**Intro to Engineering & Design**

Name:\_\_\_\_KEY\_\_\_\_\_\_\_\_\_\_\_\_\_

Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Hr.\_\_\_\_\_\_\_\_\_\_\_\_

**EOC Study Guide**

Unit 1 – Design Process – 19%

1. How might we create the best possible solution to a problem?

Engineers try to think “outside the box” in order to solve new problems or find ways to improve current solutions.

1. What is the most effective way to generate potential solutions to a problem? How many alternate solutions should you generate?

Brainstorming with a group, research and testing possible solutions

1. What is an engineer? What types of work do engineers do? Engineering is the application of mathematics and scientific principles to better or improve life. An engineer is a person who is trained in and uses technological and scientific knowledge to solve practical problems. Research, Develop, Design, Supervise, Manage, Production and Construction, Operations, Plant management, and Sales,
2. Why Keep an Engineering Notebook? An engineering notebook is recognized as a legal document that is used in patent activities to…
   1. Prove the origin of an idea that led to a solution
   2. Prove when events or ideas occurred
   3. Prove diligence in turning the idea into a solution
   4. Prove when an idea became a working solution (“reduced to practice”)
3. What are the 4 best Practices for the Engineering Notebook?
   1. Be Neat,
   2. be Accurate,
   3. be Legible,
   4. be Thorough.
4. Explain the concept of proportion. Paying close attention to the underlying basic shapes and the relative proportions of various features of the object will allow you to more accurately reflect the true shapes and proportions of the object in your sketch.
5. Why would the ability to create realistic sketches make a person a more competent designer? Representing existing objects and new ideas with sketches can make the design process more effective and efficient and greatly enhance the ability of others to understand your ideas. Allows them to communicate their ideas more clearly.
6. What is the purpose of sketching your ideas? Sketches provide a means through which one can quickly and clearly communicate ideas
7. Define and differentiate invention and innovation.

Invention: A new product, system, or process that has never existed before, created by study and experimentation.

Innovation: An improvement of an existing technological product, system, or method of doing something.

1. Define the following words:
2. Brainstorm : A group technique for solving problems, generating ideas, stimulating creative thinking, etc. by unrestrained spontaneous participation in discussion
3. Constraint: 1. A limit to a design process. Constraints may be such things as appearance, funding, space, materials, and human capabilities. 2. A limitation or restriction.
4. Design: 1. An iterative decision-making process that produces plans by which resources are converted into products or systems that meet human needs and wants or solve problems. 2. A plan or drawing produced to show the look and function or workings of something before it is built or made. 3. A decorative pattern.
5. Design Brief: A written plan that identifies a problem to be solved, its criteria, and its constraints. The design brief is used to encourage thinking of all aspects of a problem before attempting a solution.
6. Design Statement: A part of a design brief that challenges the designer, describes what a design solution should do without describing how to solve the problem, and identifies the degree to which the solution must be executed.
7. Engineering Notebook: An engineering notebook is a book in which an engineer will formally document, in chronological order, all of his/her work that is associated with a specific design project.
8. Prototype: A full-scale working model used to test a design concept by making actual observations and necessary adjustments.
9. Research: The systematic study of materials and sources in order to establish facts and reach new conclusions.
10. Put into order the Design Process steps and Define each step.

\_1\_\_) Define Problem

\_4\_\_) Construct and test Prototype

\_6\_\_) Present Solution

\_5\_\_) Evaluate Solution

\_\_2\_\_) Generate Concepts

\_\_3\_\_) Develop a Solution

1. Read through the Engineering Disciplines Power Point and write Each Engineering Field mentioned and one sentence describing what that Engineering Field does.

Chemical Engineering, Civil and Construction Engineering, Electrical and Electronics Engineering, Mechanical Engineering, Aeronautical Engineering, Agricultural Engineering, Architectural Engineering, Automotive Engineering, Biomedical Engineering, Computer Engineering, Industrial Engineering, Manufacturing Engineering

Unit 2:Technical Sketching and Drawing 12%

1. The representation of light and shade on a sketch or map. \_\_Tonal Shading\_\_\_\_\_\_\_
2. ***Match the words to the proper definition***.

