



# KAMALDNP

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## Fundamentals of Innovation and Design Thinking — Complete Syllabus (Open Elective-1, Option 2)

BTEUP Diploma in Electronics Engineering • 3rd Semester • Session 2026-27

Subject 3.7(b) — Open Elective-1, Option 2 (Theory) • Qualifying (Q) • 2 Credits • L 2 - P 0 • Choose this OR Product Design and Development

### Examination Scheme

| Code                                                            | Paper                                                                 | Type          | L<br>-<br>P | Credits  | Internal  | External | Total              |
|-----------------------------------------------------------------|-----------------------------------------------------------------------|---------------|-------------|----------|-----------|----------|--------------------|
| 3.7(b)                                                          | Open Elective-1:<br>Fundamentals of Innovation<br>and Design Thinking | Theory<br>(Q) | 2<br>-<br>0 | 2        | 50        | —        | N/A<br>(Q)         |
| <b>Fundamentals of Innovation and Design<br/>Thinking Total</b> |                                                                       |               |             | <b>2</b> | <b>50</b> | <b>—</b> | <b>N/A<br/>(Q)</b> |

### What This Subject Aims To Do

To build a strong foundation in innovation and design thinking — creating ideas through structured brainstorming and validating them with 3D printing and confirmatory testing — an iterative process for understanding user needs, challenging assumptions, redefining problems and creating innovative solutions.

### Unit-Wise Complete Topic List

| Unit | Topic                       | Periods | Marks Share |
|------|-----------------------------|---------|-------------|
| 1    | Industrial Safety Practices | 4       | 12%         |

|   |                                                      |   |     |
|---|------------------------------------------------------|---|-----|
| 2 | Introduction to Innovation & Design Thinking         | 6 | 22% |
| 3 | Design Thinking Tools & Idea Generation              | 6 | 22% |
| 4 | Introduction to 3D Modeling & Additive Manufacturing | 6 | 22% |
| 5 | Start-Up & Projection Plan                           | 6 | 22% |

### Unit 1 — Industrial Safety Practices (4 Periods, 12%)

**Topics:** (i) Types and use of fire extinguishers. (ii) Safe handling and maintenance of tools and equipment. (iii) Importance of using proper tools. (iv) Occupational safety and health (OSH) practices.

**In simple words:** Staying safe in a workshop: fire extinguishers, correct tool use and occupational safety and health.

### Unit 2 — Introduction to Innovation & Design Thinking (6 Periods, 22%)

**Topics:** (i) Definition, types, and necessity of innovation. (ii) Linear vs non-linear innovation; open vs closed models. (iii) Design thinking: principles, mindset, and value. (iv) Risk-reward analysis in innovation. (v) From innovation to start-up: key steps. (vi) Scoping and foundational principles of design thinking.

**In simple words:** What innovation is, how design thinking works, and the path from an innovative idea to a start-up.

### Unit 3 — Design Thinking Tools & Idea Generation (6 Periods, 22%)

**Topics:** (i) Brainstorming techniques and tools. (ii) Phases of design thinking: Explore, Empathize, Experiment, Engage, Evolve. (iii) Tools: SCOPES, STEEP, POEMS, SCAMPER. (iv) Deep user needs analysis (SPICE). (v) Idea selection, concept development, prototyping. (vi) Storytelling, co-creation, strategic alignment. (vii) Case studies.

**In simple words:** The practical toolkit: brainstorming methods, the five phases of design thinking, and tools with names like SCAMPER and SPICE for understanding users deeply.

## Unit 4 — Introduction to 3D Modeling & Additive Manufacturing (6 Periods, 22%)

**Topics:** (i) CAD tools, 3D modeling, product drawing & BOM. (ii) Prototyping basics and its industrial role. (iii) Additive vs traditional manufacturing. (iv) Types of 3D printers, components, working, software (slicing). (v) Laser cutting basics, process, applications, pros & cons. (vi) Case studies and latest advancements.

**In simple words:** Turning an idea into a physical prototype with CAD, 3D printing and laser cutting.

## Unit 5 — Start-Up & Projection Plan (6 Periods, 22%)

**Topics:** (i) Basics of management, leadership, HR, communication, and production. (ii) Entrepreneurial concepts and forms of business. (iii) Start-up essentials: planning, research, vision, model, operations. (iv) Business modeling, market positioning, financial analysis. (v) Start-up success factors and common failure points. (vi) Case studies and project work.

**In simple words:** The business side: planning a start-up, understanding the market and money, and why some start-ups succeed and others fail.

## Reference Books

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Reference books are not listed for this subject in the official syllabus.

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Source: BTEUP 2nd Year curriculum (folder2627), approved in C.D.C. meeting held on 16.07.2026. Topic lists follow the official syllabus; short explanations are the author's own plain-English summaries, not syllabus text.

Please confirm with your own polytechnic for any local changes.