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BTEUP CSE 2nd Semester — Complete Syllabus

Board of Technical Education, Uttar Pradesh (BTEUP) • Diploma in Computer Science & Engineering

2nd Semester (First Year — Common Curriculum) • Session 2026–27 • Branch Code 355

22 Credits • 1,050 Marks • All 7 Subjects + Student Centred Activities

About this document: The first year of a BTEUP diploma runs on one common curriculum for all 41 engineering branches, so this syllabus is the same whether you are in Computer Science, Mechanical, Civil or Electrical. The scheme and subject lists below are 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. Topic lists follow the official syllabus; short explanations are the author's own plain-English summaries, not syllabus text.

How to use it: (1) Note your exact subject list and the OR choices your institute has made — that list, not a senior's memory, decides what your paper can ask. (2) Check the marks and credits — every subject below prints its scheme. (3) Plan the semester by the units: big units early, small units in short bursts, practicals beside your lab file from week one. (4) Note the reference books named in the official syllabus and stay with one book per subject.

Source: BTEUP 1st Year common curriculum (folder2627), approved in C.D.C. meeting held on 16.07.2026. Please confirm with your own polytechnic for any local changes. Even-semester (2nd, 4th, 6th) examination dates for 2026–27 have **not been announced** by the Board; by the twice-a-year pattern (odd semesters November–December, even semesters May–June) they are **expected in May–June 2027** — expected, not announced. Do not treat any date in this document as the date sheet.

Examination Scheme — 2nd Semester (Official, Verified 2026–27)

Each period is 60 minutes; each session is 16 weeks, with at least 14 effective teaching weeks. The 1st semester carries 18 credits and 900 marks; the 2nd semester carries **22 credits and 1,050 marks**.

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Sr. No.	Subject	L–T–P	Credits	Internal	External	Total
2.1	Applied 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**			**1,050**

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.
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. A 4-week summer internship (Internship–I) is

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organised after the 2nd-semester examination and is evaluated in the 3rd 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.

2.1 — Applied Mathematics–II (100 Marks • 4 Credits)

What this subject aims to do: give a comprehensive coverage, at an introductory level, of matrices, integral calculus, coordinate geometry, basic elements of vector algebra and first-order differential equations — the mathematics every later subject (C programming logic, networks, data structures) stands on.

Unit I — Determinants and Matrices

Elementary properties of determinants up to 3rd order, consistency of equations, Cramer's rule. Algebra of matrices, inverse of a matrix, matrix inverse method to solve a system of linear equations in three variables.

Unit II — Integral Calculus

Integration as the inverse operation of differentiation. Simple integration by substitution, by parts and by partial fractions (for linear factors only). Introduction to definite integration. Use of the formulae $\int_0^{\pi/2} \sin^n x\, dx$, $\int_0^{\pi/2} \cos^n x\, dx$, $\int_0^{\pi/2} \sin^m x \cos^n x\, dx$ for solving problems, where m and n are positive integers. Applications of integration: (i) simple problems on evaluation of area bounded by a curve and axes; (ii) calculation of volume of a solid formed by revolution of an area about axes (simple problems).

Unit III — Differential Equations & Numerical Methods (15 periods)

Definition of differential equations, order and degree of a differential equation, formation of differential equations, solution of first-order and first-degree differential equations by the variable-separable method (simple problems). Trapezoidal rule, Simpson's 1/3 and Simpson's 3/8 rule and their applications in simple cases. MATLAB — simple introduction.

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Unit IV — Two-Dimensional Coordinate Geometry

Equation of a straight line in various standard forms (without proof), intersection of two straight lines, angle between two lines. Parallel and perpendicular lines, perpendicular distance formula. General equation of a circle and its characteristics. To find the equation of a circle, given: (i) centre and radius, (ii) three points lying on it, and (iii) coordinates of end points of a diameter. Definition of conics (parabola, ellipse, hyperbola), their standard equations without proof. Problems on conics when their foci, directrices or vertices are given.

Unit V — Vector Algebra

Definition, notation and rectangular resolution of a vector. Addition and subtraction of vectors. Scalar and vector product of two vectors. Simple problems related to work, moment and angular velocity.