\_c\_\_Center Line

\_\_b\_\_Extension Line

\_\_f\_\_Dimension Line

\_e\_\_Object Line \_a\_\_\_Construction

\_\_d\_\_Hidden Line

* 1. Line lightly drawn lines to guide drawing other lines and shapes.
  2. Line which represents where a dimension starts and stops.
  3. A line which defines the center of arcs, circles, or symmetrical parts
  4. A line type that represents an edge that is not directly visible.
  5. A heavy solid line used on a drawing to represent the outline of an object.
  6. A line which represents distance

***Match the words to the proper definition.***

\_\_c\_\_Orthographic Projection

\_b\_\_Leader Line:

\_g\_\_Cabinet Pictorial

\_\_d\_\_Cavalier Pictorial

\_\_e\_Pictorial Sketch

\_\_h\_\_Isometric Sketch

\_\_f\_\_Perspective Sketch

\_\_a\_\_Multi-View Drawing

\_\_i\_\_Oblique Sketch

1. A drawing which contains views of an object projected onto two or more orthographic planes.
2. Line which indicates dimensions of arcs, circles and detail.
3. A method of representing three-dimensional objects on a plane having only length and breadth. Also referred to as Right Angle Projection
4. Oblique pictorial where height, width, and depth are represented at full scale.
5. A sketch that shows an object’s height, width, and depth in a single view
6. A form of pictorial sketch in which vanishing points are used to provide the depth and distortion that is seen with the human eye.
7. Oblique pictorial where depth is represented as half scale compared to the height and width scale.
8. A form of pictorial sketch in which all three drawing axes form equal angles of 120 degrees with the plane of projection.
9. A form of pictorial in which an object is represented as true width and height, but the depth can be any size and drawn at any angle.
10. What are the 3 spatial Dimensions? \_\_\_Height, Width & Depth
11. A method of representing three-dimensional objects on a plane. \_\_Orthographic Projection\_
12. A drawing which contains views of an object projected onto two or more orthographic planes \_\_\_Multi-View Drawing\_\_\_
13. A drawing that is used to show the material, size, and shape of a product for manufacturing purposes. \_ Technical Working Drawing \_\_\_\_\_\_\_\_

**Unit 3 Measurement and Statistics 13%**

1. The Degree of closeness of measurements to the actual or accepted value is called \_\_\_Accuracy \_\_\_\_\_
2. Describe the difference between the meaning of the terms *accuracy* and *precision* in scientific measurement.

Accuracy: The degree of closeness of measurements of a quantity to the actual (or accepted) value.

Precision: The degree to which repeated measurements show the same result.

1. How can statistical and analyzed data be used to inform, justify, and validate a design or process?

Statistics are commonly used in manufacturing processes to control and maintain quality. A statistical analysis is used to determine measures of central tendency and variation of the data.

1. What is dimensional analysis and how can it help solve problems involving quantities?

Preforming a dimensional analysis on a part will assure that all needed dimensions to create the part have been included. This will insure the part is made correctly.

1. Why do engineers generally adhere to a set of dimensioning standards and guidelines?

In manufacturing, a part must be dimensioned fully and correctly and to the proper precision. Otherwise, the part may not function properly or may not fit into an assembly as intended. Dimensioning errors can lead to a delay in production time, increased design and manufacturing costs, and a potentially unsafe product.

