

# PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

# FACULTY OF SCIENCE & TECHNOLOGY

# NEP 2020 Complaint Curriculum for T.Y.B.Tech.

**Engineering with effect from 2025-26** 

Syllabus of Open Elective Basket common for all the UG Engineering programs

### PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

## FACULTY OF SCIENCE & TECHNOLOGY NEP 2020 Compliant Curriculum

### With effect from 2025-2026

Distribution	Course Code	Name of the	Engagement Hours		Credits	FA	SA			Total	
		Course	L	Τ	Р		ESE	ISE	ICA	OE/ POE	
PCC											
PCC											
PCC											
PEC											
AEC	AEC-02	Creativity and Design Thinking	1		2	02	50*		25		75
OE	OE-03	Interdisciplinary Mini Project	1		2	02			25	25	50

#### Semester -V

PCC- Programme Core Course,PEC-Programme Elective CourseAEC- Ability Enhancement Course,IKS- Indian Knowledge System,CC- Co-curricular Courses,VSEC-Vocational and Skill EnhancementCourse MDM-Multidisciplinary Minor: It should be selected from other UG Engineering Minor

Programme.



## Punyashlok Ahilyadevi Holkar Solapur University, Solapur T. Y. B. Tech. Engineering Semester-I (AEC-02) Creativity and Design Thinking

Teaching Scheme	Examination Scheme
Theory: - 1Hr/Week, 1 Credit	ESE-50 Marks
Practical: - 2Hrs/Week, 1 Credit	ICA- 25 Marks

## **Course Introduction:**

This course introduces the principles of creativity and design thinking, emphasizing innovative

Problem-solving through ideation, prototyping, and sustainable product development. Students will explore real-world applications, creative techniques, and environmental considerations to develop user-centric and impactful engineering solutions.

Course Objectives: During this course, the student is expected

- 1. To introduce students to the concepts of creativity, innovation, and design thinking process.
- 2. To develop problem-solving skills using divergent and convergent thinking approaches for iterative design methodologies.
- 3. To familiarize students with prototyping methods and their applications in iterative design methodologies.
- 4. To emphasize sustainable design principles and their integration into product development processes.

Course Outcomes: At the end of this course, students will be able to

- 1. Elaborate the critical design thinking skills needed to either improve an existing product or design a new product.
- 2. Demonstrate the ability to generate and evaluate creative ideas using ideation techniques.
- 3. Apply Creativity and Prototyping to refine product designs effectively.
- 4. Analyze and apply sustainable design principles into the engineering design process.

## **SECTION I**

## Unit 1: Introduction to Creativity and Design Thinking (4 Hrs)

Creativity and Innovation: Definition, importance, and characteristics, Design Thinking Process, Empathize, Define, Ideate, Prototype, Test, Barriers to Creativity and Techniques to Overcome Barriers.

## Unit 2: Ideation and Concept Development (3Hrs)

Exploring Problem-Solving Approaches: Divergent and convergent thinking, Creative Ideation Methods: Different Method of Idea Generation such as Brainstorming, SCAMPER, TRIZ, Mind Mapping, Transforming Ideas into Concepts: Concept sketching, storytelling, and visualization techniques.

## **SECTION II**

## **Unit 3: Creativity and Prototyping (4 Hrs)**

Creativity in Design: Applying creativity, brainstorming, and concept generation in problemsolving, Prototyping Methods and Strategies: Low-fidelity vs. high-fidelity prototypes, rapid prototyping, and iterative design, Real-Life Applications: Case studies on Real-life applications demonstrating customer-driven designs and meeting product specifications.

## Unit 4: Sustainable Design and Product Development (4Hrs)

Design for Environment Principles: Applying environmental sustainability throughout the product life cycle., Product Development Processes: Selecting and implementing staged, spiral, and agile development models based on project needs. Case Studies: Sustainable product development in the engineering domain.

## **TERM WORK**

Term work should be based on assignments (Case studies) based on the above topics.

- 1. Presentations Idea pitching and storytelling exercises.
- 2. Mini-Projects, Hands-on prototyping, testing (e.g.Designing a sustainable Engineering product).
- 3. Group Discussions Exploring innovative business models and their applications.
- 4. Participation engaging in designs thinking workshops and brainstorming sessions.

