

**MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY BHOPAL**  
**Department of Mechanical Engineering**  
**Fundamentals of Design (ME 252), 3<sup>rd</sup> Semester**  
**End Term Examination, November 2024**

Read the questions carefully.

Max. Marks: 50

All questions are compulsory.

Time: 180 mins

Marks are written in small brackets ( )

**1. Complete each of the following statements. Write only answers in your answer book. Each blank carries 1 mark. (10)**

- (a) In the ideation phase, the goal is to explore \_\_\_\_\_ (multiple/single) possible solutions to the identified problem. **[CO3, BT2]**
- (b) Prototypes are meant to fail \_\_\_\_\_ (early/late) so that designers can learn and iterate. **[CO3, BT2]**
- (c) In design thinking, \_\_\_\_\_ (empathy/sympathy/analysis) is the phase where designers attempt to understand the user's needs and experiences. **[CO2, BT1]**
- (d) The \_\_\_\_\_ (first/last) phase in the design thinking process is prototyping, where ideas are made tangible for user testing. **[CO1, BT2]**
- (e) \_\_\_\_\_ (Persona/Prototype/Empathy) is a method used to represent the different types of users and their needs in the design process. **[CO2, BT2]**
- (f) During the testing phase, feedback from users helps identify \_\_\_\_\_ (flaws/opportunities/final designs) in the prototype. **[CO3, BT2]**
- (g) A successful design solution is one that balances desirability, feasibility, and \_\_\_\_\_ (viability/creativity/empathy). **[CO1, BT2]**
- (h) \_\_\_\_\_ (Iterative/Linear/Single) processes in design thinking involve revisiting earlier stages to refine solutions continuously. **[CO3, BT2]**
- (i) The main goal of \_\_\_\_\_ (user testing/market research/prototyping) is to learn about users' reactions to different design concepts. **[CO3, BT1]**
- (j) In the double diamond model, the second phase of convergence focuses on developing the right \_\_\_\_\_ (solution/problem/product). **[CO1, BT2]**

**2. Answer following questions in limited words.**

- (a) Suppose you are part of a design team tasked with creating an inclusive playground for children with varying physical abilities. How would you apply the principles of design to ensure that all children feel included and engaged? **(4) [CO1, BT 3]**
- (b) In the context of product development, why is it essential to have a diverse design team? **(3) [CO1, BT 4]**
- (c) Explain the double diamond approach of design thinking **(3) [CO2, BT 3]**

**3. Answer following questions in limited words.**


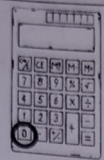
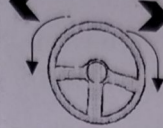


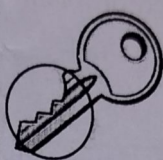
- (a) Create a plan for a "Random Acts of Kindness Week" on campus that encourages students to engage in small, thoughtful gestures for each other. How would you implement the plan to attract attention and encourage contributions, and how would you share the stories of these acts to foster a strong sense of community?

**(4) (CO3, BT1)**



- (b) Match the circled features of products in column A with attributes for discoverability and understanding in column B. (3)

[CO4; BT4]

Understanding in column B. (3)					[CO4; BT4]				
Column A			Column B						
P		Q		R		G	AFFORDANCE	I	CONSTRAINT
S		T		U		H	SIGNIFIER	J	MAPPING

(c) Explain optimization. Discuss suitable examples.

- (c) Explain optimization: Discuss the role of optimization in design process with a suitable example. (3) [CO5, BT 2,3]

4. What is SCAMPER Method and why it is used? Using the SCAMPER method, select any one of the products below and apply each step of SCAMPER to propose potential improvements. (5) [CO4, BT4]

Products to Choose From:

- Bicycle Helmet
- Desk Lamp
- Water Bottle
- Key Ring
- Alarm Clock
- Summer Cooler

5. Explain the Difference between any three:

- a) Market Pull & Technology Push
- b) Business & Startup
- c) Signifiers & Affordance
- d) Innovation & Invention
- e) Discovery and Invention

(3)

[CO1, BT2]

[CO2, BT2]

[CO3, BT2]

[CO4, BT2]

[CO1, BT2]

6. From the table below, select any two objects and imagine a new, innovative product that merges the best features of both objects. In your answer, address the following:
- **Identify** the two objects you selected and explain your choice.
  - **Describe** the new product's purpose, functionality, and key features.
  - **Illustrate** or explain how these combined features work together and how your design improves usability or user experience considering practical aspects like size, materials, and design principles such as affordance, discoverability, and feedback.

(6) [CO 3, BT 5]

**Object Table:**

Backpack	Coffee mug	Flashlight	Desk organizer	Umbrella
Digital camera	Thermos bottle	Book stand	Solar charger	Reusable straw
Picnic blanket	Pocket knife	Headphones	Whiteboard	Travel pillow
Plant pot	Alarm clock	Sunglasses	Power bank	Travel journal
Foldable chair	Bluetooth speaker	Portable fan	Keychain light	First aid kit

*Note: Be creative, focusing on how the new product combines the best aspects of each item!*

7. The provided Google Form has poor design, with misplaced options and difficult navigation. Redesign the form by **drawing a clear, user-friendly version**. Focus on improving its layout, logical flow, ease of use, and visual hierarchy. Ensure the form is easy to fill and well-organized. **(6) [CO4 BT 5]**

Google Form

- First Name  Email Id
- Last Name  Password
- Re-type Password
- Email/SMS/Post
 

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SMS  
POST
- Date of Birth  Pin Code
- Address
- Security Question 

Security Answer
- City  Mobile
- Alternate Mobile  State

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