1. Convert the following – Show work, conversion faction and units.
   1. 2,375 trillion Meters to Giga-meters.\_\_2,375,000,000 x10-9= = 2.375 Giga-meters
   2. 23,439 milliliters to liters. \_\_23,439 x .001 = 23.439 liters\_\_\_\_\_
   3. 13 thousand microseconds to seconds. \_13,000 x 1-6\_= .13 seconds\_\_
   4. 9.25 yards to feet. \_\_9.25 x 3 = 27.75 feet\_\_\_\_\_\_
   5. 1.15 feet to inches. \_\_1.15 x 12 = 13.8 in\_\_\_\_\_
   6. 5 ft – 6 ½ in. to inches. \_(5 x 12) + 6.5 = 66.5 inches\_\_\_
   7. 4 ft – 3 inches to decimal feet. \_\_4 + (3/12) = 4.25\_\_\_\_\_\_\_\_\_\_\_
   8. 67.5 cm to inches. \_67.5 x .393701 = 26.5748175 in\_\_\_\_\_\_\_
   9. 1.7 yards to inches. \_\_1.7 x 36 = 253\_\_\_\_\_\_\_\_\_\_
2. Why would you have to know how to convert measurements when looking at a technical drawing?

If they are not in the units preferred by the engineer, they will need to change them

1. Why is placement of your dimensions so important?

So they can be read clearly without confusion

1. How can you use units help you solve a problem? If the Units are all the same communication of size and shape are understood with out confusion.
2. Why do designers need to fully dimension a part? A fully dimension part is required to communicate clearly how the part is to be constructed.
3. What does it mean when a sketch is over dimensioned? A sketch is over dimensioned when the same measurement/dimension is on 2 or more of the views: such as the over all width is placed in both the front and top views. This can cause confusion and increase the probability of the part being constructed incorrectly
4. A graph of vertical bars representing the frequency distribution of a set of data is called\_\_\_\_\_Histogram\_\_\_\_\_\_\_\_\_\_
5. Collection of methods for planning experiments, obtaining data, organizing, summarizing, and presenting, analyzing, interpreting, and drawing conclusions based on data. \_\_\_Statistics\_\_\_\_\_
6. The Standard Deviation is a measure of the spread of data values
7. A function that represents the distribution of variables as a symmetrical bell-shaped graph. \_\_\_Normal Distribution\_\_
8. The value that occurs most frequently in a given data set \_\_\_\_\_\_Mode\_\_\_\_\_\_
9. The\_\_\_\_Range\_\_\_\_\_\_\_ is the difference between the largest and smallest values that occur in a set of data.
10. A measure of center in a set of numerical data\_\_\_\_\_\_Median\_\_\_\_\_
11. The digits in a decimal number that carry meaning contributing to the precision or accuracy of the quantity Significant Digits
12. What is Central Tendency? \_It s the Center of a distribution: Mean, Median or Mode.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
13. A full-scale working model used to test a design concept by making actual observations and necessary adjustments. \_\_\_\_Prototype\_\_
14. A measuring instrument having two adjustable jaws typically used to measure distance or thickness. Calipers

**Unit 4 Modeling Skills 4%**

1. What is the role of models in the design process?

**Provides a visual for all to see and helps them to see the viability of the idea**

1. How can we use technology to make the design and manufacture of a product more efficient and less prone to error? Allows us to investigate the properties digitally before it is built physically
2. What is the purpose of a portfolio? How do you decide what information to include in a portfolio

The Purpose of a portfolio is to effectively communicate the details of a project. Title page, working technical drawings and an “exploded” presentation page with a parts list (i.e., whatever is necessary to communicate all the details of a project)

1. Match the word with its definition

**\_j\_\_ Model**

**\_h\_\_ Annotate**

\_\_c\_ Component

\_\_a\_\_ Physical Model

\_d\_ Scale Model

**\_\_g\_\_ Geometric Constraint**

**\_e\_\_ Solid Modeling**

**\_i\_ Mathematical Modeling**

**\_b\_\_ Prototype**

**\_f\_\_ Working Drawings**

1. A physical representation of an object. Prototypes and appearance models are physical models.
2. A full-scale working model used to test and improve a design concept by making actual observations and necessary adjustments.
3. A part or element of a larger whole
4. An enlarged or reduced representation of an object that is usually intended for study purposes.
5. A type of 3D CAD modeling that represents the volume of an object, not just its lines and surfaces.
6. Drawings that convey all of the information needed to manufacture and assemble a design
7. Constant, non-numerical relationships between the parts of a geometric figure. Examples include parallelism, perpendicularity, and concentricity.
8. To add explanatory notes to a drawing
9. The process of choosing and using appropriate mathematics and statistics to analyze empirical situations, To understand them better, and to improve decisions.
10. A visual, mathematical, or three-dimensional representation in detail of an object or design, often smaller than the original.

