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BTEUP Electronics Engineering Syllabus 2026-27

Complete — 1st Year to 6th Semester, All 46 Subjects in One PDF
Diploma in Electronics Engineering • NEP-2020 • Approved 16.07.2026

What is inside: all 46 subject-wise syllabus PDFs in one file — the complete 1st-year common curriculum (11 subjects, same for all engineering branches), the full 3rd semester (20 credits, 700 marks), the full 4th semester (20 credits, 650 marks), the full 5th semester (20 credits, 650 marks) and the full 6th semester (20 credits, 750 marks on the Normal Pathway, 650 marks on the Industrial Pathway). Each subject keeps its own pages, tables and reference books. **Note on the 1st year:** the full 1st-year examination scheme is from the official 1st-year curriculum (folder2627), corrected and approved by the Board of Technical Education, U.P. Lucknow in the C.D.C. meeting held on 16.07.2026, effective from 2026-27 — 1st semester 18 credits / 900 marks, 2nd semester 22 credits / 1050 marks. The official curriculum gives no paper codes — subjects are numbered 1.1-1.6 and 2.1-2.7 only. **Qualifying (Q) subjects** must be passed but their marks are not counted in semester totals or percentages. Where the official syllabus gives no reference books or unit weightages for a subject, the subject pages say so honestly instead of inventing values.

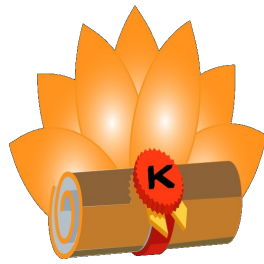
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Source: BTEUP Electronics Engineering curricula (folder2627), approved in C.D.C. meeting held on 16.07.2026. Topic lists follow the official syllabi; short explanations are the author's own plain-English summaries, not syllabus text.



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Mathematics — First Year

BTEUP Diploma • 1st Semester (First Year — Common Curriculum) • Session 2026–27
Common Curriculum • 1st Semester • All 41 Engineering Branches

About this document: The first year of a BTEUP diploma runs on one common curriculum for 41 engineering branches, so this subject is the same whether you are in Computer Science, Mechanical, Civil or Electrical. The examination scheme below is from the official 1st-year curriculum (folder2627, NEP-2020), corrected and approved by the Board of Technical Education, U.P. Lucknow in the C.D.C. meeting held on 16.07.2026.

What This Subject Aims To Do

To build the mathematical foundation every engineer needs — the algebra, calculus and matrices that later subjects (C programming logic, networks, data structures) all stand on.

Unit-Wise Complete Topic List

Algebra & Trigonometry

Topics: Algebraic expressions and equations; trigonometric ratios, identities and heights and distances.

In simple words: The everyday maths of engineering: solving equations and working with angles and triangles.

Calculus

Topics: Limits, differentiation and its applications; integration and its applications; definite integrals.

In simple words: How things change and accumulate — the maths behind rates, slopes, areas and volumes.

Matrices & Determinants

Topics: Types of matrices; operations on matrices; determinants; solving systems of linear equations.

In simple words: Organising numbers in tables and solving several equations at once — the same idea behind computer graphics and data handling.

Differential Equations

Topics: First-order differential equations and their simple applications.

In simple words: Equations that describe how things change over time — used everywhere from circuits to mechanics.

Examination Scheme — 1st & 2nd Semester (Official, Verified 2026-27)

1st Semester — 18 Credits, 900 Marks

Sr. No.	Subject	L-T-P	Credits	Internal	External	Total
1.1	Mathematics-I	2-1-0	3	Th 40	Th 60	100
1.2	Applied Physics-I	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.3	Applied Chemistry OR Introduction to IT and AI	3-0-2 / 2-0-4	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.4	Communication Skills in English OR Fundamentals of Electrical & Electronics Engineering	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200

1.5	Engineering Graphics OR Engineering Workshop Practice	0-0- 4	2	Graphics: Pr 40 / Workshop: Pr 60	Graphics: Th 60 / Workshop: Pr 40	100
1.6	Sports & Yoga	0-0- 2	1	Pr 50	—	50
—	Student Centred Activities (SCA)	0-0- 10	—	Pr 50	—	50
1st Semester Total			18	—	—	900

2nd Semester — 22 Credits, 1050 Marks

Sr. No.	Subject	L-T- P	Credits	Internal	External	Total
2.1	Mathematics-II	3-1- 0	4	Th 40	Th 60	100
2.2	Applied Physics-II	3-0- 2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.3	Introduction to IT and AI OR Applied Chemistry	2-0- 4 / 3-0- 2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.4	Fundamentals of Electrical & Electronics Engineering OR Communication Skills in English	3-0- 2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.5	Engineering Mechanics	2-1- 2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.6	Engineering Workshop Practice OR Engineering Graphics	0-0- 4	2	Workshop: Pr 60 / Graphics: Pr 40	Workshop: Pr 40 / Graphics: Th 60	100
2.7	(Q) Environmental Sciences	3-0- 0	— (Audit)	—	Th 60*	—
—	Student Centred Activities (SCA)	0-0- 4	—	Pr 50	—	50
2nd Semester Total			22	—	—	1050

About the OR choices: at Sr. No. 1.3, 1.4 and 1.5 the institute chooses which alternative runs in the 1st semester; the other alternative then runs in the 2nd semester (1.3 ↔ 2.3, 1.4 ↔ 2.4, 1.5 ↔ 2.6). An alternative once selected in the 1st semester is not selected again in the 2nd semester.

No paper codes: the official 1st-year curriculum gives no paper codes — subjects are numbered 1.1–1.6 in the 1st semester and 2.1–2.7 in the 2nd semester only.

Qualifying subject: Environmental Sciences (2.7, Q) is an audit subject — you must appear and pass, but its 60 external marks are not counted for percentage or division.

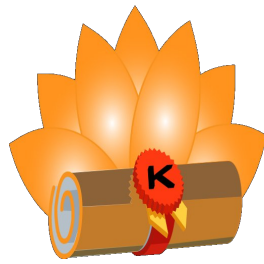
Each period is 60 minutes; each session is 16 weeks, with at least 14 effective teaching weeks. A 4-week summer internship (Internship-I) is organised after the 2nd-semester examination and is evaluated in the 3rd semester.

How This Helps You Later

If your maths is weak, building logic in C programming becomes difficult. Strong first-year maths makes 2nd-year subjects noticeably easier.

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Source: BTEUP 1st Year common curriculum (folder2627), corrected and approved in the C.D.C. meeting held on 16.07.2026 — scheme and subject areas verified. 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.



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Physics — First Year

BTEUP Diploma • 1st Semester (First Year — Common Curriculum) • Session 2026–27
Common Curriculum • 1st Semester • All 41 Engineering Branches

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What This Subject Aims To Do

To build a working understanding of the physical world — motion, force, energy, light, sound and electricity — through concepts and simple experiments.

Unit-Wise Complete Topic List

Mechanics

Topics: Laws of motion; force, work, energy and power; friction; circular motion.

In simple words: Why things move the way they do — the foundation of machines and structures.

Electricity & Magnetism

Topics: Electric charge, current and voltage; Ohm's law; magnetic effects of current.

In simple words: The physics behind every circuit you will meet in electronics and networks.

Optics & Waves

Topics: Reflection and refraction; lenses; wave motion and sound.

In simple words: How light and sound behave — used in instruments, communication and displays.

Modern Physics

Topics: Atomic structure; semiconductors in brief; lasers and their uses.

In simple words: A first look at the physics inside chips and modern devices.

Examination Scheme — 1st & 2nd Semester (Official, Verified 2026-27)

1st Semester — 18 Credits, 900 Marks

Sr. No.	Subject	L-T-P	Credits	Internal	External	Total
1.1	Mathematics-I	2-1-0	3	Th 40	Th 60	100
1.2	Applied Physics-I	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.3	Applied Chemistry OR Introduction to IT and AI	3-0-2 / 2-0-4	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.4	Communication Skills in English OR Fundamentals of Electrical & Electronics Engineering	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.5	Engineering Graphics OR Engineering Workshop Practice	0-0-4	2	Graphics: Pr 40 / Workshop: Pr 60	Graphics: Th 60 / Workshop: Pr 40	100
1.6	Sports & Yoga	0-0-2	1	Pr 50	—	50
—	Student Centred Activities (SCA)	0-0-10	—	Pr 50	—	50

1st Semester Total	18	—	—	900
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2nd Semester — 22 Credits, 1050 Marks

Sr. No.	Subject	L-T-P	Credits	Internal	External	Total
2.1	Mathematics-II	3-1-0	4	Th 40	Th 60	100
2.2	Applied Physics-II	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.3	Introduction to IT and AI OR Applied Chemistry	2-0-4 / 3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.4	Fundamentals of Electrical & Electronics Engineering OR Communication Skills in English	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.5	Engineering Mechanics	2-1-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.6	Engineering Workshop Practice OR Engineering Graphics	0-0-4	2	Workshop: Pr 60 / Graphics: Pr 40	Workshop: Pr 40 / Graphics: Th 60	100
2.7	(Q) Environmental Sciences	3-0-0	— (Audit)	—	Th 60*	—
—	Student Centred Activities (SCA)	0-0-4	—	Pr 50	—	50
2nd Semester Total			22	—	—	1050

About the OR choices: at Sr. No. 1.3, 1.4 and 1.5 the institute chooses which alternative runs in the 1st semester; the other alternative then runs in the 2nd semester (1.3 ↔ 2.3, 1.4 ↔ 2.4, 1.5 ↔ 2.6). An alternative once selected in the 1st semester is not selected again in the 2nd semester.

No paper codes: the official 1st-year curriculum gives no paper codes — subjects are numbered 1.1–1.6 in the 1st semester and 2.1–2.7 in the 2nd semester only.

Qualifying subject: Environmental Sciences (2.7, Q) is an audit subject — you must appear and pass, but its 60 external marks are not counted for percentage or division.

Each period is 60 minutes; each session is 16 weeks, with at least 14 effective teaching weeks. A 4-week summer internship (Internship-I) is organised after the 2nd-semester examination and is evaluated in the 3rd semester.

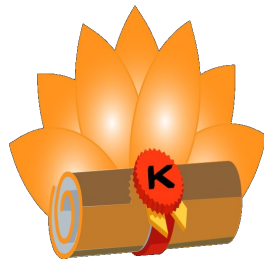
How This Helps You Later

Physics and electronics form the base of Computer Networks and IoT. Weak physics in the first year makes networks harder in the 2nd year.

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Chemistry — First Year

BTEUP Diploma • 1st Semester (First Year — Common Curriculum) • Session 2026–27
Common Curriculum • 1st Semester • All 41 Engineering Branches

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What This Subject Aims To Do

To give a practical understanding of the chemistry that engineers meet — materials, water, fuels and corrosion — and safe laboratory practice.

Unit-Wise Complete Topic List

Atomic Structure & Bonding

Topics: Atoms, molecules and ions; chemical bonds; the periodic table in brief.

In simple words: What materials are made of and why they behave the way they do.

Water Technology

Topics: Hardness of water; water treatment methods; boiler feed water.

In simple words: Why water must be treated before it is used in boilers and industry.

Fuels & Combustion

Topics: Types of fuels; calorific value; combustion and its control.

In simple words: How fuels release energy and how that energy is used efficiently.

Corrosion & Its Prevention

Topics: What corrosion is; types of corrosion; methods of prevention.

In simple words: Why metals rust and wear out, and how engineers protect them.

Examination Scheme – 1st & 2nd Semester (Official, Verified 2026-27)

1st Semester — 18 Credits, 900 Marks

Sr. No.	Subject	L-T-P	Credits	Internal	External	Total
1.1	Mathematics-I	2-1-0	3	Th 40	Th 60	100
1.2	Applied Physics-I	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.3	Applied Chemistry OR Introduction to IT and AI	3-0-2 / 2-0-4	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.4	Communication Skills in English OR Fundamentals of Electrical & Electronics Engineering	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.5	Engineering Graphics OR Engineering Workshop Practice	0-0-4	2	Graphics: Pr 40 / Workshop: Pr 60	Graphics: Th 60 / Workshop: Pr 40	100
1.6	Sports & Yoga	0-0-2	1	Pr 50	—	50
—	Student Centred Activities (SCA)	0-0-10	—	Pr 50	—	50
1st Semester Total			18	—	—	900

2nd Semester — 22 Credits, 1050 Marks

Sr. No.	Subject	L-T-P	Credits	Internal	External	Total
2.1	Mathematics-II	3-1-0	4	Th 40	Th 60	100
2.2	Applied Physics-II	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.3	Introduction to IT and AI OR Applied Chemistry	2-0-4 / 3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.4	Fundamentals of Electrical & Electronics Engineering OR Communication Skills in English	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.5	Engineering Mechanics	2-1-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.6	Engineering Workshop Practice OR Engineering Graphics	0-0-4	2	Workshop: Pr 60 / Graphics: Pr 40	Workshop: Pr 40 / Graphics: Th 60	100
2.7	(Q) Environmental Sciences	3-0-0	— (Audit)	—	Th 60*	—
—	Student Centred Activities (SCA)	0-0-4	—	Pr 50	—	50
2nd Semester Total			22	—	—	1050

About the OR choices: at Sr. No. 1.3, 1.4 and 1.5 the institute chooses which alternative runs in the 1st semester; the other alternative then runs in the 2nd semester (1.3 ↔ 2.3, 1.4 ↔ 2.4, 1.5 ↔ 2.6). An alternative once selected in the 1st semester is not selected again in the 2nd semester.

No paper codes: the official 1st-year curriculum gives no paper codes — subjects are numbered 1.1–1.6 in the 1st semester and 2.1–2.7 in the 2nd semester only.

Qualifying subject: Environmental Sciences (2.7, Q) is an audit subject — you must appear and pass, but its 60 external marks are not counted for percentage or division.

Each period is 60 minutes; each session is 16 weeks, with at least 14 effective teaching weeks. A 4-week summer internship (Internship-I) is organised after the 2nd-semester examination and is evaluated in the 3rd semester.

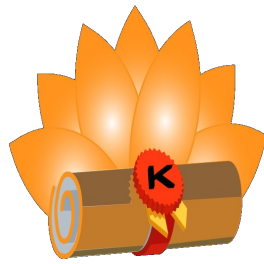
How This Helps You Later

Chemistry teaches you how materials behave — useful whenever you work with hardware, batteries and electronic components.

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English Communication — First Year

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Common Curriculum • 1st Semester • All 41 Engineering Branches

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What This Subject Aims To Do

To build the English communication skills a diploma engineer needs — reading technical material, writing clearly, and speaking confidently in interviews and at work.

Unit-Wise Complete Topic List

Reading & Comprehension

Topics: Reading technical passages; understanding instructions and manuals; vocabulary building.

In simple words: Reading a manual or a question paper and understanding exactly what it asks.

Writing Skills

Topics: Letters, emails, reports and notices; paragraph and essay writing; grammar in use.

In simple words: Writing clearly and correctly — the skill behind every report, email and job application.

Speaking & Listening

Topics: Introducing yourself; group discussion; presentation skills; listening comprehension.

In simple words: Speaking with confidence in class, in viva and in placement interviews.

Workplace Communication

Topics: Resume writing; interview skills; telephone and email etiquette.

In simple words: The communication that gets you placed and keeps you professional at work.

Examination Scheme — 1st & 2nd Semester (Official, Verified 2026-27)

1st Semester — 18 Credits, 900 Marks

Sr. No.	Subject	L-T-P	Credits	Internal	External	Total
1.1	Mathematics-I	2-1-0	3	Th 40	Th 60	100
1.2	Applied Physics-I	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.3	Applied Chemistry OR Introduction to IT and AI	3-0-2 / 2-0-4	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.4	Communication Skills in English OR Fundamentals of Electrical & Electronics Engineering	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200

1.5	Engineering Graphics OR Engineering Workshop Practice	0-0- 4	2	Graphics: Pr 40 / Workshop: Pr 60	Graphics: Th 60 / Workshop: Pr 40	100
1.6	Sports & Yoga	0-0- 2	1	Pr 50	—	50
—	Student Centred Activities (SCA)	0-0- 10	—	Pr 50	—	50
1st Semester Total			18	—	—	900

2nd Semester — 22 Credits, 1050 Marks

Sr. No.	Subject	L-T- P	Credits	Internal	External	Total
2.1	Mathematics-II	3-1- 0	4	Th 40	Th 60	100
2.2	Applied Physics-II	3-0- 2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.3	Introduction to IT and AI OR Applied Chemistry	2-0- 4 / 3-0- 2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.4	Fundamentals of Electrical & Electronics Engineering OR Communication Skills in English	3-0- 2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.5	Engineering Mechanics	2-1- 2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.6	Engineering Workshop Practice OR Engineering Graphics	0-0- 4	2	Workshop: Pr 60 / Graphics: Pr 40	Workshop: Pr 40 / Graphics: Th 60	100
2.7	(Q) Environmental Sciences	3-0- 0	— (Audit)	—	Th 60*	—
—	Student Centred Activities (SCA)	0-0- 4	—	Pr 50	—	50
2nd Semester Total			22	—	—	1050

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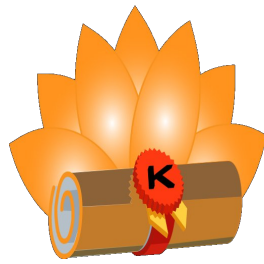
How This Helps You Later

Communication skill decides how far technical skill takes you — in viva, in interviews and in every job after the diploma.

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Engineering Graphics — First Year

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Common Curriculum • 1st Semester • All 41 Engineering Branches

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What This Subject Aims To Do

To teach the language engineers draw in — lines, projections and sections — so you can read a drawing and make one, by hand and on computer.

Unit-Wise Complete Topic List

Drawing Basics

Topics: Drawing instruments; lines and lettering; dimensioning; scales.

In simple words: The alphabet of engineering drawing: line types, letters and measurements.

Projections

Topics: Orthographic projections; first-angle and third-angle projection; isometric views.

In simple words: How a 3D object is shown correctly on a flat sheet of paper.

Sections & Development

Topics: Sectional views; development of surfaces.

In simple words: Seeing inside an object on paper, and unfolding a 3D shape into a flat pattern.

Computer-Aided Drawing

Topics: Introduction to CAD tools for engineering drawing.

In simple words: The same drawing work done on a computer — the skill used in every design office today.

Examination Scheme — 1st & 2nd Semester (Official, Verified 2026-27)

1st Semester — 18 Credits, 900 Marks

Sr. No.	Subject	L-T-P	Credits	Internal	External	Total
1.1	Mathematics-I	2-1-0	3	Th 40	Th 60	100
1.2	Applied Physics-I	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.3	Applied Chemistry OR Introduction to IT and AI	3-0-2 / 2-0-4	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.4	Communication Skills in English OR Fundamentals of Electrical & Electronics Engineering	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.5	Engineering Graphics OR Engineering Workshop Practice	0-0-4	2	Graphics: Pr 40 / Workshop: Pr 60	Graphics: Th 60 / Workshop: Pr 40	100
1.6	Sports & Yoga	0-0-2	1	Pr 50	—	50
—	Student Centred Activities (SCA)	0-0-10	—	Pr 50	—	50

1st Semester Total	18	—	—	900
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2nd Semester — 22 Credits, 1050 Marks

Sr. No.	Subject	L-T-P	Credits	Internal	External	Total
2.1	Mathematics-II	3-1-0	4	Th 40	Th 60	100
2.2	Applied Physics-II	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.3	Introduction to IT and AI OR Applied Chemistry	2-0-4 / 3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.4	Fundamentals of Electrical & Electronics Engineering OR Communication Skills in English	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.5	Engineering Mechanics	2-1-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.6	Engineering Workshop Practice OR Engineering Graphics	0-0-4	2	Workshop: Pr 60 / Graphics: Pr 40	Workshop: Pr 40 / Graphics: Th 60	100
2.7	(Q) Environmental Sciences	3-0-0	— (Audit)	—	Th 60*	—
—	Student Centred Activities (SCA)	0-0-4	—	Pr 50	—	50
2nd Semester Total			22	—	—	1050

About the OR choices: at Sr. No. 1.3, 1.4 and 1.5 the institute chooses which alternative runs in the 1st semester; the other alternative then runs in the 2nd semester (1.3 ↔ 2.3, 1.4 ↔ 2.4, 1.5 ↔ 2.6). An alternative once selected in the 1st semester is not selected again in the 2nd semester.

No paper codes: the official 1st-year curriculum gives no paper codes — subjects are numbered 1.1–1.6 in the 1st semester and 2.1–2.7 in the 2nd semester only.

Qualifying subject: Environmental Sciences (2.7, Q) is an audit subject — you must appear and pass, but its 60 external marks are not counted for percentage or division.

Each period is 60 minutes; each session is 16 weeks, with at least 14 effective teaching weeks. A 4-week summer internship (Internship-I) is organised after the 2nd-semester examination and is evaluated in the 3rd semester.

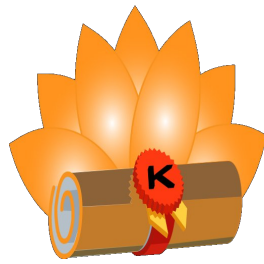
How This Helps You Later

Graphics trains your eye for shape and size — useful in every branch, and the base of design and modelling work.

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Source: BTEUP 1st Year common curriculum (folder2627), corrected and approved in the C.D.C. meeting held on 16.07.2026 — scheme and subject areas verified. 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.





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Workshop Practice — First Year

BTEUP Diploma • 1st Semester (First Year — Common Curriculum) • Session 2026–27
Common Curriculum • 1st Semester • All 41 Engineering Branches

About this document: The first year of a BTEUP diploma runs on one common curriculum for 41 engineering branches, so this subject is the same whether you are in Computer Science, Mechanical, Civil or Electrical. The examination scheme below is from the official 1st-year curriculum (folder2627, NEP-2020), corrected and approved by the Board of Technical Education, U.P. Lucknow in the C.D.C. meeting held on 16.07.2026.

What This Subject Aims To Do

To give hands-on workshop experience — measuring, cutting, fitting, joining and finishing — with real tools, safely and correctly.

Unit-Wise Complete Topic List

Fitting Shop

Topics: Measuring instruments; marking; filing; sawing; drilling; tapping.

In simple words: Making a metal piece to exact size by hand — the core workshop skill.

Carpentry & Joinery

Topics: Woodworking tools; joints; simple wooden jobs.

In simple words: Working with wood: cutting, shaping and joining it cleanly.

Welding & Sheet Metal

Topics: Arc and gas welding in brief; sheet-metal cutting, bending and joining.

In simple words: Joining metals and shaping thin sheets — used in fabrication everywhere.

Safety & Housekeeping

Topics: Workshop safety rules; personal protective equipment; tool care.

In simple words: The habits that keep you and others safe in any workshop or lab.

Examination Scheme — 1st & 2nd Semester (Official, Verified 2026-27)

1st Semester — 18 Credits, 900 Marks

Sr. No.	Subject	L-T-P	Credits	Internal	External	Total
1.1	Mathematics-I	2-1-0	3	Th 40	Th 60	100
1.2	Applied Physics-I	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.3	Applied Chemistry OR Introduction to IT and AI	3-0-2 / 2-0-4	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.4	Communication Skills in English OR Fundamentals of Electrical & Electronics Engineering	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.5	Engineering Graphics OR Engineering Workshop Practice	0-0-4	2	Graphics: Pr 40 / Workshop: Pr 60	Graphics: Th 60 / Workshop: Pr 40	100
1.6	Sports & Yoga	0-0-2	1	Pr 50	—	50
—	Student Centred Activities (SCA)	0-0-10	—	Pr 50	—	50

1st Semester Total	18	—	—	900
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2nd Semester — 22 Credits, 1050 Marks

Sr. No.	Subject	L-T-P	Credits	Internal	External	Total
2.1	Mathematics-II	3-1-0	4	Th 40	Th 60	100
2.2	Applied Physics-II	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.3	Introduction to IT and AI OR Applied Chemistry	2-0-4 / 3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.4	Fundamentals of Electrical & Electronics Engineering OR Communication Skills in English	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.5	Engineering Mechanics	2-1-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.6	Engineering Workshop Practice OR Engineering Graphics	0-0-4	2	Workshop: Pr 60 / Graphics: Pr 40	Workshop: Pr 40 / Graphics: Th 60	100
2.7	(Q) Environmental Sciences	3-0-0	— (Audit)	—	Th 60*	—
—	Student Centred Activities (SCA)	0-0-4	—	Pr 50	—	50
2nd Semester Total			22	—	—	1050

About the OR choices: at Sr. No. 1.3, 1.4 and 1.5 the institute chooses which alternative runs in the 1st semester; the other alternative then runs in the 2nd semester (1.3 ↔ 2.3, 1.4 ↔ 2.4, 1.5 ↔ 2.6). An alternative once selected in the 1st semester is not selected again in the 2nd semester.

No paper codes: the official 1st-year curriculum gives no paper codes — subjects are numbered 1.1–1.6 in the 1st semester and 2.1–2.7 in the 2nd semester only.

Qualifying subject: Environmental Sciences (2.7, Q) is an audit subject — you must appear and pass, but its 60 external marks are not counted for percentage or division.

Each period is 60 minutes; each session is 16 weeks, with at least 14 effective teaching weeks. A 4-week summer internship (Internship-I) is organised after the 2nd-semester examination and is evaluated in the 3rd semester.

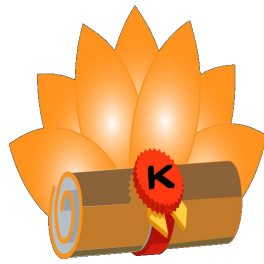
How This Helps You Later

Workshop is where you stop being only a theory student and become a practical engineer. Many students take it lightly — do not.

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Source: BTEUP 1st Year common curriculum (folder2627), corrected and approved in the C.D.C. meeting held on 16.07.2026 — scheme and subject areas verified. 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.





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IT Systems — First Year

BTEUP Diploma • 1st Semester (First Year — Common Curriculum) • Session 2026–27
Common Curriculum • 1st Semester • All 41 Engineering Branches

About this document: The first year of a BTEUP diploma runs on one common curriculum for 41 engineering branches, so this subject is the same whether you are in Computer Science, Mechanical, Civil or Electrical. The examination scheme below is from the official 1st-year curriculum (folder2627, NEP-2020), corrected and approved by the Board of Technical Education, U.P. Lucknow in the C.D.C. meeting held on 16.07.2026.

What This Subject Aims To Do

To build a solid base in computers — hardware, software, operating systems, the internet and everyday office tools — before branch subjects begin.

Unit-Wise Complete Topic List

Computer Fundamentals

Topics: Parts of a computer; input and output devices; memory and storage; types of software.

In simple words: What is inside a computer and how its parts work together.

Operating Systems

Topics: What an operating system does; files and folders; basic commands.

In simple words: Managing your own computer properly — the first step before the Operating Systems subject in the 3rd semester.

Internet & Email

Topics: Browsers and search; email; safe internet use; online services.

In simple words: Using the internet for study and work, and staying safe while doing it.

Office Tools

Topics: Word processing; spreadsheets; presentations.

In simple words: Documents, tables and slides — the tools behind every report, assignment and seminar.

