UNIT 1 – Design Thinking (5 Marks Each)

1) Explain in detail how design thinking differs from traditional linear problem-solving methods with suitable examples.

1. Design Thinking is an iterative process where steps can be repeated based on feedback, while traditional methods follow a fixed step-by-step and usually do not allow backward movement once a phase is completed.

2. Traditional methods focus on technical or organizational goals, but design thinking emphasizes understanding user needs, emotions, and behavior, making solutions more human-centered.

3. In linear problem-solving, the problem is assumed correct from the beginning, whereas in design thinking the problem is redefined after deep research to uncover the real underlying issue.

4. Design thinking encourages creativity and out-of-the-box ideas through brainstorming and prototyping, whereas linear methods often produce predictable and routine solutions.

5. Users are involved only during evaluation in traditional methods, but in design thinking they participate throughout the process, leading to solutions like Uber or Swiggy where user experience was central right from ideation.

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2) Describe any three important design thinking skills and justify their importance in solving complex problems.

1. Empathy: It helps designers truly understand what users think, feel, and struggle with, ensuring the solution connects with real user needs rather than assumptions.

2. Creativity: Complex problems rarely have standard answers, so thinking beyond conventional limits helps generate innovative and impactful solutions.

3. Collaboration: Bringing together different people from diverse fields combines varied knowledge and perspectives, making solutions more complete and practical.

4. Iteration: Accepting failure and learning from feedback helps refine solutions until they perfectly solve the problem.

5. Problem Reframing: It enables moving from surface symptoms to deeper causes, resulting in more accurate and meaningful solutions.

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3) Apply principles of design thinking to suggest innovative solutions for reducing food waste in a college canteen.

1. Empathy: Observe and interact with students and canteen staff to understand reasons behind waste, such as large portions, menu dislike, or long queues.

2. Define: Frame a clear problem such as "Students waste food due to fixed portion sizes and lack of choice in servings."

3. Ideate: Brainstorm ideas like customizable portions, pre-order apps, leftover exchange counters, and awareness campaigns.

4. Prototype: Test small solutions like half-plate options, digital menu boards showing food stock, or student feedback kiosks.

5. Test: Collect results and refine — for example, if half-plate is successful, expand it to all food items and continuously track food waste reduction.

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4) Demonstrate with a real-world example how empathy and ideation together contribute to the success of design thinking.

1. Empathy helps in deeply understanding user pain points, such as elderly customers struggling to use heavy water bottles.

2. Insights gained from empathy lead to redefining the problem — the issue is not the bottle but the grip and weight.

3. Ideation generates a range of creative solutions like bottles with handles, lightweight material, and easy-pour designs.

4. Real-world example: Companies like Milton and Tupperware developed ergonomically designed bottles based on user discomfort.

5. The final product became successful because empathy identified true needs and ideation enabled the creation of practical and attractive alternatives.

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5) Differentiate between the basis of design thinking and conventional analytical problem-solving, focusing on mindset and approach.

1. Design thinking has a human-centered mindset, while conventional problem-solving has a system-oriented and logic-based mindset.

2. Analytical approaches use existing data to derive solutions, whereas design thinking explores new possibilities through creativity.

3. Design thinking welcomes ambiguity and trial-and-error, while analytical methods avoid uncertainty and seek clear structure from the start.

4. Solutions in design thinking emerge over time through prototypes, whereas in analytical methods the solution is finalized before implementation.

5. Design thinking judgments are based on desirability and experience, whereas analytical solutions focus mostly on feasibility and efficiency.

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6) Show how effective teamwork in a design thinking project can lead to innovative outcomes. Support your answer with a case-based discussion.

1. Teamwork brings multidisciplinary knowledge where each member contributes different insights that expand the solution space.

2. Collective brainstorming leads to more diverse ideas than an individual can create alone, increasing innovation potential.

3. Feedback sharing within the team quickly identifies flaws and improvements, making prototypes stronger.

4. Case example: When designing a smart classroom, engineers handled technology, students shared usage challenges, and teachers gave learning perspectives, resulting in an interactive screen with attendance tracking and learning tools.

5. The collaborative process ensured the final solution was desirable for students, feasible for management, and viable for college operations.

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7) Analyze the structure and importance of design thinking workshops in generating creative ideas and solutions.

1. They follow a structured agenda including empathy exercises, brainstorming sessions, rapid prototyping, and testing activities.