**Unit 5 Geometry of Design 13%**

1. What are physical properties and why are they important to the design of a product?

**The material it is made of, its mass, density, etc.**

1. What advantage do Computer Aided Design and Drafting (CAD) provide over traditional paper and pencil design? The advantage of CAD is that it is easily modified, and reproducible. Usually faster to produce. Can be looked at in 3 dimensions and seen at different angles
2. How does the material chosen for a product impact the design of the product?

It determines the products weight and density, its durability, etc.

1. Match the word with its definition

**\_g\_ Acute Triangle**

**\_l\_\_ Center of Gravity**

**\_f\_\_ Centroid**

**\_d\_\_ Tangent**

**\_e\_\_ Circumscribe**

**\_\_i\_ Principal Axes**

**\_\_b\_ Density**

**\_\_h\_ Volume**

**\_c\_\_ Inscribe**

**\_\_J\_ Obtuse Triangle**

**\_a\_\_ Fillet**

**\_k\_\_ Right Triangle**

1. A curve formed at the interior intersection between two or more surfaces.
2. The measure of mass density is a measure of mass per volume.
3. To draw a figure within another so that their boundaries touch but do not intersect.

d. A straight or curved line that intersects a circle or arc at one point only.

e. A triangle located round a polygon such as a circle. To draw a figure around another, touching it at points but not cutting it.

f. 3D point defining the geometric center of a solid.

g. A triangle that contains only angles that are less than 90 degrees.

h. The amount of three-dimensional space occupied by an object or enclosed within a container.

i. The lines of intersection created from three mutually perpendicular planes, with the three planes’ point of intersection at the centroid of the part.

j. A triangle with one angle that is greater than 90 degrees.

k. A triangle that has a 90 degree angle.

l. A 3D point where the total weight of the body may be considered to be concentrated.

1. How is a geometric constraint different from a numeric constraint in the inventor program?

Geometric constraint “bonds” two geometric parts (surfaces, edges, centers) together (i.e., mate, flush). A numeric constraint is a measurement or distance and constrains an object to be a certain length.

1. What advantages do CAD sketches have over freehand sketches?

It is usually faster to produce and more accurate. Can be looked at in 3 dimensions and seen at different angles

1. A Drum cylinder serves as a storage for used grease in a restaurant. The cylinder has a height of 3.25 feet and a diameter of 2 feet. The weight density of Steel iron is 0.2836 lbs/in3. Use this information to answer the following questions. (WATCH THE UNITS OF MEASURE)

· What is the volume of the cylinder? Precision = 0.00

V = πr2h

V = (3.14)(12)(3.25) = 10.205 ft3

· What is the surface area of the cylinder? Precision = 0.00

SA = (2πr)h + 2(πr2)

SA= (2)(3.14)(1)(3.25) + (2)(3.14)( 12) = 20.41 + 6.28 = 26.69 ft2

· What is the weight of the cylinder? Precision = 0.00

W = VDw

W = (10.205)(.2836) = 2.894138 lbs

··What will the total cost be to ship the 30,000 cylinders from the factory to a facility for distribution to area restaurants at $4.25 per pound?

Shipping Cost = # of Cylinders x Weight x Shipping Cost per lb.