Examination Scheme — 1st & 2nd Semester (Official, Verified 2026-27)

1st Semester — 18 Credits, 900 Marks

Sr. No.	Subject	L-T-P	Credits	Internal	External	Total
1.1	Mathematics-I	2-1-0	3	Th 40	Th 60	100
1.2	Applied Physics-I	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.3	Applied Chemistry OR Introduction to IT and AI	3-0-2 / 2-0-4	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.4	Communication Skills in English OR Fundamentals of Electrical & Electronics Engineering	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.5	Engineering Graphics OR Engineering Workshop Practice	0-0-4	2	Graphics: Pr 40 / Workshop: Pr 60	Graphics: Th 60 / Workshop: Pr 40	100
1.6	Sports & Yoga	0-0-2	1	Pr 50	—	50
—	Student Centred Activities (SCA)	0-0-10	—	Pr 50	—	50

1st Semester Total	18	—	—	900
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2nd Semester — 22 Credits, 1050 Marks

Sr. No.	Subject	L-T-P	Credits	Internal	External	Total
2.1	Mathematics-II	3-1-0	4	Th 40	Th 60	100
2.2	Applied Physics-II	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.3	Introduction to IT and AI OR Applied Chemistry	2-0-4 / 3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.4	Fundamentals of Electrical & Electronics Engineering OR Communication Skills in English	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.5	Engineering Mechanics	2-1-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.6	Engineering Workshop Practice OR Engineering Graphics	0-0-4	2	Workshop: Pr 60 / Graphics: Pr 40	Workshop: Pr 40 / Graphics: Th 60	100
2.7	(Q) Environmental Sciences	3-0-0	— (Audit)	—	Th 60*	—
—	Student Centred Activities (SCA)	0-0-4	—	Pr 50	—	50
2nd Semester Total			22	—	—	1050

About the OR choices: at Sr. No. 1.3, 1.4 and 1.5 the institute chooses which alternative runs in the 1st semester; the other alternative then runs in the 2nd semester (1.3 ↔ 2.3, 1.4 ↔ 2.4, 1.5 ↔ 2.6). An alternative once selected in the 1st semester is not selected again in the 2nd semester.

No paper codes: the official 1st-year curriculum gives no paper codes — subjects are numbered 1.1–1.6 in the 1st semester and 2.1–2.7 in the 2nd semester only.

Qualifying subject: Environmental Sciences (2.7, Q) is an audit subject — you must appear and pass, but its 60 external marks are not counted for percentage or division.

Each period is 60 minutes; each session is 16 weeks, with at least 14 effective teaching weeks. A 4-week summer internship (Internship-I) is organised after the 2nd-semester examination and is evaluated in the 3rd semester.

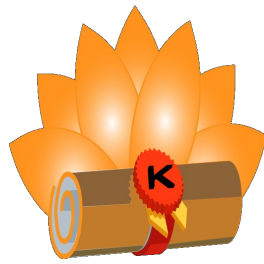
How This Helps You Later

This subject is your first step into computing — it makes the 3rd-semester subjects (Operating Systems, Web Technologies, C) much easier to pick up.

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Source: BTEUP 1st Year common curriculum (folder2627), corrected and approved in the C.D.C. meeting held on 16.07.2026 — scheme and subject areas verified. 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.





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Electrical & Electronics Fundamentals — First Year

BTEUP Diploma • 1st Semester (First Year — Common Curriculum) • Session 2026-27
Common Curriculum • 1st Semester • All 41 Engineering Branches

About this document: The first year of a BTEUP diploma runs on one common curriculum for 41 engineering branches, so this subject is the same whether you are in Computer Science, Mechanical, Civil or Electrical. The examination scheme below is from the official 1st-year curriculum (folder2627, NEP-2020), corrected and approved by the Board of Technical Education, U.P. Lucknow in the C.D.C. meeting held on 16.07.2026.

What This Subject Aims To Do

To explain electricity and basic electronics from the ground up — current, voltage, circuits and components — with simple experiments.

Unit-Wise Complete Topic List

Basic Electrical Concepts

Topics: Charge, current, voltage, resistance and power; Ohm's law; series and parallel circuits.

In simple words: The four quantities behind every electrical circuit, and how they relate.

AC & DC

Topics: Direct current and alternating current; single-phase AC in brief; transformers in brief.

In simple words: The two kinds of electric supply, and how voltage is changed for transmission and use.

Electronic Components

Topics: Resistors, capacitors, inductors; diodes and transistors in brief.

In simple words: The small parts that make electronic circuits work.

Measuring Instruments

Topics: Multimeter; ammeter and voltmeter; measuring voltage, current and resistance.

In simple words: Measuring a real circuit and checking whether it behaves as expected.

Examination Scheme — 1st & 2nd Semester (Official, Verified 2026-27)

1st Semester — 18 Credits, 900 Marks

Sr. No.	Subject	L-T-P	Credits	Internal	External	Total
1.1	Mathematics-I	2-1-0	3	Th 40	Th 60	100
1.2	Applied Physics-I	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.3	Applied Chemistry OR Introduction to IT and AI	3-0-2 / 2-0-4	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.4	Communication Skills in English OR Fundamentals of Electrical & Electronics Engineering	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.5		0-0-4	2	Graphics: Pr 40 /	Graphics: Th 60 /	100

	Engineering Graphics OR Engineering Workshop Practice			Workshop: Pr 60	Workshop: Pr 40	
1.6	Sports & Yoga	0-0- 2	1	Pr 50	—	50
—	Student Centred Activities (SCA)	0-0- 10	—	Pr 50	—	50
1st Semester Total			18	—	—	900

2nd Semester — 22 Credits, 1050 Marks

Sr. No.	Subject	L-T- P	Credits	Internal	External	Total
2.1	Mathematics-II	3-1- 0	4	Th 40	Th 60	100
2.2	Applied Physics-II	3-0- 2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.3	Introduction to IT and AI OR Applied Chemistry	2-0- 4 / 3-0- 2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.4	Fundamentals of Electrical & Electronics Engineering OR Communication Skills in English	3-0- 2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.5	Engineering Mechanics	2-1- 2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.6	Engineering Workshop Practice OR Engineering Graphics	0-0- 4	2	Workshop: Pr 60 / Graphics: Pr 40	Workshop: Pr 40 / Graphics: Th 60	100
2.7	(Q) Environmental Sciences	3-0- 0	— (Audit)	—	Th 60*	—
—	Student Centred Activities (SCA)	0-0- 4	—	Pr 50	—	50
2nd Semester Total			22	—	—	1050

About the OR choices: at Sr. No. 1.3, 1.4 and 1.5 the institute chooses which alternative runs in the 1st semester; the other alternative then runs in the 2nd semester (1.3 ↔ 2.3, 1.4 ↔

2.4, 1.5 ↔ 2.6). An alternative once selected in the 1st semester is not selected again in the 2nd semester.

No paper codes: the official 1st-year curriculum gives no paper codes — subjects are numbered 1.1–1.6 in the 1st semester and 2.1–2.7 in the 2nd semester only.

Qualifying subject: Environmental Sciences (2.7, Q) is an audit subject — you must appear and pass, but its 60 external marks are not counted for percentage or division.

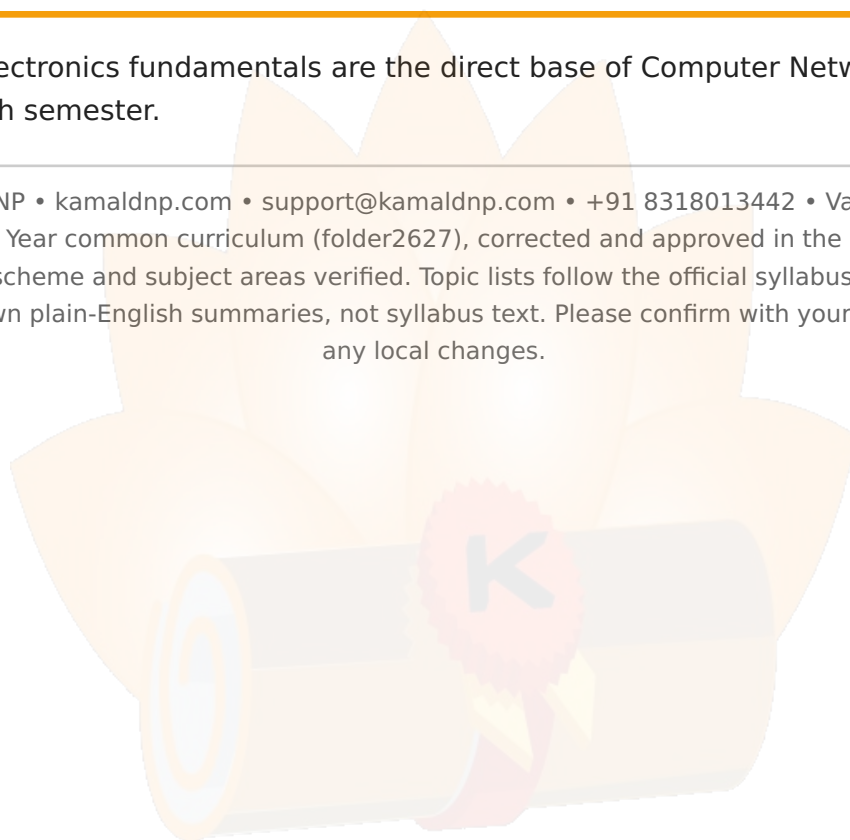
Each period is 60 minutes; each session is 16 weeks, with at least 14 effective teaching weeks. A 4-week summer internship (Internship-I) is organised after the 2nd-semester examination and is evaluated in the 3rd semester.

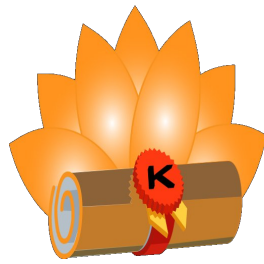
How This Helps You Later

Electrical and electronics fundamentals are the direct base of Computer Networks and the IoT subject in the 5th semester.

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Source: BTEUP 1st Year common curriculum (folder2627), corrected and approved in the C.D.C. meeting held on 16.07.2026 — scheme and subject areas verified. 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.





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Engineering Mechanics — First Year

BTEUP Diploma • 1st Semester (First Year — Common Curriculum) • Session 2026–27
Common Curriculum • 1st Semester • All 41 Engineering Branches

About this document: The first year of a BTEUP diploma runs on one common curriculum for 41 engineering branches, so this subject is the same whether you are in Computer Science, Mechanical, Civil or Electrical. The examination scheme below is from the official 1st-year curriculum (folder2627, NEP-2020), corrected and approved by the Board of Technical Education, U.P. Lucknow in the C.D.C. meeting held on 16.07.2026.

What This Subject Aims To Do

To explain how forces act on bodies — at rest and in motion — so you can analyse simple machines and structures.

Unit-Wise Complete Topic List

Forces & Equilibrium

Topics: Types of forces; resultant and equilibrant; conditions of equilibrium.

In simple words: When things stay still and when they move — the first question of mechanics.

Friction

Topics: Laws of friction; angle of friction; friction in simple machines.

In simple words: Why things grip or slip, and how friction is used or reduced.

Laws of Motion & Simple Machines

Topics: Newton's laws; levers, pulleys and inclined planes.

In simple words: The classic machines that multiply force — still the base of mechanical design.

Centre of Gravity & Moment of Inertia

Topics: Centre of gravity of simple shapes; moment of inertia in brief.

In simple words: Where a body's weight acts, and how hard it is to turn it.

Examination Scheme — 1st & 2nd Semester (Official, Verified 2026-27)

1st Semester — 18 Credits, 900 Marks

Sr. No.	Subject	L-T-P	Credits	Internal	External	Total
1.1	Mathematics-I	2-1-0	3	Th 40	Th 60	100
1.2	Applied Physics-I	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.3	Applied Chemistry OR Introduction to IT and AI	3-0-2 / 2-0-4	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.4	Communication Skills in English OR Fundamentals of Electrical & Electronics Engineering	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.5	Engineering Graphics OR Engineering Workshop Practice	0-0-4	2	Graphics: Pr 40 / Workshop: Pr 60	Graphics: Th 60 / Workshop: Pr 40	100
1.6	Sports & Yoga	0-0-2	1	Pr 50	—	50
—	Student Centred Activities (SCA)	0-0-10	—	Pr 50	—	50

1st Semester Total	18	—	—	900
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2nd Semester — 22 Credits, 1050 Marks

Sr. No.	Subject	L-T-P	Credits	Internal	External	Total
2.1	Mathematics-II	3-1-0	4	Th 40	Th 60	100
2.2	Applied Physics-II	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.3	Introduction to IT and AI OR Applied Chemistry	2-0-4 / 3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.4	Fundamentals of Electrical & Electronics Engineering OR Communication Skills in English	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.5	Engineering Mechanics	2-1-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.6	Engineering Workshop Practice OR Engineering Graphics	0-0-4	2	Workshop: Pr 60 / Graphics: Pr 40	Workshop: Pr 40 / Graphics: Th 60	100
2.7	(Q) Environmental Sciences	3-0-0	— (Audit)	—	Th 60*	—
—	Student Centred Activities (SCA)	0-0-4	—	Pr 50	—	50
2nd Semester Total			22	—	—	1050

About the OR choices: at Sr. No. 1.3, 1.4 and 1.5 the institute chooses which alternative runs in the 1st semester; the other alternative then runs in the 2nd semester (1.3 ↔ 2.3, 1.4 ↔ 2.4, 1.5 ↔ 2.6). An alternative once selected in the 1st semester is not selected again in the 2nd semester.

No paper codes: the official 1st-year curriculum gives no paper codes — subjects are numbered 1.1–1.6 in the 1st semester and 2.1–2.7 in the 2nd semester only.

Qualifying subject: Environmental Sciences (2.7, Q) is an audit subject — you must appear and pass, but its 60 external marks are not counted for percentage or division.

Each period is 60 minutes; each session is 16 weeks, with at least 14 effective teaching weeks. A 4-week summer internship (Internship-I) is organised after the 2nd-semester examination and is evaluated in the 3rd semester.

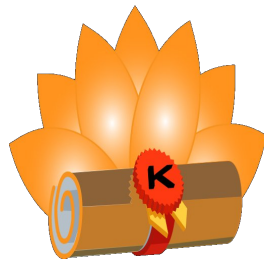
How This Helps You Later

Mechanics trains structured problem-solving — the same step-by-step thinking used in programming and in Data Structures.

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Source: BTEUP 1st Year common curriculum (folder2627), corrected and approved in the C.D.C. meeting held on 16.07.2026 — scheme and subject areas verified. 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.





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Environmental Science — First Year

BTEUP Diploma • 1st Semester (First Year — Common Curriculum) • Session 2026–27
Common Curriculum • 1st Semester • All 41 Engineering Branches

About this document: The first year of a BTEUP diploma runs on one common curriculum for 41 engineering branches, so this subject is the same whether you are in Computer Science, Mechanical, Civil or Electrical. The examination scheme below is from the official 1st-year curriculum (folder2627, NEP-2020), corrected and approved by the Board of Technical Education, U.P. Lucknow in the C.D.C. meeting held on 16.07.2026.

What This Subject Aims To Do

To build awareness of the environment engineers work in — pollution, resources and sustainability — and the engineer's responsibility towards them.

Unit-Wise Complete Topic List

Environment & Ecosystems

Topics: What an ecosystem is; biodiversity in brief; natural resources.

In simple words: The natural systems that engineering draws on and affects.

Pollution

Topics: Air, water, soil and noise pollution; their causes and effects; control measures.

In simple words: What pollution is, where it comes from, and how it is controlled.

Sustainability & Green Energy

Topics: Sustainable development; renewable energy sources — solar, wind, hydro.

In simple words: Meeting today's needs without taking away tomorrow's — and the clean energy that makes it possible.

Environmental Laws & Responsibility

Topics: Key environmental laws in brief; the engineer's role.

In simple words: The rules that protect the environment, and what they ask of an engineer.

Examination Scheme — 1st & 2nd Semester (Official, Verified 2026-27)

1st Semester — 18 Credits, 900 Marks

Sr. No.	Subject	L-T-P	Credits	Internal	External	Total
1.1	Mathematics-I	2-1-0	3	Th 40	Th 60	100
1.2	Applied Physics-I	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.3	Applied Chemistry OR Introduction to IT and AI	3-0-2 / 2-0-4	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.4	Communication Skills in English OR Fundamentals of Electrical & Electronics Engineering	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.5	Engineering Graphics OR Engineering Workshop Practice	0-0-4	2	Graphics: Pr 40 / Workshop: Pr 60	Graphics: Th 60 / Workshop: Pr 40	100
1.6	Sports & Yoga	0-0-2	1	Pr 50	—	50
—	Student Centred Activities (SCA)	0-0-10	—	Pr 50	—	50

1st Semester Total	18	—	—	900
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2nd Semester — 22 Credits, 1050 Marks

Sr. No.	Subject	L-T-P	Credits	Internal	External	Total
2.1	Mathematics-II	3-1-0	4	Th 40	Th 60	100
2.2	Applied Physics-II	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.3	Introduction to IT and AI OR Applied Chemistry	2-0-4 / 3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.4	Fundamentals of Electrical & Electronics Engineering OR Communication Skills in English	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.5	Engineering Mechanics	2-1-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.6	Engineering Workshop Practice OR Engineering Graphics	0-0-4	2	Workshop: Pr 60 / Graphics: Pr 40	Workshop: Pr 40 / Graphics: Th 60	100
2.7	(Q) Environmental Sciences	3-0-0	— (Audit)	—	Th 60*	—
—	Student Centred Activities (SCA)	0-0-4	—	Pr 50	—	50
2nd Semester Total			22	—	—	1050

About the OR choices: at Sr. No. 1.3, 1.4 and 1.5 the institute chooses which alternative runs in the 1st semester; the other alternative then runs in the 2nd semester (1.3 ↔ 2.3, 1.4 ↔ 2.4, 1.5 ↔ 2.6). An alternative once selected in the 1st semester is not selected again in the 2nd semester.

No paper codes: the official 1st-year curriculum gives no paper codes — subjects are numbered 1.1–1.6 in the 1st semester and 2.1–2.7 in the 2nd semester only.

Qualifying subject: Environmental Sciences (2.7, Q) is an audit subject — you must appear and pass, but its 60 external marks are not counted for percentage or division.

Each period is 60 minutes; each session is 16 weeks, with at least 14 effective teaching weeks. A 4-week summer internship (Internship-I) is organised after the 2nd-semester examination and is evaluated in the 3rd semester.

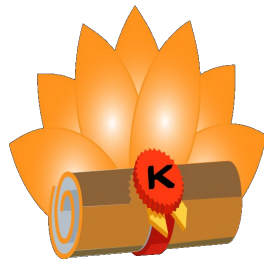
How This Helps You Later

Every project today is judged on its environmental impact too — this subject teaches you to think that way from the start.

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Source: BTEUP 1st Year common curriculum (folder2627), corrected and approved in the C.D.C. meeting held on 16.07.2026 — scheme and subject areas verified. 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.





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Sports & Yoga — First Year

BTEUP Diploma • 1st Semester (First Year — Common Curriculum) • Session 2026–27
Common Curriculum • 1st Semester • All 41 Engineering Branches

About this document: The first year of a BTEUP diploma runs on one common curriculum for 41 engineering branches, so this subject is the same whether you are in Computer Science, Mechanical, Civil or Electrical. The examination scheme below is from the official 1st-year curriculum (folder2627, NEP-2020), corrected and approved by the Board of Technical Education, U.P. Lucknow in the C.D.C. meeting held on 16.07.2026.

What This Subject Aims To Do

To build physical fitness, discipline and focus through sports and yoga, alongside academic study.

Unit-Wise Complete Topic List

Physical Fitness

Topics: Warm-up and exercise; games and sports activities.

In simple words: Staying fit and active — the base of steady study and work.

Yoga

Topics: Asanas, pranayama and meditation in brief; benefits for concentration and health.

In simple words: Simple practices that improve focus, calm and stamina.

Teamwork & Discipline

Topics: Playing in a team; following rules; sportsmanship.

In simple words: The discipline and teamwork that employers value as much as marks.

Health Awareness

Topics: Balanced diet; sleep; avoiding harmful habits.

In simple words: Looking after the body that has to carry you through the diploma and beyond.

Examination Scheme — 1st & 2nd Semester (Official, Verified 2026-27)

1st Semester — 18 Credits, 900 Marks

Sr. No.	Subject	L-T-P	Credits	Internal	External	Total
1.1	Mathematics-I	2-1-0	3	Th 40	Th 60	100
1.2	Applied Physics-I	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.3	Applied Chemistry OR Introduction to IT and AI	3-0-2 / 2-0-4	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.4	Communication Skills in English OR Fundamentals of Electrical & Electronics Engineering	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
1.5	Engineering Graphics OR Engineering Workshop Practice	0-0-4	2	Graphics: Pr 40 / Workshop: Pr 60	Graphics: Th 60 / Workshop: Pr 40	100
1.6	Sports & Yoga	0-0-2	1	Pr 50	—	50
—	Student Centred Activities (SCA)	0-0-10	—	Pr 50	—	50

1st Semester Total	18	—	—	900
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2nd Semester — 22 Credits, 1050 Marks

Sr. No.	Subject	L-T-P	Credits	Internal	External	Total
2.1	Mathematics-II	3-1-0	4	Th 40	Th 60	100
2.2	Applied Physics-II	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.3	Introduction to IT and AI OR Applied Chemistry	2-0-4 / 3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.4	Fundamentals of Electrical & Electronics Engineering OR Communication Skills in English	3-0-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.5	Engineering Mechanics	2-1-2	4	Th 40 + Pr 60	Th 60 + Pr 40	200
2.6	Engineering Workshop Practice OR Engineering Graphics	0-0-4	2	Workshop: Pr 60 / Graphics: Pr 40	Workshop: Pr 40 / Graphics: Th 60	100
2.7	(Q) Environmental Sciences	3-0-0	— (Audit)	—	Th 60*	—
—	Student Centred Activities (SCA)	0-0-4	—	Pr 50	—	50
2nd Semester Total			22	—	—	1050

About the OR choices: at Sr. No. 1.3, 1.4 and 1.5 the institute chooses which alternative runs in the 1st semester; the other alternative then runs in the 2nd semester (1.3 ↔ 2.3, 1.4 ↔ 2.4, 1.5 ↔ 2.6). An alternative once selected in the 1st semester is not selected again in the 2nd semester.

No paper codes: the official 1st-year curriculum gives no paper codes — subjects are numbered 1.1–1.6 in the 1st semester and 2.1–2.7 in the 2nd semester only.

Qualifying subject: Environmental Sciences (2.7, Q) is an audit subject — you must appear and pass, but its 60 external marks are not counted for percentage or division.

Each period is 60 minutes; each session is 16 weeks, with at least 14 effective teaching weeks. A 4-week summer internship (Internship-I) is organised after the 2nd-semester examination and is evaluated in the 3rd semester.

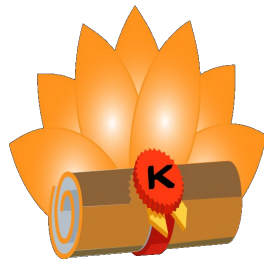
How This Helps You Later

A diploma is a marathon, not a sprint — fitness and focus decide how well you finish it.

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Source: BTEUP 1st Year common curriculum (folder2627), corrected and approved in the C.D.C. meeting held on 16.07.2026 — scheme and subject areas verified. 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.





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Electronic Devices and Circuits — Complete Syllabus

BTEUP Diploma in Electronics Engineering • 3rd Semester • Session 2026-27
Subject 3.1 (Theory) + 3.5 (Lab) • Total 200 Marks • 5 Credits

About this document: Electronic Devices and Circuits appears twice in the 3rd semester — as a theory paper (3.1) and as a lab (3.5). Both are covered here, completely, in the official order.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
3.1	Electronic Devices and Circuits	Theory	3 - 0	3	Theory 40	Theory 60 (3 hrs)	100
3.5	Electronic Devices and Circuits (Lab)	Practical	0 - 4	2	Practical 60	Practical 40 (3 hrs)	100
Electronic Devices and Circuits Total				5	100	100	200

What This Subject Aims To Do

To develop the skills required to use basic electronic devices in various electronic circuits, and to understand the construction, working, characteristics and applications of semiconductor devices such as diodes and transistors — the basic building blocks of amplifiers, oscillators, switching circuits, wave shaping circuits and power supplies.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Semiconductor Diodes Circuit and Applications	6	14%
2	Bipolar Junction Transistor	11	25%
3	Unipolar Junction and Field Effect Transistor	9	21%
4	Amplifiers and Oscillators	11	25%
5	SCR, DIAC, TRIAC and IGBT	5	14%

Note: the weightages in the official marks-distribution table add to 99% (14+25+21+25+14), although the table's Total row prints 100%. Reproduced as printed in the official syllabus.

Unit 1 — Semiconductor Diodes Circuit and Applications (6 Periods, 14%)

Topics: Definition, Extrinsic/Intrinsic, N-type & p-type, P-N junction diode forward & reverse bias characteristics. Different types of diodes, Diode (P-N Junction) as rectifier, Half wave rectifier, full wave rectifier. Construction & Working Principle of Positive, Negative, and Biased Clippers - Construction & Working Principle of Positive and Negative Clampers

In simple words: How a semiconductor diode works, how it turns AC into DC (rectifiers), and how clippers and clampers shape waveforms.

Unit 2 — Bipolar Junction Transistor (11 Periods, 25%)

Topics: PNP and NPN transistor- Operation and characteristics. CB, CE and CC configurations: working, characteristics and their comparison. Concept of leakage current, effect of temperature on leakage current, standard notation for current and voltage polarity. Transistor Biasing, Transistor as an amplifier in CE configuration, DC load line.

In simple words: The transistor: how it works in its three configurations, how to bias it correctly, and how it amplifies a signal.

Unit 3 — Unipolar Junction and Field Effect Transistor (9 Periods, 21%)

Topics: Junction Field Effect Transistor: Construction, operation, characteristics and Biasing. MOSFET: Construction, operation, Characteristics. CMOS: Construction, operation and Characteristics. Comparison of JEET, MOSFET and Bipolar Transistor. Introduction to advance non-planer devices like FinFET, GAA.

In simple words: Field-effect transistors (JFET and MOSFET), the CMOS pair that runs modern chips, and a first look at newer devices like FinFET and GAA.

Unit 4 — Amplifiers and Oscillators (11 Periods, 25%)

Topics: Single Stage Transistor Amplifier: Analysis of Single Stage CE, CB and CC amplifier. Multistage Amplifiers: Need of multistage amplifier, gain of multistage amplifier, RC coupled, and transformer coupled, direct coupled Amplifier, their frequency response and bandwidth. Large Signal Amplifier: Difference between voltage and power amplifiers - Importance of impedance matching in amplifiers - Class A, Class B, Class AB, and Class C amplifiers, Push-pull amplifier. Feedback Amplifiers: Properties of negative Feedback, impact of feedback on different parameters, Basic Feedback Amplifier Topologies. Basic Principles, different types of Oscillator-LC, RC and crystal oscillator.

In simple words: Making signals bigger (amplifiers of several kinds) and making signals from nothing (oscillators) — including feedback, which trades gain for stability.