Recommended books (as listed in the syllabus): B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007 • G.B. Thomas, R.L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition, 1995 • S.S. Sabharwal, Sunita Jain, Applied Mathematics, Vol. I & II, Eagle Parkashan, Jalandhar • Comprehensive Mathematics, Vol. I & II, Laxmi Publications, Delhi • Reena Garg & Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishing House, New Delhi.

2.2 — Applied Physics–II (200 Marks • 4 Credits)

What this subject aims to do: give an understanding of the world around us, both by observation and by prediction of the way objects behave — concrete knowledge of physical laws, analysis and applications in engineering and technology. In all contents, SI units are followed.

1. Wave Motion and Its Applications

Wave motion, transverse and longitudinal wave motion with examples. Sound and light waves and their properties. Definition of wave velocity, frequency and wavelength and their relationship. Wave equation $y = r \sin \omega t$, phase, phase difference, principle of superposition of waves and amplitude. Simple Harmonic Motion (SHM): definition, expression for displacement, velocity,

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acceleration, time period, frequency in S.H.M., energy of a body executing S.H.M., study of vibration of a cantilever and determination of its time period, concept of simple harmonic progressive wave. Free, damped and forced oscillations, resonance with examples. Echo and reverberation, Sabine formula for reverberation time (without derivation), coefficient of absorption of sound, methods to control reverberation time and their applications, acoustics of buildings. Ultrasonics — introduction, properties and applications in engineering and medical fields.

2. Optics

Basic optical laws — reflection and refraction, refractive index. Images and image formation by mirrors, lenses (concept only), lens formula (without derivation), power of lens, magnification. Total internal reflection, critical angle and conditions for total internal reflection, application of total internal reflection in optical fibre. Optical instruments — simple and compound microscope, astronomical telescope in normal adjustment, magnifying power, resolving power, use of microscope and telescope.

3. Electrostatics

Concept of charge, Coulomb’s law, electric field of point charges, electric lines of force and their properties, electric flux, electric potential and potential difference. Gauss law of electrostatics: application of Gauss law to find electric field intensity of a straight charged conductor, plane charged sheet and charged sphere. Capacitor and its working principle, types of capacitors. Capacitance and its units. Capacitance of a parallel-plate capacitor. Series and parallel combination of capacitors (numerical). Dielectric and its effect on capacitance, dielectric breakdown.

4. Current Electricity

Electric current and its unit, direct and alternating current. Resistance and its units, specific resistance, conductance, specific conductance, series and parallel combination of resistance, factors affecting resistance of a wire, colour coding of carbon resistances, Ohm’s law. Kirchhoff’s laws, Wheatstone bridge and its applications (slide wire bridge). Concept of terminal potential difference

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and electromotive force (EMF). Heating effect of current, electric power, electric energy and its units (related numerical problems), advantages of electric energy over other forms of energy.

5. Electromagnetism

Types of magnetic materials: dia-, para- and ferromagnetic materials with their properties. Magnetic field and its units, magnetic intensity, magnetic lines of force, magnetic flux and its units, magnetisation. Concept of electromagnetic induction, Faraday's laws, Lorentz force (force on a moving charge in a magnetic field). Force on a current-carrying conductor. Moving-coil galvanometer — principle of construction and working. Conversion of a galvanometer into an ammeter and a voltmeter.

6. Semiconductor Physics

Energy bands in solids (definition only). Types of materials (insulator, semiconductor, conductor), intrinsic and extrinsic semiconductors, p–n junction and p–n junction diode and its V–I characteristics. Diode as rectifier — half-wave and full-wave rectifier (centre-tapped). Semiconductor transistor, PNP and NPN (concepts only) and some electronic applications (list only). Application of semiconductor diodes (Zener, LED).

7. Modern Physics

Lasers: energy levels, ionisation and excitation potential, spontaneous and stimulated emission, population inversion, pumping methods. Types of lasers: ruby, He–Ne lasers, laser characteristics, engineering and medical applications of lasers. Fibre optics — introduction to optical fibres, light propagation, acceptance angle and numerical aperture, fibre types, application in telecommunication, medical and sensors. Nanoscience and nanotechnology: introduction, nanoparticles and nanomaterials, properties at the nanoscale, nanotechnology, nanotechnology-based devices and applications.