Shipping Cost = (30,000)(2.894138)(4.25) = $369,002.60

1. A wood board is one of a 6 different parts in a shelf kit. The width, depth, and height dimensions of the board are 42 inches x 8 inches x .75 inches, respectively. The board is made from southern yellow pine, which has an air dry weight density of .021 lbs/in.3. (WATCH THE UNITS OF MEASURE)

· What is the volume of the wood board? Precision = 0.00

V = wdh

V= 42 x 8 x .75 = 252in3

· What is the surface area of the wood board? Precision = 0.00

SA = 2(wd + wh + dh)

SA = 2((42 x 8) + (42 x .75) + (8 x .75))

SA = 2(336 + 31.5 + 6)

SA = 2(373.5) = 747 in2

· What is the weight of the wood board? Precision = 0.00

W = VDw

W = 252 x .021 = 5.292 lbs

· If one gallon of paint will cover 35,000 square inches, how many gallons would be needed to give two coats of paint to 15,000 boards? Round your answer to the nearest gallon

# of gallons of paint needed = (SA x # of Boards)/# of sq. ins 1 gallon covers

# of gallons of paint needed = (747 x 15,000)/35,000 = 11,205,000/35,000= 320.14 gallons

1. What 3D CAD functions could be used to create a wire paper clip?\_\_\_\_Spline\_\_\_\_\_
2. What feature would be used to create a 3D representation of a baseball or softball bat that was created on a wood lathe? \_\_\_\_\_\_\_\_Revolve\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. What do you need to know in order to perform a physical property analysis?

What material it is made of and dimensions of the object.

1. Why is it important to perform a physical property analysis prior to producing a part?

In order to find the weight and density

1. Why is it important to understand the mathematics used in physical property analysis?

The Mathematics is important for you to determine the volume, density, mass, weight and size of the object you are developming.

1. A ***work point*** is an independent entity whose location is defined in \_Space\_. Work points may be placed or projected onto \_Part faces\_, \_\_Linear Edges\_\_, or onto an \_Arc\_\_\_ or \_\_Circle\_\_. Work points can be constrained to the Center\_\_ points of arcs, circles, and ellipses.
2. A ***work axis*** is a line that extends forever in \_\_Two\_\_\_ directions. Work axes are useful for locating the \_\_Center\_\_of a \_Hole\_\_ or \_\_Cylinder\_\_, are used in the creation of Revolved\_ features, and may be \_Constrained\_ to in assembly models.
3. ***Work planes*** are continuous \_\_\_\_\_\_Two Dimensional planes that can be used to establish Sketch\_ planes. \_\_Assembly\_\_ constraints can also be applied to work planes.

**Unit 6 Reverse Engineering 13%**

1. Why do engineers perform reverse engineering on products?

* Engineers preform reverse engineering on an item to learn how it operates and how internal parts were constructed.
* Documentation
* Discovery
* Investigation
* Product Improvement

1. Identify a product that you feel is aesthetically pleasing. What is it about the product that you find appealing? Use vocabulary words in your description

[Answers will vary]