Unit 5 — SCR, DIAC, TRIAC and IGBT (5 Periods, 14%)

Topics: Construction, working and characteristics, SCR as a Switch, DIAC as bidirectional switch, Comparison of SCR, DIAC, TRIAC, MOSFET and IGBT.

In simple words: Power switching devices: how SCRs, DIACs, TRIACs and IGBTs turn heavy loads on and off, and how they compare.

Practical Work

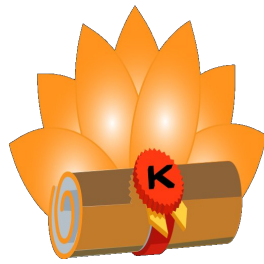
- Construct the circuit and plot the VI characteristics of the PN Junction Diode, find the cut in voltage.
- Plot the V-I Characteristic of Zener Diode.
- Plot the V-I Characteristic of Photo Diode.
- Plot the V-I Characteristic of Light emitting Diode.
- Simulate half wave, full wave and bridge rectifier using simulation tool like P Spice/ Orcad/ Multisim.
- Construct a Half Wave Rectifier and obtain regulation characteristics – Without Filters and with Filters Compare the results.

- Construct a Full Wave Rectifier and obtain regulation characteristics – Without Filters and with Filters Compare the results.
- Plot input and output characteristics of transistor in CB /CE/CC configuration.
- Build and test voltage divider biased type amplifier & measure voltage at different points on the circuit and observe waveforms.
- Obtain the characteristics of DIAC and TRIAC.
- Obtain frequency response of Single stage RC/RL -coupled amplifier.
- Develop a simulation model for Voltage Series and Voltage Shunt Feedback Amplifiers.
- Develop circuits for Voltage Series and Voltage Shunt Feedback Amplifiers and obtain output plots. Compare the results with the simulation model.
- Develop a simulation model for Current Series and Current Shunt Feedback Amplifiers.
- Develop circuits for Current Series and Current Shunt Feedback Amplifiers and obtain output plots. Compare the results with the simulation model.

Reference Books (as listed in the syllabus)

- Analog Circuits A.K. Maini Khanna Publishing House Ed. 2018 (ISBN: 978-93-86173-584)
- Electronic Devices and Circuits. Salivahanan and N. Suresh Kumar McGraw Hill Education; Fourth edition (1 July 2017) ISBN: 978-9339219505
- Electronics Devices and circuit theory Boyestad & Nashelsky Pearson Education India; 11 edition (2015) ISBN: 978-9332542600
- Electronic Principles Albert Malvino & David Bates Tata McGraw Hill Publication 2010 ISBN: 978-0070634244
- Rahul Wadhwa, Electronics Devices & Circuits, Asian Publishers, Muzaffarnagar. ISBN: 978-93-91541-74-3
- Electronics Devices & Circuits Jacob Millman McGraw Hill Education; 4 editions (2015) ISBN: 978-9339219543

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Digital Electronics — Complete Syllabus

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

Subject 3.2 (Theory) + 3.6 (Lab) • Total 200 Marks • 5 Credits

About this document: Digital Electronics appears twice in the 3rd semester — as a theory paper (3.2) and as a lab (3.6). Both are covered here, completely, in the official order.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
3.2	Digital Electronics	Theory	3 - 0	3	Theory 40	Theory 60 (3 hrs)	100
3.6	Digital Electronics (Lab)	Practical	0 - 4	2	Practical 60	Practical 40 (3 hrs)	100
Digital Electronics Total				5	100	100	200

What This Subject Aims To Do

To expose students to the design process of combinational and sequential logic circuits, giving a strong foundation for all modern electronic devices and digital systems, and a profile for work in hardware and process industries.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
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1	Number Systems & Boolean Algebra	8	19%
2	Logic Gates	8	19%
3	Combinational Logic Circuits	8	19%
4	Sequential Logic Circuits	10	24%
5	Memory Devices	8	19%

Unit 1 — Number Systems & Boolean Algebra (8 Periods, 19%)

Topics: Introduction to different number systems – Binary, Octal, Decimal, Hexadecimal. Conversion between the number system, 1's complement and 2's complement, Binary Addition and Subtraction. Special Codes: BCD, Gray Codes, ASCII codes. Boolean Algebra: Basic Boolean laws, De-Morgan's Theorem, SOP and POS representation

In simple words: How computers count (binary, octal, hexadecimal), how negative numbers are stored, and the algebra that describes logic.

Unit 2 — Logic Gates (8 Periods, 19%)

Topics: Logic Gates – NOT, AND, OR, NAND, NOR, XOR, XNOR: Symbol, Logical expression and truth table. Implementation of Boolean expressions and Logic Functions using gates; Simplification of Boolean expressions using Karnaugh Maps (up to 4 variables).

In simple words: The seven basic gates, their symbols and truth tables, and K-maps — a visual shortcut for simplifying logic.

Unit 3 — Combinational Logic Circuits (8 Periods, 19%)

Topics: Half Adder, Full Adder, Half Subtractor, Full Subtractor, Multiplexer – 2 to 1 MUX, 4 to 1 MUX, 8 to 1 MUX., Demultiplexer – 1 to 2 DEMUX, 1 to 4 DEMUX, Decoder, Encoder. Parity generator and checker.

In simple words: Circuits whose output depends only on the present inputs: adders, subtractors, multiplexers, decoders, and error-checking parity circuits.

Unit 4 — Sequential Logic Circuits (10 Periods, 24%)

Topics: Basic Latches using NAND and NOR gates, Triggering and types of triggering. Flip Flops – SR, JK, T, D Flip Flops, JK-MS Flip Flops. Counters – Definition and types of counters, difference between asynchronous and synchronous counters, logic diagram, truth table and operation of Decade Counter, Johnson Counter and Ring Counter, applications of counters. Registers –: Types of register, Serial in Serial Out, Serial in Parallel Out, Parallel in Serial Out, Parallel in Parallel Out, applications of registers

In simple words: Circuits with memory: flip-flops that store one bit, counters that count pulses, and registers that hold and shift data.

Unit 5 — Memory Devices (8 Periods, 19%)

Topics: Classification of Memories – RAM Organization, Address Lines and Memory Size, SRAM, DRAM, Read Only memory – ROM organization, PROM, EPROM, EEPROM, Flash memory. Data Converters – Introduction: Digital to Analog converters, Analog to Digital Converters.

In simple words: How digital systems store data (RAM, ROM and their variants) and how the digital world talks to the analog world through ADCs and DACs.

Practical Work

- Verification of Demorgan's Theorems.
- To verify the truth tables for all logic Gates- NOT,OR,AND,NAND,NOR, X-OR, X-NOR Gates.
- Realization of Logic Gates using universal Gates.
- Design and verification of the truth tables of Half and Full Adder circuits.
- Design and verification of the truth tables of Half and Full Subtractor circuits.
- Design and verification of the truth tables of 4 to 1 Multiplexer (74150) and 1 to 4 De-Multiplexer (74154) circuits.
- To convert a given octal input to the binary output and to study the LED display using 7447 7-segment decoder.
- Construct and test the performance of parity generator.
- Design and test of an S-R flip-flop using NOR/NAND gates.
- Design and test of an J-K flip-flop using NOR/NAND gates.
- Design and test of an T flip-flop using NOR/NAND gates.
- Construct and test the performance of Decade counter.
- Design a Programmable Up-Down Counter with a 7 Segment Display.
- Design of 4-bit shift register.
- To conduct an experiment to store a set of data in a RAM using IC 2114 starting from location to location and retrieve the same data.

Reference Books (as listed in the syllabus)

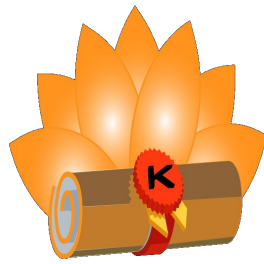
- Digital principles & Applications Albert Paul Malvino& Donald P. Leach McGraw Hill Education; Eighth edition ISBN: 978-9339203405
- Digital Electronics Roger L. Tokheim Macmillian McGraw-Hill Education (ISE Editions); International 2 Revised edition ISBN: 978-0071167963
- Digital Electronics – an introduction to theory and practice William H. Gothmann Prentice Hall India Learning Private Limited; 2 edition ISBN: 978-8120303485
- Fundamentals of Logic Design Charles H. Roth Jr. Jaico Publishing House; First edition ISBN: 978-8172247744
- Digital Electronics R. Anand Khanna Publications, New Delhi (Edition 2018) ISBN: 978-93-82609445
- Rahul Wadhwa, Digital Electronics, Asian Publishers, Muzaffarnagar. ISBN: 978-93-91541-21-7

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Linear Integrated Circuit — Complete Syllabus

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

Subject 3.3 (Practicum) • Total 100 Marks • 3 Credits • L 2 - P 2

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
3.3	Linear Integrated Circuit	Practicum	2 - 2	3	Theory 40	Theory 60 (3 hrs)	100
Linear Integrated Circuit Total				3	40	60	100

What This Subject Aims To Do

To cover the fundamentals of operational amplifiers and their linear and non-linear applications — signal conditioning, medical electronics and instrumentation — and to build the skills to maintain linear electronic circuits based on integrated circuits.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Operational Amplifiers	6	21%
2	Applications of Operational Amplifiers	4	16%
3	Special Purpose Operational Amplifiers	6	21%
4	Voltage Regulator	6	21%

5	Comparator and Timers	6	21%
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Unit 1 — Operational Amplifiers (6 Periods, 21%)

Topics: Symbol, pin diagram, ratings of IC 741, Electrical properties, transfer characteristics & parameters of ideal OP AMP, DC and AC performance characteristics, slew rate, Open and closed loop configurations, Block diagram & operating principle, OP-AMP with positive and negative feedback.

In simple words: The op-amp itself: the 741 chip, what an ideal op-amp should do, what a real one actually does, and open-loop vs closed-loop operation.

Unit 2 — Applications of Operational Amplifiers (4 Periods, 16%)

Topics: Open loop configuration-Inverting, Non-inverting, Close loop configuration – Inverting, non- inverting, Differential amplifier, unity gain amplifier, Inverting & non-inverting configuration of Adders (summing, scaling, averaging amplifier), Subtractor, Integrator & Differentiator

In simple words: The classic op-amp circuits: amplifiers, adders, subtractors, and circuits that integrate or differentiate a signal.

Unit 3 — Special Purpose Operational Amplifiers (6 Periods, 21%)

Topics: Bridge amplifier, instrumentation amplifier with two & three OP AMPS, V-I converters, I-V converters, logarithmic & Antilogarithmic amplifier, Astable, Monostable and Bistable Multivibrator using OP AMP.

In simple words: More specialised op-amp circuits: instrumentation amplifiers for tiny sensor signals, converters between voltage and current, and multivibrators that generate square waves.

Unit 4 — Voltage Regulator (6 Periods, 21%)

Topics: Linear voltage regulator: Block schematic, pin diagrams, features, Specifications, rating and operating principle of IC 723, 78xx, 79xx series, switching regulator: Block schematic, pin diagram, features, specifications, ratings and operating, Principle of switching regulator IC LM 317, LM337 Regulator.

In simple words: How to get a steady DC supply voltage: the 723, 78xx/79xx and adjustable LM317/LM337 regulator chips, and switching regulators.

Unit 5 — Comparator and Timers (6 Periods, 21%)

Topics: Op-Amp as comparator, Study of Op-amp peak to peak detector, phase detector circuit, voltage level detector circuit, Schmitt trigger using op-amp, Study of timer IC – 555, Block diagram, operating principle, pin diagram, Features of IC-555, IC-555 as Astable, Monostable, bi-stable & Schmitt Trigger, Sample and hold circuit, Phase Locked Loop- Principle & block diagram of PLL, Transfer characteristics, lock range & capture range.

In simple words: Using an op-amp to compare voltages, the famous 555 timer chip in its three modes, and the phase-locked loop.

Practical Work

- To Interpret the parameters of given Op-Amplifier from data sheet.
- To test performance of OP_AMP as an inverting & Non inverting amplifier and observe input/output waveforms. To test performance of OP_AMP as unity gain amplifier.
- To design and test performance of OP_AMP as an Adder and Subtractor.
- To test performance of OP_AMP as an Integrator & Differentiator.
- To test performance of OP_AMP Instrumentation Amplifier calculate gain & frequency response.
- To build & test Astable multivibrator using IC 741 for different values of R and C.
- To build/test Monostable multivibrator using IC 741 for different values of R and C.
- To build & test fixed/variable voltage regulator using LM723 & plot line/ load regulation characteristics.
- To build & test variable voltage regulator using LM317 & measure the dropout voltage & plot line/ load regulation characteristics.
- To build & test variable voltage regulator using LM337 & measure the dropout voltage & plot line/ load regulation characteristics.
- To build & test voltage regulator using 78xx and 79xx and measure the dropout voltage & plot line/ load regulation characteristics.
- To build Op-Amp as voltage Regulator- IC 723.
- Various applications of Timer IC555.

Reference Books (as listed in the syllabus)

- Design with operational amplifiers and analog integrated circuits, 3rd Edition Sergio Franco Tata McGraw-Hill, 2007
- Linear Integrated Circuits, D.Roy Choudhry, Shail Jain New Age International Pvt. Ltd
- System design using Integrated Circuits. B.S.Sonde New Age Pub, 2nd Edition, 2001
- Analysis and Design of Analog Integrated Circuits Gray and Meyer Wiley International, 2005.

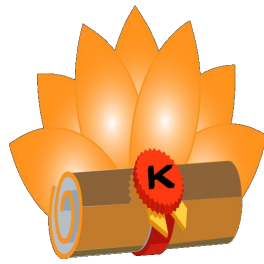
- OP-AMP and Linear ICs Ramakant A. Gayakwad Prentice Hall / Pearson Education, 4th Edition, 2001
- Operational Amplifier and Linear Integrated Circuits K Lal Kishore, Pearson Education, 2006

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Electric Circuits and Network — Complete Syllabus

BTEUP Diploma in Electronics Engineering • 3rd Semester • Session 2026-27
Subject 3.4 (Practicum) • Total 100 Marks • 3 Credits • L 2 - P 2

Note: The scheme table and contents list call this subject “Electric Circuit and Network” (singular); the subject heading in the PDF calls it “Electric Circuits and Network”. No marks-distribution table is given for this subject in the PDF, so unit weightages are not shown.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
3.4	Electric Circuit and Network	Practicum	2 - 2	3	Practical 60	Practical 40 (3 hrs)	100
Electric Circuit and Network Total				3	60	40	100

What This Subject Aims To Do

To build on A.C. theory with networks, filters and transmission lines — the foundation for line communication, audio and video communication and microwave communication systems.

Unit-Wise Complete Topic List

Note: no marks-distribution table is given for this subject in the official syllabus, so unit weightages are not shown.

Unit 1 — Basic Electrical Circuits & Theorem (6 Periods)

Topics: Node and Mesh analysis, Superposition Theorem, Thevenin Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem.

In simple words: The standard theorems for analysing circuits: nodal and mesh analysis, and the theorems of Thevenin, Norton, superposition, maximum power transfer and reciprocity.

Unit 2 — Two Port Network (5 Periods)

Topics: Two Port Network: Open Circuit Impedance Parameters, Short Circuit Admittance Parameters, Transmission Parameters Hybrid Parameters. Overview of T network, π network, Ladder network; Lattice network

In simple words: Describing a network by its two-port parameters (Z, Y, transmission and hybrid) and the standard T, π , ladder and lattice shapes.

Unit 3 — Attenuator (6 Periods)

Topics: Units of attenuation (Decibels and Nepers): General characteristics of attenuators - Analysis and design of simple attenuator of following types; Symmetrical T and π type, L type.

In simple words: Circuits that deliberately reduce signal strength by a known amount, measured in decibels and nepers.

Unit 4 — Filter (6 Periods)

Topics: Brief idea of the use of filter networks in different communication systems, concept of low pass, high pass, band pass and band stop filters. Active Filters Basic concept of active filters and their comparison with passive filters.

In simple words: Filters that let some frequencies through and block others — low-pass, high-pass, band-pass and band-stop, passive and active.

Unit 5 — Transmission Line (5 Periods)

Topics: Transmission Lines, their types and applications, Distributed constants, T and π representation of transmission line section, Concept of reflection and standing waves, definition of reflection coefficient, SWR & VSWR and their relation (no derivation), Concept of transmission lines at high frequencies.

In simple words: What happens when a signal travels along a long line: reflections, standing waves and SWR, and why lines behave differently at high frequencies.

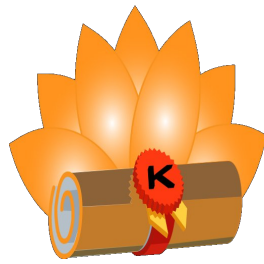
Practical Work

- Verify voltage and current using Node analysis in a DC resistive circuit.
- Verify voltage and current using Mesh analysis in a DC resistive circuit.
- Verification of electrical circuit using Thevenin's theorem.
- Verification of electrical circuit using Norton's theorem.
- Verification of electrical circuit using Maximum Power Transfer theorem.
- Use Superposition theorem to determine current/voltage in a linear circuit with multiple sources.
- Determine Z-parameters of a two-port network.
- To determine the Y parameters of a Two-port network.
- Determine transmission line parameters A, B, C, and D of a two-port network.
- To determine Hybrid parameters of a two-port network.
- To design and verify a symmetrical T-type attenuator for a given attenuation and characteristic impedance.
- To design and verify a symmetrical π -type attenuator for a specified dB loss and characteristic impedance.
- To study the frequency response of a Low Pass Filter and observe the cut-off frequency.
- To study the frequency response of a High Pass filter and observe the cut-off frequency.
- To study the frequency response of a Band Pass filter and observe the cut-off frequency.
- To study the frequency response of a Band Stop filter and observe the cut-off frequency.
- To construct and test a Band Pass Filter and study its center frequency and bandwidth.
- To observe reflections due to impedance mismatch in transmission lines.

Reference Books (as listed in the syllabus)

- Network Filters and Transmission Lines by AK Chakarvorty; Dhanpat Rai and Co. Publication, New Delhi
- Rahul Wadhwa, Network, Filters & Transmission Lines, Asian Publishers, Muzaffarnagar. ISBN: 978-93-5502-112-0
- Networks and Systems by Ashfaq Husain, Khanna Publishing House
- Network Analysis by Soni and Gupta; Dhanpat Rai and Co. Publication, New Delhi
- Network Filters and Transmission Line by Yash Pal; Ishan Publications, Ambala City
- Electrical and Electronics Measuring instrumentation, A.K Sawhney; Dhanpat Rai and Co. Publication, New Delhi

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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.

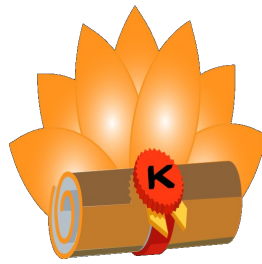
Reference Books

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

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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 - P	Credits	Internal	External	Total
3.7(b)	Open Elective-1: Fundamentals of Innovation and Design Thinking	Theory (Q)	2 - 0	2	50	—	N/A (Q)
Fundamentals of Innovation and Design Thinking Total				2	50	—	N/A (Q)

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.

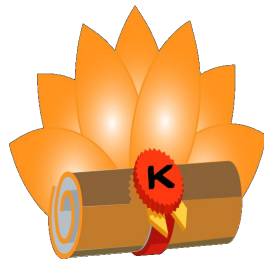
Reference Books

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

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Summer Internship-I & Student Centred Activities — 3rd Semester

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

Subject 3.8 (Internship) 50 Marks • SCA 50 Marks • Total 100 Marks

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
3.8	Summer Internship-I (4 weeks after 2nd Sem.)	Internship	—	2	50	—	50
—	Student Centred Activities (SCA)	Activity	0 - 12	—	50	—	50
Internship-I + SCA Total				2	100	—	100

Summer Internship-I — What It Is

Industrial training during the semester break after the 2nd semester examinations. The scheme table gives the duration as 4 weeks; the scheme note says “SUMMER INTERNSHIP (4-6 WEEKS) duration to be organized after second semester exam. Evaluation will be in third semester.” The salient features say four and six weeks of industrial training are mandatory after the II and IV semesters, with total marks of 50 and 100 respectively. It gives students an opportunity to experience the environment and culture of industrial production units and commercial activities in field organisations, and to integrate theory with practice. The concerned HOD, along with other teachers, guides students in arranging appropriate training places relevant to their branch. (No detailed internship syllabus, evaluation break-up or report format is given in the PDF for this internship — the marks are shown only as 50 internal in the scheme table.)

Student Centred Activities (SCA) — 50 Marks

A provision for overall personality development, including co-curricular activities such as extension lectures, games, hobby clubs (for example photography, painting and singing), seminars, declamation contests, educational field visits, NCC, NSS, library work, cultural activities and self-study. Maximum marks 50, distributed as: (i) 15 marks for general behaviour and discipline (by HODs in consultation with all teachers of the department); (ii) 10 marks for attendance — 75–80% = 6 marks, 80–85% = 8 marks, above 85% = 10 marks; (iii) 25 marks maximum in an odd semester for Language Lab Practices, Group Discussion and Personality Development, Industrial Visits/Industrial Talks, Power Point Presentations and Resume Making, Development of Aptitude and Reasoning Skills, and participation in technical Exhibitions, Symposiums, Seminars, Workshops at Institute/District/State/National level. (In an even semester the 25 marks are for Sports/NCC/Cultural/Co-curricular/NSS activities.)

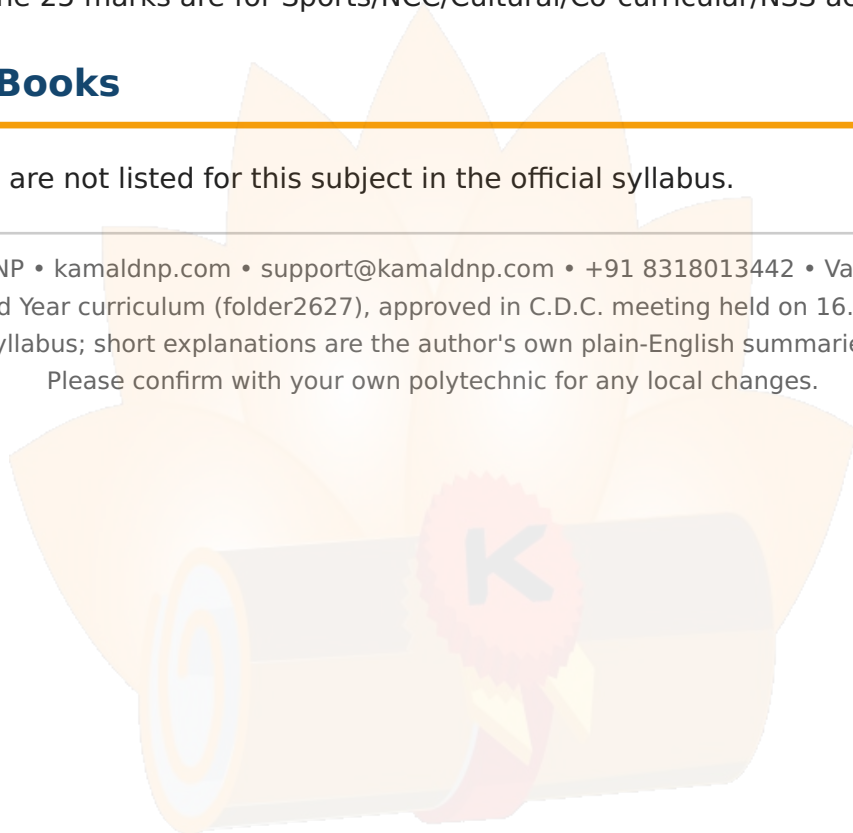
Reference Books

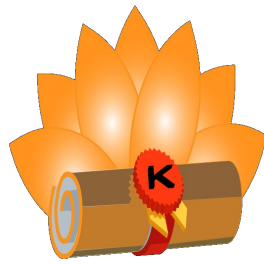
Reference books are not listed for this subject in the official syllabus.

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Microprocessor and Its Applications — Complete Syllabus

BTEUP Diploma in Electronics Engineering • 4th Semester • Session 2026-27
Subject 4.1 (Theory) + 4.5 (Lab) • Total 200 Marks • 6 Credits

About this document: Microprocessor and Its Applications appears twice in the 4th semester — as a theory paper (4.1) and as a lab (4.5). Both are covered here, completely, in the official order.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
4.1	Microprocessor and Its Applications	Theory	3 - 0	3	Theory 40	Theory 60 (3 hrs)	100
4.5	Microprocessor and Its Applications (Lab)	Practical	0 - 6	3	Practical 60	Practical 40 (3 hrs)	100
Microprocessor and Its Applications Total				6	100	100	200

What This Subject Aims To Do

To give a strong foundation in microprocessor concepts and evolution, with emphasis on the 8085 and 8086 architectures — instruction sets, assembly language programming, memory organisation and peripheral interfacing — plus practical programming skills and real-world applications of microprocessor-based systems.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Introduction to Microprocessor	10	24%
2	8086 Microprocessor Programming	12	29%
3	Interfacing with Peripheral Devices	8	19%
4	Microprocessor-Based System Design	6	14%
5	Microcontrollers and Embedded Systems	6	14%

Unit 1 — Introduction to Microprocessor (10 Periods, 24%)

Topics: Evolution and History of microprocessors, Introduction to 8-bit, 16-bit, and 32-bit processors, Architecture and Operation of the 8085 microprocessor, Addressing modes and Bus organization, Architecture and Operation of the 8086 microprocessor, Addressing modes and Bus organization

In simple words: How microprocessors evolved, and the inside story of the 8085 and 8086: their architecture, addressing modes and buses.

Unit 2 — 8086 Microprocessor Programming (12 Periods, 29%)

Topics: Instruction set of 8086 microprocessors, Assembly language programming, Stack, Subroutines and Interrupt Handling

In simple words: Writing programs in assembly language for the 8086: its instructions, the stack, subroutines and interrupts.

Unit 3 — Interfacing with Peripheral Devices (8 Periods, 19%)

Topics: Memory and I/O interfacing, 8255 Programmable Peripheral Interface, DC, DAC, and sensor interfacing, Serial and parallel communication

In simple words: Connecting a microprocessor to the outside world: memory, I/O ports, the 8255 interface chip, ADC/DAC and sensors, and serial/parallel communication.

Unit 4 — Microprocessor-Based System Design (6 Periods, 14%)

Topics: Design of microprocessor-based control systems, Industrial applications of microprocessors, Data acquisition and process control, Case studies of real-world applications

In simple words: Designing complete control systems around a microprocessor, with industrial examples and case studies.

Unit 5 — Microcontrollers and Embedded Systems (6 Periods, 14%)

Topics: Introduction to Microcontrollers (8051), Difference between microprocessors and microcontrollers, Role of microcontrollers in embedded systems, Applications of modern microprocessor-based systems

In simple words: Microcontrollers vs microprocessors, the 8051, and where embedded systems fit in modern products.