2. Workshops create an energetic environment that promotes open thinking without judgment, encouraging unique ideas.

3. Hands-on exercises allow participants to visually and physically explore ideas, which enhances creativity.

4. Participants come from different teams or backgrounds, leading to cross-functional collaboration and improved solution quality.

5. Such workshops accelerate innovation by quickly converting problems into tangible prototypes and user-tested outcomes.

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8) Examine the role of exercises and case-based discussions in enhancing participation and learning in design thinking workshops.

1. Exercises encourage active participation and break hesitation, helping participants express their thoughts freely.

2. Real cases provide relatable problems that help participants understand how design thinking works in practical situations.

3. Group tasks help develop teamwork, leadership, and communication skills essential for co-creation of solutions.

4. Reflection after each activity deepens understanding and allows participants to learn from mistakes and successes.

5. These methods build confidence and enable participants to apply design thinking principles in real-life professional environments.

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9) Apply design thinking principles to propose a solution for improving the student learning experience in online education.

1. Empathize: Collect student feedback about online learning challenges like distractions, lack of interaction, and technical issues.

2. Define: Focus on clear problems like "Students feel disconnected during online classes due to low engagement."

3. Ideate: Generate solutions such as breakout rooms for group study, gamified quizzes, personalized learning dashboards, and attendance reminders.

4. Prototype: Create small-scale versions like a trial gamified attendance or interactive polls in lectures.

5. Test: Implement with a selected batch and refine based on their responses, increasing participation and overall learning outcomes.

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10) Compare and analyze the contribution of prototyping and testing phases in achieving practical outcomes in design thinking projects.

1. Prototyping turns ideas into simple physical or digital models, helping understand how a solution might work in real life.

2. It enables quick validation of assumptions and exposes design flaws early, reducing overall cost and time.

3. Testing involves gathering user feedback by interacting with prototypes to evaluate usefulness and usability.

4. Testing ensures that solutions match user needs accurately and helps refine prototypes based on real responses.

5. Together, prototyping and testing convert theoretical concepts into practical, user-approved innovations with higher chances of success when fully implemented.

UNIT 2 – Design Thinking (Empathy & Ideation)

1) Explain how listening and empathizing techniques help in identifying user pain points. Give suitable examples.

1. Active listening helps designers capture user emotions, complaints, and expectations that may not be visible externally, allowing deeper understanding of frustrations.

2. Empathy helps in connecting with users' feelings rather than focusing only on what they say, revealing hidden problems such as stress, fear, or confusion.

3. Techniques like one-on-one interviews, storytelling, and emotional mapping help designers identify the root causes behind user difficulties.

4. Example: Students complaining about a slow Wi-Fi signal may actually be frustrated about online class interruptions affecting grades — empathy reveals the real pain point.

5. Example: Hospital patients saying beds are uncomfortable may be expressing anxiety about treatment — empathic listening helps improve both comfort and emotional support.

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2) Describe the importance of observation as a tool for empathy in design thinking with any two practical scenarios.

1. Observation captures actual user behavior which may differ from what users claim, providing more reliable and unbiased insights.

2. Designers can identify environmental, psychological, and social influences affecting user actions that interviews might miss.

3. Scenario 1: Observing students during lunch in college canteen may reveal long waiting lines and confusion at counters — helping redesign queue systems.

4. Scenario 2: Watching elderly people buy medicines in a store can show their struggle with reading small labels — leading to bigger fonts and color codes.

5. Observation thus supports human-centered innovation by exposing hidden usability problems.

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3) Differentiate between structured and open-ended approaches to empathy building. Support your answer with real-life examples.

1. Structured empathy uses planned tools like questionnaires, surveys, and controlled interviews, mainly for collecting measurable and consistent data.

2. Open-ended empathy involves natural conversations, shadowing, and contextual inquiry allowing users to express freely without restrictions.

3. Structured example: A bank using a fixed survey to learn why customers delay bill payments.

4. Open-ended example: Designers spending a day with physically challenged students to see how they actually navigate the campus.

5. Structured provides clear comparison, while open-ended reveals deeper emotions — both are essential for accurate understanding.

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4) Apply the brainstorming technique to suggest innovative solutions for improving the campus transport system.

1. Introduce electric shuttle services on fixed routes to reduce waiting time and pollution.

2. Launch a mobile app showing live bus location, seat availability, and estimated arrival times.

3. Implement bicycle-sharing stations near hostel blocks and academic buildings for short-distance travel.

4. Design a ride-sharing community platform where students going in the same direction can travel together.

5. Provide priority seating and pickup facilities for specially-abled students to ensure inclusivity.

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5) Demonstrate how innovation heuristics can be used to redesign a common product (e.g., water bottle, notebook, or chair).

