclined to both the horizontal and vertical planes, you would use the auxiliary projection method. By projecting the line onto an auxiliary plane that is perpendicular to the line itself, the line's true length can be directly measured because it will appear as a straight line on that plane.

Question 10: How do you determine the inclination of a line concerning the horizontal plane in an engineering drawing?

Answer: The inclination of a line concerning the horizontal plane can be determined by measuring the angle it forms with the horizontal line in the front view of an orthographic projection. This angle reflects how the line tilts away from being parallel to the horizontal plane.

Question 11: Can you explain the concept of traces concerning a plane and how these are useful in engineering drawings?

Answer: Traces are the lines where a plane intersects the principal projection planes (horizontal and vertical). There are two types of traces: horizontal trace, which is where the plane meets the horizontal plane, and vertical trace, where it intersects the vertical plane. These traces are crucial in determining the orientation of the plane in space and are essential for accurately depicting the plane in technical drawings.

Question 12: What does it mean if a plane is perpendicular to the vertical plane and how is it represented in a drawing?

Answer: If a plane is perpendicular to the vertical plane, it means it forms a 90-degree angle with it. In a drawing, this plane will appear as a true size line in the side or top view, depending on its orientation. In the front view, it may appear as an edge view, which is a line.

Question 13: Describe how you would project a point that is above the horizontal plane and to the right of the vertical plane in first-angle projection.

Answer: In first-angle projection, a point that is above the horizontal plane and to the right of the vertical plane would be projected onto the drawing surfaces such that in the top view, the point appears in its actual position relative to the vertical plane. In the front view, the point will appear directly above its ground line position, representing its height above the horizontal plane. The positions in the respective views are a direct translation of the point's spatial coordinates onto the two-dimensional drawing plane.

Unit -3

Question 1: What is orthographic projection and why is it used in engineering drawings?

Answer: Orthographic projection is a method of depicting three-dimensional objects in two dimensions using multiple views (typically front, top, and side). It is used in engineering drawings to provide accurate and measurable views of an object, ensuring precise manufacturing and verification against design specifications.

Question 2: Describe how orthographic views are developed for a solid object.

Answer: Orthographic views are developed by projecting the features of a solid object onto three orthogonal planes (typically the front, top, and side planes). Each view represents the object as seen from that direction and is aligned with the other views to give a complete dimensional representation of the object.

Question 3: What is isometric projection and how does it differ from orthographic projection?

Answer: Isometric projection is a method where a three-dimensional object is represented in a single view with all three axes (x, y, and z) displayed at equal angles of 120 degrees. Unlike orthographic projection, which provides multiple views from orthogonal perspectives, isometric projection gives a more holistic, albeit less dimensionally accurate, view of the object.

Question 4: Explain the purpose of using an isometric scale in drawings.

Answer: An isometric scale is used to compensate for the distortion caused by the 30-degree inclination of the axes in isometric drawings. It ensures that measurements along these axes reflect true distances, maintaining proportionality and accuracy in the representation.

Question 5: How can you convert an isometric view into an orthographic view?

Answer: To convert an isometric view into orthographic views, one must reorient the object along the principal axes to create separate views that are orthogonal to each other. This involves imagining or constructing the front, top, and side views based on the spatial relationships and dimensions observed in the isometric view.

Question 6: What is a section plane, and how is it represented in a drawing?

Answer: A section plane, or cutting plane, is used to "slice" through a part of a solid object to reveal internal features. It is represented in drawings by a line often accompanied by arrows indicating the direction of view. The section plane line might include letters at each end, referring to the specific section view presented elsewhere on the drawing.

Question 7: What is the difference between a full section and a half section?

Answer: A full section displays an object as if it were completely cut along a section plane, showing all internal features across the plane. A half section shows one half of the object as if cut, while the other half is represented as an external view, combining internal and external perspectives in a single image.

Question 8: How do sectional views help in understanding engineering drawings?

Answer: Sectional views expose internal details of an object that are not visible in external views. They are crucial for understanding complex assemblies, the interaction of different components, and the material composition of various parts of an object.