## **TEXT BOOK**

- 1. Product Design and Development by Karl T. Ulrich, Steven D. Eppinger, Tata McGraw Hill.
- 2. Design Thinking: Understanding How Designers Think and Work by Nigel Cross.
- 3. Creative Confidence by Tom Kelley and David Kelley.

## **REFERENCE BOOKS**

- 1. Product Design for Engineers by Devdas Shetty, Cengage Learning.
- 2. Product Design by Kevin Otto and Kristin Wood, Pearson Education.
- 3. Sustainable Design: A Critical Guide by David Bergman.
- 4. Entrepreneurship by Robert D. Hisrich, Michael Peters, and Dean Shepherd, Tata McGraw Hill.



## Punyashlok Ahilyadevi Holkar Solapur University, Solapur T. Y. B. Tech. Engineering Semester-I (OE-03) Interdisciplinary Mini Project

Teaching Scheme	Examination Scheme
Theory: - 1Hr/Week, 1 Credit	ICA- 25 Marks
Practical: - 2Hrs/Week, 1 Credit	OE- 25 Marks

## **Course Prerequisite:**

An interdisciplinary mini-project is designed for interdisciplinary learning to help students to develop practical ability and knowledge about practical tools/techniques that integrate concepts from other fields with potential project ideas to solve real life problems related to the industry, academic institutions and society.

## **Course Objectives**

During this course, students are expected to:

- 1. To foster interdisciplinary collaboration among engineering students for familiarize students with cutting-edge technologies and trends in engineering.
- 2. To encourage the application of diverse engineering principles to enhance technical, analytical, and problem-solving skills through project-based learning to find innovative solutions.
- 3. To equip students with the knowledge of ethical considerations and sustainable development principles in engineering.
- 4. To develop project management, documentation, and presentation skills.

Course Outcomes: At the end of this course, student will be able to:

- 1. Apply interdisciplinary knowledge, teamwork and collaboration skills to design and implement innovative solutions to engineering problems.
- 2. Develop integration to emerging technologies in engineering and their applications into project design and development.
- 3. Apply ethical principles and sustainable development goals in engineering design.
- 4. Produce and present a comprehensive project report with proper documentation.

### **SECTION I**

### **Unit 1: Introduction to Interdisciplinary Projects (4 Hours)**

Definition and significance of interdisciplinary projects, Importance of interdisciplinary projects in engineering, Overview of project management: Planning, execution, and evaluation, Team formation and role allocation.

### **Unit 2: Problem Identification and Scope Definition (3 Hrs)**

Techniques for identifying real-world problems, Defining project scope, objectives, and deliverables, Feasibility analysis: Technical, economic, and environmental considerations.

## **SECTION II**

#### **Unit 3: Design and Development Process (3 Hrs)**

System design and architecture, Integration of core engineering disciplines (electrical, mechanical, electronics, computer science), Prototyping and testing methodologies.

### Unit 4: Ethics and Sustainability in Engineering Projects (3 Hrs)

Ethical considerations in engineering design and implementation, Sustainable development goals and their relevance to engineering projects.

## **Unit 5: Project Documentation and Presentation (2 Hrs)**

Writing technical reports: Structure and guidelines, Effective presentation techniques, Intellectual property rights and patent filing basics.

#### **TERM WORK**

Students will work in teams of maximum 3-4 members to complete a mini-project. The project should integrate at least two engineering disciplines. Assessment can be done on Project Proposal, Mid-Term Review, Presentation and Viva.

#### **TEXT BOOK**

1. Project Management for Engineering and Technology by David L. Goetsch, Pearson Education.

- 2. Interdisciplinary Engineering Design Education by Michael A. Stylios, Springer.
- Project Management: A Systems Approach to Planning, Scheduling, and Controlling by Harold Kerzner.
- 4. Interdisciplinary Research: Process and Theory by Allen F. Repko and Rick Szostak.

## **REFERENCE BOOKS**

- 1. Product Design for Engineers by Devdas Shetty, Cengage Learning.
- 2. Engineering Project Management by Nigel J. Smith.
- 3. Emerging Technologies: From Hype to Impact by Bruno Salgues.
- 4. Sustainable Engineering: Principles and Practice by David T. Allen and David R. Shonnard.