Practical Work

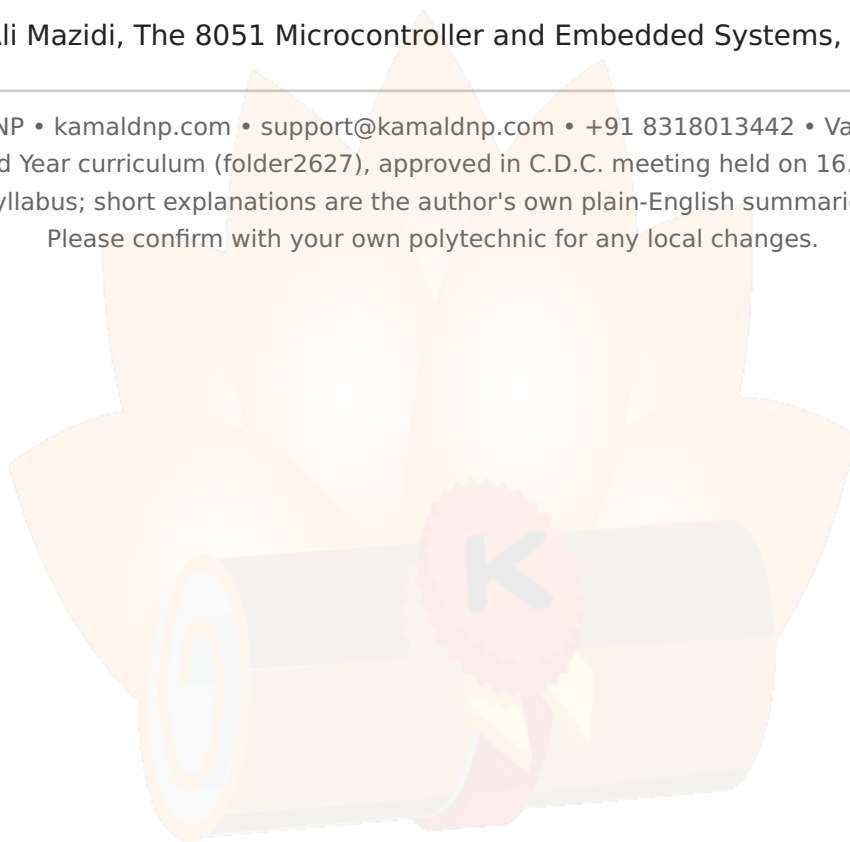
- Introduction to 8085/8086 kit and instruction set.
- Add two 8-bit numbers using 8085.
- Subtract and compare two 8-bit numbers.
- Multiply two 8-bit numbers using repeated addition.
- Divide two 8-bit numbers using 8085.
- Block data transfer using 8085.
- Sorting of an array using 8085.
- To add two hexadecimal & decimal numbers using 8085.
- To subtract two hexadecimal & decimal numbers using 8085.
- Interfacing ADC/DAC with 8085.
- To interface ADC & DAC with 8085 & demonstrate generation of square wave.
- Add two 8-bit numbers using 8086.
- Subtract and compare two 8-bit numbers using 8086.
- Multiply two 8-bit numbers using repeated addition using 8086.
- Divide two 8-bit numbers using 8086.
- Block data transfer using 8086.
- Sorting of an array using 8086.
- Perform various logical operation using 8086.
- Perform universal gate operation using 8086.
- Find 1s' and 2's complement of a number in 8086.
- Program for LED blinking using microprocessor I/O interfacing.

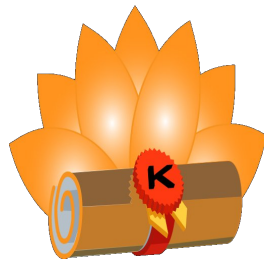
- Stepper motor interfacing using 8255.
- Traffic light control simulation using 8085.

Reference Books (as listed in the syllabus)

- Ramesh Gaonkar, Microprocessor Architecture, Programming, and Applications with the 8085, PHI.
- Douglas V. Hall, Microprocessors and Interfacing: Programming & Hardware, McGraw-Hill.
- Kenneth J. Ayala, The 8051 Microcontroller, Cengage Learning.
- B.B. Dwivedi, Microprocessors & Peripheral Devices, Asian Publishers, Muzaffarnagar. ISBN: 978-93-91541-77-4
- A.P. Godse & D.A. Godse, Microprocessor and its Applications, Technical Publications.
- Muhammad Ali Mazidi, The 8051 Microcontroller and Embedded Systems, Pearson.

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Principles of Electronic Communication — Complete Syllabus

BTEUP Diploma in Electronics Engineering • 4th Semester • Session 2026-27
Subject 4.2 (Theory) + 4.6 (Lab) • Total 200 Marks • 6 Credits

About this document: Principles of Electronic Communication appears twice in the 4th semester — as a theory paper (4.2) and as a lab (4.6). Both are covered here, completely, in the official order. The simulation-experiment list in the lab section is numbered confusingly in the PDF (e.g. “1. 1Simulation”, “7Simulation”); the list below follows the PDF text.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
4.2	Principles of Electronic Communication	Theory	3 - 0	3	Theory 40	Theory 60 (3 hrs)	100
4.6	Principles of Electronic Communication (Lab)	Practical	0 - 6	3	Practical 60	Practical 40 (3 hrs)	100
Principles of Electronic Communication Total				6	100	100	200

What This Subject Aims To Do

To equip students with a thorough understanding of the fundamental principles of communication — filters, modulation-demodulation and antennas — so they can analyse, troubleshoot and adapt to advancements in communication technologies.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Introduction to Communication Engineering	4	10%
2	Amplitude Modulation	11	26%
3	Angle Modulation	11	26%
4	Digital Modulation Techniques	10	24%
5	Introduction to Antennas	6	14%

Unit 1 — Introduction to Communication Engineering (4 Periods, 10%)

Topics: Introduction to electromagnetic frequency spectrum- relationship between wavelength and frequency. Filters: Definition, types of filters and their frequency response characteristics- LPF, HPF and BPF - applications. Noise: Definition, Types of noise and their sources, SNR and noise figure. Distortion - Definition, types of distortion, Difference between noise and distortion. Concept of fidelity, selectivity and sensitivity. Introduction to modulation- Need of modulation, Concept of frequency translation

In simple words: The basics: the frequency spectrum, filters, noise and distortion, and why modulation is needed at all.

Unit 2 — Amplitude Modulation (11 Periods, 26%)

Topics: Definition of amplitude modulation, Expression for AM and its waveform representation, frequency spectrum and bandwidth of AM wave, relative power distribution in carrier and side bands. Elementary idea of DSB, DSB-SC SSB and VSB modulation. Principles of AM modulators: Square Law Modulator, Balanced Modulator. Principles of AM Demodulator: Diode Detector Circuit. Need and Principles of Super Heterodyne Receiver

In simple words: AM: how the carrier is varied by the message, how much power sits in the sidebands, AM modulators and detectors, and the superheterodyne receiver.

Unit 3 — Angle Modulation (11 Periods, 26%)

Topics: Frequency Modulation: Concept of Angle Modulation, Definition of FM modulation, Waveform representation of FM, Expression for FM and its frequency spectrum, modulation index, maximum frequency deviation and deviation ratio, bandwidth a FM signals, Carzon's rule, Pre-emphasis and De-emphasis, FM modulator and demodulator circuit in brief. Phase Modulation: Definition, expression for PM and its frequency spectrum, modulation index, PM modulator and demodulator circuit in brief, comparison of FM, PM and AM communication systems

In simple words: FM and PM: varying the frequency or phase instead of the amplitude, modulation index and bandwidth (Carson's rule), and how FM compares with AM.

Unit 4 — Digital Modulation Techniques (10 Periods, 24%)

Topics: Digital Modulation Techniques- ASK, FSK, PSK, BPSK modulation and demodulation techniques (only block diagram, operation and waveforms)- Basic concept of OFDM. Pulse modulation techniques: Generation and detection of PAM PWM and PPM. Pulse Digital modulation techniques: PCM and DM transmitter and receiver

In simple words: Sending digital data over analog channels: ASK, FSK, PSK and BPSK, pulse modulation (PAM, PWM, PPM), and digital pulse modulation (PCM, delta modulation).

Unit 5 — Introduction to Antennas (6 Periods, 14%)

Topics: Definition of Antenna, Importance and applications of Antenna, Basic parameters: radiation pattern, gain, directivity, impedance, polarization

In simple words: Antennas: what they are, their radiation pattern, gain, directivity, impedance and polarisation.

Practical Work

- Construct and test the performance of LPF,HPF and BPF.
- Construct and test the performance of AM Modulator.
- Construct and test the performance of AM demodulation using envelope detector.
- (a) To obtain an AM wave from a square law modulator circuit and observe waveforms. (b) To measure the modulation index of the obtained wave form. Observe under modulated, 100% modulated & over modulated AM.
- Construct and test the performance of FM Modulator.
- Construct and test the performance of FM demodulator.
- To obtain an FM wave and measure the frequency deviation and modulation index for different modulating signals.

- Test the performance of ASK modulator and demodulator and draw its input and output waveform.
- Test the performance of PSK modulator and demodulator and draw its input and output waveform.
- Test the performance of FSK modulator and demodulator and draw its input and output waveform.
- Construct and test the performance of Sample and Hold Circuit.
- To observe the sampled signal and compare it with the analog input signal. Note the effect of varying the sampling pulse width and frequency on the sampled output.
- To observe and note the pulse amplitude modulated signal (PAM) and compare them with the corresponding analog input signal.
- To observe PPM signal and compare it with the analog input signal.
- To observe PWM signal and compare it with the analog input signal.
- Construct and test the performance of Pulse Width Modulator.
- Determine the directional characteristics of Moving Coil Microphone.
- Determine the directional characteristics of Dynamic core Loudspeaker.
- Test the performance (its field strength, radiation pattern, bandwidth, efficiency, polarization, and gain) of a given dipole antenna. Plot the radiation pattern for different length of antennas.
- Test the performance of given Yagi-Uda antenna.

Simulation Experiments — any 10 to be performed through open source simulation tools

- Simulation of frequency response of LPF.
- Simulation of frequency response of HPF.
- Simulation of frequency response of BPF.
- Simulation of DSB modulation and demodulation.
- Simulation of DSB-SC modulation and demodulation.
- Simulation of SSB modulation and demodulation.
- Simulation of FM modulation and demodulation.
- Simulation of PM modulation and demodulation.
- Simulation of ASK modulation and demodulation.
- Simulation of PSK modulation and demodulation.
- Simulation of BPSK modulation and demodulation.
- Simulation of FSK modulation and demodulation.
- Simulate the sampling of an analog signal.
- Simulation of PAM generation.
- Simulation of PWM generation.

- Simulation of PPM generation.
- Simulation of Delta Modulation.
- To simulate and analyse the performance of different types of dipole antenna and understand their key parameters such as radiation patterns, gain, directivity, and bandwidth.
- To simulate and analyse the performance of different types of Yagi-Uda antenna and understand their key parameters such as radiation patterns, gain, directivity, and bandwidth.
- To design a basic communication system.

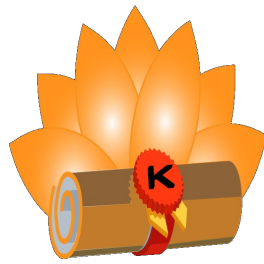
Reference Books (as listed in the syllabus)

- Principles of communication systems by Taub Schilling, T.M.H.
- Fundamentals of communication systems by Proakis & Salehi, Pearson education
- Communication Systems by Simon Haykin, John Wiley
- Communication Systems (Analog and Digital) By R.P. Singh, S.D. Sapre, T.M.H.
- Modern Digital & Analog Communication by B.P. Lathi, Oxford Publications
- Rahul Wadhwa, Principles of Communication Engineering Asian Publishers, Muzaffarnagar. ISBN: 978-93-5502-128-1
- Digital & Analog Communication Systems by K.S. Shanmugam, John Wiley
- E-books/e-tools to be used as recommended by AICTE/NITTTR, Chandigarh.

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Electronic Instrumentation and Measurement — Complete Syllabus

BTEUP Diploma in Electronics Engineering • 4th Semester • Session 2026-27
Subject 4.3 (Practicum) • Total 100 Marks • 3 Credits • L 2 - P 2

Note: The scheme table spells this subject “Electronic Instrumentation & Measurement” (sic); the subject heading spells it “Electronic Instrumentation & Measurement”.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
4.3	Electronic Instrumentation & Measurement	Practicum	2 - 2	3	Theory 40	Theory 60 (3 hrs)	100
Electronic Instrumentation and Measurement Total				3	40	60	100

What This Subject Aims To Do

To build on basic measuring tools with the principles, concepts and techniques of analog and digital electronic measurement methods — for accurate determination of process parameters in industrial applications, with data detection, acquisition, analysis and control.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Basics of Measurements	4	15%
2	AC and DC and Bridges	4	15%
3	Measuring Instruments	7	25%
4	Oscilloscopes	7	25%
5	Transducers	6	20%

Unit 1 — Basics of Measurements (4 Periods, 15%)

Topics: Measurement, Method of measurements, Types of instruments, Accuracy & Precision, Sensitivity, Resolution, Types of Errors, Sources of errors, Loading effect

In simple words: What makes a measurement good: accuracy, precision, sensitivity, resolution, and the errors that creep in.

Unit 2 — AC and DC and Bridges (4 Periods, 15%)

Topics: DC Bridges -Wheatstone and Kelvin Double Bridge (Only comparative study). AC Bridges - Maxwell's Bridge, Hay's Bridge, Anderson Bridge, De-Sauty's Bridge (Only comparative study)

In simple words: Bridge circuits for measuring resistance and inductance precisely — Wheatstone, Kelvin, Maxwell, Hay, Anderson and De-Sauty.

Unit 3 — Measuring Instruments (7 Periods, 25%)

Topics: Permanent Magnet Moving Coil Instruments (PMMC), Moving Iron Type Instruments (MI), Electro Dynamo Type Instruments, Single Phase Energy Meter, Applications of DC Potentiometer and AC Potentiometers, Various types of Electronic Instruments.

In simple words: The classic indicating instruments — PMMC, moving-iron and dynamometer types — plus energy meters and potentiometers.

Unit 4 — Oscilloscopes (7 Periods, 25%)

Topics: Cathode ray tube: probe structure (1:1,10:1), construction, operation, screens, Graticules vertical deflection system, Horizontal deflection system, Delay line, Measurement of frequency, time delay, phase angle and modulation index (trapezoidal method), Oscilloscope probe: Structure of 1:1 and 10:1 probe, Multiple Trace CRO, Digital storage oscilloscope (DSO).

In simple words: The oscilloscope: how a CRO works, its probes, and how to measure frequency, phase and modulation index — plus the modern digital storage oscilloscope.

Unit 5 — Transducers (6 Periods, 20%)

Topics: Classification, Selection Criteria, Characteristics, Construction, Working Principles and Application of following Transducers: RTD, Thermocouple, Thermistor, LVDT, Strain Gauge Load Cell, Piezoelectric Transducers.

In simple words: Sensors that convert physical quantities into electrical signals: temperature (RTD, thermocouple, thermistor), displacement (LVDT), strain gauges and piezoelectric devices.

Practical Work

- Determine the value of unknown resistance using Wheatstone bridge.
- Measure Low resistance by Kelvin's Double Bridge.
- Measure unknown inductance using following bridges (a) Anderson's Bridge (b) Maxwell's Bridge.
- List various standard sources & measuring UNITS. Measure DC & AC voltages, current using ammeter and voltmeter.
- Test diodes and transistors using analog and digital Multimeter.
- Study the working of Q-meter and measure Q of coils.
- Operate front panel controls of DSO/CRO to observe various waveforms.
- Measure time, voltage, frequency, phase difference of input signals using DSO/CRO.
- Demonstrate features of digital storage oscilloscope.
- Experiment with front panel controls of various signal generators and observe output Waveform.
- Measure strain/stress using strain gauge measurement.
- Measure displacement using LVDT.
- Measure temperature using thermistor and thermocouple.
- Using a piezo resistive sensor to measure pressure variations/Using a piezoelectric sensor to measure sound vibrations.

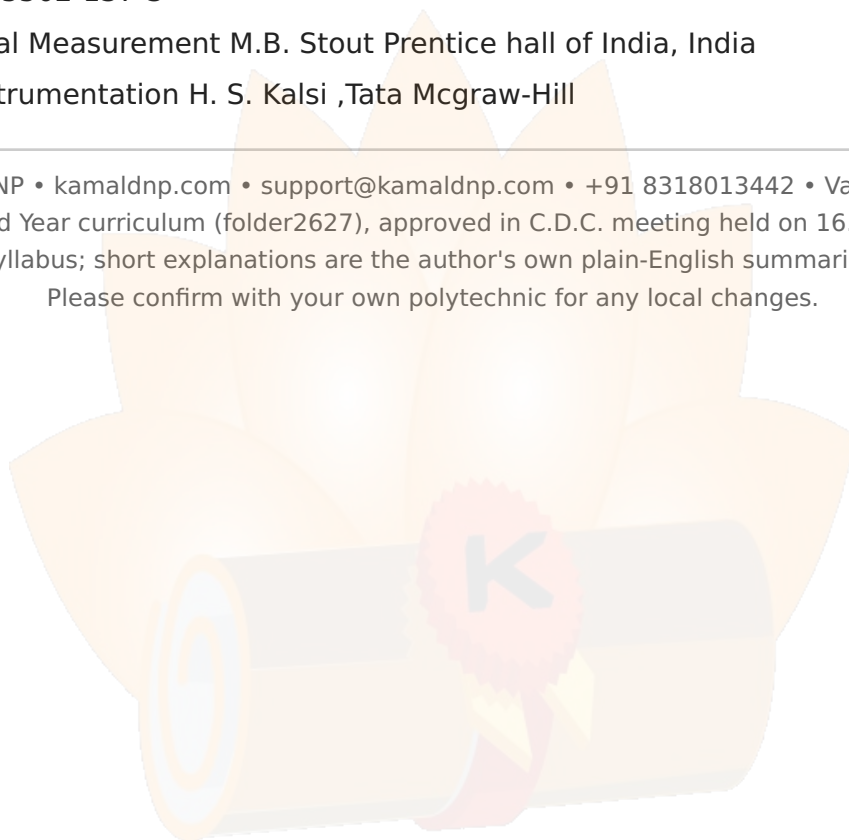
Reference Books (as listed in the syllabus)

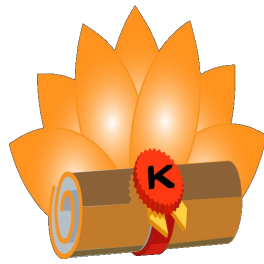
- Electrical & Electronic Measurement & Instruments A.K. Sawhney, Dhanpat Rai & Sons, India
- Electronic Instrument and Measurement Technique W.D. Cooper Prentice Hall International, India.
- Electronic Measurement & Instrumentation J.G. Joshi Khanna Publishing House, Delhi
- Measurement systems application and design E.O. Doebelin and D. N. Manik, Tata Mcgraw-Hill
- Electronic Measurements and Instrumentation Oliver and Cage, Tata Mcgraw-Hill
- Rahul Wadhwa, Electronic Instruments&Measurement, Asian Publishers, Muzaffarnagar. ISBN: 978-93-5502-137-3
- Basic Electrical Measurement M.B. Stout Prentice hall of India, India
- Electronic Instrumentation H. S. Kalsi ,Tata Mcgraw-Hill

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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.

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Programming in C — Complete Syllabus

BTEUP Diploma in Electronics Engineering • 4th Semester • Session 2026-27

Subject 4.4 (Practicum) • Total 100 Marks • 3 Credits • L 1 - P 4

Note: The PDF prints Unit 1 as “(0 4 Periods)” (garbled); 4 periods is used here. No marks-distribution table is given for this subject, so unit weightages are not shown. Book 4 in the PDF’s list (“Electronic Instruments&Measurement”) appears to be a copy-paste error in the original — it is reproduced exactly as printed.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
4.4	Programming in C	Practicum	1 - 4	3	Practical 60	Practical 40 (3 hrs)	100
Programming in C Total				3	60	40	100

What This Subject Aims To Do

To enable students to use computers for problem-solving through the C programming language, reinforced with hands-on exercises and programming labs; the course also introduces Python programming (language fundamentals, IDE/IDLE usage, control flow, strings, input/output, collections, classes, modules and regular expressions).

Unit-Wise Complete Topic List

Note: no marks-distribution table is given for this subject in the official syllabus, so unit weightages are not shown.

Unit 1 — Introduction (4 Periods)

Topics: Brief idea of low level and high level programming languages, steps in development of a Program, Flow charts, Algorithm development, Programme Debugging, Introduction to Python, Basis of C programming, I/O statements, Assign statements, Constants, variables and data types, Operators and Expressions, Standards and Formatted IOS, Data Type Casting

In simple words: First steps: low-level vs high-level languages, flowcharts and algorithms, and the C basics — variables, data types, operators and input/output — plus a first look at Python.

Unit 2 — Control Structures (2 Periods)

Topics: Decision making with IF - statement, IF - Else and Nested IF, While and do-while, FOR loop Break. Continue go to and switch statements

In simple words: Making decisions and repeating work: if-else, loops, break, continue and switch.

Unit 3 — Functions (4 Periods)

Topics: Introduction to functions, Global and Local Variables, Function Declaration, Standard functions Parameters and Parameter Passing, Call - by value/reference, Recursion

In simple words: Splitting programs into reusable functions, passing values by value or by reference, and recursion.

Unit 4 — Arrays (2 Periods)

Topics: Introduction to Arrays, Array Declaration, Length of array, Single and Multidimensional Array, Arrays of characters, Passing an array to function, Pointers to an array

In simple words: Storing many values together: single and multi-dimensional arrays, character arrays, and pointers to arrays.

Unit 5 — Pointers (2 Periods)

Topics: Introduction to Pointers, Address operator and pointers, Declaring and Initializing pointers Single pointer, Introduction to Colab, Programming in Python.

In simple words: Pointers — variables that hold addresses — plus an introduction to Google Colab and Python programming.

Practical Work

- Programming exercises on executing and editing a C program.
- Programming exercises on defining variables and assigning values to variables.
- Programming exercises on arithmetic and relational operators.
- Programming exercises on arithmetic expressions and their evaluation.
- Programming exercises on formatting input/output using printf and scanf and their return type values.
- Programming exercises using if statement.
- Programming exercises using if - Else.
- Programming exercises on switch statement.
- Programming exercises on do - while, statement.
- Programming exercises on for - statement.
- Programs on one-dimensional array.
- Programs on two-dimensional array.
- (i) Programs for putting two strings together. (ii) Programs for comparing two strings.
- Simple programs using structures.
- Simple programs using pointers.
- Simple programs using union.
- Practice basic coding syntax in Python language.

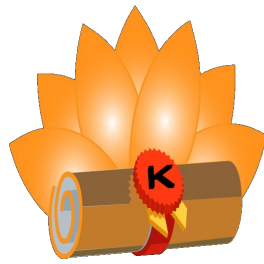
Reference Books (as listed in the syllabus)

- Let Us C, Yashavant Kanetkar
- Problem Solving and Programming in C, R.S. Salaria, Khanna Publishing House
- C Programming Absolute Beginner's Guide, Dean Miller and Greg Perry
- Rahul Wadhwa, Electronic Instruments&Measurement, Asian Publishers, Muzaffarnagar. ISBN: 978-93-5502-137-3
- Learning Python by Mark Lutz; Pratham Books, Bangalore
- Foundations of Python Network Programming by John Goerzen and Brandeu Rhodes; A press-e Book distributed by Springer Science and Business Media, New York

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Electric Vehicle — Complete Syllabus (Open Elective-2, Option 1)

BTEUP Diploma in Electronics Engineering • 4th Semester • Session 2026-27

Subject 4.7.1 — Open Elective-2, Option 1 (Theory) • Qualifying (Q) • 2 Credits • L 2 - P 0

• Choose this OR Industrial Robotics

Note: Case studies and a Mini Project should be carried out throughout the semester (as stated in the PDF).

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
4.7.1	Open Elective-2: Electric Vehicle	Theory (Q)	2 - 0	2	50	—	N/A (Q)
Electric Vehicle Total				2	50	—	N/A (Q)

What This Subject Aims To Do

To provide a solid foundation in electric vehicle (EV) technology, government policies and their economic and environmental implications — the systems and subsystems of EVs, design and operation calculations, selection of motors, controllers, battery packs, battery management systems and charging infrastructure, regenerative braking, regulatory standards, safety, wiring harness design and testing norms, and the latest advancements.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Introduction to Industrial Safety Practices & Electric Vehicle	4	15%
2	Electric Vehicle Architecture, Motors and Controllers	6	20%
3	Energy Storage System & Charging System, Electric Vehicle Battery Management System and Basic Regulatory Requirements	8	30%
4	Electric Vehicle Circuit Protection Safety, Repair and Maintenance of EV	6	20%
5	Electric Vehicle Testing and Technology Advancement in Electric Vehicle	4	15%

Unit 1 — Introduction to Industrial Safety Practices & Electric Vehicle (4 Periods, 15%)

Topics: Fire Extinguishers & its Types, safely handling Tools & Equipment, Use of proper Tools & Equipment & its maintenance, OSH & practices to be observed as a precaution. Overview electric Vehicle Technologies, India policy regarding electric vehicles, Electric vehicle advantages and limitations, Electric vehicle effects on the economy and environment

In simple words: Workshop safety first, then the big picture: EV technology, India's EV policy, and the economic and environmental case for electric vehicles.

Unit 2 — Electric Vehicle Architecture, Motors and Controllers (6 Periods, 20%)

Topics: Types of Electric Vehicles (Overview of electric vehicle technologies like BEV, HEV, PHEV and FCEV.), Basic architecture of electric vehicle drivetrains, Overview of various system and subsystem of Electrical Vehicle and their functions. Function and operation of electric vehicle motors, Classification of electrical vehicle motors, Types of loads acting on vehicle, Motor specifications, Motor calculation for electric vehicle, Motor selection, Motor controllers and its function, Motor controller selection, Function and operation of a DC-to-DC converter, Basic Wiring harness for EV, Overview of regenerative braking, function & working

In simple words: The types of EVs (battery, hybrid, plug-in hybrid, fuel-cell), their drivetrains and motors, how to size and choose a motor and controller, and regenerative braking.

Unit 3 — Energy Storage System & Charging System, Electric Vehicle Battery Management System and Basic Regulatory Requirements (8 Periods, 30%)

Topics: Electric Vehicle Energy Storage & Charging System, Overview of battery pack. (Cell selection, battery connection, battery pack construction), Overview of battery pack sizing, Thermal management, charging system types, Fundamentals of constant voltage and constant current charging, Standards for electric car charging, Connector standards for charging electric vehicles, Calculation for battery recharging and discharge, Pros and Limitations of batteries for electric vehicles, Regenerative Braking Systems. Introduction to Battery Management System, function of a battery management system (BMS), Block diagram of the battery management system, Thermal control system, cell load distribution, and State of Charge (SOC) and State of Health (SOH) analysis, Difference between high voltage and low voltage system, Maintenance & repairing of electric vehicle system, Basic Regulatory Requirements.

In simple words: Batteries and charging: pack construction and sizing, charging standards and connectors, and the battery management system that keeps cells safe and healthy.

