

DHANALAKSHMI SRINIVASAN ENGINEERING COLLEGE



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UNIT-I PRINCIPLES OF DESIGN THINKING

1) Define design thinking.

Design thinking is an iterative process in which you seek to understand your users, challenge assumptions, redefine problems and create innovative solutions which you can prototype and test. The overall goal is to identify alternative strategies and solutions that are not instantly apparent with your initial level of understanding.

2) What are the five stages of the design thinking process?

- ❖ Empathize
- ❖ Define
- ❖ Ideate
- ❖ Test
- ❖ Prototype

3) Why is empathy important in design thinking?

Empathy helps designers understand users' feelings, experiences, and pain points, which ensures the solution is truly user-centric.

4) What is the purpose of the observation phase?

The purpose of the observation phase in design thinking is to gain deep insights into user behavior, needs, and challenges by watching how they interact with products, services, or environments.

5) Define point-of-view (POV).

A Point-of-View (POV) in design thinking is a clear and actionable problem statement that defines:

- ❖ A specific user,
- ❖ Their need, and
- ❖ The insight that explains why the need exists.

6) What is ideation in design thinking?

Ideation is the phase in design thinking where creative ideas and potential solutions are

generated to address a defined problem or user need.

It encourages divergent thinking, where quantity and variety of ideas are prioritized, often through techniques like brainstorming, SCAMPER, or mind mapping.

7) What is rapid prototyping?

Rapid prototyping is the process of quickly creating simple, low-cost models or mock-ups of a product or idea to test functionality and gather user feedback early in the design process.

8) What do you mean by “fail fast” in testing?

“Fail fast” in testing means identifying flaws or weaknesses in a design as early as possible, through quick testing and feedback.

9) Mention two activities done during the implementation phase.

Learning Launch: Testing the solution on a small scale to gather real-world feedback.

Change Management: Guiding users and stakeholders through the adoption of the new solution.

10) Define problem scoping.

Problem scoping is the process of clearly defining the boundaries, goals, and key aspects of a design challenge before starting the design thinking process.

11) Why is the define phase considered critical?

- ❖ Clearly frame the problem by synthesizing insights gathered during the empathy phase.
- ❖ Ensure the team is solving the right problem for the right user, setting the foundation for ideation and solution development.

12) Differentiate between ideation and prototyping.

IDEATION	PROTOTYPING
To generate a wide range of creative ideas	To build models to test and validate those ideas
Idea exploration and brainstorming	Practical implementation and user feedback
Comes before prototyping in the design process	Follows ideation to visualize and test concepts

13) What does iteration mean in design thinking?

Iteration in design thinking refers to the repeated process of refining and improving a solution based on feedback and testing results. It involves prototyping, testing, and modifying ideas multiple times and ensuring the final design better meets user needs and expectations

14) Give one benefit of the test phase.

- ❖ Identify what works well and what needs improvement
- ❖ Refine the solution to better meet user needs and expectations

15) What is user-centered design?

User-centered design (UCD) is a design approach that focuses on the needs, preferences, and limitations of end users at every stage of the design process.

16) Mention any two goals of the implementation phase.

To launch the final solution effectively into the real-world environment.
 To ensure user adoption and sustainability through change management and continuous support.

17) What is creative confidence in the context of design thinking?

Creative confidence is the belief that everyone has the ability to be creative and solve problems through innovative thinking.

- ❖ Take risks and experiment with ideas
- ❖ Overcome fear of failure and trust their creative potential
- ❖ Actively engage in the design process with confidence

18) How is design thinking different from traditional problem-solving?

DESIGN THINKING	TRADITIONAL PROBLEM SOLVING
User-centered and empathy-driven	Problem-centered and logic-driven
Iterative, creative, and exploratory	Linear, analytical, and structured
Innovative solutions based on user needs	Efficient solutions to defined problems

19) State one example where design thinking is applied.

Design thinking is applied in healthcare, such as designing a patient-friendly hospital experience. By empathizing with patients, hospitals have redesigned waiting areas, improved communication systems, and created apps for easier appointment booking — all based on user needs and feedback.

20) What is the role of feedback in design thinking?

- ❖ Understand how users perceive the solution and whether it meets their needs
- ❖ Identify flaws, improve prototypes, and make informed changes through iteration

UNIT-II EXPLORE, EMPATHIZE AND EXPERIMENT PHASES

1) Define STEEP analysis.

STEER Analysis is a tool to explore and determine the impact of macro-environmental trends in the context of the project topic (design challenge) as you should not limit your thinking just to the people you are designing for

2) What is strategic priority?