1. Match the words with their definitions

\_\_o\_ Asymmetry

\_\_k\_\_Symmetry

**\_\_f\_\_**Proportion

**\_\_m\_\_** Balance.

**\_\_b\_**Form

**\_\_d\_\_**Color

**\_\_i\_\_**Rhythm

**\_\_c\_**Graphic Design

**\_\_p\_\_**Contrast

**\_\_l\_**Texture

**\_e\_\_**Pattern

**\_\_g\_\_** Radial Symmetry;

**\_\_n\_\_**Value

**\_\_h\_\_**Reverse Engineering

**\_\_j\_\_**Shape;

**\_a\_\_**Emphasis

1. Special importance, value, or prominence given to something.
2. Having the three dimensions of length, width, and depth. Also referred to as a solid. The organization, placement, or relationship of basic elements, as volumes or voids in a sculpture, so as to produce a coherent image.
3. The art of combining text and pictures in advertisements, magazines, books, etc.
4. The property possessed by an object of producing different sensations on the eye as a result of the way it reflects or emits light.
5. A repeated decorative design.
6. The relationship of one thing to another in size, amount, etc. Size or weight relationships among structures or among elements in a single structure.
7. Symmetry about a central axis.
8. The process of taking something apart and analyzing its workings in detail.
9. A regularly recurring sequence of events or actions.
10. The two-dimensional contour that characterizes an object or area, in contrast to three-dimensional form.
11. The correspondence in size, shape, and relative position of parts on opposite sides of a median line or about a central axis. Also referred to as formal balance.
12. The feel, appearance, or consistency of a surface, substance, or fabric.
13. A condition in which different elements are equal or in the correct proportions. There are three types of visual balance: symmetry, asymmetry, and radial
14. The lightness or darkness of a color in relation to a scale ranging from white to black
15. Symmetry in which both halves of a composition are not identical. Also referred to as informal balance.
16. The state of being noticeably different from something else when put or considered together
17. What considerations should be made in when reverse engineering?

* Visual Analysis
* Functional Analysis
* Structural Analysis

1. What makes a product aesthetically pleasing or eye-catching?

**Elements of design: Color, value, form, shape, texture, line, point, balance; symmetry, radial, and asymmetry, emphasis, contrast, rhythm, proportion, unity, and economy,**

1. How are principles and elements of design used with engineering practice to develop a successful product? They are incorporated into the Visual, Functional and Structural Analysis to develop a product that is not only aesthetically pleasing but also economical reproducible that solves the problem.
2. Why do engineers need to understand the design principles and elements when designing or innovating a produce? (make sure you use the vocabulary words.

Engineers use **Color, value, form, shape, texture, line, point, balance; symmetry, radial, and asymmetry, emphasis, contrast, rhythm, proportion, unity, and economy** to make it as aesthetically pleasing, while still being functional, as possible

1. Describe the process of reverse engineering.

Reverse engineering (RE) is the process of taking something apart and analyzing its workings in detail, usually with the intention of understanding its structure, function, and operation.

1. A system input/output model is used in unit 6 Functional Analysis helps to determine what about a product we are Reengineering/Innovating?

|  |  |  |
| --- | --- | --- |
| **Inputs** | **Product Function** | **Output** |
|  |  |  |
|  |  |  |
|  |  |  |

A black box systems model is used to identify what goes into and out of the product in order to make it work as a system. The “black box” is used to represent the product’s internal components or processes, which are deemed unknown at this point.

1. Describe how important it is to have good interpersonal communication skills in a technically related field, such as engineering and design.

You must be able to communicate clearly and succinctly with the people with whom you work in-order for them to understand how your design is going to solve the problem at hand.

**Unit 7 Documentation 20 %**

1. Arcs and circles are dimensioned in views that \_\_\_ **show the arc or circle** \_\_\_\_\_\_\_\_.
2. Arcs are dimensioned with a \_\_ **leader** \_ to identify the \_\_\_**radius** \_\_\_; in some cases, a center mark is included.
3. Circles should have a \_\_ **center**\_\_\_\_\_\_mark and are dimensioned with a \_\_ **leader** \_\_\_ to identify the \_\_\_\_ **diameter** \_\_\_.
4. What is an offset and how is it used?

An offset is used when constraining two parts and you don’t want to constrain them completely flush (you might offset one part so that it sticks out from another part).

1. What is the difference between a mate and flush constraint?
   * **Mate: two surfaces face to face.**
   * **Flush: two surfaces side by side or two edges side by side.**
2. What constraint would you use to place a pin inside a hole? Insert Constraint

**.**

1. What is a subassembly? How is it useful in the assembly of a complex product that involves multiple parts?

**A subassembly is when some of the parts of a product are put together, and then those subassemblies are put together in one total assembly**

1. Why is detailed documentation important in the design of a product?

**If documentation is incomplete, the part cannot be produced as it was intended to be made.**

1. Angled surface may be dimensioned using \_\_\_ **coordinate** \_\_\_ method to specify the \_\_\_ **two**\_\_\_\_\_\_\_\_\_location distances of the angle.
2. Angled surfaces may also be dimensioned using the \_\_angular\_\_\_\_ method by specifying \_\_one\_\_\_\_\_\_ location for distance and the angle.
3. **What needs to be answered in a Design Brief.**