Unit 4 — Electric Vehicle Circuit Protection Safety, Repair and Maintenance of EV (6 Periods, 20%)

Topics: Introduction to electrical wiring harness, Importance of colour coding and labelling on wiring harness, Materials used for wiring harness and its selection criteria, Design consideration in wiring harness, Understand wire gauge and power rating capacity, Types of Electric vehicle Fuses, Electric Vehicle Relays, Selection of relay type, Positioning Fuses and relays in Electric vehicle circuit. Preventive maintenance of EV, Standard procedure to work on high voltage systems, Diagnosis and fault finding, Schedule servicing of EV, Predictive maintenance of EV.

In simple words: Wiring harnesses, fuses and relays, and how to maintain and repair an EV safely — especially its high-voltage systems.

Unit 5 — Electric Vehicle Testing and Technology Advancement in Electric Vehicle (4 Periods, 15%)

Topics: Vehicle Performance testing for acceleration, top speed, range, braking, hill climbing, vehicle structure, road handling, weather resistance, etc., Vehicle Durability testing or life expectancy of parts, materials, and components, Safety: battery safety, charging system safety, and occupant safety, Emission standard and its testing, Vehicle Noise standards and its testing, Advancements in electrical vehicle: Autonomous Driving, Battery Technology to improved range, greater efficiency, and faster charging, life span of batteries, Charging Infrastructure (public charging networks, on-the-go charge, development in vehicle overnight charging technology, wireless Charging).

In simple words: How EVs are tested for performance, durability and safety, and where the technology is heading: autonomy, better batteries and wireless charging.

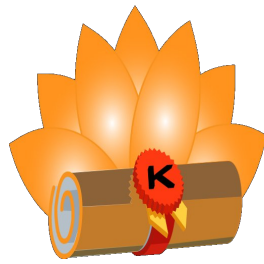
Reference Books (as listed in the syllabus)

- Electric Vehicle Technology Explained — Authors: James Larminie, John Lowry — Publisher: Wiley
- Modern Electric Vehicle Technology — Author: C.C. Chan, K.T. Chau — Publisher: Oxford University Press
- Electric and Hybrid Vehicles: Design Fundamentals — Author: Iqbal Husain — Publisher: CRC Press
- Electric and Hybrid Vehicles: Technologies, Modeling and Control – A Mechatronic Approach — Author: Amir Khajepour, M. Saber Fallah, Avesta Goodarzi — Publisher: Wiley
- Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives — Author: Chris Mi, M. Abul Masrur, David Wenzhong Gao — Publisher: Wiley
- Battery Management Systems for Large Lithium Ion Battery Packs — Author: Davide Andrea — Publisher: Artech House
- Electric Vehicles: Prospects and Challenges — Editors: Tariq Muneer, Irene Illescas García — Publisher: Elsevier
- Power Electronics for Electric Vehicles and Energy Storage — Author: Anup Bhattacharya — Publisher: Springer
- Automotive Power train and Electric Vehicle Systems — Author: Alexander G. Arnold — Publisher: SAE International
- The Electric Car: Development and Future of Battery, Hybrid and Fuel-Cell Cars — Author: Michael Here ward Westbrook — Publisher: IET (Institution of Engineering and Technology)

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Industrial Robotics — Complete Syllabus (Open Elective-2, Option 2)

BTEUP Diploma in Electronics Engineering • 4th Semester • Session 2026-27

Subject 4.7.2 — Open Elective-2, Option 2 (Theory) • Qualifying (Q) • 2 Credits • L 2 - P 0
• Choose this OR Electric Vehicle

Note: Case studies and a Mini Project should be carried out throughout the semester (as stated in the PDF).

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
4.7.2	Open Elective-2: Industrial Robotics	Theory (Q)	2 - 0	2	50	—	N/A (Q)
Industrial Robotics Total				2	50	—	N/A (Q)

What This Subject Aims To Do

To equip students with foundational and advanced knowledge of industrial robotics — robot anatomy, programming, kinematics and control systems — to design, simulate and operate robotic systems used in manufacturing, with emphasis on automation integration, safety protocols and real-world applications.

Unit-Wise Complete Topic List

Unit	Topic	Periods
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			Marks Share
1	Introduction to Industrial Safety Practices and Introduction to Industrial Robotics	8	30%
2	Jogging of Robot	4	15%
3	Programming of a Robot Using Teach Pendant	6	20%
4	Robot Integration with PLC, HMI and Other Equipment	6	20%
5	Robot Programming with Advance Level Instructions	4	15%

Unit 1 — Introduction to Industrial Safety Practices and Introduction to Industrial Robotics (8 Periods, 30%)

Topics: Fire Extinguishers & its Types, safely handling Tools & Equipment, Use of proper Tools & Equipment & its maintenance, OSH & practices to be observed as a precaution. Introduction of Robots and their Importance in Manufacturing and Production, Applications of robots in manufacturing and assembly for which they can be efficiently utilized, Role of robots and automation systems in boosting the safety at dangerous manufacturing tasks, Structure and functions of robot System (Basic Package) and additional Equipment, Major Applications of Robots-Pick and Place, Arc Welding, Ultrasonic welding, Part Transfer, Packing, Palletizing. Type of End of arm tools and differences between them: Handling tools - Pneumatic Gripper, Vacuum Gripper, Hydraulic Gripper, Hydraulic Gripper, and Servo-Electric Gripper. Welding guns - Arc Welding guns, Spot welding guns. Robotic cell and its various components. Cycle time and its importance. Operator job in robotic cell. Safety procedure for Programmer and an Operator.

In simple words: Safety first, then what industrial robots are, where they are used (welding, pick-and-place, packing), their tools and grippers, and how a robotic cell works.

Unit 2 — Jogging of Robot (4 Periods, 15%)

Topics: Turn ON /OFF Steps of Robot, Checking Robotic cell Health, Introduction to Teach pendant and key functions, Industrial robot Coordinate system, Different coordinate systems in Robots, Defining X, Y, Z co-ordinate system, Jogging Robot using Teach pendant in different Modes of coordinate systems: Joint co-ordinate system, rectangular co-ordinate system, and User or object co-ordinate system, Tool co-ordinate system, TCP (Tool centre point definition) i.e., TCP File. , Creating user defined work objects i.e., user coordinate frame File.(Box, circle, triangle work object definition)

In simple words: Moving a robot by hand with the teach pendant: switching it on, checking the cell, coordinate systems, and the tool centre point.

Unit 3 — Programming of a Robot Using Teach Pendant (6 Periods, 20%)

Topics: Robot Program Structure, Different Motion Types used in Programming (PTP, Linear, Circular, Spline): Move J (PTP) , Move L (Linear) , Move C (Circular) , Move S (Spline) ; Different Motion Parameters used in Program Point Recording, Basic Program creation using Motion types and parameters, Path optimization for smooth robot movement and cycle time, Safety instructions to be followed while loading and unloading of parts.

In simple words: Writing robot programs: point-to-point, linear, circular and spline moves, and how to optimise a path for smooth, fast motion.

Unit 4 — Robot Integration with PLC, HMI and Other Equipment (6 Periods, 20%)

Topics: PLC and robot communication and HMI, Conveyor system and its communication with PLC, Methods to create fencing and safety equipment's, Steps to work with two different types of Robots at same project, Tool mounting on Robot Flange, Different connections of grippers (Electric, Pneumatic etc.).

In simple words: Making the robot part of a bigger automated line: talking to PLCs and HMIs, conveyors, safety fencing, and mounting tools on the robot flange.

Unit 5 — Robot Programming with Advance Level Instructions (4 Periods, 15%)

Topics: Loop control instructions, Arithmetic and Logical instructions, Shift instructions, Interfacing End of arm tools to Robot using robot I/O, establishing communication between Robot I/O and PLC modules, Function Keys in Pendant for Arc welding and Material Handling robot, MIG welding Instructions in Robot, MIG welding Program and how to optimize it, Material Handling Program and how to optimize it.

In simple words: Advanced programming: loops, arithmetic and logic, connecting tools through robot I/O, and ready-made routines for MIG welding and material handling.

Reference Books (as listed in the syllabus)

- Modern Robotics: Mechanics, Planning, and Control — Authors: Kevin M. Lynch, Frank C. Park — Publisher: Cambridge University Press
- Robot Modelling and Control — Authors: Mark W. Spong, Francesco Bullo — Publisher: Wiley
- Springer Handbook of Robotics — Editors: Bruno Siciliano, Oussama Khatib — Publisher: Springer
- Robotics for Engineers — Author: Yoram Koren — Publisher: McGraw-Hill

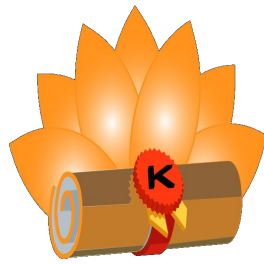
- Robotic Engineering: An Integrated Approach — Author: Richard D. Klafter, Thomas A. Chmielewski, Michael Negin — Publisher: Prentice Hall

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Essence of Indian Knowledge and Tradition — Complete Syllabus

BTEUP Diploma in Electronics Engineering • 4th Semester • Session 2026-27
Subject 4.8 — Audit Course (Theory) • Qualifying (Q) • 50 Marks Internal • No Credits • L
2 – P 0

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
4.8	Essence of Indian Knowledge and Tradition (Q)	Audit Course	2 - 0	—	50	—	N/A (Q)
Essence of Indian Knowledge and Tradition Total				—	50	—	N/A (Q)

What This Subject Aims To Do

To understand the fundamental aspects of the Indian Knowledge System, its integration with modern science, principles of Yoga and holistic healthcare, and practical applications in contemporary contexts.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Introduction to Indian Knowledge System	7	40%
2	Modern Science and Indian Knowledge System	7	30%

3	Yoga and Holistic Healthcare	7	15%
4	Case Studies / Assignment	7	15%

Unit 1 — Introduction to Indian Knowledge System (7 Periods, 40%)

Topics: Overview of Indian Knowledge System. Importance and relevance. Introduction to the Vedas. Upavedas. Vedangas. Upangas

In simple words: The Indian Knowledge System: its importance and relevance, and its core texts — the Vedas, Upavedas, Vedangas and Upangas.

Unit 2 — Modern Science and Indian Knowledge System (7 Periods, 30%)

Topics: Relevance of Science and Spirituality, Science and Technology in Ancient India,

In simple words: How science and spirituality relate, and what ancient India contributed to science and technology.

Unit 3 — Yoga and Holistic Healthcare (7 Periods, 15%)

Topics: Basic principles of Yoga. Benefits of holistic healthcare practices. Integration with modern healthcare

In simple words: Yoga's basic principles, the benefits of holistic healthcare, and how it integrates with modern medicine.

Unit 4 — Case Studies / Assignment (7 Periods, 15%)

Topics: Practical Applications / Case studies demonstrating the relevance of Indian Knowledge System in modern times

In simple words: Case studies showing how the Indian Knowledge System still matters today.

Student Centred Activities (SCA) — 4th Semester, 50 Marks

SCA in the 4th semester carries 5 periods per week and 50 marks (internal only). Maximum marks 50, distributed as: (i) 15 marks for general behaviour and discipline (by HODs in consultation with all teachers of the department); (ii) 10 marks for attendance — 75-80% = 6 marks, 80-85% = 8 marks, above 85% = 10 marks; (iii) 25 marks maximum in an even semester for Sports/NCC/Cultural/Co-curricular/NSS activities — State/National level participation, participation in two of the above activities, or Inter-Polytechnic level participation. SCA comprises co-curricular activities such as extension lectures, games, hobby

clubs (e.g. photography, painting, singing), seminars, declamation contests, educational field visits, NCC, NSS, library work, cultural activities and self-study.

Reference Books

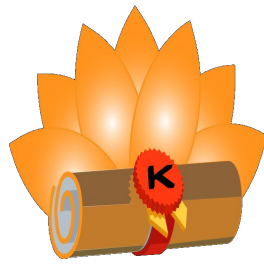
Reference books are not listed for this subject in the official syllabus.

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Optical Fiber Communication — Complete Syllabus

BTEUP Diploma in Electronics Engineering • 5th Semester • Session 2026-27
Subject 5.1 (Theory) + 5.5 (Lab) • Total 200 Marks • 7 Credits

About this document: Optical Fiber Communication appears twice in the 5th semester — as a theory paper (5.1) and as a lab (5.5). Both are covered here, completely, in the official order.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
5.1	Optical Fiber Communication	Theory	4 - 0	4	Theory 40	Theory 60 (3 hrs)	100
5.5	Optical Fiber Communication (Lab)	Practical	0 - 6	3	Practical 60	Practical 40 (3 hrs)	100
Optical Fiber Communication Total				7	100	100	200

What This Subject Aims To Do

To understand and apply the principles of optical communication systems — fibre optic technology being the most economical and efficient medium for wired communication, with lower costs than copper, improved transmission quality and reduced maintenance.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Introduction	8	16%
2	Optical Fiber	12	21%
3	Fiber Materials, Connectors, Coupler, Splicer and Losses	12	21%
4	Optical Sources and Detectors	12	21%
5	Optical Amplifiers and Its Type	12	21%

Unit 1 — Introduction (8 Periods, 16%)

Topics: Various wired communication mediums – copper wire and optical fiber cable. Electromagnetic spectrum, optical band and its range, Optical windows. General Block diagram of optical Fiber communication system. Advantages, disadvantages and application of Fiber Optic communication.

In simple words: Why fibre beats copper: the optical band, the parts of a fibre-optic link, and its advantages, disadvantages and applications.

Unit 2 — Optical Fiber (12 Periods, 21%)

Topics: Nature of light, its properties, Definition and concept of Reflection, refraction dispersion, diffraction, absorption, Total internal reflection (TIR) and scattering of light ray. Propagation of light in optical fiber, Ray model, Theoretical approach to Wave model, Snell's law, definition and concept of Critical angle, numerical aperture, acceptance angle and acceptance cone - (Numerical on above concepts).

In simple words: The optics behind fibre: total internal reflection, critical angle, numerical aperture and acceptance cone — with numerical problems.

Unit 3 — Fiber Materials, Connectors, Coupler, Splicer and Losses (12 Periods, 21%)

Topics: Fiber materials, Structure of fiber, Dimension of fiber. Optical fiber classification based on Modes and index profile, Modes of light propagation in fiber. Optical fiber connections: joints and Couplers-Fiber alignment and joint loss, fiber splicing techniques (Mechanical, fusion). fiber connectors, Losses and signal degradation in optical fiber.

In simple words: What fibre is made of, how it is classified by mode and index profile, how fibres are joined and spliced, and where signal is lost.

Unit 4 — Optical Sources and Detectors (12 Periods, 21%)

Topics: Optical sources: LED, LASER, construction and working, Characteristics, specifications & Comparison. Optical detectors: PIN diode, Avalanche photo diode- construction, working, Characteristics, specifications & Comparison.

In simple words: The light sources (LED and laser) and the detectors (PIN and avalanche photodiodes) at the two ends of a fibre link, compared side by side.

Unit 5 — Optical Amplifiers and Its Type (12 Periods, 21%)

Topics: Optical Amplifiers: Types of optical amplifiers, semiconductor & fiber optical amplifiers, principle of operation of SOA, types of SOA. EDFA, Raman amplifiers. Comparison of SOA, EDFA and Raman Amplifiers.

In simple words: Amplifiers that boost light without converting it to electricity: semiconductor, erbium-doped fibre (EDFA) and Raman amplifiers.

Practical Work

- To identify and use various components and tools used in optical fiber communication.
- To view and draw the structure of an optical fiber and cable.
- To observe the Total Internal Reflection (TIR) and Light transmission.
- To calculate NA of given optical fiber.
- To set up fiber optic analog link.
- To set up fiber optic digital link.
- Identify various layers & parts of an optical fiber cable.
- Measure bending losses of the given fiber optic cable.
- Plot the characteristics of optical source & detector.
- To connect a fiber with connector at both ends.
- To observe and measure the splice or connector loss.
- To splice the available optical fiber.
- To measure attenuation in optical fiber.
- To do power budgeting of an optical fiber link.
- To determine the position of fault in optical fiber link.

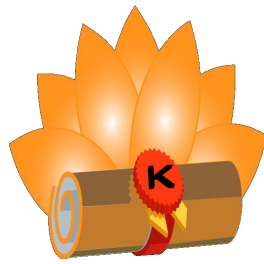
Reference Books (as listed in the syllabus)

- Fiber Optic Communication Keiser, Gerd McGraw Hill New Delhi.
- Optical Fiber communications principles & Practices Senior, John M. Pearson Education Ltd., New Delhi.
- Govind P. Agrawal, "Fiber Optic Communication Systems", John Wiley, 3rd Edition, 2004.

Source: BTEUP 3rd 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.

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Control System & PLC — Complete Syllabus (Program Elective-1, Option 1)

BTEUP Diploma in Electronics Engineering • 5th Semester • Session 2026-27

Subject 5.2.1 — Program Elective-1, Option 1 (Theory) • Total 100 Marks • 3 Credits • L 3

– P 0 • Choose this OR Microwave and Radar OR Digital Communication Systems

Note: Unit 1 in the PDF prints “Close App Control System” (sic); it is reproduced exactly as printed.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
5.2.1	Program Elective-1: Control System & PLC	Theory	3 - 0	3	Theory 40	Theory 60 (3 hrs)	100
Control System & PLC Total				3	40	60	100

What This Subject Aims To Do

To provide a solid understanding of control system principles — open-loop and closed-loop systems, feedback and stability analysis — to model and analyse control systems, apply PID control, and implement PLC programming (Ladder Logic, Function Block Diagram) for industrial automation, with hands-on experience in designing, implementing and troubleshooting PLC-based systems.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Introduction to Control System	9	21%
2	Transfer Function	6	14%
3	Time Domain Analysis and Stability Theory	10	24%
4	Basic Controllers	7	17%
5	Introduction to PLC and Instruction Set	10	24%

Unit 1 — Introduction to Control System (9 Periods, 21%)

Topics: Open loop Control System and Close App Control System - block diagram and its elements, properties and application (with example) and Comparison between open and close loop Control System, Block diagram of feedback Control System and its elements, Definition and Explanation of the following Control System - Linear and Non-linear System, Continuous and Discrete System, Static and dynamic System

In simple words: Open-loop vs closed-loop control, feedback, and the basic types of control systems — linear/non-linear, continuous/discrete, static/dynamic.

Unit 2 — Transfer Function (6 Periods, 14%)

Topics: Definition of Transfer function and its use in Control System, Transfer function of the following: Open loop and Close Loop System, Simple RC low pass and High pass filter, Characteristic Equation, Pole-Zero Concept of Transfer Function, Initial value and final value theorem.

In simple words: The transfer function: a mathematical model of a system, its poles and zeros, and the initial- and final-value theorems.

Unit 3 — Time Domain Analysis and Stability Theory (10 Periods, 24%)

Topics: Time response of first order system with unit step input, Time response of second order system with unit step input, Basic idea of delay time, rise time, setting time, steady state error, max overshoot, damping ratio (No Derivation), Over damped, under damped, critically damped, un damped system (basic idea only) and Pole-zero representation, Nature of transit response, Damping ratio (No Derivation), Basic concept of stability analysis by Routh-Hurwitz Criterion

In simple words: How a system responds over time to a step input — rise time, overshoot, damping — and the Routh-Hurwitz test for whether it is stable.

Unit 4 — Basic Controllers (7 Periods, 17%)

Topics: Introduction to controllers, need of controller, Type of controller (Basic idea and Mathematical expression only): (a) On-off controller b) Proportional controller c) PD controller d) PI controller e) PID controller

In simple words: The controllers that keep a system on target: on-off, proportional, PD, PI and the workhorse PID controller.

Unit 5 — Introduction to PLC and Instruction Set (10 Periods, 24%)

Topics: Concept of PLC, building block of PLC, function of various blocks, limitation of relays, advantage of PLC over electromagnetic relays, different programming languages, PLC manufacturer, working of PLC, basic operation and principles of PLC, architectural details. Basic instructions like latch, master control self-holding relays, timer instruction like retentive timers, resetting of timers, counter instructions like up counter, resetting of counters.

In simple words: The programmable logic controller: its blocks, why it replaced relay panels, its programming languages, and its basic instructions — latches, timers and counters.

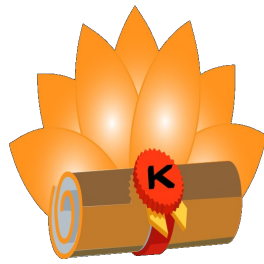
Reference Books (as listed in the syllabus)

- Modern Control Engineering, K. Ogata, PHI Publications.
- Control System Engineering I.J. Nagrath and M. Gopal, New Age International Publishers.
- Linear Control Systems, B.S. Manke, Khanna Publishers.
- Introduction to PLCs, Gary Dunning, Tata McGraw Hill.
- Control System (With MATLAB Programs), Sonveer Singh and Sanjay Agrwal, I. K. International

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Microwave and Radar — Complete Syllabus (Program Elective-1, Option 2)

BTEUP Diploma in Electronics Engineering • 5th Semester • Session 2026-27

Subject 5.2.2 — Program Elective-1, Option 2 (Theory) • Total 100 Marks • 3 Credits • L 3

- P 0 • Choose this OR Control System & PLC OR Digital Communication Systems

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
5.2.2	Program Elective-1: Microwave and Radar	Theory	3 - 0	3	Theory 40	Theory 60 (3 hrs)	100
Microwave and Radar Total				3	40	60	100

What This Subject Aims To Do

To enhance the technical skills of diploma engineers in the operation, maintenance and troubleshooting of microwave and RADAR-based telecommunication systems — microwave communication being the backbone of terrestrial communication and fundamental to mobile communication systems.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Fundamentals of Microwave Communication	4	10%
2	Introduction to Microwave Devices	14	33%

3	Wave Guides	8	19%
4	Radar Systems	8	19%
5	Satellite Communication	8	19%

Unit 1 — Fundamentals of Microwave Communication (4 Periods, 10%)

Topics: History, Microwave frequency spectrum, band designations and applications of microwave in various fields, Simple block diagram of microwave transmitter, receiver and microwave link repeater. Types of propagation- Ground wave, Sky Wave and Space Wave. Introduction to Transmission Lines, their types and applications.

In simple words: Microwaves: their frequency bands and uses, how signals propagate (ground, sky and space waves), and the basic transmitter-receiver link.

Unit 2 — Introduction to Microwave Devices (14 Periods, 33%)

Topics: Microwave Passive Devices: Directional Coupler, Power Divider, Attenuator, Resonator. Microwave vacuum tube devices: Construction working, specifications and applications of two cavity Klystron amplifier, Reflex Klystron, Magnetron and Helix TWT. Compare the performance of Klystron, Magnetron and TWT. Microwave semiconductor devices: Construction, working, specifications, characteristics and applications of Gunn diode. IMPATT diode. Tunnel diode, PIN diode

In simple words: The devices that generate and handle microwaves: passive components, vacuum tubes (klystron, magnetron, travelling-wave tube) and semiconductor devices (Gunn, IMPATT, tunnel and PIN diodes).

Unit 3 — Wave Guides (8 Periods, 19%)

Topics: Types of Waveguides, and Propagation of waves in rectangular and circular waveguides and their applications. Advantages and disadvantages of rectangular and circular wave guides. Modes of wave guide; Propagation constant of a rectangular wave guide, cut off wavelength, guide wavelength and their relationship with free space wavelength (no mathematical derivation). Impossibility of TEM mode in a wave guide. Comparison of wave guide with Transmission line and comparison of rectangular waveguide with circular waveguide.

In simple words: Waveguides — hollow pipes that carry microwaves: their modes, cut-off wavelength, and why the TEM mode cannot exist inside one.

Unit 4 — Radar Systems (8 Periods, 19%)

Topics: Introduction to RADAR Fundamentals: Basic block diagram of RADAR system, RADAR performance factors: RADAR range equation, factors influencing range, effect of noise. Types of RADAR Systems: Basic pulse RADAR system: Block diagram and description, applications. Doppler Effect, CW Doppler RADAR: Block diagram, operation and application. FM CW RADAR: Block diagram. Operation and application. MTI: Block diagram, operation concept of blind speed, application. Automatic target detection RADAR, SONAR system: Working principle and applications.

In simple words: Radar: how it detects targets and measures range, pulse radar, Doppler radar, FM-CW radar, moving-target indication, and sonar.

Unit 5 — Satellite Communication (8 Periods, 19%)

Topics: Introduction. Advantages & disadvantages of satellite system. Frequency bands, uplink & downlink frequencies. Kepler's First Law. Kepler's Second Law. Kepler's Third Law. Definitions of Terms for Earth-Orbiting Satellites. Orbital Elements. Apogee and Perigee Heights. Orbit Perturbations, Effects of a non-spherical earth. Atmospheric drag. Satellite angles, satellite repeaters. Station keeping. attitude control. satellite positioning. LEO, MEO, GEO satellite overview. Satellite communication system. Transponders. Crosslink, Satellite frequency allocation and frequency reuse. Block diagram of satellite earth station.

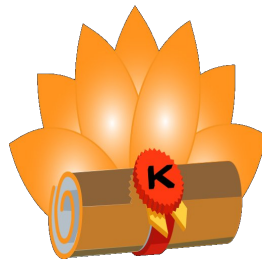
In simple words: Satellites: Kepler's laws, orbits (LEO, MEO, GEO), transponders, frequency reuse, and the earth station that talks to them.

Reference Books (as listed in the syllabus)

- RADAR systems and radio aids to navigation Sen, A. K. and Bhattacharya, A. B. Mercury Learning information. PVT.LTD. New Delhi, 2017.
- Microwave Engineering, Das, Annapurna and Das, S. K. Mc Graw Hill, New Delhi (3rd edition)
- Microwave Engineering, Gupta, Sanjeev, Khanna publication 2015 New Delhi
- Microwave and RADAR Engineering, Gautam, A. K., S.K. Kataria Publication New Delhi.
- Microwave and RADAR Engineering, Kulkarni, M. Umesh Publications, New Delhi, 2009.

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Digital Communication Systems — Complete Syllabus (Program Elective-1, Option 3)

BTEUP Diploma in Electronics Engineering • 5th Semester • Session 2026-27

Subject 5.2.3 — Program Elective-1, Option 3 (Theory) • Total 100 Marks • 3 Credits • L 3
– P 0 • Choose this OR Control System & PLC OR Microwave and Radar

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
5.2.3	Program Elective-1: Digital Communication Systems	Theory	3 - 0	3	Theory 40	Theory 60 (3 hrs)	100
Digital Communication Systems Total				3	40	60	100

What This Subject Aims To Do

To understand the facts, concepts and working principles of digital communication systems — digital information theory (information rate and channel capacity), digital modulation techniques, channel coding and error control, multiple access schemes and spread spectrum modulation — and to apply them in modern communication systems.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Introduction to Digital Communication	6	14%

2	Modulation Techniques	10	24%
3	Error Control Coding	8	19%
4	Multiplexing and Multiple Access Techniques	8	19%
5	Digital Transmission Fundamentals and Performance Analysis	10	24%

Unit 1 — Introduction to Digital Communication (6 Periods, 14%)

Topics: Overview of digital communication systems, Analog vs. digital communication, Elements of digital communication systems, Basics of information theory, entropy, relationship between information theory and communication systems.

In simple words: Digital vs analog communication, the parts of a digital link, and information theory — entropy and how much information a channel can carry.