Strategic Priorities Matrix is a tool with which you will look through multiple perspectives to better understand the context and the real issues with your design challenge and help you synthesize and formulate a point of view or theory to explain your design challenge problem.

3) Define stakeholder mapping.

Stakeholder mapping is a process to identify the key people, group and organization that have direct influence on the design challenge and understand the key stakeholders so as to better engage them. It draws the relationship between the stakeholders and shows the importance of the stakeholder(s) as it plays a key role in influencing the development and outcome of the design challenge.

4) What is opportunity framing?

Opportunity Framing prepares you to better define the design challenge, ensuring all relevant notes have been considered before reframing the design challenge and transform the design challenge into design opportunity with many possibilities (It is not only about thinking out of the box but it is about the expansion of the box).

5) Mention one method of empathy-building.

This involves directly talking to users to understand their needs, emotions, experiences, and challenges from their point of view.

6) Define field observation.

It is a structured approach to observing people in their natural Environment rather than in a formal research setting. It is to uncover user insights and fresh perspectives of people and behavior.

7) What is a deep user interview?

Deep user interview is an art of conversation to elicit stories and to uncover deep users' insights and needs – both latent and unmet needs through understanding of the users

- ❖ Behavior & feelings
- ❖ Goals
- ❖ Motivations
- ❖ Aspirations
- ❖ Values
- ❖ Beliefs
- ❖ Pains and challenges.

8) What do you mean by persona development?

Persona development is a process of humanizing your target user, giving voice and character and making them real. Personas are fictional characters created to represent your group of target users who exhibit similar behaviors, patterns, motivations and goals.

9) Give an example of analogous inspiration.

To improve the hospital check-in process, a design team studied the airport self-check-in kiosks used for boarding passes.

By applying a similar self-service model, they designed a touchscreen check-in system for patients that reduced waiting time and improved experience.

10) Define deconstruct and reconstruct.

Deconstruct and Reconstruct is the process of taking a product or service and initially breaking it down into its essential parts; core components; key elements, significant strengths and then reconstruct idea and imagine new possibilities by combining features/characteristic.

11) What is the role of empathy in exploring user needs?

Empathy plays a crucial role in exploring user needs because it helps designers understand the user's feelings, challenges, motivations, and behavior from their perspective.

By using empathy, designers can:

- ❖ Discover hidden or unspoken needs
- ❖ Avoid assumptions about users
- ❖ Build human-centered solutions that are meaningful and relevant

12) Mention any two experiment methods used in design.

- i. Prototyping – Creating a basic model or version of a product to test ideas quickly.
- ii. User Testing – Observing how real users interact with the prototype to gather feedback and insights.

13) What is needs finding?

Needs finding is the process of discovering and understanding the real needs, desires, and pain points of users through observation, interviews, and empathy.

14) List two uses of persona.

- i. To represent the target user clearly – Helps the design team understand user goals, behaviors, and challenges.
- ii. To guide decision-making – Ensures that design solutions stay aligned with the user's needs and expectations.

15) Why is field observation better than surveys?

Field observation is better than surveys because it allows designers to:

- ❖ See real user behavior in context, not just what users say.
- ❖ Uncover hidden needs and pain points that users may not express in surveys.

Surveys collect opinions, while field observation reveals actual actions and challenges users face in their environment.

16) What does SCAMPER stand for?

S- Substitute

C- Combine

A- Adapt

M -Modify

P- Put to other use

E – Eliminate

R -Reverse

17) Define user experience design.

User experience design is the process of creating positive and great experiences by enhancing the user satisfaction. It is focused on the user and involves the process from how the person discovers the product/ services to how he/she uses it to achieve a goal. It outlines the details as to whether the ideas may or may not work from user perspective.

18) What is the goal of experimentation in design thinking?

The goal of experimentation in design thinking is to test ideas quickly and gather feedback to see what works, what doesn't, and how to improve solutions.

It helps in:

- ❖ Validating assumptions
- ❖ Reducing risks
- ❖ Refining prototypes based on real user reactions

19) List two tools used in the Explore phase.

STEEP Analysis

STEEP Analysis is a tool to explore and determine the impact of macro-environmental trends in the context of the project topic (design challenge) as you should not limit your thinking just to the people you are designing for.

Activity System

Activity system is a visual representation of how the organization creates value, satisfies its users and builds competitive advantages. It also identifies gaps in achieving the objectives (providing service) and possible duplication of jobs

20) What is the benefit of using analogous inspiration?

The benefit of using analogous inspiration is that it helps designers find creative and innovative solutions by learning from how similar problems are solved in other fields or industries.

It encourages out-of-the-box thinking and leads to unique ideas that may not come from focusing only on the current domain.