Question 9: What considerations must be taken when choosing a plane for sectioning a solid?

Answer: The plane should be chosen to reveal the most informative features of the object, considering the purpose of the drawing. It should ideally pass through the most complex or significant internal features, providing a clear view of important components or assemblies.

Question 10: Explain how a cutting plane line is indicated in a drawing.

Answer: A cutting plane line is indicated by a thick, dashed line that often includes arrows pointing in the direction that the section view is "looking." It may also have letters at each end, which correspond to the labels used in the section view for clarity and reference.

Question 11: Describe the process of converting orthographic views to isometric views.

Answer: Converting orthographic views to an isometric view involves visually combining the separate orthogonal views into a single 3D representation. This requires an understanding of spatial relationships and dimensions provided in the orthographic views and translating them into a cohesive isometric format.

Question 12: What are the challenges of representing complex solids in orthographic and isometric views?

Answer: The main challenge in representing complex solids is maintaining accuracy and clarity. Orthographic views must align perfectly to avoid dimensional inconsistencies, while isometric views must balance the intuitive representation of depth with the distortion inherent in non-orthogonal angles. Both types of views require a deep understanding of spatial relationships and projection techniques to effectively communicate the design intent.

Unit -4

Basic Interface and Layout

1. What are the primary components of a CAD software interface?
2. Describe the function of the menu bar in CAD software.
3. What is the purpose of the command window in CAD?
4. Explain how the properties inspector is used in CAD software.
5. Identify and describe the function of the status bar in CAD software.

Toolbars and Common Tools

6. What tools are found in the standard toolbar of most CAD software?
7. Describe the functions of the draw toolbar in CAD.
8. How does the modify toolbar enhance CAD functionality?
9. What is the purpose of the dimension toolbar?
10. Explain the use of the layer toolbar in CAD software.

Drawing Commands

11. How do you create a line in CAD software?
12. Explain the process of creating a rectangle with specific dimensions.
13. What is the difference between a line and a polyline in CAD?
14. Describe how to draw a circle based on a given radius.
15. How is an ellipse created in CAD software?

Object Manipulation

16. What does the move command do in CAD?
17. Explain how the copy command is used.
18. Describe what the mirror command does and provide a use case.
19. How does the rotate command function?
20. What is the purpose of the offset command?

Advanced Editing Tools

21. Explain how the trim command is utilized in CAD.
22. What is the extend command and when would you use it?
23. Describe the break command and its applications.
24. How do you use the chamfer command in a drawing?
25. What does the fillet command do?

Dimensions and Annotations

26. How do you add linear dimensions to a CAD drawing?
27. Explain the process of adding radial dimensions to a drawing.
28. What are angular dimensions and how are they used?
29. Describe how to use the text tool in CAD for annotations.
30. How can you create a dimension style in CAD?

Coordinate Systems and Points

31. Explain the use of absolute coordinates in drawing.
32. How do relative coordinates differ from absolute coordinates?
33. What are polar coordinates and how are they used in CAD?
34. Describe how to input specific coordinate points to place an object.
35. Explain the concept of snap settings in CAD.

Complex Shapes and Operations

36. How do you create polygons in CAD?
37. What are splines and how do you use them in drawings?

38. Describe the process of creating a custom polyline with varying widths.
39. How do you use the hatch command?
40. Explain how to create and use blocks in CAD.

Review and Revision Tools

41. What is the purpose of the check and repair tools in CAD software?
42. How can you compare two drawings for differences?
43. Explain the use of revision clouds in CAD drawings.
44. What tools are available for measuring objects in CAD?
45. How can layer management enhance the organization of a CAD drawing?

Basic Interface and Layout

1. Primary components of a CAD software interface include the drawing area, toolbars, menu bar, command line, status bar, and property inspector.
2. Menu bar function: Provides access to various functions grouped by categories like file management, editing, and view settings.
3. Purpose of the command window: Allows users to input commands directly, offering more precision and speed in executing complex sequences.
4. Properties inspector use: Enables the modification of properties for selected objects, such as dimensions, color, line type, and layer.
5. Function of the status bar: Displays the current state of the software, including the active command and settings like snap or grid mode.