(Example: Water Bottle)

1. Add modular features such as detachable cup or snack container, making it multifunctional.

2. Use collapsible or foldable design to save space in bags and suitcases.

3. Include smart sensors for water level, temperature, and hydration reminders for health tracking.

4. Improve grip and lightweight materials to make it easier for children and elderly to handle.

5. Design eco-friendly bottles with recyclable materials and filter attachments for refilling anywhere.

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6) Show how behavior models can be applied to predict and improve student engagement in online learning platforms.

1. Behavior models like Fogg Behavior Model analyze motivation, ability, and triggers to predict when students participate more.

2. If motivation drops due to long lectures, gamified quizzes can increase engagement by providing rewards and progress badges.

3. Reducing difficulty by offering short video modules improves learning ability and reduces dropout chances.

4. Timely triggers like reminders and pop-ups help students join classes or complete tasks on schedule.

5. Tracking behavior data allows continuous personalization, improving attention and performance of different student groups.

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7) Analyze the challenges of cognitive fixedness in creative problem-solving and suggest methods to overcome them.

1. Cognitive fixedness causes people to rely on habitual thinking and known solutions, limiting innovation.

2. It restricts the ability to see alternative functions of objects or systems, slowing down idea generation.

3. Methods such as SCAMPER (Substitute, Combine, Adapt, Modify, Put to use, Eliminate, Reverse) encourage thinking beyond conventional uses.

4. Cross-disciplinary collaboration introduces new perspectives and helps break mental blocks.

5. Prototyping and experimentation allow freedom to test unconventional ideas, reducing fear of failure and encouraging fresh thinking.

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8) Examine two design thinking frameworks and highlight their similarities and differences with respect to user-centered design.

(Example: Stanford d.school Model vs. Double Diamond Model)

1. Both frameworks aim at human-centered innovation involving user research, creativity, and experimentation.

2. Stanford model has five stages: Empathize, Define, Ideate, Prototype, Test; Double Diamond has four phases: Discover, Define, Develop, Deliver.

3. Stanford focuses more on user interviews and rapid prototyping, while Double Diamond emphasizes problem divergence and convergence.

4. Double Diamond clearly separates problem understanding and solution development, whereas Stanford model flows more smoothly between stages.

5. Despite structural differences, both frameworks ensure solutions are desirable for users and validated through feedback.

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9) Apply design thinking ideation tools to propose a solution for reducing plastic waste in your community.

1. Use brainstorming to introduce refill stations for water and cleaning products at local stores to reduce single-use plastic bottles.

2. Apply SCAMPER to replace plastic packaging with compostable or reusable alternatives like cloth or paper-based bags.

3. Conduct mind-mapping to plan awareness events in schools, highlighting effects of plastic on health and environment.

4. Involve the community in prototyping collection drives and recycling campaigns led by youth groups.

5. Test solutions by implementing pilot zones where plastic usage is monitored and improved with continuous feedback.

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10) Evaluate the effectiveness of exercises and case-based discussions in building empathy and creativity during design thinking workshops.

1. Exercises such as role-playing allow participants to experience problems from the user's perspective, building strong empathy.

2. Case-based discussions help learners apply theory to real scenarios, improving understanding of user needs.

3. Interactive tasks encourage creativity by removing fear of judgment and allowing imaginative thinking.

4. Collaborative activities improve communication, teamwork, and exposure to diverse viewpoints, making solutions more user-centered.

5. These methods enhance learning outcomes as participants practice design thinking rather than only studying it theoretically.

UNIT 3 – Tools for Ideation & Innovation

1) Explain the purpose of an empathy map in design thinking. How does it help in understanding users better?

1. An empathy map helps visualize what users say, think, do, and feel, giving a deeper understanding of their experiences beyond basic observations.

2. It identifies emotional and behavioral patterns, allowing designers to focus on real pain points instead of assumptions.

3. By categorizing insights, designers recognize gaps between user needs and what is currently provided.

4. It builds empathy within the team, ensuring all members share a common understanding of the user.

5. Helps refine the problem statement and guide ideation towards solutions that are more meaningful and desirable for users.

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2) Describe how an affinity diagram can be used to organize insights during the ideation phase of design thinking.