UNIT-III ENGAGE AND EVOLVE PHASE

1. Define storytelling in design thinking.

Storytelling is the most powerful way to put your ideas into the world today. Storytelling is basically giving voice to your persona's story which you have developed in the experiment phase (ideal user experience journey).

2. What is co-creation?

Co-creation involves engaging the target users early in the development process of your solution ideas in order to enhance and refine the ideas. By eliciting user's feedback and suggestions, you can better understand user needs and desires, and refine and improve solution ideas.

3. What is storyboarding?

Storyboarding is a visual illustration of your idea for the easy and effective communication with the users. Storyboard will include your persona, need statement, solution illustrations, and impact or end result of the solution concept.

4. Define concept synthesis.

Concept synthesis is the process of consolidating your learning (deep user needs, unmet needs and solution concept) and studying and defining the impact (value proposition in terms of function, Social, Emotional) it may have on the users and organization. Concept synthesis can be done using "11 box" tool which highlights.

5. What are strategic requirements?

Strategic requirements are the key conditions or needs that a design solution must meet to align with business goals, user expectations, and market success.

They ensure that the solution is not only user-friendly but also feasible, viable, and scalable from a strategic perspective.

6. What is activity system integration?

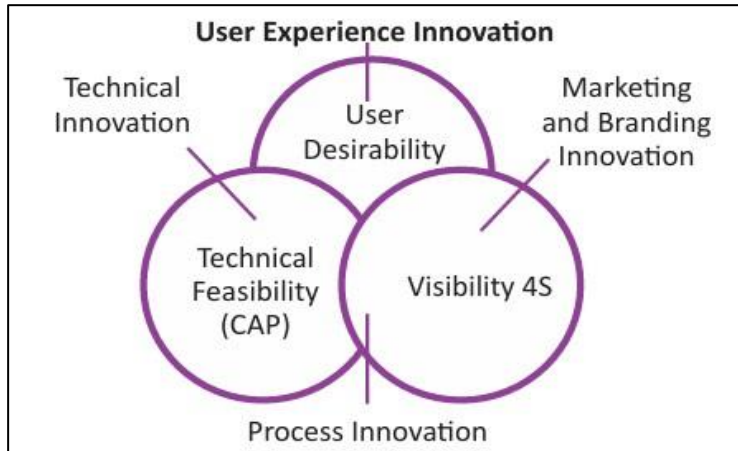
Activity system integration is the process of aligning the new design solution with the existing systems, processes, and user activities in an organization or environment.

7. Define viability analysis.

Viability analysis is the process of evaluating whether a design solution is practical, sustainable, and profitable in the long run.

It checks if the idea aligns with business goals, resources, technical feasibility, and market needs, ensuring the solution can succeed beyond just user desirability.

8. What is an innovation tool?



9. What does CAP stand for?

CAP stands for **Change Acceleration Process**.

It is a framework used to manage and accelerate change effectively during the implementation of new solutions in design thinking.

It focuses on building commitment, aligning teams, and sustaining transformation.

10. What is the 4S framework in innovation?

The 4S framework is a tool used to evaluate the viability and scalability of an innovative solution. It consists of:

- 1) Story – The vision or narrative behind the idea
- 2) Strategy – The plan for implementing and sustaining the idea
- 3) Structure – The organizational setup and resources needed
- 4) Systems – The processes and tools to support the solution

11. Define change management.

Change management is the structured approach used to prepare, support, and guide individuals or teams in adopting a new process, system, or solution.

12. What are quick wins?

Quick wins are small, easily achievable improvements that deliver immediate value during the implementation of a new design or change.

- ❖ Build confidence and momentum
- ❖ Gain stakeholder support
- ❖ Show early signs of success in the overall project

13. List two engagement tools.

- ❖ Storyboarding
- ❖ Visually represents the user journey and interactions.
- ❖ Co-creation Workshops
- ❖ Involve users directly in idea development and feedback.

14. What is the purpose of storyboarding?

- ❖ To graphically describe user's activities, your design idea and communicate the idea more effectively to the users.
- ❖ To create story narratives

15. Why is co-creation important in the evolve phase?

Co-creation is important in the Evolve phase because it involves users and stakeholders directly in refining and improving the solution.

16. What are the methods used to engage users?

1. Storytelling – Sharing user journeys or design ideas in a narrative form
2. Co-creation workshops – Collaborating with users to develop or refine solutions
3. Prototyping sessions – Involving users in testing and giving feedback on early models
4. Feedback loops – Continuously collecting and using user feedback to improve the design

17. What is concept validation?

Concept validation is the process of testing and confirming whether a proposed idea or solution meets the needs, expectations, and preferences of users and stakeholders.

