1 course. Unit 7. Engineering Design Method, Surname Name Group

1. **Define the problem:** Understand and outline the problem's requirements and constraints.
2. **Identify specifications:** Establish criteria and objectives for a successful solution.
3. **Brainstorm solutions:** Generate a wide range of potential designs.
4. **Create prototypes:** Develop and test physical or virtual models.
5. **Test and Evaluate solutions:** Analyze the effectiveness of proposed designs.
6. **Refine and improve:** Iterate based on evaluation findings.
7. **Communicating the solution.** Share the final design with stakeholders through presentations and marketing materials.
8. **Manufacturing process and product quality control.** Manage production and ensure the product meets quality standards.
9. **Product launch.** Release the product to the market with marketing and distribution strategies.

Task 1. Match the terms related to the design stages with their definitions.

Term	Definitions
1. **Requirements**	a) Computer-based models used to test a design's behavior under different conditions before physical production.
2. **Preliminary Drawings**	b) The process of introducing a new product to the market, including the planning, marketing, distribution, and delivery to customers.
3. **Simulations**	c) The process of manufacturing large quantities of a product, often using automated techniques.
4. **Effectiveness**	d) The specific needs and conditions that a design or product must meet in order to be successful.
5. **Optimizations**	e) A measure of how well a solution meets its intended objectives.
6. **Mass Production**	f) Rough or initial sketches that represent early design ideas and concepts for a product.
7. **Product Rollout**	g) The process of making improvements to a design or product to increase its efficiency, performance, or cost-effectiveness.

Task 2. Match the question with the stage of the design process mentioned above.

1. _____ How can we ensure that production is efficient and cost-effective?
2. _____ How does this problem impact the environment, society, or economy?

3. _____ Are there any unconventional approaches we haven't considered?
4. _____ What materials or tools will we need to create the prototype?
5. _____ How can we address the weaknesses or limitations identified in testing?
6. _____ What is the best platform or channel to introduce our product?
7. _____ What are the most important features or functions our solution must have?

Task 3. Read the descriptions below and determine which stage of the design process they correspond to. Match each situation or phrase to one of the following stages:

1. _____

- *Situation*: A team designing a new coffee mug decides it must be microwave-safe, hold at least 12 oz, and be affordable to produce.
- *Phrase*: "The mug must be heat-resistant, lightweight, and cost less than $5 per unit to manufacture."

2. _____

- *Situation*: A team presents their redesigned wheelchair to stakeholders, highlighting how it improves comfort and accessibility.
- *Phrase*: "Our design reduces weight by 20% and increases maneuverability, making it ideal for daily use."

3. _____

- *Situation: A hospital reports that patients often struggle to navigate its facilities, causing delays in care and frustration.*
- *Phrase:* "What can we do to create a clear and user-friendly wayfinding system for patients and visitors?"

4. _____

- *Situation*: A school needs a more effective way to reduce plastic waste. Students suggest ideas like reusable bottles, compostable plastics, or recycling programs.
- *Phrase*: "What if we created a program where students earn rewards for bringing reusable lunch containers?"

5. _____

- *Situation*: A new electric scooter is introduced at a trade show, complete with live demonstrations and customer reviews.
- *Phrase*: "Join us for the product reveal where you can test-drive the most efficient e-scooter on the market!

6. _____

- *Situation*: Engineers develop a model for a collapsible bicycle helmet and test it for safety.
- *Phrase*: "Let's 3D-print the design and test its durability under simulated crash conditions."

7._____

- *Situation*: After testing various app layouts, users provide feedback on ease of navigation and overall satisfaction.
  Phrase: "The first layout is intuitive, but users find the color scheme distracting. How can we adjust it?"

Task 4. Listen to the audio and fill in the gaps with the correct words.

1. Once the problem has been clearly defined, engineers do research to fully understand the _____of the problem.
2. Engineers utilize creative problem solving and _____ techniques to develop a wide range of possible solutions to the problem.
3. At this stage the engineers compare ideas and _____ how each one fulfills the specifications.
4. Diagrams or graphs can be used to help _____ the basic functions or features along with computer and mathematical models.
5. In the final stage of the engineering design process, engineers will _____ a variety of tests to evaluate the design solutions and _____ it with the goals.

Task 5. Put the stages in the correct order. Then write what processes were missed.

_____ The team begins by quickly creating a physical or virtual model of the product based on initial ideas, keeping in mind the specifications and objectives.

_____ The company realizes that their previous product failed because it didn't address customer needs, so they now begin to identify what exactly the problem is and what needs to be improved.

_____ The team evaluates the effectiveness of the various prototypes, analyzing how well each one would meet the design criteria and objectives.

_____ After production and quality control, the product is launched to the market, and the company gathers feedback from customers.

_____ Based on the evaluation, the team adjusts the final design by making small tweaks to improve its functionality and performance.

_____ After understanding the problem and establishing specifications, the team gathers to discuss possible solutions and generates a wide range of ideas for the new product.

Task 6. Fill-in-the-Gaps

1. The first stage of the design process involves identifying and clearly understanding the _____ (problem / solution) to be addressed.
2. In this stage, the design team creates detailed _____ (models… / prototypes) to test the feasibility of the concept.
3. After brainstorming, the team evaluates the _____ (effectiveness / ideas) of each proposed solution to identify the best one.
4. During the _____ (creation …/ design) phase, engineers develop initial models or blueprints for the product based on requirements.
5. (Refine / Evaluate) and improve the design based on feedback and findings from prototype testing.
6. The product must be tested for _____ (quality / speed) and durability before moving to production.
7. Once the solution is determined, it is communicated through (marketing… / presentations) to stakeholders.
8. The _____ (product / solution) is developed and tested through various iterations before the final version is chosen.
9. After finalizing the design, the product enters the _____ (marketing …/ manufacturing) stage for mass production.
10. After the product is in stores, feedback is collected to inform any _____ (advertisements …/ improvements) for future versions.