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Product Design and Development — Complete Syllabus (Open Elective-1, Option 1)

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

Subject 3.7(a) — Open Elective-1, Option 1 (Theory) • Qualifying (Q) • 2 Credits • L 2 - P 0 • Choose this OR Fundamentals of Innovation and Design Thinking

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
3.7(a)	Open Elective-1: Product Design and Development	Theory (Q)	2 - 0	2	50	—	N/A (Q)
Product Design and Development Total				2	50	—	N/A (Q)

What This Subject Aims To Do

To give the basic concepts of Product Design and Development (PDD) — its phases, hands-on CAD tools, manufacturing considerations, detail design and 3D modelling — so students can convert ideas into real products, including prototyping through additive manufacturing.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Industrial Safety Practices	4	12%
2	Introduction to Product Design Development	6	22%

3	Engineering Drawing & 3D Design Tools	6	22%
4	Concept Creation & 3D Modelling	6	22%
5	Additive Manufacturing	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 Product Design Development (6 Periods, 22%)

Topics: (i) Introduction and need for product design. (ii) Stages of the PDD process and standard industry practices. (iii) Key elements: market research, customer needs, feasibility, concept design, ergonomics, regulatory aspects, and cost. (iv) Detailed design: material selection, Design for Assembly (DFA), Design for Manufacturing (DFM) and Design failure mode and effect analysis (DFMEA). (v) Verification, validation, quality control, packaging. (vi) Program management and product support.

In simple words: The journey from an idea to a product: research, concept, detailed design, checking it works, and supporting it after launch.

Unit 3 — Engineering Drawing & 3D Design Tools (6 Periods, 22%)

Topics: (i) Basics of engineering drawings, projections, and views. (ii) Concept creation, 2D/3D design, and use of design tools. (iii) Introduction to 3D CAD software and its applications. (iv) Overview of modules: part, surface, assembly, drawing. (v) Interface, customization, specification tree, and layout.

In simple words: Reading engineering drawings and meeting 3D CAD software — the tool that turns sketches into precise digital models.

Unit 4 — Concept Creation & 3D Modelling (6 Periods, 22%)

Topics: (i) Sketcher tools and dimensional constraints. (ii) Part design (Pad, Pocket, Hole, etc.). (iii) Surface design (Extrude, Sweep, etc.). (iv) Assembly design, constraints, exploded views, BOM. (v) Engineering drawings and GD&T. (vi) Case studies on modelling different materials.

In simple words: Building parts, surfaces and assemblies in CAD, with proper drawings, tolerances (GD&T) and bills of materials.

Unit 5 — Additive Manufacturing (6 Periods, 22%)

Topics: (i) Basics of prototyping and 3D printing. (ii) Material types and selection based on properties and applications. (iii) 3D printing process and industrial uses. (iv) Introduction to slicing software and its functions

In simple words: 3D printing: how a digital model becomes a physical prototype, which materials to use, and the slicing software that drives the printer.

Reference Books

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.