**Client / End User / Target Consumer**

**Problem Statement**

**Design Statement**

**Constraints**

1. **What is a Decision matrix?** **It is used to compare design solutions against one another, using specific criteria that are often based on project requirements.**
2. **Identifying Ideas or Alternatives**

* **Cost**
* **Reusability**
* **Geometry**
* **Connections**
* **Cleanliness**
* **Resilience**
* **Testability**
* **Function**
* **Product life span**
* **Development time**
* **Size**
* **Material costs**
* **Development costs**
* **Manufacturing costs**
* **Company standards**
* **Manufacturing capabilities**
* **Safety**

1. **Importance of Technical Writing: is a type of expository writing that is used to \_\_convey\_\_\_\_\_ information to a particular \_audience\_\_\_\_\_\_ for a particular \_technical\_\_\_\_\_\_or \_business\_\_\_\_\_\_ purposes**
2. **Technical reports communicate \_technical\_\_\_\_\_\_\_information and \_conclusions\_\_\_\_about projects to \_\_customers\_\_\_, \_managers\_\_\_, legal authority figures, and other \_engineers\_\_\_. It contains the following sections:**

* ***Technical reports* communicate technical information and conclusions about projects to customers, managers, legal authority figures, and other engineers.**
* ***Front Matter: Title Page, Abstract, Table of Contents, List of Tables & Figures***
* ***Text: Summary, Introduction, Methods, Assumptions, and procedures, Results & Discussion, conclusion, References***
* ***Back Matter: Appendices, List of Symbols, Abbreviations and Acronyms***

1. **Match the word with its definition:**

**Section 1: Dimensioning**

\_l\_\_Aligned Dimension

\_b\_\_Baseline Dimensioning

System

\_m\_\_Chain Dimensioning

\_i\_Limit Dimensions

\_\_d\_Location Dimension

\_\_e\_Reference Dimension

\_h\_\_Datum Dimensioning

\_f\_\_Unidirectional Dimension

\_g\_Tolerance

\_c\_\_Nominal Size

\_J\_\_Bilateral Tolerance

\_\_k\_Allowance

\_n\_\_Clearance Fit

1. The amount of overlap that one part has with another when assembled
2. Dimensioning in which all dimensions are placed from a datum and not from feature to feature.
3. The designation of the size established for a commercial product.
4. A location dimension that defines the relationship of features of an object.
5. A dimension, usually without a tolerance, used for information purposes only. A reference is a repeat of a given dimension or established from other values shown on a drawing. Reference dimensions are enclosed in ( ) on the drawing.
6. A tolerance in which variation is permitted in both directions from the specified dimension.
7. The acceptable amount of dimensional variation that will still allow an object to function correctly..
8. A dimensioning system where each dimension originates from a common surface, plane, or axis. Also known as baseline dimensioning.
9. The largest and smallest possible boundaries to which a feature may be made as related to the tolerance of the dimension.
10. A tolerance in which variation is permitted in both directions from the specified dimension.
11. The tightest possible fit between two mating parts.
12. A system of dimensioning which requires all numerals, figures, and notes to be aligned with the dimension lines so that they may be read from the bottom (for horizontal dimensions) and from the right side (for vertical dimensions).
13. Also known as point-to-point dimensioning where dimensions are established from one point to the next.
14. Limits the size of mating parts so that a clearance always results when mating parts are assembled.