18. Define activity system.

An activity system is a structured set of interrelated tasks, processes, and interactions that users or organizations perform to achieve a specific goal.

In design thinking, understanding the activity system helps ensure that the new solution fits seamlessly into existing workflows and adds value without disrupting core operations.

19. What is the importance of storytelling in innovation?

- i. Communicate complex ideas clearly and emotionally connect with stakeholders
- ii. Explain the user journey and the problem-solution narrative effectively
- iii. Inspire teams and build shared understanding during design and implementation

20. What is meant by review-based change management?

Review-based change management is the process of regularly evaluating the progress of a design solution or implementation and making adjustments based on feedback.

UNIT-IV VISUALIZATION

1. What is journey mapping?

Journey mapping is a visualization tool used to illustrate the complete experience a user goes through while interacting with a product, service, or system.

2. Define value chain analysis.

Value Chain Analysis is a method used to identify the key activities within an organization that add value to a product or service.

3. What is the use of mind mapping in design?

Mind mapping is a visual thinking tool used in design to explore, organize, and connect ideas around a central problem or concept. It helps designers visually structure information in a way that mirrors how the brain naturally works.

Uses of mind mapping in design include:

1. Idea Generation: It encourages free thinking and brainstorming by allowing multiple ideas to branch out from a single topic.
2. Problem Breakdown: Complex problems can be split into smaller components, making them easier to analyze and solve.

4. Define brainstorming.

Brainstorming is a creative thinking technique used to generate a large number of ideas in a short period of time without immediate judgment or evaluation. It encourages free thinking, collaboration, and exploration of diverse solutions during the ideation phase of design thinking.

5. What is concept development?

Concept development is the process of refining and expanding initial ideas into detailed, practical, and user-centered solutions. It involves selecting promising ideas, shaping them into clear concepts, and preparing them for prototyping, testing, and implementation.

6. What is assumption testing?

Assumption testing is a method used to identify and evaluate the assumptions made during the design process to determine if they are valid. It helps designers reduce risk by testing uncertain beliefs about users, technology, or the market before full development.

7. Define rapid prototyping.

Rapid prototyping is the process of quickly creating simple and low-cost models or mock-ups of a product or idea to test and gather feedback early in the design process.

8. What is customer co-creation?

Customer co-creation in design thinking is the practice of involving customers directly in the design process, from initial idea generation to prototyping and testing, to develop more user-centered products and services.

9. What is a learning launch?

A learning launch is a small-scale, low-risk release of a product or solution to a limited group of users to gather real-world feedback and learn before a full launch.

10. How is visualization applied in design?

Visualization is applied in design to communicate ideas, concepts, and user experiences clearly through visual tools like journey maps, storyboards, mind maps, and prototypes.

11. What are the components of a value chain?

The value chain consists of primary activities and support activities that work together to deliver value to the customer.

- ❖ Primary Activities: Inbound logistics, operations, outbound logistics, marketing & sales, and services
- ❖ Support Activities: Firm infrastructure, human resource management, technology development, and procurement

12. Give two benefits of assumption testing.

- ❖ Reduces risk by identifying and validating uncertain beliefs early in the design process.
- ❖ Saves time and resources by avoiding investment in ideas based on incorrect assumptions.

13. What is the goal of concept testing?

The goal of concept testing is to evaluate how users react to a proposed idea or solution before full development.

- ❖ Validate the usefulness and appeal of the concept
- ❖ Gather early feedback for improvement
- ❖ Ensure the idea meets user needs and expectations

14. What is the difference between a concept and prototype?

CONCEPT	PROTOTYPE
A concept is an abstract idea or proposed solution to a user problem.	It helps in brainstorming and discussing possibilities before building anything.
It is usually presented in the form of sketches, descriptions, or mind maps.	It is used to test, demonstrate, or validate how the concept works.
It helps in brainstorming and discussing possibilities before building anything.	Prototypes help gather user feedback and improve the design.

15. List any two visualization techniques.

- ❖ Journey Mapping
- ❖ Illustrates the user's experience step-by-step.
- ❖ Storyboarding
- ❖ Visually represents user interactions and scenarios through sketches or frames.

16. Why is learning launch important before implementation?

A learning launch is important before implementation because it allows teams to:

- ❖ Test the solution in a real-world setting on a small scale
- ❖ Collect feedback and insights to improve the design before a full launch

17. Define creative visualization.

Creative visualization is the process of mentally imagining and visually representing ideas, solutions, or experiences to explore possibilities and communicate concepts effectively.