Unit 2 — Modulation Techniques (10 Periods, 24%)

Topics: Pulse Amplitude Modulation (PAM), Pulse Position Modulation (PPM), Pulse Width Modulation (PWM). Pulse Code Modulation, Basic concept of sampling theorem, quantization, coding and Shannon's theorem, Types of PCM system and its application (Basic idea only). Basic idea of: Amplitude Shift Keying (ASK) modulation and demodulation technique, Frequency Shift Keying (FSK) modulation and demodulation technique, Phase Shift Keying (PSK) modulation and demodulation technique, Quadrature Amplitude Modulation (QAM) modulation and demodulation technique

In simple words: How digital data rides on an analog carrier: pulse modulation, PCM and the sampling theorem, and ASK, FSK, PSK and QAM.

Unit 3 — Error Control Coding (8 Periods, 19%)

Topics: Introduction to channel coding, Basics of code theory, Error detection and correction codes, Block codes and Convolution codes, Introduction to error detection and correction technique.

In simple words: Adding clever redundancy so the receiver can spot — and fix — errors: block codes and convolutional codes.

Unit 4 — Multiplexing and Multiple Access Techniques (8 Periods, 19%)

Topics: Frequency division Multiplexing (FDM), Time division Multiplexing (TDM), Code division Multiplexing (CDM), Basics of orthogonal frequency division Multiplexing (OFDM). Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Code Division Multiple Access (CDMA), Orthogonal Frequency Division Multiple Access (OFDMA)

In simple words: Sharing one channel among many users: multiplexing by frequency, time or code, and the multiple-access schemes built on them (FDMA, TDMA, CDMA, OFDMA).

Unit 5 — Digital Transmission Fundamentals and Performance Analysis (10 Periods, 24%)

Topics: Line coding techniques (NRZ, RZ, Manchester), Baseband and passband transmission, Signal-to-noise ratio (SNR) and bit error rate (BER), Channel capacity, Shannon-Hartley theorem, Link budget analysis, Brief idea of interference and noise in digital communication systems.

In simple words: How good a digital link is: line codes, SNR and bit error rate, channel capacity (Shannon-Hartley), and link budgets.

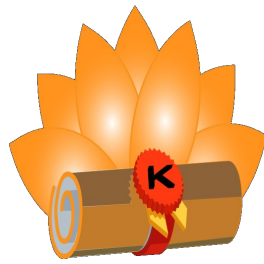
Reference Books (as listed in the syllabus)

- Modern Digital and Analog Communication Systems, Lathi, B.P. and Ding, Z
- Communication Systems, Haykin, S
- Digital & Analog Communication Systems By K.S. Shanmugam, John Wiley
- E-books/e-tools to be used as recommended by AICTE/NITTTR, Chandigarh. Websites for Reference: <http://swayam.gov.in>

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Electronic System Design and Embedded System — Complete Syllabus

BTEUP Diploma in Electronics Engineering • 5th Semester • Session 2026-27
Subject 5.3 (Practicum) • Total 100 Marks • 3 Credits • L 2 - P 2

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
5.3	Electronic System Design and Embedded System	Practicum	2 - 2	3	Theory 40	Theory 60 (3 hrs)	100
Electronic System Design and Embedded System Total				3	40	60	100

What This Subject Aims To Do

To understand the fundamentals of electronic system design and apply them to develop complete electronic systems — selecting sensors and actuators for interfacing with the real world — and to learn modern embedded systems (operating system concepts, real-time design) starting with the 8051 microcontroller and the Arduino platform for real-time embedded applications.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Basics of Electronic Systems Design	5	17%

2	Sensors and Actuators	6	22%
3	Embedded System	6	22%
4	8051 Microcontroller	6	22%
5	Communication with Arduino Uno	5	17%

Unit 1 — Basics of Electronic Systems Design (5 Periods, 17%)

Topics: Definition, Purpose and Scope; System Architecture for Electronic Product Designs; Breakdown of an Electronic System Design; Requirements; Electromagnetic Interference in Electronic Systems and Its Impact; Concept of Grounding and Its Significance, PCB designing principals, Etching process, Types of etching.

In simple words: How a complete electronic product is designed: system architecture, requirements, electromagnetic interference, grounding, and PCB design and etching.

Unit 2 — Sensors and Actuators (6 Periods, 22%)

Topics: Sensor: Definition: Sensor Characteristics - Sensitivity, Linearity, Range, Resolution, Accuracy, Repeatability, and Hysteresis. Types of Sensors: Temperature Sensor, Ultrasonic Sensor, Gas Sensor, Level Sensor, Ph Sensor, Flow Sensor, Humidity Sensor, Proximity Sensor, Pressure Sensor, etc. Actuator: Definition: Actuator Principles and Classification, Energy Source-Based Actuators (i.e., Pneumatic Actuator, Hydraulic Actuator, Electric Actuator, Thermal Actuator, Magnetic Actuator, and Piezoelectric Actuator). Classification of Actuators by Motion: Linear, Rotary, and Semi-Rotary.

In simple words: Sensors that measure the world and actuators that act on it: their types, characteristics and classifications.

Unit 3 — Embedded System (6 Periods, 22%)

Topics: Embedded system architecture Types of Architecture of Embedded Processors: Von Neumann, Harvard, Super Harvard, RISC, CISC, DSP, Multi core processor, factors affecting embedded systems, Types of embedded O.S: Non real time O.S, Real time O.S, Mobile O.S

In simple words: Embedded systems: processor architectures (Von Neumann, Harvard, RISC, CISC, DSP, multicore) and the operating systems that run on them — real-time and otherwise.

Unit 4 — 8051 Microcontroller (6 Periods, 22%)

Topics: Introduction to 8051 Pin Diagram and Description, Memory Organization, Special Function Registers, Addressing Modes, Interrupts, Timers, Serial Communication. Difference between the C language and Embedded C language,

In simple words: The 8051 microcontroller: its pins, memory, special-function registers, addressing modes, interrupts, timers and serial communication.

Unit 5 — Communication with Arduino Uno (5 Periods, 17%)

Topics: Arduino Uno specifications including power ratings, digital and analog peripherals. Arduino Uno Ports, Pins, Digital and Analog Peripherals, Familiarizing with the Arduino IDE, Arduino I/O functions, Arduino Interrupts, Serial Peripheral Interface and Communication and their programming.

In simple words: The Arduino Uno: its specifications, pins and peripherals, the Arduino IDE, and programming its I/O, interrupts and serial communication.

Practical Work

- Familiarization with different types of PCB'S Materials and their key specifications. (Bakelite,FR4 etc).
- Schematic creation and PCB Layout for simple circuits using open source software.
- Creating a PCB that is fully prepared for component installation with PCB grounding techniques.
- Identifying various types of sensors and analyzing their specifications through datasheets.
- Identifying various types of actuators and analyzing their specifications through datasheets.
- Familiarization with different types of microcontrollers and their specifications and IC packages (ESP8266/32, Arduino Classic, MKR, Nano and Mega family, Raspberry pi).
- Template for embedded C program for 8051 (using reg.51).
- Write a program to load a number into Accumulator.
- Write a program to load three numbers into Accumulator and send them to port 1.
- Write a program to explain different logical operations.
- Write a program for LED blinking with 1s delay.
- Write a program for handling two LEDs blinking alternatively with a delay of 2s.
- Write a program to read digital states of a push button and print in IDE serial monitor.
- Write a program to send a message using serial communication.

Reference Books (as listed in the syllabus)

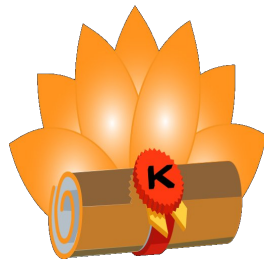
- John F. Wakerly, Digital Design: Principles and Practices, 5th edition, Pearson Publications, 2018
- Charles Kitchin and Lew Counts, A Designer's Guide to Instrumentation Amplifiers, 3rd edition, Analog Devices, 2006
- Eamon Nash, Errors and Error Budget Analysis in Instrumentation Amplifier Applications, 3rd edition, Analog Devices, 2006
- Lyla B. Das, Embedded systems: An Integrated Approach, 1st edition, Pearson Education, 2013
- Steve Furbe, ARM System on chip Architecture, 2nd Edition, Pearson Education, 2015

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Mechatronics — Complete Syllabus (Program Elective-2, Option 1)

BTEUP Diploma in Electronics Engineering • 5th Semester • Session 2026-27
Subject 5.4.1 — Program Elective-2, Option 1 (Practicum) • Total 100 Marks • 3 Credits •
L 1 – P 4 • Choose this OR Signal and Image Processing

Note: No marks-distribution table and no reference-books list are given for this subject in the PDF, so unit weightages and books are not shown.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
5.4.1	Program Elective-2: Mechatronics	Practicum	1 - 4	3	Practical 60	Practical 40 (3 hrs)	100
Mechatronics Total				3	60	40	100

What This Subject Aims To Do

To understand mechatronics — the integration of mechanical, electrical, electronics, computer and control engineering — for designing advanced, reliable and cost-effective electro-mechanical systems, with growing demand for diploma engineers skilled in installing, operating and maintaining these integrated systems in industry.

Unit-Wise Complete Topic List

Note: no marks-distribution table is given for this subject in the official syllabus, so unit weightages are not shown.

Unit 1 — Introduction (3 Periods)

Topics: Introduction to Mechatronics: Mechatronics; Importance of Mechatronics; Systems: Measurement systems; Control systems and their types; Closed-loop control System; Automatic water level controller; Sequential controllers-washing machine. Mechatronics system architecture: Sensors, signal conditioners, PLC/Embedded controllers, pneumatic, hydraulic and electrical actuators. Introduction to Real Time Mechatronics System

In simple words: What mechatronics is, its system architecture (sensors, controllers, actuators), and everyday examples like a water-level controller and a washing machine.

Unit 2 — Sensors & Switches (3 Periods)

Topics: Sensors: Principle of operation and application of each. Proximity, Motion Sensors, Pressure sensor, High and low temperature measurement sensors, Light Sensors, Selection of Sensors. Switches: Principle, working and applications of-Limit switches, proximity switches like inductive, capacitive and optical (deflecting and through beam type),

In simple words: The senses of a mechatronic system: proximity, motion, pressure, temperature and light sensors, and the switches that detect position and presence.

Unit 3 — Electrical & Mechanical System (3 Periods)

Topics: Electric actuators, Stepper motor, servo motors, DC motor, DC brushless motors, AC motor (Only diagram). Relays Principle of operation and application, latching, triggering, Types of relays- solid state. Hydraulic systems: Physical components of hydraulic systems. Pneumatic systems: Air compressors, filters and regulators.

In simple words: The muscles: electric motors (stepper, servo, DC, brushless, AC), relays, and hydraulic and pneumatic systems.

Unit 4 — Signal Conditioners (3 Periods)

Topics: Need of isolators, filters, amplifiers, fluid amplifiers, and optical amplifiers mechatronics systems. Computer Aided Control Systems: CNC Machines: various blocks of CNC machine, advantages of CNC, Part programming of CNC machines, G codes and M codes, small application programs, CNC based machine example.

In simple words: Conditioning sensor signals for use, and CNC machines: their blocks, advantages, and part programming with G and M codes.

Unit 5 — Introduction to SCADA and PLC (2 Periods)

Topics: SCADA: Data acquisition system, communication technologies, monitoring and supervisory functions. PLC: Block diagram, programming languages, Applications, Interfacing of PLC to SCADA. Case studies of mechatronics systems: A Microcontroller based pick-and-place robot, Microcontroller based antilock brake system.

In simple words: SCADA and PLC: supervising and controlling industrial processes, and two case studies — a pick-and-place robot and an antilock brake system.

Practical Work

- Familiarize students with measurement systems and control systems, including the working principle of closed-loop control systems.
- Design and implement an automatic water level controller system, which uses sensors to control the water flow into a tank.
- Implement a sequential control system, such as a washing machine controller, using a microcontroller or PLC.
- Study the integration of sensors, signal conditioners, actuators, and controllers in a mechatronics system, with a focus on industrial applications.
- Understand the principle of operation and applications of proximity sensors.
- Study how motion sensors detect and respond to movement.
- Study the operation and applications of pressure sensors.
- Study the principle and applications of LDR, photodiodes, and phototransistors.
- To understand the working principle and applications of electric actuators.
- To understand the working principle and applications of stepper motors, Servo motor, DC motors, DC brushless motors.
- To understand the principle of operation and applications of relays (including latching, triggering, and solid-state relays).
- To understand the function and need for various isolators, filters, amplifiers, and their applications in mechatronics systems.
- To understand the components, working, and programming of CNC machines and the role of computer-aided control systems in mechatronics.
- To simulate and troubleshoot common CNC machine operations and errors.
- To understand the SCADA system, its components, and its role in data acquisition, communication, and supervisory control.
- To understand the principles of PLC programming, its block diagram, and its application in real-time systems.
- To explore various microcontroller-based mechatronics systems by designing, simulating, and implementing real-world applications.

Reference Books

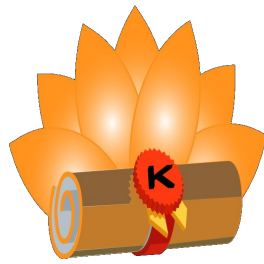
Reference books are not listed for this subject in the official syllabus.

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Signal and Image Processing — Complete Syllabus (Program Elective-2, Option 2)

BTEUP Diploma in Electronics Engineering • 5th Semester • Session 2026-27

Subject 5.4.2 — Program Elective-2, Option 2 (Practicum) • Total 100 Marks • 3 Credits •

L 1 - P 4 • Choose this OR Mechatronics

Note: No marks-distribution table is given for this subject in the PDF, so unit weightages are not shown.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
5.4.2	Program Elective-2: Signal and Image Processing	Practicum	1 - 4	3	Practical 60	Practical 40 (3 hrs)	100
Signal and Image Processing Total				3	60	40	100

What This Subject Aims To Do

To give foundational and advanced concepts in processing digital signals and images — filtering, sampling, Fourier transforms and convolution — and in image processing: enhancement, restoration, compression, segmentation and feature extraction, with theory and practical implementation using tools such as MATLAB or Python.

Unit-Wise Complete Topic List

Note: no marks-distribution table is given for this subject in the official syllabus, so unit weightages are not shown.

Unit 1 — Basics of Signals and Systems (2 Periods)

Topics: Step, Ramp, Pulse, Impulse, Real, complex and exponentials _ Classification of signals – Continuous time (CT) and Discrete Time (DT) signals, Periodic & Aperiodic signals, Deterministic & Random signals, Energy & Power signals. Classification of systems- CT systems and DT systems- – Linear & Nonlinear, Time-variant & Time-invariant, Causal & Non causal, Stable & Unstable

In simple words: The vocabulary of signals and systems: step, ramp, pulse and impulse signals, and how signals and systems are classified.

Unit 2 — Fourier Transform and Laplace Transform (4 Periods)

Topics: Fourier Transform: Fourier series for periodic signals – Fourier Transform – properties. Laplace Transform: Laplace Transforms and properties - convolution and properties

In simple words: The transforms that move a signal between the time domain and the frequency domain: Fourier and Laplace, plus convolution.

Unit 3 — Basics of Image Processing (4 Periods)

Topics: Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition, Introduction to image sampling and quantization, Color Image Fundamentals: RGB models

In simple words: How a digital image is captured and represented: sensing, sampling, quantisation, and the RGB colour model.

Unit 4 — Image Enhancement and Restoration (2 Periods)

Topics: Image Enhancement: Spatial Domain: Gray level Transformations-Image negative-contrast stretching - Histogram processing – Basics of Spatial Filtering- Smoothing and Sharpening Spatial filtering. Image Restoration – introduction to degradation model & Noise models

In simple words: Making images clearer: contrast stretching, histogram processing, smoothing and sharpening filters, and how degraded images are restored.

Unit 5 — Image Segmentation and Compression (2 Periods)

Topics: Image Segmentation: Edge detection, Region based segmentation – Region growing – Region splitting and merging. Image Compression: Need for data compression, Huffman, JPEG standard, MPEG

In simple words: Splitting an image into meaningful regions (segmentation) and shrinking image files without losing what matters (JPEG, MPEG, Huffman coding).

Practical Work

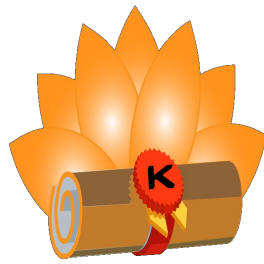
- Understand various signal types in the time domain.
- Learn about signal operations such as addition, multiplication, and time-shifting.
- Transform signals from the time domain into the frequency domain.
- Explore critical properties of the Fourier Transform such as linearity, time-shifting, frequency-shifting, scaling, and duality.
- Introduce the Laplace transform as a tool for analyzing continuous-time signals and systems, and verify its properties such as linearity, time-shifting.
- Introduction to Digital Image Processing Environment.
- Understand image as a matrix and perform fundamental operations.
- Break down an image into its RGB components.
- Simulate the process of image capture using virtual sensors.
- Understand human perception of brightness and contrast.
- Improve the visual quality of images by suppressing degradation.
- Understand how reducing intensity levels affects image quality.
- Understand and apply basic pixel intensity transformations.
- Perform segmentation by dividing and combining image regions based on uniformity.
- Demonstrate how compression reduces image size and storage needs.
- Simulate the core steps of JPEG compression.
- Understand basic principles behind video compression.

Reference Books (as listed in the syllabus)

- A.V. Oppenheim, A.S. willsky and S.H. Nawab, Signals and Systems, 2nd Edition, Prentice-Hall of India, 2015
- Rafel C.Gonzalez and Richard E. woods, Digital Image processing, 4th edition, Pearson Inc, 2018
- Simon Haykin and Barry Van Veen, Signals and Systems, 2nd edition, Wiley, 2007

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.





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AI & ML — Complete Syllabus (Open Elective-3, Option 1)

BTEUP Diploma in Electronics Engineering • 5th Semester • Session 2026-27
Subject 5.6.1 — Open Elective-3, Option 1 (Practicum) • Qualifying (Q) • 2 Credits • L 1 - P 3 • Choose this OR IoT OR Industrial Automation & MES

Note: The PDF gives this subject as 7 numbered topic sections (not 5 units), with no unit-wise periods, no marks-distribution table and no reference-books list — so periods, weightages and books are not shown. The 5.6 scheme row is shared by all three Open Elective-3 options.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
5.6.1	Open Elective-3: AI & ML	Practicum (Q)	1 - 3	2	50	—	N/A (Q)
AI & ML Total				2	50	—	N/A (Q)

What This Subject Aims To Do

To equip students with the theoretical and practical skills needed to understand requirements, collect and pre-process data, and build and deploy machine learning and artificial intelligence solutions for real-world applications, with hands-on experience of the latest software.

Unit-Wise Complete Topic List

Note: no marks-distribution table is given for this subject in the official syllabus, so unit weightages are not shown.

Section 1 — Industrial Safety Practices

Topics: Fire Extinguishers & its Types; Safely handling Tools & Equipment; Use of proper Tools & Equipment & its maintenance; OSH & practices to be observed as a precaution

In simple words: Workshop safety: fire extinguishers, correct tool use and occupational safety and health.

Section 2 — Fundamentals required for AI and ML

Topics: Introduction to Artificial Intelligence and Machine Learning; Need of AI and ML; Basic Mathematical concepts related to AI and ML; Data Collection, Data Processing and Cleaning; Types of Data Sources — Structured Data, Unstructured Data, Semi Structured, Realtime Data, Open Data Set, Data Scraping; Data Acquisition Techniques — APIs (Application Programming Interfaces), Web Scrapping, Surveys and Forms, Sensor Data, Database and Data Warehouse; Data Integration — Combining Data from Multiple Sources, Data Merging, Data Aggregation; Data Pre-Processing — Data Cleaning, Outlier Detection and Removal, Duplicate Data

In simple words: The foundations: what AI and ML are, the maths behind them, and where data comes from and how it is cleaned and prepared.

Section 3 — Programming concepts for AI and ML

Topics: Python Basics; Python Structure; NumPy; Pandas; Matplotlib and Seaborn; Scikit-learn

In simple words: The Python toolkit for AI and ML: NumPy, Pandas, Matplotlib, Seaborn and scikit-learn.

Section 4 — Introduction to Supervised Machine Learning

Topics: Types of Machine Learning Techniques (Supervised, Unsupervised and Reinforcement Learning). Supervised Learning — Regression, Classification, Logistic Regression, Support Vector Machines, Decision Tree, Random Forest, K – Nearest Neighbors (KNN), Use cases of Regression and Classification. Introduction to Unsupervised Learning — Clustering: K – Means Clustering, Hierarchical Clustering, DBSCAN; Dimensionality Reduction; Anomaly Detection; Use cases of clustering and Dimensional Reduction; Building Machine Learning Model; Model Evaluation and Validation; Machine Learning Model Deployment

In simple words: Supervised learning (regression and classification) and unsupervised learning (clustering, dimensionality reduction, anomaly detection), and how a model is built, evaluated and deployed.

Section 5 — Deep Learning, Reinforcement Learning and Natural Language Processing

Topics: Fundamentals of Deep Learning; Convolutional Neural Networks (CNNs); Recurrent Neural Networks (RNNs); Natural Language Processing; Reinforcement Learning; TensorFlow and Keras. Generative AI — Understanding of Gen AI; Applications of Gen AI; Development of Gen AI model; Integration of Gen AI in Mobile App.; Deployment

In simple words: Deep learning (CNNs, RNNs), natural language processing, reinforcement learning, and generative AI — including building and deploying Gen AI models and apps.

Section 6 — Deep Learning Applications

Topics: Computer Vision; Natural Language Processing; Speech Recognition; Model Deployment

In simple words: Where deep learning is used: computer vision, language, speech recognition, and deploying models.

Section 7 — Ethics and Responsibility in AI and Machine Learning

Topics: Ethics in AI and ML; Accountability and Responsibility; Privacy and Data Protection; Social Impact of AI; Ethical Guidelines

In simple words: The responsible side of AI: ethics, accountability, privacy, data protection and social impact.

Practical Work

- Load a Dataset and perform basic preprocessing.
- Splitting of Dataset into Training and Testing Set.
- Explore Python Libraries Pandas, NumPy, Matplotlib etc.
- Build Machine Learning Model for Linear Regression Analysis for predict.
- Implement K – Means clustering to segment customer based on purchasing behaviour.
- Build a Machine Learning Model – Decision Tree.
- Build a Machine Learning Model – Random Forest.
- Build a Machine Learning Model for Anomaly Detection.
- Build SVM model and evaluate performance (Precision, Recall, F-Score and Confusion Matrix).
- Build a Neural Network using Keras or TensorFlow to classify the handwriting digits.
- Implement a Convolutional Neural Network to classify images using given dataset.
- Build a Recurrent Neural Network (RNN) for Sentiment Analysis.
- Implement a Chatbot using RNN.
- Compare two different Gen AI models.
- Integrate a Trained Machine Learning Model in Mobile APP for Prediction.
- Case Studies.
- Mini Project.

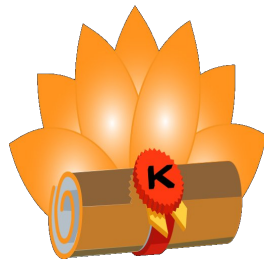
Reference Books

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

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Source: BTEUP 3rd 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.



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IoT — Complete Syllabus (Open Elective-3, Option 2)

BTEUP Diploma in Electronics Engineering • 5th Semester • Session 2026-27
Subject 5.6.2 — Open Elective-3, Option 2 (Practicum) • Qualifying (Q) • 2 Credits • L 1 – P 3 • Choose this OR AI & ML OR Industrial Automation & MES

Note: The PDF gives this subject as 7 numbered topic sections (not 5 units), with no unit-wise periods, no marks-distribution table and no reference-books list — so periods, weightages and books are not shown. The PDF's "experiments" list (1-13) repeats the course outcomes almost verbatim rather than naming distinct experiments; it is reproduced as printed. The 5.6 scheme row is shared by all three Open Elective-3 options.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
5.6.2	Open Elective-3: IoT	Practicum (Q)	1 - 3	2	50	—	N/A (Q)
IoT Total				2	50	—	N/A (Q)

What This Subject Aims To Do

To develop skills on Internet of Things (IoT) using the latest software and hardware — building IoT applications and devices using controllers, sensors, actuators and other electronic components — and competency in IoT across home automation, smart city, agriculture, automotive and manufacturing, including opportunities to start a business with novel IoT applications.

Unit-Wise Complete Topic List

Note: no marks-distribution table is given for this subject in the official syllabus, so unit weightages are not shown.

Section 1 — Introduction to Industrial Safety Practices

Topics: Fire Extinguishers & its Types; Safely handling Tools & Equipment; Use of proper Tools & Equipment & its maintenance; OSH & practices to be observed as a precaution

In simple words: Workshop safety: fire extinguishers, correct tool use and occupational safety and health.

Section 2 — Fundamentals of Internet of Things

Topics: Introduction of Internet of Things; Basics of electricals & electronics components used in IoT; History of IoT; Applications, Benefits and Limitations of IoT; Important components of IoT – Micro Controller, Sensors, actuators, communication protocol, cloud etc; IoT Architecture – Physical layer, Network layer, Data processing layer, Application layer.

In simple words: What IoT is, its history, benefits and limitations, its key components, and its four-layer architecture.

Section 3 — IoT Microcontrollers and Single board computer

Topics: Introduction to microcontroller; Different types of microcontrollers, Arduino, Raspberry pi; Introduction to input, output and PWM, interface of camera to raspberry pi, interface of various sensors to raspberry pi, IOT protocol (HTTP, MQTT, HTTPS) for RPI, Study connection of raspberry pi to cloud; Important features of microcontroller; Specification of microcontroller; Selection of microcontroller based on IoT application; Basic programming of microcontroller; Advanced programming of micro controller; Debugging of program, Testing of program

In simple words: The brains of IoT devices: Arduino and Raspberry Pi, their programming, interfacing sensors and cameras, and connecting to the cloud (HTTP, MQTT, HTTPS).

Section 4 — IoT Sensors

Topics: Introduction of Sensors; Various types of Sensors and their applications; Specifications of sensors; Working principle of important sensors; Comparison of sensors and relative advantages and limitations; Selection of sensor based on IOT application; Interfacing of sensors with microcontroller to develop IOT application; Testing of sensors for IOT application

In simple words: Sensors: their types, working principles, specifications, and how to choose and interface the right one for an application.

Section 5 — Use of Actuators for IoT applications

Topics: Introduction to actuators; Various types of actuators; Working principle of actuator; Applications of actuators; Comparison of various actuators and relative advantages and limitations; Selection of actuator based on IOT application

In simple words: Actuators: the devices that let an IoT system act on the physical world, and how to choose between them.

Section 6 — IoT Network Connectivity

Topics: Introduction to IoT network technologies; Various options for IoT connectivity; Comparison of various options for IoT connectivity; Selection of IoT connectivity based on application parameter like Range, Data size, Rate of data transfer, Type of data, Number of devices to be connected etc.

In simple words: How IoT devices connect: the network options available, and choosing one by range, data size, speed and number of devices.