\_\_a\_Interference

**Part 2: Organizations & Technical Writing**

\_g\_\_American National

Standards Institute (ANSI)

\_e\_\_Technical Writing

\_c\_\_American Society of Mechanical Engineers (ASME)

\_b\_\_Parts List

\_f\_\_International Organization for Standardization (IOS);

\_d\_\_Decision Matrix;

\_\_a\_Market Research

1. The activity of gathering information about consumers’ needs and preferences.
2. A list of materials or parts specified for a project. Also referred to as a bill of materials or BOM.
3. A professional engineering organization that is known for setting codes and standards for mechanical devices in the United States.
4. A tool used to compare design solutions against one another, using specific criteria.
5. A type of expository writing that is used to convey information for technical or business purposes.
6. This is a worldwide organization that creates engineering standards.
7. A private, non-profit organization that coordinates the development and use of a voluntary consensus standards in the United States.

**Part 3: Drawing Types**

\_J\_\_Auxiliary view

\_i\_\_Section Lines;

\_h\_\_Broken-Out Section

\_c\_\_Working Drawings

\_f\_\_Full Section

\_e\_Detail View

\_b\_Part Drawing

\_a\_\_Half Section;

\_d\_ Section View

g\_\_Cutting Plane Line

1. A sectional drawing based on a cutting plane line that cuts through one-quarter of an object. A half section reveals half of the interior and half of the exterior.
2. A drawing that contains all the information for making one part of the design.
3. Drawings that convey all of the information needed to manufacture and assemble a design.
4. Used to show “inside” details not apparent on the exterior of the part
5. A view that is used to show a magnified view of features that are too small to adequately specify in another view.;
6. A sectional drawing based on a cutting plane line that extends completely through an object.
7. A line drawn on a view where a cut was made in order to define the location of the imaginary section plane.
8. A section of an object broken away to reveal an interior feature for a sectional drawing
9. Thin lines used in a section view to indicate where the cutting plane line has cut through material.
10. A view that is used to show features that is located on an inclined surface in true size and shape.

**Part 4: Holes**

\_d\_\_Blind Hole

\_\_c\_Taper

\_e\_Counter bore

\_b\_\_Tapped Holes

\_a\_\_Countersink

1. A conical-shaped recess around a hole, often used to receive a tapered screw.
2. has internal threads
3. Gradual diminution of width or thickness in an elongated object
4. A hole that does not go completely through the work piece.
5. A cylindrical recess around a hole, usually to receive a bolt head or nut

**Unit 8 Advanced Computer Modeling 4%**

1. **Match the words with the proper definitions.**

\_\_c\_Phantom Line

\_g\_\_Exploded Assembly

\_\_d\_Ratio.

\_f\_Rib

\_b\_\_Numeric Constraint

\_e\_Parameter

\_a\_\_Parametric Modeling

1. A CAD modeling method that uses parameters to define the size and geometry of features and to create relationships between features. Changing a parameter value updates all related features of the model at once.
2. A number value or algebraic equation that is used to control the size or location of a geometric figure.
3. A line used to show the alternate positions of an object or matching part without interfering with the main drawing.
4. The quantitative relation between two amounts showing the number of times one value contains or is contained within the other.
5. A property of a system whose value determines how the system will behave.
6. A relatively thin flat member acting as a brace support. Also called a web.
7. An assembly drawing in which parts are moved out of position along an axis so that each individual part is visible

**Unit 9 Design Team 2%**

\_\_c\_Environmental Protection Agency (EPA).

\_d\_\_Ergonomics

f\_\_Virtual Team

\_e\_Occupation Safety and Health Administration (OSHA)

\_b\_Ethics

\_\_a\_Norms

1. Principles of right action, binding upon the members of a group and serving to guide, control, or regulate proper and acceptable behavior.
2. The moral principles governing or influencing conduct.
3. The US federal agency with a mission to protect human health and the environment
4. The study of workplace equipment design or how to arrange and design devices, machines, or workspace so that people and things interact safely and most efficiently.
5. A government organization whose mission is to assure the safety and health of America's workers by setting and enforcing standards; providing training, outreach, and education; establishing partnerships; and encouraging continual improvement in workplace safety and health.
6. A group of people that rely primarily or exclusively on electronic forms of communication to work together in accomplishing goals.