18. What is hypothesis-driven prototyping?

Hypothesis-driven prototyping is the process of creating prototypes based on specific assumptions or hypotheses about user behavior, needs, or preferences.

19. Define mapping tools.

Mapping tools are visual techniques used to organize, analyze, and communicate user experiences, processes, or systems in design thinking.

20. What is visual storytelling?

Visual storytelling is the use of images, sketches, diagrams, or storyboards to communicate a user's journey, emotions, or design concepts in a clear and engaging way.

UNIT-V ADOPTION OF ARTIFICIAL INTELLIGENCE

1. What is AI-empowered design?

AI-empowered design refers to the integration of Artificial Intelligence technologies into the design process to enhance creativity, efficiency, and user personalization.

2. Define adoption of AI.

Adoption of AI is the process of accepting, implementing, and using artificial intelligence technologies in various sectors to improve efficiency, productivity, and innovation.

3. What is the role of AI in design thinking?

- ❖ Analyzing user data to uncover insights during the empathy phase
- ❖ Generating ideas or design variations during ideation
- ❖ Testing and refining prototypes through predictive analytics and simulations

4. Mention any two AI applications in design.

- ❖ Generative Design – AI creates multiple design options based on input constraints.
- ❖ User Behavior Prediction – AI analyzes user data to personalize and improve user experiences.

5. What is AI design context?

AI design context refers to the overall environment in which artificial intelligence is applied during the design process. It involves understanding the user's needs, behaviors, and expectations, as well as the goals and purpose behind using AI in a specific design task.

6. Define intelligent system.

An intelligent system is a computer-based system that can sense, reason, learn, and act to solve problems or perform tasks with minimal human intervention.

It uses technologies like:

- ❖ Artificial Intelligence (AI)
- ❖ Machine Learning
- ❖ Natural Language Processing (NLP)

7. What is innovation in AI design?

Innovation in AI design is defined as creative and purposeful use of artificial intelligence to develop new or improved products, services, or user experiences.

8. Give one example of AI-based product design.

One example of AI-based product design is Nike's AI-driven shoe customization platform.

It uses artificial intelligence to:

- ❖ Analyze customer preferences and foot data
- ❖ Recommend personalized shoe designs
- ❖ Allow users to visualize and customize products in real time

9. What is human-AI collaboration?

Human-AI collaboration is the process where humans and artificial intelligence systems work together to solve problems, make decisions, or create designs.

10. Define adaptive design.

Adaptive design is a design approach where products, interfaces, or systems automatically adjust to different users, devices, or environments to provide an optimal experience.

11. What is the impact of AI on user experience?

Personalization: AI adapts content and recommendations based on user preferences (e.g., Netflix or Amazon).

Automation: Chatbots and virtual assistants provide 24/7 support and reduce wait time.

Predictive UX: AI anticipates user needs and actions, creating a smoother journey.

12. Mention two design tools enhanced by AI.

Adobe Sensei – Integrates AI into Adobe products to automate design tasks, suggest layouts, and enhance images.

Figma AI – Uses AI to assist with design suggestions, content generation, and faster prototyping.

13. What is personalized design using AI?

Personalized design using AI refers to creating customized user experiences by analyzing individual user data such as behavior, preferences, and interactions.

14. Define learning algorithms in AI design.

Learning algorithms in AI design are computer programs that enable systems to learn from data and improve performance over time without being explicitly programmed.

15. What is AI-driven prototyping?

AI-driven prototyping is the use of artificial intelligence to automate and accelerate the creation of prototypes during the design process.

16. Mention one ethical issue in AI-based design.

One major ethical issue in AI-based design is bias in algorithms.

- ❖ Discriminate against certain users or groups
- ❖ Lead to unfair or harmful decisions
- ❖ Undermine trust and inclusivity in the product

17. Define real-time AI systems.

Real-time AI systems are intelligent systems that process data and make decisions instantly or within milliseconds, allowing immediate interaction with users or environments.

These systems are used in:

- ❖ Autonomous vehicles
- ❖ Virtual assistants
- ❖ Healthcare monitoring

18. What is explainable AI in design?

Explainable AI (XAI) in design refers to AI systems that provide clear, understandable reasons for their decisions and actions.

19. What is the difference between rule-based and AI-based design

RULE-BASED DESIGN	AI-BASED DESIGN
Follows predefined rules and conditions	Learns from data and patterns
Rigid cannot adapt to new inputs	Adaptive improves over time with learning
Form validation with fixed conditions	Personalized recommendations using user behavior

20. What is the future trend of AI in design systems?

The future trend of AI in design systems points toward more intelligent, personalized, and collaborative tools that enhance creativity and efficiency.