Toolbars and Common Tools

6. Standard toolbar tools: Include new, open, save, print, undo, and redo.
7. Draw toolbar functions: Provides tools for creating geometric entities like lines, rectangles, circles, and polygons.
8. Modify toolbar enhancement: Includes tools for altering objects, like move, rotate, scale, trim, and extend.
9. Dimension toolbar purpose: Contains tools for adding dimensional annotations to the drawing, crucial for manufacturing and assembly.
10. Layer toolbar purpose: Helps in managing different layers of the drawing, allowing for organized, non-destructive editing.

Drawing Commands

11. Creating a line: Select the Line tool, click to set the start point, then click again to set the end point or enter length and angle manually.
12. Creating a rectangle with dimensions: Select the Rectangle tool, click to set one corner, then drag or enter the dimensions for length and width.
13. Difference between line and polyline: A line is a single straight segment, while a polyline is a continuous sequence of connected line segments.
14. Drawing a circle with a radius: Select the Circle tool, click to set the center, then enter the radius or click to set the perimeter.
15. Creating an ellipse: Select the Ellipse tool, click to set one axis, then set the perpendicular axis.

Object Manipulation

16. Move command: Select objects, then move them from one point to another by specifying start and end points.
17. Copy command use: Creates duplicates of selected objects which can be placed at a specified location without altering the original.
18. Mirror command function: Reflects selected objects about a specified axis line, producing a mirrored copy.
19. Rotate command function: Rotates selected objects around a chosen point by a specified angle.
20. Offset command purpose: Creates parallel copies of objects at a specified distance, commonly used for creating concentric shapes or offset lines.

Advanced Editing Tools

21. Trim command utilization: Trims parts of objects to meet the edges of other intersecting objects.
22. Extend command and use: Lengthens objects to meet the edges of other objects or boundaries.
23. Break command applications: Allows breaking an object into two parts at a specified point or between two points.
24. Chamfer command use: Creates a beveled edge by cutting or adding at the intersection of two lines.

25. Fillet command function: Rounds the corners of two intersecting lines or arcs by a specified radius.

Dimensions and Annotations

26. Adding linear dimensions: Use the Dimension tool to click on two points of an object and place the dimension line.
27. Adding radial dimensions: Select the radial dimension tool, click on a circle or arc, then place the dimension.
28. Angular dimensions and use: Measure angles between two lines by selecting them and placing the dimension arc.
29. Using the text tool for annotations: Select the Text tool, click on the drawing area, and enter the text.
30. Creating a dimension style: Define specific properties like text size, line style, and arrows in the dimension style manager.

Coordinate Systems and Points

31. Using absolute coordinates: Enter exact x, y (and z if applicable) coordinates to place objects precisely.
32. Relative coordinates difference: Specifies positions relative to the last point rather than the origin.
33. Polar coordinates use: Specify distances and angles from a reference point to place objects.
34. Inputting specific coordinate points: Use the command line or dynamic input to enter coordinate values directly.
35. Concept of snap settings: Ensures precision by locking cursor movement to specific increments or elements within the drawing.

Complex Shapes and Operations

36. Creating polygons: Use the Polygon tool, specify the center, then enter the number of sides and radius.
37. Using splines in drawings: Draw smooth curved lines by defining control points.
38. Custom polyline with varying widths: Draw a polyline and modify the width at various segments using properties.

39. Using the hatch command: Fill enclosed areas with patterns or solid fills to denote materials or sections.
40. Creating and using blocks: Define reusable groups of objects that can be inserted multiple times across drawings.

Review and Revision Tools

41. Purpose of check and repair tools: Identify and fix errors or inconsistencies in the drawing.
42. Comparing two drawings: Use software tools to highlight differences in geometry and annotations.
43. Using revision clouds: Draw attention to changes or updates in a drawing by encircling them with a cloud-like polyline.
44. Measuring tools availability: Tools for measuring distances, angles, and areas directly within the software.
45. Enhancing organization with layer management: Organize different elements of the drawing on separate layers to simplify edits and visibility controls.