Section 7 — Cloud and Application of IoT

Topics: Various options available to store IOT Data; Comparison of storage options; Storage on premises and Cloud; IOT Database; Selection of database; Interfacing Database with IOT application; Requirements for IoT applications; Selection of sensors and actuators as per IoT application; IoT dashboard building; Authentication; IoT application building as per real world application related to Smart City, Healthcare, Automotive, Manufacturing; IoT based mobile application development; Use of API in IoT application Building; Basics of Machine Learning and AI; Use of Machine Learning and Artificial Intelligence in IoT; Industrial Use cases

In simple words: The cloud side: storing IoT data, databases, dashboards and authentication, building real IoT applications for smart cities, healthcare, automotive and manufacturing, and where ML and AI fit in.

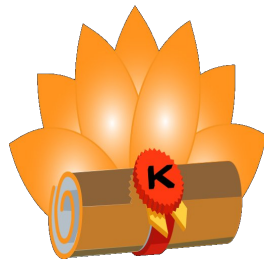
Practical Work

- Comply with Industry health and safety guidelines.
- Identify the market needs & customer demand analysis.
- Ability to develop basic circuit design and measurement techniques and calibration according to common engineering standards symbols, unit, schematics.
- Ability to generate ideas for upgrading existing product or creation of new product as per customer requirement.
- Ability to convert Ideas into reality by developing prototype model with the help of microcontrollers and wired or wireless protocols.
- Ability to develop IOT applications based on specific needs.
- Ability to handle cloud operations for internet of things applications.
- Ability to implement ideas for entrepreneurship and better career opportunities.
- Create value by using problems solving approach and by applying innovation techniques.
- Ability to develop IoT applications related to home automation, agriculture, smart city, automotive, manufacturing etc.
- Able to create innovative products, processes, services, business models etc.
- Able Create and protect their intellectual property.
- Start Their Own Business | Start up | Entrepreneurship.

Reference Books

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

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Industrial Automation & MES — Complete Syllabus (Open Elective-3, Option 3)

BTEUP Diploma in Electronics Engineering • 5th Semester • Session 2026-27

Subject 5.6.3 — Open Elective-3, Option 3 (Practicum) • Qualifying (Q) • 2 Credits • L 1 - P 3 • Choose this OR AI & ML OR IoT

Note: The PDF gives this subject as 8 numbered topic sections (not 5 units), with no unit-wise periods, no marks-distribution table and no reference-books list — so periods, weightages and books are not shown. The 5.6 scheme row is shared by all three Open Elective-3 options.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
5.6.3	Open Elective-3: Industrial Automation & MES	Practicum (Q)	1 - 3	2	50	—	N/A (Q)
Industrial Automation & MES Total				2	50	—	N/A (Q)

What This Subject Aims To Do

To provide a comprehensive understanding and hands-on experience of Industrial Automation and Manufacturing Execution Systems (MES) — PLC, SCADA, HMI, Variable Frequency Drives (VFD) and MES, integrated into cohesive, efficient systems — with the latest software and hardware tools, in line with industry standards.

Unit-Wise Complete Topic List

Note: no marks-distribution table is given for this subject in the official syllabus, so unit weightages are not shown.

Section 1 — Industrial Safety Practices

Topics: Fire Extinguishers & its Types; Safely handling Tools & Equipment; Use of proper Tools & Equipment & its maintenance; OSH & practices to be observed as a precaution

In simple words: Workshop safety: fire extinguishers, correct tool use and occupational safety and health.

Section 2 — Fundamentals of Industrial Automation

Topics: Introduction to industrial automation; Need and application of automation; Benefits of automation; Types of Industrial automation; Important Components of Automation; Discrete, Continuous and Batch Manufacturing; Open-loop vs. Closed-loop systems; Introduction to PLC, HMI, VFD, SCADA, MES; Industrial sensors: types and applications; Actuators: motors, valves, pneumatics; Signal conditioning and A/D conversion; Process variables: temperature, pressure, flow, level; PID control and its applications; Control panel components and wiring standards; Industrial communication protocols

In simple words: Why factories automate: the types of manufacturing, the main components (PLC, HMI, VFD, SCADA, MES), sensors and actuators, PID control, and industrial communication.

Section 3 — Programmable Logic Controller (PLC)

Topics: Introduction to Programmable Logic Controller (PLC); Types of PLCs and selection criteria; Application and advantages of PLC; Important components of PLC; Numbering systems: binary, hexadecimal, BCD; PLC memory organization and addressing; Explain sink and source concept; Interfacing of PLC with field devices; PLC communication protocols: Modbus, Profibus, ethernet/IP; Types of PLC programming; Ladder logic programming basics; Conditional logic: AND, OR, NOT, NAND, NOR XOR, XNOR Gates; Timers and counters in PLC; Explain advance instruction used in PLC; Fault handling and troubleshooting in PLCs; Industrial case study of PLC.

In simple words: The PLC: its types, memory and addressing, ladder-logic programming, timers and counters, communication protocols, and troubleshooting.

Section 4 — Variable Frequency Drive (VFD)

Topics: Introduction to Variable Frequency Drive (VFD); Basics of AC motors; Application of VFD; Components of a VFD: rectifier, DC bus, inverter; Types of VFDs: scalar control vs. vector control; Connections and control mechanism; VFD parameter configuration and settings; Study motor protection and overload prevention; Understand energy efficiency optimization using VFD; Troubleshooting and fault diagnosis in VFDs; Regenerative braking and energy recovery in VFD; Learn Modbus and ethernet communication for VFDs; Industry applications of VFD in HVAC, pumps, and conveyors; Case study: VFD implementation for smart energy saving; Interfacing of VFD with PLC & SCADA.

In simple words: Variable frequency drives: how they control AC motor speed, their components and settings, energy saving, and interfacing with PLC and SCADA.

Section 5 — Human Machine Interface

Topics: Introduction to HMI; Role of HMI in industrial automation; Components of HMI; Compare HMI and SCADA; Communication protocols in HMI; User interface of HMI software; Building basic HMI control animations; Alarms and event logging; Security and user access management; Multi-screen navigation in HMI systems; Study trending and historical data logging; Communication between HMI and PLC; SCADA-HMI integration; Troubleshooting common issues in HMI; Industrial case study: HMI in production line

In simple words: HMI screens: building operator interfaces with buttons, indicators, alarms and trends, and connecting them to PLCs and SCADA.

Section 6 — Supervisory Control and Data Acquisition (SCADA)

Topics: Introduction to Supervisory Control and Data Acquisition (SCADA); Application and advantages of SCADA; Important components of SCADA; Block diagram of SCADA; SCADA communication protocols; Types of tags and its usage; Explore the features of SCADA; User interface of SCADA software; Building basic SCADA screens with animation; Dynamic properties like sizing, location, blinking, visibility, percentage filling, object size, orientation, etc.; Alarm management and event logging in SCADA; Historical data logging and trending in SCADA; Recipe management; Script programming; Security options and administrative levels in SCADA; Explore data transfer feature in SCADA software; SCADA and PLC interfacing for real-time control; Troubleshooting and fault detection; Role of SCADA in industry 4.0 and IIoT; SCADA applications in water treatment, energy, and manufacturing.

In simple words: SCADA: supervising whole plants from a control room — screens, alarms, trends, recipes, security, and its role in Industry 4.0 and IIoT.

Section 7 — Flexible Manufacturing System (FMS)

Topics: Introduction to FMS and its importance in modern manufacturing; Important Components of FMS, Advantages and Disadvantages of FMS; Applications of Pneumatics in Manufacturing; Use of Machine Vision, important components, sorting application; Pick and Place concept and its important components

In simple words: Flexible manufacturing systems: their components and advantages, pneumatics, machine vision for sorting, and pick-and-place.

Section 8 — Overview of Manufacturing Execution Systems (MES)

Topics: Introduction to manufacturing execution systems (MES); ISA 88 AND ISA 95; MES architecture and MES core functionalities; Key functions of MES: production scheduling, quality control, tracking; MES data flow and communication protocols; Real-time work order management in MES; Resource allocation via MES; MES reporting and dashboards for production insights; Barcode integration for MES automation; Exploring MES and industry 4.0: digital twin and smart manufacturing; Case study: MES implementation in a smart factory.

In simple words: MES: the software layer that tracks raw material to finished goods — scheduling, quality control, work orders, dashboards, barcodes, and the digital twin.

Practical Work

- Explain different safety tools & Kits, Hazard identification & avoidance, proper waste management.
- Demonstrate various components of the automation simulator panel.
- Demonstrate signal measurement using Multimeter.
- Identifying and testing of different type of sensors.
- Demonstrate wiring and testing of various output devices.
- Show on-off control using relays.
- Test Emergency stop and safety interlock.
- Decode alarm and status indications.
- Configuring and opening PLC programming software.
- Use of basic commands and instructions.
- Demonstrate XIC, XIO, coil and addressing concept.
- Interfacing digital I/O with PLC.
- Configuring analog, I/O with PLC.
- Writing basic ladder logic programs.
- Implementing start-stop logic using push buttons.
- Design logic gates concept using ladder diagram.

- Design and practice various real time scenarios.
- Configuring and programming timers and counters.
- Create various programs based on timer's application.
- Create various programs based on timer, counter and comparators.
- Design a PLC program to execute the elevator system in a 3-floor apartment.
- Troubleshooting faulty I/O modules in a PLC system.
- Programming safety interlocks for emergency shutdown.
- Demonstration of buttons/keys present on VFD.
- Configuring basic VFD parameters for motor speed control.
- Implementing start/stop and forward/reverse operation.
- Adjusting acceleration and deceleration ramp times.
- Interfacing VFD with PLC for automated speed control.
- Implementing emergency stop and safety interlocks.
- Analysing VFD faults and troubleshooting issues.
- Opening the HMI programming software.
- Designing HMI screens with buttons and indicators.
- Configuring alarms and event logging in HMI.
- Setting up data entry fields in HMI for operator input.
- Creating HMI screens for tank level monitoring.
- Implementing multi-screen navigation and setting up trends in HMI.
- Integration of HMI with PLC.
- Debugging HMI-PLC communication issues.
- Demonstrate the SCADA software interface.
- Design program for a switch and a lamp and check out results in runtime.
- Designing start/stop control for pumps and motors via SCADA.
- Configuring alarm management system with alerts.
- Logging and retrieving historical data for analysis.
- Creating live graphs and trend displays for process monitoring.
- Interfacing SCADA with PLC, HMI and VFD for motor control applications.
- Implementing data export and report generation in SCADA.
- Using SCADA for batch processing and recipe management.
- Designing a SCADA simulation for a smart dashboard energy monitoring system.
- Integrate pneumatic systems, sorting, and pick and place.
- Configuring MES software for the first time.
- Setting up work order tracking in MES.
- Implementing barcode/RFIDs-based inventory management.
- Creating automated production reports using MES dashboards.
- Setting up automated work scheduling for assembly line operations.

- Demonstrate integration of MES with PLC for process automation.
- Setting up role-based user access for MES data security.
- Identify and resolve common issues in the MES assembly line like communication failure, alarms, equipment malfunction and data irregularity.

Reference Books

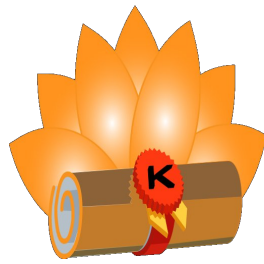
Reference books are not listed for this subject in the official syllabus.

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Source: BTEUP 3rd 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.





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Indian Constitution — Complete Syllabus

BTEUP Diploma in Electronics Engineering • 5th Semester • Session 2026-27

Subject 5.8 — Audit Course (Theory) • Qualifying (Q) • 50 Marks Internal • No Credits • L
2 - P 0

Note: The scheme table numbers this subject 5.8, but the contents list numbers it 5.7 (and numbers the Summer Internship 5.7 in the scheme but omits it from the contents list). The “Recommended Books” heading in the PDF is empty — only learning websites are listed.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
5.8	Indian Constitution (Q)	Audit Course	2 - 0	—	50	—	N/A (Q)
Indian Constitution Total				—	50	—	N/A (Q)

What This Subject Aims To Do

To help students understand the origin, development and importance of the Indian Constitution — fundamental rights and duties, and the structure and functions of the legislature, executive and judiciary — and to promote democratic values such as equality, justice and the rule of law, and a sense of responsible citizenship.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	The Constitution - Introduction	6	21%
2	Union Government	6	21%
3	State Government	8	28%
4	Local Administration	4	15%
5	Election Commission	4	15%

Unit 1 — The Constitution - Introduction (6 Periods, 21%)

Topics: The History of the Making of the Indian Constitution, Preamble and the Basic Structure, and its interpretation, Fundamental Rights and Duties and their interpretation. State Policy Principles

In simple words: How the Constitution was made, its Preamble and basic structure, Fundamental Rights and Duties, and the Directive Principles of State Policy.

Unit 2 — Union Government (6 Periods, 21%)

Topics: Structure of the Indian Union, President – Role and Power, Prime Minister and Council of Ministers Lok Sabha and Rajya Sabha

In simple words: The Union government: the President, Prime Minister and Council of Ministers, and the two Houses of Parliament.

Unit 3 — State Government (8 Periods, 28%)

Topics: Governor – Role and Power, Chief Minister and Council of Ministers, State Secretariat

In simple words: State government: the Governor, Chief Minister and Council of Ministers, and the State Secretariat.

Unit 4 — Local Administration (4 Periods, 15%)

Topics: District Administration Municipal Corporation, Zila Panchayat

In simple words: Local government: district administration, municipal corporations and zila panchayats.

Unit 5 — Election Commission (4 Periods, 15%)

Topics: Role and Functioning Chief Election Commissioner State Election Commission

In simple words: The Election Commission: its role and functioning, the Chief Election Commissioner, and State Election Commissions.

Suggested Software / Learning Websites (as listed in the PDF)

- <https://www.constitution.org/cons/india/const.html>
- <http://www.legislative.gov.in/constitution-of-india>
- <https://www.sci.gov.in/constitution>
- <https://www.toppr.com/guides/civics/the-indian-constitution/the-constitution-of-india/>

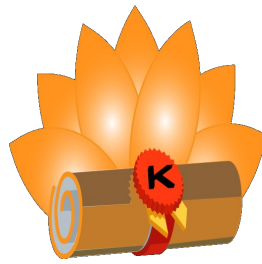
Reference Books

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

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Summer Internship-II & Student Centred Activities — 5th Semester

BTEUP Diploma in Electronics Engineering • 5th Semester • Session 2026-27
Subject 5.7 (Internship) 100 Marks • SCA 50 Marks • Total 150 Marks

Note: The scheme table marks the internship's 60 internal / 40 external split with asterisks (60*, 40*, 100*), but the asterisk footnote in the scheme ("* Advance skill development...") does not explain the internship marks — the asterisks on this row have no matching footnote in the PDF.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
5.7	Summer Internship-II (4 weeks after 4th Sem.)	Internship	—	2	60	40 (3 hrs)	100
—	Student Centred Activities (SCA)	Activity	0 - 8	—	50	—	50
Internship-II + SCA Total				2	110	40	150

Summer Internship-II — What It Is

Industrial training of 4 weeks, organised after the fourth semester examination; evaluation is in the fifth semester. The salient features say four and six weeks of industrial training are mandatory after the II and IV semesters, with total marks of 50 and 100 respectively — this second internship carries 100 marks (60 internal + 40 external, 3 hrs). It gives students an opportunity to experience the environment and culture of industrial production units and commercial activities in field organisations, and to integrate theory with practice. (No detailed

internship syllabus, evaluation break-up or report format is given in the PDF for this internship beyond the scheme-table marks.)

Student Centred Activities (SCA) — 50 Marks

A provision for overall personality development, including co-curricular activities such as extension lectures, games, hobby clubs (for example photography, painting and singing), seminars, declamation contests, educational field visits, NCC, NSS, library work, cultural activities and self-study. Maximum marks 50, distributed as: (i) 15 marks for general behaviour and discipline (by HODs in consultation with all teachers of the department); (ii) 10 marks for attendance — 75–80% = 6 marks, 80–85% = 8 marks, above 85% = 10 marks; (iii) 25 marks maximum in an odd semester for Language Lab Practices, Group Discussion and Personality Development, Industrial Visits/Industrial Talks, Power Point Presentations and Resume Making, Development of Aptitude and Reasoning Skills, and participation in technical Exhibitions, Symposiums, Seminars, Workshops at Institute/District/State/National level. (In an even semester the 25 marks are for Sports/NCC/Cultural/Co-curricular/NSS activities.)

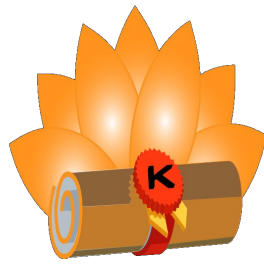
Reference Books

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

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Entrepreneurship and Start-Up — Complete Syllabus

BTEUP Diploma in Electronics Engineering • 6th Semester • Session 2026-27
Subject 6.1 (Humanities and Social Science) • Total 100 Marks • 2 Credits • L 2 – P 0

Note: In the Industrial Pathway (6th semester alternative), this course is mandatory and taught in online mode by the student's polytechnic, followed by a separate examination conducted by the Board of Technical Education, Lucknow.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
6.1	Entrepreneurship and Start-Up	Humanities and Social Science	2 - 0	2	Theory 40	Theory 60 (3 hrs)	100
Entrepreneurship and Start-Up Total				2	40	60	100

What This Subject Aims To Do

To explore the objectives of entrepreneurship — innovation, wealth creation and societal impact — and learn how entrepreneurs foster economic growth, since entrepreneurship drives the economy and is fundamental to all innovation and development.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
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1	Introduction to Entrepreneurship and Start - Ups	2	17%
2	Business Ideas and their implementation	6	14%
3	Ideas to Start-up	6	20%
4	Management	4	17%
5	Financing and Protection of Ideas	10	32%

Unit 1 — Introduction to Entrepreneurship and Start - Ups (2 Periods, 17%)

Topics: Definitions, Classification of Entrepreneur; Traits of an Entrepreneur, Intrapreneurship, Motivation; Types of Business Structures- On the Basis of size and On the basis of ownership; Similarities/differences between entrepreneurs and managers

In simple words: Who an entrepreneur is, what makes one tick, and the types of business structures — plus how entrepreneurs differ from managers.

Unit 2 — Business Ideas and their implementation (6 Periods, 14%)

Topics: Discovering ideas and visualizing the business; Activity map; Business Plan (Case Study)

In simple words: Finding a business idea, visualising it, and turning it into a business plan — with a case study.

Unit 3 — Ideas to Start-up (6 Periods, 20%)

Topics: Marketing and Accounting- Definition and Importance; Market Analysis - STP (Segmentation, Targeting, Positioning); Competition evaluation and Strategy Development - Vision, Mission, Goal, Objectives; Risk analysis- SWOT Analysis.

In simple words: From idea to start-up: marketing, market analysis (segmentation, targeting, positioning), competition, and SWOT risk analysis.

Unit 4 — Management (4 Periods, 17%)

Topics: Definition Concept and Functions of Management; Company's Organization Structure- Concept and Classification; Recruitment and Selection- Definition; Training and Development- Importance.

In simple words: Managing a business: what management is, organisation structures, and hiring and training people.

Unit 5 — Financing and Protection of Ideas (10 Periods, 32%)

Topics: Financing methods available for Entrepreneurship/ Startups in India (Government Scheme, Banking, NBFCs, SHG and Micro Financing). Intellectual Property Rights- Overview of - Copyrights, Trademark, Geographical Indicators, Patenting and Licenses. Communication of Ideas to potential investors – Investor Pitch. Succession, Dissolution and Harvesting strategy: Ways of succession, Types of Dissolution

In simple words: Raising money (government schemes, banks, NBFCs, microfinance), protecting ideas (copyrights, trademarks, patents, GI tags), pitching to investors, and exit strategies.

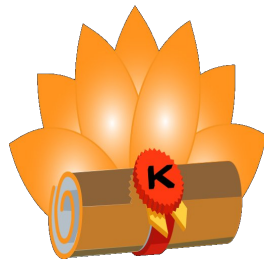
Reference Books (as listed in the syllabus)

- The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company — Steve Blank and Bob Dorf — K & S Ranch — ISBN - 978-0984999392
- Entrepreneurship Development (A new Venture creation) — Vasant Desai — Himalya Publication
- Entrepreneurship Development — Khanka S.S. — S Chand & Company Limited, New Delhi
- Entrepreneurship Development — Gupta and Srinivsan — S Chand & Company Limited, New Delhi
- Demand: Creating What People Love Before They Know They Want It — Adrian J. Slywotzky with Karl Weber — Headline Book Publishing — ISBN - 978-0755388974
- The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses — Eric Ries — Penguin UK — ISBN - 978-0670921607
- The Innovator's Dilemma: The Revolutionary Book That Will Change the Way You Do Business — Clayton M. Christensen — Harvard Business — ISBN: 978-142219602

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Managerial Economics — Complete Syllabus (Elective — Pathway, Option 1)

BTEUP Diploma in Electronics Engineering • 6th Semester • Session 2026-27

Subject 6.2.1 — Elective (Pathway), Option 1 (Theory) • Total 100 Marks • 3 Credits • L 3

– P 0 • Choose this OR Finance Fundamentals OR Cyber Security OR Data Science

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
6.2.1	Elective (Pathway): Managerial Economics	Theory	3 - 0	3	Theory 40	Theory 60 (3 hrs)	100
Managerial Economics Total				3	40	60	100

What This Subject Aims To Do

To provide diploma students with a basic understanding of economic principles and how they are applied in business decision-making — analysing and interpreting economic data, understanding market behaviour, and making informed managerial decisions to optimise resources and improve business performance.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Fundamentals of Managerial Economics	10	22%
2	Demand Analysis and Forecasting	10	26%

3	Production and Cost Analysis	12	30%
4	Market Structures	10	22%

Unit 1 — Fundamentals of Managerial Economics (10 Periods, 22%)

Topics: Nature and scope, meaning, goals and importance of managerial economics in business decision-making, Economic principles, Macroeconomics and Micro economics, Firm, nature and objective.

In simple words: What managerial economics is, why it matters for business decisions, and the basics of micro- and macroeconomics and the firm.

Unit 2 — Demand Analysis and Forecasting (10 Periods, 26%)

Topics: Theory of demand, factors influencing demand, and elasticity of demand, Demand Forecasting, Methods and techniques for forecasting demand.

In simple words: Demand: what drives it, how sensitive it is to price (elasticity), and how to forecast it.

Unit 3 — Production and Cost Analysis (12 Periods, 30%)

Topics: Production, Production Function, Relationship between inputs and outputs, Production Analysis, Short-run and long-run production analysis, Law of Variable Proportions, Output behavior when one input varies and others are constant. Cost Analysis, Fixed cost, variable cost, total cost, marginal cost, average cost, Cost Curves.

In simple words: Production and costs: the production function, the law of variable proportions, and fixed, variable, marginal and average costs and their curves.

Unit 4 — Market Structures (10 Periods, 22%)

Topics: Market Structures, Perfect Competition, Monopoly, Monopolistic Competition, Oligopoly.

In simple words: The four market structures — perfect competition, monopoly, monopolistic competition and oligopoly — and how firms behave in each.

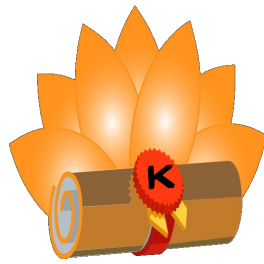
Reference Books (as listed in the syllabus)

- “Managerial Economics” by Dominick Salvatore
- “Managerial Economics: Theory and Practice” by Thomas J. Webster
- “Managerial Economics” by D. N. Dwivedi
- “Managerial Economics and Financial Analysis” by Dr. N. Appa Rao & Dr. P. Vijay Kumar

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Finance Fundamentals — Complete Syllabus (Elective — Pathway, Option 2)

BTEUP Diploma in Electronics Engineering • 6th Semester • Session 2026-27

Subject 6.2.2 — Elective (Pathway), Option 2 (Theory) • Total 100 Marks • 3 Credits • L 3

– P 0 • Choose this OR Managerial Economics OR Cyber Security OR Data Science

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
6.2.2	Elective (Pathway): Finance Fundamentals	Theory	3 - 0	3	Theory 40	Theory 60 (3 hrs)	100
Finance Fundamentals Total				3	40	60	100

What This Subject Aims To Do

To enable the student to identify different ways to save money for the future, understand various techniques to raise capital, get acquainted with essential finance terminology, and be exposed to banking, credit, investments, assets, budgeting, costing and its impact on profitability — the study of money, banking, credit, investments, assets and liabilities that make up financial systems, improving overall financial literacy.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Personal Finance	7	17%
2	Business Funding	7	17%

3	Finance Language	10	23%
4	Budgeting	8	20%
5	Marginal Costing	10	23%

Unit 1 — Personal Finance (7 Periods, 17%)

Topics: Personal Finance – Meaning, Objectives and advantages – Individual Perspective – Family Perspective – Time Value of Money – Personal Savings: Meaning, Different modes of Saving – Bank Deposit, Online Investments, Insurance, Stocks, Gold, Real Estate – Returns Vs Risk – Financial Discipline – Setting Alerts for commitments (With Real time Examples)

In simple words: Managing your own money: savings, the time value of money, where to save or invest (deposits, insurance, stocks, gold, property), and returns vs risk.

Unit 2 — Business Funding (7 Periods, 17%)

Topics: Sources: Personal Savings – Borrowings – Venture Capital – Venture Capital Process – Commercial Banks – Government Grants and Scheme

In simple words: Where a business gets money: savings, borrowing, venture capital, banks, and government grants and schemes.

Unit 3 — Finance Language (10 Periods, 23%)

Topics: Capital – Drawing – Income – Expenditure – Revenue Vs Capital Items – Assets – Fixed Assets – Current Assets – Fictitious Assets – Liabilities – Long-term Liabilities – Current Liabilities – Internal Liabilities – External Liabilities – Share holders fund: Equity Share capital, Preference Share Capital, Reserve & Surplus – Borrowings: Debentures, Bank Loan, Other Loan – Depreciation – Reserve Vs Provision.

In simple words: The vocabulary of finance: capital, assets, liabilities, shareholders' funds, borrowings, depreciation, reserves and provisions.

Unit 4 — Budgeting (8 Periods, 20%)

Topics: Budgetary Control – Meaning – Preparation of various budgets – Purchase budget – Sales Budget – Production budget – Cash Budget – Flexible budgets. (With Problems)

In simple words: Budgetary control: preparing purchase, sales, production, cash and flexible budgets — with problems.

Unit 5 — Marginal Costing (10 Periods, 23%)

Topics: Marginal Costing – Meaning – Marginal Costing Vs Absorption Costing – Concepts of Variable Cost, Fixed Cost and Contribution – PV Ratio – Break Even Point – Margin of Safety – Key Factor – Application of Marginal Costing in decision making – Make or Buy – Shutdown or Continue – Exploring New Markets (With Problems)

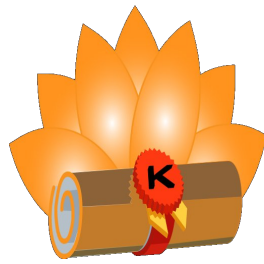
In simple words: Marginal costing: contribution, PV ratio, break-even point and margin of safety, and using them to decide make-or-buy, shutdown-or-continue and new markets.

