SELECTIVE PREPARATION PROBLEMS

Make sure to leave all intermediate steps to demonstrate your understanding of problems.

1. [10] The following shows typical design process. Identify the steps and make brief descriptions of steps next to each step. Also, show the design flows with arrows.

[Hint: See the textbook to understand the typical design process in engineering]
2. [20] Draw a (regular) pentagon for a given size below using the general method discussed in the class. This is NOT an inscribed pentagon to a circle.
3. [10] (a) Divide the given line into the proportion of 2:3:5 using the method discussed in the class.
4. [10] Create a curve tangent to three lines below using arcs starting from the point P.
5. [10] Sketch an approximate ellipse with major diameter 3” and minor diameter 2”.

8. [20] Draw all necessary views based on the principles of orthographic projection. Units are in inches that are shown in the grid below by 10 subdivisions per inch. Clearly show the reference lines.
9. [15] For the given views, determine the missing right-side view. Show labels for points and reference lines (i.e., fold lines).
10. [15] For the given views, determine the missing right-side view. Show labels for points and reference lines (i.e., fold lines).
11. [20] (a) Why is the section view needed and how is it created? (b) Name the following section views next to them.
12. [20] Determine the true size of the angle between a plane and a line shown below.
13. [20] [challenging problem] Find the true size of the angle between a line and a plane below.
14. [30] [challenging problem] For the given two lines find the shortest distance between two lines and project it back to the original views.
15. [20] Find the true size of angle between two planes given below. Use the method of revolution first, and then method of auxiliary views to obtain it.
16. [20] Draw the isometric drawing for the given object. For the circle, find the circle in the rear surface first and then project to the inclined surface with **true distances**.
17. [20] For the same object in the previous problem, draw a two-point perspective drawing for the given picture plane, station point, horizon, and ground line.
18. [20] Draw a two-point perspective drawing for the object shown below. Include the front vertical edge on the picture plane. The depth of the product is 2.00. You are given the starting point A and two vanishing points.
19. [20] Determine the visibility of a plane and a line given in two views. Label the corners.
20. [20] Determine the visibility between a line and a plane.
21. [10] Determine the visibility between a plane and a line. Use either method to project off or to revolve.
22. [20] Find the lines of intersection between horizontal and vertical prisms.
23. [20] Determine the intersection between two cylinders. Use at least six points for curved intersection.
24. Find the intersection between a cone and a plane. Use at least 8 intersecting points.
25. [20] For the given two views label the corners and then find the development of the lateral surfaces. There are no bottom and top surfaces. The fold lines must be shared by developed surfaces.
26. [10] In engineering drawings the surface finish is also shown by the surface finish symbols as shown in the illustration below.

Explain the following surface finish symbol (in metric units).

\[
\begin{array}{c}
1.6 \\
0.8 \\
3.5
\end{array}
\]
27. (a) [5] Find the tolerances of the shaft and hole shown below.

(b) [15] The tolerances between mating parts result in different fits. Name the fits for each and find the fits (e.g., allowance and interference).
28. [15] Explain the geometric tolerances (a), (b), and (c) in the following ASME standards.
29. [20] Draw the tolerance zones in the second figures for the given tolerances of the part with the values shown clearly (may be not-to-scale) in two different ways.
30. [10] Complete the thread note below explaining the blank items.
31. [10] What are the names of the following fasteners and explain how they are fastened into places?

![Fasteners](image1)

32. [10] What is the name of the following fasteners in various joints and explain how it is fastened into places?

![Fasteners](image2)
33. [6] Name the features of the fastener.

34. [18] Name the groove shapes and weld types below each figure.

**Weld Groove Shapes**

![Weld Groove Shapes Diagram]

**Weld Types**

![Weld Types Diagram]
35. [18] Name the welds based on groove shapes and weld symbols below each figure.
36. [10] Name the types of weld and sketch the groove shapes on top of the figures with explanation of notes.