1. An affinity diagram groups similar ideas or user insights together based on relationships and common themes.

2. It organizes large volumes of data collected from interviews, observations, and brainstorming into clear categories.

3. This method helps teams identify recurring issues and major opportunity areas.

4. It reduces confusion and enhances collaboration by making information visible and structured for everyone.

5. By clustering ideas, teams can prioritize solutions that address the most critical user needs.

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3) Apply a journey map to illustrate the experience of a student using an online learning portal.

1. Awareness stage: Student receives class login details and feels uncertain about how to navigate the platform.

2. Onboarding stage: Student attempts to join lectures but faces login or audio issues, creating frustration.

3. Learning stage: Interactive quizzes and lecture videos increase engagement and confidence.

4. Assignment stage: Submission deadlines and unclear instructions may cause stress and confusion.

5. Completion stage: Student receives grades and feedback, feeling more satisfied if the process was smooth, highlighting improvement areas in earlier stages.

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4) Demonstrate how mind maps can be used to combine multiple ideas into a complex innovation concept.

1. A mind map starts with a central concept, branching into related sub-ideas such as features, users, challenges, and technologies.

2. It visually connects previously unrelated ideas, helping designers explore broader innovation possibilities.

3. It encourages divergent thinking by allowing free expansion of thoughts without limitation.

4. For example, starting with "Smart Classroom," branches may include AR teaching tools, AI attendance, group collaboration apps, and personalized learning dashboards.

5. These connected branches can merge into one integrated concept improving overall teaching and learning efficiency.

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5) Show with an example how storytelling and improvisation can improve the effectiveness of idea presentation.

1. Storytelling makes ideas memorable by presenting them as real-life scenarios that emotionally connect with the audience.

2. Improvisation adds spontaneity and flexibility, helping presenters respond to audience reactions and highlight benefits clearly.

3. Example: Presenting an app that helps visually impaired users by narrating a day-in-the-life story of a blind student using the app.

4. This approach demonstrates the problem, the product's value, and future impact in a relatable way.

5. As a result, stakeholders better understand the solution's purpose and show greater support for implementation.

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6) Analyze the role of scenario planning and evaluation tools in predicting user adoption of an innovative product.

1. Scenario planning helps visualize multiple future conditions like high demand, low demand, or changing technology trends.

2. It allows designers to identify risk factors and success drivers, helping tailor the product to user expectations.

3. Evaluation tools like usability testing, surveys, and feedback forms measure how likely users are to adopt the innovation.

4. These tools ensure continuous refinement based on real-world reactions before full launch.

5. Together, they improve decision-making and reduce chances of product failure in the market.

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7) Examine how frog design and prototyping methods contribute to refining and testing innovation concepts.

1. Frog design emphasizes creative experimentation using low-cost prototypes early in the process.

2. Quick prototypes help identify usability issues faster and allow design modifications before major investment.

3. User testing with prototypes provides direct feedback on functionality, look, and feel.

4. This method encourages cross-disciplinary collaboration for a more holistic product design.

5. Refined prototypes increase stakeholder confidence and ensure the final solution is user-approved and practical.

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8) Analyze a case where developer and user perspectives may introduce bias. Suggest frameworks to reduce this gap.

1. Developers may prioritize technical efficiency, while users care more about comfort and ease, leading to conflicting viewpoints.

2. Example: A college app designed for advanced tracking but difficult for first-year students to navigate due to complex interface.

3. Bias arises when designers assume users have the same skills or preferences as they do.

4. Frameworks like empathy mapping and co-creation workshops allow users to participate in designing and decision-making.

5. Regular user testing phases ensure the product evolves as per user needs rather than developer assumptions.

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9) Apply design thinking tools to strengthen communication within a diverse project team.

1. Use mind maps and visual boards to ensure every team member understands goals and ideas clearly despite different backgrounds.

2. Empathy exercises help improve mutual respect and reduce misunderstandings in communication styles.

3. Regular brainstorming sessions encourage open dialogue and involvement from all members.

4. Prototypes allow teams to visualize ideas and align expectations early in the development process.

5. Feedback loops ensure everyone's opinions are considered, enhancing collaboration and problem-solving efficiency.

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10) Evaluate the importance of sustaining a culture of innovation through workshops, exercises, and case-based discussions.

1. Workshops create a creative environment where participants learn design thinking by actively practicing it.

2. Exercises encourage risk-taking and experimentation, making teams more comfortable with new and bold ideas.

3. Case-based discussions build knowledge from real-world problems, improving analytical and empathy skills.

4. Continuous activities help maintain enthusiasm and curiosity for innovation across the organization or institution.

5. Such a culture ensures long-term progress and adaptability, making individuals capable of solving new challenges creatively.