Reference Books (as listed in the syllabus)

- S. K. Sharma, Fundamentals of Financial Management, Sultan Chand & sons, New Delhi, 2024
- L. Natarajan, Banking Theory, Law & Practice, 1st edition, Margham Publications, 2019
- T.S. Reddy and Dr. Y. Hariprasad Reddy, Management Accounting, 1st edition, Margham Publications, 2005
- T.S. Reddy and Dr. Y. Hariprasad Reddy, Cost Accounting, 1st edition, Margham Publications, 2012
- Web resource: <https://archive.nptel.ac.in/courses/110/107/110107144/>

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Cyber Security — Complete Syllabus (Elective — Pathway, Option 3)

BTEUP Diploma in Electronics Engineering • 6th Semester • Session 2026-27

Subject 6.2.3 — Elective (Pathway), Option 3 (Theory) • Total 100 Marks • 3 Credits • L 3
- P 0 • Choose this OR Managerial Economics OR Finance Fundamentals OR Data Science

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
6.2.3	Elective (Pathway): Cyber Security	Theory	3 - 0	3	Theory 40	Theory 60 (3 hrs)	100
Cyber Security Total				3	40	60	100

What This Subject Aims To Do

To introduce the fundamentals of cyber security, threats and ethical practices; explain cryptography and data encryption; describe network vulnerabilities and protection methods; give knowledge of web application vulnerabilities and security techniques; and develop understanding of security policies, audits and ethical hacking.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Introduction to Cyber Security	7	16%
2	Cryptography and Encryption	10	24%

3	Network Security	7	16%
4	Web and Application Security	9	22%
5	Cyber Security Management and Ethical Hacking	9	22%

Unit 1 — Introduction to Cyber Security (7 Periods, 16%)

Topics: Definition and Importance of Cyber Security, Cyber Threats and Attacks: Malware, Phishing, Ransomware, Social Engineering, Denial of Service (DoS) , Cyber Security Principles: Confidentiality, Integrity, Availability, Authentication, Non-repudiation. Cyber Security in Electronics and IoT: Security concerns in embedded systems, smart devices, and industrial control systems. Cyber Laws and Ethics: Overview of IT Act (2000), Data Protection Laws, Ethical Hacking

In simple words: The threats — malware, phishing, ransomware, social engineering, denial of service — the core principles (confidentiality, integrity, availability), security in electronics and IoT, and cyber law and ethics.

Unit 2 — Cryptography and Encryption (10 Periods, 24%)

Topics: Introduction to Cryptography: Basics of encryption and decryption, Types of Cryptographic Algorithms: Symmetric (AES, DES), Asymmetric (RSA, ECC), Hash functions (MD5, SHA), Public Key Infrastructure (PKI): Digital signatures, Certificates, Trust models, Applications of Cryptography: SSL/TLS, Secure Email, VPNs, Blockchain. Cryptography in IoT and Embedded Systems: Key exchange protocols, securing communication between IoT devices

In simple words: Encryption: symmetric and asymmetric algorithms (AES, DES, RSA, ECC), hashes, digital signatures and PKI, and real uses like SSL/TLS, VPNs and blockchain.

Unit 3 — Network Security (7 Periods, 16%)

Topics: Introduction to Network Security: Concepts of firewalls, intrusion detection and prevention systems (IDS/IPS), Network Security Protocols: IPsec, SSL/TLS, HTTPS, SSH. VPNs and Proxies: Understanding Virtual Private Networks and Proxy Servers for secure communication. Securing Wireless Networks: Wireless security standards (WPA, WPA2, WPA3), threats to wireless networks

In simple words: Protecting networks: firewalls, intrusion detection and prevention, security protocols, VPNs and proxies, and wireless security (WPA2/WPA3).

Unit 4 — Web and Application Security (9 Periods, 22%)

Topics: Web Application Vulnerabilities: XSS (Cross-Site Scripting), SQL Injection, CSRF (Cross-Site Request Forgery). Web Security Measures: Web Application Firewalls (WAFs), Secure Coding Practices, Input validation. Secure HTTP (HTTPS): SSL/TLS in securing web traffic. Mobile and IoT Application Security: Securing mobile applications, secure communication in IoT

In simple words: Web attacks — cross-site scripting, SQL injection, cross-site request forgery — and the defences: web application firewalls, secure coding and input validation.

Unit 5 — Cyber Security Management and Ethical Hacking (9 Periods, 22%)

Topics: Cyber Security Policies and Risk Management: Establishing security policies, risk assessment, and mitigation strategies. Security Audits: Understanding how to conduct a security audit, common audit frameworks. Ethical and Legal Issues: Legal aspects of hacking, cybersecurity compliance, and international regulations

In simple words: Managing security: policies, risk assessment and mitigation, security audits, and the legal and ethical side of hacking.

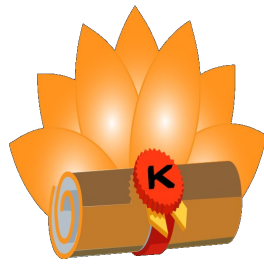
Reference Books (as listed in the syllabus)

- Cyber Security Essentials by Charles J. Brooks
- Principles of Information Security by Michael E. Whitman and Herbert J. Mattord
- Network Security Essentials by William Stallings
- Introduction to Modern Cryptography by Jonathan Katz and Yehuda Lindell
- Ethical Hacking and Penetration Testing Guide by Rafay Baloch
- Cyber Security and Cyber Laws by S. B. S. K. Sharma (Indian Author)
- Cyber Security: Understanding Cyber Crimes, Computer Forensics, and Legal Perspectives by Nishith Chhapparia (Indian Author)

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Data Science — Complete Syllabus (Elective — Pathway, Option 4)

BTEUP Diploma in Electronics Engineering • 6th Semester • Session 2026-27
Subject 6.2.4 — Elective (Pathway), Option 4 (Theory) • Total 100 Marks • 3 Credits • L 3
– P 0 • Choose this OR Managerial Economics OR Finance Fundamentals OR Cyber Security

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
6.2.4	Elective (Pathway): Data Science	Theory	3 - 0	3	Theory 40	Theory 60 (3 hrs)	100
Data Science Total				3	40	60	100

What This Subject Aims To Do

To learn the basics of Data Science and its use in electronics; gain skills in collecting, cleaning and analysing data; use Python with tools like NumPy and Pandas; understand basic machine learning and how it applies to electronics; and apply data science in IoT, automation and signal processing.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Introduction to Data Science	8	20%
2	Data Handling and Visualization	8	20%

3	Python for Data Science	8	20%
4	Introduction to Machine Learning	8	20%
5	Real-World Applications of Data Science	10	20%

Unit 1 — Introduction to Data Science (8 Periods, 20%)

Topics: What is Data Science? Evolution and Importance, Data Science vs. Data Analytics vs. Machine Learning, Applications in Electronics: IoT, Automation, Signal Processing, Overview of Data Science Workflow

In simple words: What data science is, how it differs from data analytics and machine learning, its uses in electronics, and the workflow from data to decision.

Unit 2 — Data Handling and Visualization (8 Periods, 20%)

Topics: Types of Data: Structured, Unstructured, Time-Series, Data Collection Methods (from sensors, logs, APIs), Data Cleaning Techniques, Introduction to Excel and CSVs, Visualization with Matplotlib / Seaborn / Excel, Basics of Statistics (mean, median, mode, std. dev.)

In simple words: Handling data: its types, collecting it from sensors, logs and APIs, cleaning it, visualising it, and the basic statistics that describe it.

Unit 3 — Python for Data Science (8 Periods, 20%)

Topics: Why Python for Data Science? Basics of Python Programming (variables, loops, functions) , Libraries: NumPy, Pandas – Data Manipulation , Reading sensor data from files , Mini project: Handling electronics-related datasets (e.g., temperature, voltage logs)

In simple words: Python for data work: the basics, NumPy and Pandas for manipulating data, and a mini-project on electronics datasets like temperature and voltage logs.

Unit 4 — Introduction to Machine Learning (8 Periods, 20%)

Topics: Supervised vs. Unsupervised Learning, Algorithms Overview: Linear Regression, KNN, Decision Trees, Real-world examples in electronics (e.g., fault prediction, pattern detection), Model Training, Testing, and Evaluation.

In simple words: Machine learning basics: supervised vs unsupervised learning, linear regression, KNN and decision trees, and how to train, test and evaluate a model.

Unit 5 — Real-World Applications of Data Science (10 Periods, 20%)

Topics: Data Science in IoT & Smart Devices, Signal and Image Data Analysis Basics, Introduction to Big Data Concepts (brief) , Ethics in Data Science and AI , Capstone Project Guidelines

In simple words: Data science in the real world: IoT and smart devices, signal and image data, big data in brief, ethics, and the capstone project.

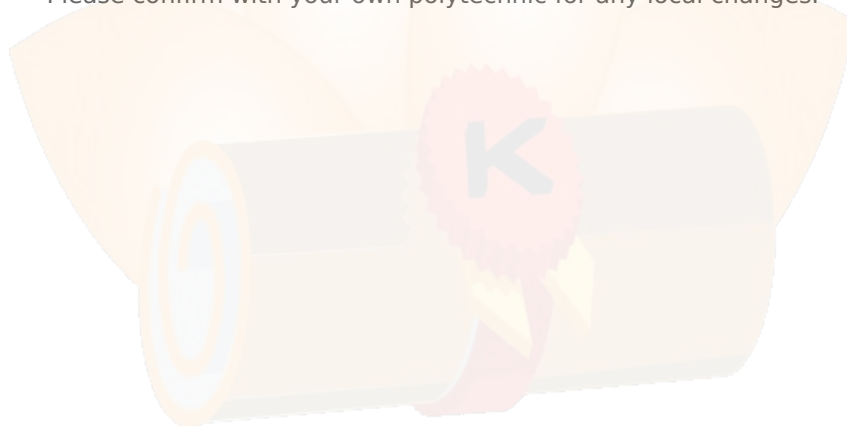
Reference Books (as listed in the syllabus)

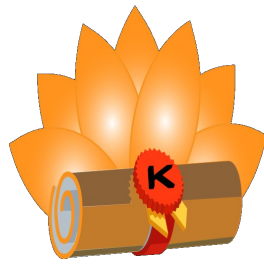
- “Doing Data Science” by Cathy O'Neil & Rachel Schutt
- “Data Visualization with Python and JavaScript” by Kyran Dale
- “Python Data Science Handbook” by Jake VanderPlas
- “Machine Learning for Absolute Beginners” by Oliver Theobald
- “Data Science for IoT Engineers” by Perry Lea
- Data Science & Machine Learning by Rashmi Singh

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Mobile and Wireless Communication — Complete Syllabus (Elective — Specialisation, Option 1)

BTEUP Diploma in Electronics Engineering • 6th Semester • Session 2026-27

Subject 6.3.1 — Elective (Specialisation), Option 1 (Practicum) • Total 100 Marks • 3

Credits • L 2 - P 3 • Choose this OR VLSI Using VHDL OR Power Electronic Devices

Note: No marks-distribution table and no reference-books list are given for this subject in the PDF, so unit weightages and books are not shown.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
6.3.1	Elective (Specialisation): Mobile and Wireless Communication	Practicum	2 - 3	3	Practical 60	Practical 40	100
Mobile and Wireless Communication Total				3	60	40	100

What This Subject Aims To Do

To equip students with fundamental knowledge and practical understanding of wireless and mobile communication systems — their functioning, architecture and operational principles — so they stay updated with current and emerging communication technologies, as mobile communication has largely replaced traditional landline systems.

Unit-Wise Complete Topic List

Note: no marks-distribution table is given for this subject in the official syllabus, so unit weightages are not shown.

Unit 1 — Wireless Communication and Propagation (6 Periods)

Topics: Basics, Advantages of wireless communication, Electromagnetic waves, Frequency Spectrum used, Cellular Network Systems, Link budget, Free-space path loss, Noise figure of receiver, Multipath fading, Shadowing, fading margin, Shadowing margin

In simple words: Wireless basics: the spectrum used, cellular systems, link budgets, path loss, and the fading and shadowing that weaken signals.

Unit 2 — Overview of Cellular Systems (8 Periods)

Topics: Evolution 1G/2G/3G/4G/5G. Cellular Concepts – Cell area, Cell site structure, Capacity of cell, Frequency reuse, Co-channel and Adjacent Channel Interference, Power Control for reducing Interference, Fundamentals of cellular network planning: Coverage planning, Capacity planning, Cell splitting and sectoring. Antenna diversity, wireless channel capacity and MIMO

In simple words: Cellular systems from 1G to 5G: cells, frequency reuse, interference, network planning (coverage, capacity, cell splitting and sectoring), antenna diversity and MIMO.

Unit 3 — Multiple Access Techniques for Wireless Communication (6 Periods)

Topics: Introduction to Multiple Access. Frequency Division Multiple Access (FDMA). Time Division Multiple Access (TDMA), Distinction between TDMA FDD and TDMA TDD, Code Division Multiple Access (CDMA), WCDMA

In simple words: How many users share the airwaves: FDMA, TDMA (FDD and TDD) and CDMA/WCDMA.

Unit 4 — Mobile Communication Systems (8 Periods)

Topics: Introduction of Global Systems for Mobile Communication (GSM) and its architecture, Introduction of CDMA System, comparison of CDMA and GSM Systems and frequency bands. Introduction to GPRS and EDGE, Introduction to Architecture and Features of UMTS HSPA (High Speed Packet Access), Features and Architecture of LTE (Long Term Evolution), Vo-LTE (Voice Over Long-Term Evolution)

In simple words: The systems themselves: GSM and CDMA compared, GPRS and EDGE, UMTS/HSPA, LTE and voice over LTE.

Practical Work

- To understand the path loss.
- Understand the path loss with shadowing.
- Understanding the Flat fading.
- Understanding the Frequency selective fading.
- Understanding the Multipath channel for the following objectives: a. No Fading; b. Flat Fading; c. Dispersive Fading.
- Study the features, specification and working of cellular mobile.
- To understand the cellular frequency reuse concept to find the co-channel cells for a particular cell.
- To simulate a dipole antenna (λ , $\lambda/4$, $\lambda/2$, $3\lambda/2$) for a particular frequency using 4NEC2.
- Perform following experiments using CDMA trainer kit: a. PSK modulation and demodulation experiment; b. Bit synchronization extraction experiment; c. Error correction encoding experiment.
- Measurement of signal strength at various points from a transmitting antenna.
- Demonstration of Base Trans Receiver (BTS) with nearby cellular tower.
- Observing call processing of GSM trainer kit.
- Repair of a GSM mobile phone.
- Troubleshooting GSM Mobile Phone: a. Assembling and disassembling of GSM phone; b. Study parts of Mobile Phone; c. Testing of various parts.

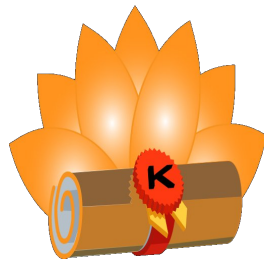
Reference Books

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

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VLSI Using VHDL — Complete Syllabus (Elective — Specialisation, Option 2)

BTEUP Diploma in Electronics Engineering • 6th Semester • Session 2026-27
Subject 6.3.2 — Elective (Specialisation), Option 2 (Practicum) • Total 100 Marks • 3 Credits • L 2 - P 3 • Choose this OR Mobile and Wireless Communication OR Power Electronic Devices

Note: The PDF gives no titles for the five units of this subject (only “UNIT 1-”, “UNIT 2-”, etc.), and no marks-distribution table and no reference-books list — so unit titles, weightages and books are not shown.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
6.3.2	Elective (Specialisation): VLSI Using VHDL	Practicum	2 - 3	3	Practical 60	Practical 40	100
VLSI Using VHDL Total				3	60	40	100

What This Subject Aims To Do

To introduce the fundamentals of VLSI design using hardware description languages, with emphasis on the design and analysis of combinational and sequential digital circuits, simulation and functional verification using VHDL, and exposure to programmable logic devices such as CPLDs and FPGAs.

Unit-Wise Complete Topic List

Note: no marks-distribution table is given for this subject in the official syllabus, so unit weightages are not shown.

Unit 1 (6 Periods)

Topics: Levels of abstraction in VLSI design, Stages in the VLSI design process: Design Entry, Simulation, Synthesis, Placement, and Routing, Implementation of NOT, AND, OR, NAND, and NOR gates using NMOS, Implementation of NOT, AND, OR, NAND, and NOR gates using CMOS, Design of simple combinational circuits using NMOS, Design of simple combinational circuits using CMOS.

In simple words: The VLSI design flow — entry, simulation, synthesis, placement and routing — and building basic gates in NMOS and CMOS.

Unit 2 (6 Periods)

Topics: Types of HDL, Various modeling techniques, Fundamentals of VHDL language: module, Data types, Operators: Arithmetic operators, Logical shift operators, Relational operators, Logical operators, Syntax for Continuous assignment statements, Procedural assignment statements, Timing control, wait statement, Syntax for control statements.

In simple words: The VHDL language itself: its types, operators, and the syntax for continuous and procedural assignments and control statements.

Unit 3 (6 Periods)

Topics: VHDL code for Half Adder and Full Adder, VHDL code for Half Subtractor and Full Subtractor, VHDL code for 4-to-1 Multiplexer, 1-to-4 Demultiplexer, VHDL code for 4-to-2 Encoder, 2-to-4 Decoder.

In simple words: Writing VHDL for combinational circuits: adders, subtractors, multiplexers, demultiplexers, encoders and decoders.

Unit 4 (6 Periods)

Topics: VHDL code for D, JK, and T Flip-flops, VHDL code for 3-bit Shift register, VHDL code for 3-bit up counter, VHDL code for 3-bit down counter, VHDL code for 3-bit up-down counter.

In simple words: Writing VHDL for sequential circuits: flip-flops, shift registers and up, down and up-down counters.

Unit 5 (4 Periods)

Topics: Introduction to PROM, PLA, and PAL – Design of combinational circuits using PROM, PAL, and PLA (up to 3 variables).

In simple words: Programmable logic: PROM, PLA and PAL, and designing combinational circuits with them (up to 3 variables).

Practical Work

- Simulation of AND and OR gate using VHDL code.
- Simulation of half adder and full adder using VHDL.
- Simulation of half subtractor and full using VHDL.
- Simulation of 4x1 MUX using VHDL.
- Simulation of 1x4 DMUX using VHDL.
- Simulation of 4 to 2 encoder using VHDL.
- Simulation of 2 to 4 decoder using VHDL.
- Write VHDL program for D, JK and T flip-flops.
- Write VHDL program for 3-bit shift register.
- Write VHDL program for 3-bit up counter.
- Write VHDL program for 3-bit down counter.

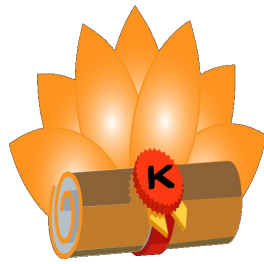
Reference Books

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Power Electronic Devices — Complete Syllabus (Elective — Specialisation, Option 3)

BTEUP Diploma in Electronics Engineering • 6th Semester • Session 2026-27

Subject 6.3.3 — Elective (Specialisation), Option 3 (Practicum) • Total 100 Marks • 3 Credits • L 2 – P 3 • Choose this OR Mobile and Wireless Communication OR VLSI Using VHDL

Note: No marks-distribution table and no reference-books list are given for this subject in the PDF, so unit weightages and books are not shown. Unit 3's topic text repeats the inverter introduction that Unit 4 then covers in full (as printed in the PDF).

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
6.3.3	Elective (Specialisation): Power Electronic Devices	Practicum	2 - 3	3	Practical 60	Practical 40	100
Power Electronic Devices Total				3	60	40	100

What This Subject Aims To Do

To introduce the fundamental concepts, principles and applications of power electronics and power semiconductor devices — MOSFETs, IGBTs and thyristors — and the operation, analysis and applications of power converters (DC-DC converters/choppers and inverters), with practical exposure through hands-on experiments and simulations, and integration in renewable energy applications such as solar and wind, with power quality considerations.

Unit-Wise Complete Topic List

Note: no marks-distribution table is given for this subject in the official syllabus, so unit weightages are not shown.

Unit 1 — Introduction to Power Electronics and Power Semiconductor Devices (6 Periods)

Topics: Introduction to Power Electronics: Definition, Basic concepts and Applications, Power Metal Oxide Semiconductor Field Effect Transistor (MOSFET)-N-channel Enhancement Power MOSFET, Insulated Gate Bipolar Transistor (IGBT)- Symbol, Principle of Working, Voltage-Current (V-I) Characteristics, and its applications.

In simple words: Power electronics: what it is, and its two key switches — the power MOSFET and the IGBT — their symbols, working and V-I characteristics.

Unit 2 — Thyristor Family Devices (6 Periods)

Topics: SCR, DIAC, TRIAC, UJT – Symbol, working principle, Characteristics and applications.

In simple words: The thyristor family: SCR, DIAC, TRIAC and UJT — their symbols, working, characteristics and applications.

Unit 3 — Choppers & Converters (5 Periods)

Topics: Introduction to DC-DC converters (Choppers), Working principle and classification of choppers : Step-up (Boost) Converter, Step-down (Buck) Converter, Buck-Boost Converter, Cuk Converter, Types of Choppers, Applications of Choppers. Single Phase Full Controlled Bridge Converter with R Load and RL load. Introduction to Inverters, Types of inverters, Basic Operation, Control Strategies, Applications.

In simple words: DC-DC converters (choppers): boost, buck, buck-boost and Cuk types, plus controlled bridge converters — and a first introduction to inverters.

Unit 4 — Inverters (5 Periods)

Topics: Introduction to Inverters, Types of inverters, Basic Operation, Control Strategies, Applications. Inverter with Resistive Load, Single Phase Inverter with RL load –Methods to obtain Sine Wave output from an Inverter.

In simple words: Inverters in full: their types, operation and control, with resistive and inductive loads, and how to get a sine-wave output.

Unit 5 — Applications of Power Electronics in Renewable Energy Systems (6 Periods)

Topics: Solar Power Electronics: Solar cells, solar panels, and the working principle of photovoltaic systems, Power converters in solar systems: DC-DC converters, MPPT (Maximum Power Point Tracking), and solar inverters, Grid integration of solar power, Wind Power Electronics: Wind energy conversion systems and their components, Power electronics for controlling wind turbines and grid integration, Energy Storage Systems: Role of energy storage in renewable energy systems: Batteries, supercapacitors, and hybrid systems. Power quality issues in renewable energy and their mitigation using power electronics.

In simple words: Power electronics in renewable energy: solar PV with MPPT and solar inverters, wind energy conversion, energy storage, and power quality issues.

Practical Work

- Explore the working principle and applications of an N-channel enhancement MOSFET.
- Demonstrate the working principle and real-world applications of an IGBT.
- Visualize the Voltage-Current (V-I) characteristics of IGBT.
- Explore real-world applications of MOSFETs and IGBTs.
- To study the characteristics and applications of an SCR and observe its switching behaviour.
- To study the characteristics of the DIAC and observe its switching behaviour.
- To study the characteristics and switching behaviour of a TRIAC and observe its use in controlling AC loads.
- To study the characteristics of the UJT and use it in triggering applications like relaxation oscillators.
- Design and Simulation of a Boost Converter.
- Implement a simple application using a DC-DC converter, such as a power supply for a microcontroller.
- Design and Simulation of a Basic Inverter.
- Design and simulate a pure sine wave inverter.
- Study the characteristics of a solar panel and design an MPPT controller.
- Design and implement a basic solar inverter.
- Analyze a small wind energy conversion system with a focus on power electronics.

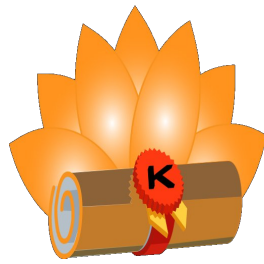
Reference Books

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Project & Student Centred Activities — 6th Semester (Normal Pathway)

BTEUP Diploma in Electronics Engineering • 6th Semester • Session 2026-27
Subject 6.4 (Project) 400 Marks • SCA 50 Marks • Total 450 Marks • Normal Pathway

Note: No detailed project syllabus (objectives, content, evaluation break-up) is given in the PDF — only the scheme-table entry below. The Industrial Pathway is an alternative to this normal pathway; see the extra section.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
6.4	Project	Project	4 - 16	12	Practical 240	Practical 160	400
—	Student Centred Activities (SCA)	Activity	0 - 6	—	50	—	50
Project + SCA Total				12	290	160	450

Industrial Pathway — the alternative to the Normal Pathway (6th Semester)

Instead of the normal pathway, a student may take the Industrial Pathway (one-semester industrial training/internship). Its scheme is: 6.1 Entrepreneurship and Start-Up (Online Mode) — 2 credits, external theory 100 (3 hrs), total 100; 6.2 Industrial Hands-on Practice — 12 credits, internal 150* (faculty mentor) + external 200** (industry), total 350; 6.3 Industrial Project — 4 credits, internal 50* + external 50**, total 100; 6.4 Seminar (in-house) — 2

credits, internal 100, total 100. Pathway total: 20 credits, 650 marks. Notes from the PDF: (1) the industrial training tenure should not be less than 4 months; (2) “Entrepreneurship and Start-Up” is mandatory in the industrial training option, taught in contact mode by the student’s polytechnic institute, and after completing the online course the student must appear for a separate exam conducted by the Board of Technical Education, Lucknow; (3) the student must attend a seminar at his/her polytechnic institute after training to earn 2 credits; (4) a monthly progress report attested by the industrial authority must be submitted during training; (5) the industrial unit must evaluate the student using the format provided by the polytechnic, in both credits and marks; (7) *Evaluation by faculty mentor — the institute deposes one faculty member for mentoring at least 20–30 students; mentors monitor, guide and counsel, and may make surprise visits to check the student’s presence; (8) **Evaluation by industry — the industry assesses attendance, discipline and punctuality, familiarity of tools and material, engineering skills, application of knowledge and problem-solving skills, comprehension and observation, professional ethics, safety and environmental consciousness, communication skills, supervisory skills and general conduct; (9) evaluation through seminar presentation/viva-voce at the institute before an expert committee. (Caution: the scheme-table numbers 6.2/6.3/6.4 mean different subjects in the two pathways — Normal: 6.2 Elective (Pathway), 6.3 Elective (Specialisation), 6.4 Project; Industrial: 6.2 Industrial Hands-on Practice, 6.3 Industrial Project, 6.4 Seminar.)

Student Centred Activities (SCA) — 50 Marks

A provision for overall personality development, including co-curricular activities such as extension lectures, games, hobby clubs (for example photography, painting and singing), seminars, declamation contests, educational field visits, NCC, NSS, library work, cultural activities and self-study. Maximum marks 50, distributed as: (i) 15 marks for general behaviour and discipline (by HODs in consultation with all teachers of the department); (ii) 10 marks for attendance — 75–80% = 6 marks, 80–85% = 8 marks, above 85% = 10 marks; (iii) 25 marks maximum in an even semester for Sports/NCC/Cultural/Co-curricular/NSS activities — State/National level participation, participation in two of the above activities, or Inter-Polytechnic level participation.

Reference Books

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