List of Practicals (perform a minimum of six experiments)

1. To determine the velocity of sound with the help of a resonance tube.
2. To determine the time period of a cantilever.
3. To verify the laws of reflection from a plane mirror / interface.

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4. To verify the laws of refraction (Snell’s law) using a glass slab.
5. To determine the focal length and magnifying power of a convex lens.
6. To verify laws of resistances in series and parallel combination.
7. To verify Ohm’s law by drawing a graph between voltage and current.
8. To measure very low resistance and very high resistances using a slide wire bridge.
9. Conversion of a galvanometer into an ammeter and voltmeter of a given range.
10. To draw characteristics of a PN junction diode and determine knee and breakdown voltages.
11. To verify Kirchhoff’s law using an electric circuit.
12. To find the numerical aperture of an optical fibre.

Recommended books (as listed in the syllabus): Text Book of Physics (Part-I, Part-II), N.C.E.R.T., Delhi • H.C. Verma, Concepts in Physics, Vol. I & II, Bharti Bhawan Ltd., New Delhi • Subramanian and Brij Lal, A Text Book of Optics, S. Chand & Co., New Delhi • C.L. Arora, Practical Physics, S. Chand Publications • P.V. Naik, Engineering Physics, Pearson Education Pvt. Ltd., New Delhi • S.L. Gupta, Sanjeev Gupta, Modern Engineering Physics, Dhanpat Rai Publications • Halliday, Resnick and Krane, Physics Volume 2, 5th edition, Wiley • Halliday, Resnick & Walker, Fundamentals of Physics, 7th edition, Wiley.

2.3 — Introduction to IT and AI OR Applied Chemistry (200 Marks • 4 Credits)

Your institute runs one of these two in the 2nd semester; the other runs in the 1st semester. Both are given below.

Introduction to IT and AI

Computer Fundamentals: 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.

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Operating Systems: 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: 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: word processing; spreadsheets; presentations. In simple words: documents, tables and slides — the tools behind every report, assignment and seminar.

Applied Chemistry

Atomic Structure & Bonding: 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: 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: 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: what corrosion is; types of corrosion; methods of prevention. In simple words: why metals rust and wear out, and how engineers protect them.

2.4 — Fundamentals of Electrical & Electronics Engineering OR Communication Skills in English (200 Marks • 4 Credits)

Your institute runs one of these two in the 2nd semester; the other runs in the 1st semester. Both are given below.

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Fundamentals of Electrical & Electronics Engineering

Basic Electrical Concepts: 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: 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: resistors, capacitors, inductors; diodes and transistors in brief. In simple words: the small parts that make electronic circuits work.

Measuring Instruments: multimeter; ammeter and voltmeter; measuring voltage, current and resistance. In simple words: measuring a real circuit and checking whether it behaves as expected.

Communication Skills in English

Reading & Comprehension: 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: 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: introducing yourself; group discussion; presentation skills; listening comprehension. In simple words: speaking with confidence in class, in viva and in placement interviews.

Workplace Communication: resume writing; interview skills; telephone and email etiquette. In simple words: the communication that gets you placed and keeps you professional at work.

2.5 — Engineering Mechanics (200 Marks • 4 Credits)

What this subject aims to do: explain how forces act on bodies — at rest and in motion — so you can analyse simple machines and structures.

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Forces & Equilibrium: 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: 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: 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: 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.

2.6 — Engineering Workshop Practice OR Engineering Graphics (100 Marks • 2 Credits)

Your institute runs one of these two in the 2nd semester; the other runs in the 1st semester. Both are given below.

Engineering Workshop Practice

Fitting Shop: 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: woodworking tools; joints; simple wooden jobs. In simple words: working with wood — cutting, shaping and joining it cleanly.

Welding & Sheet Metal: 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: workshop safety rules; personal protective equipment; tool care. In simple words: the habits that keep you and others safe in any workshop or lab.

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Engineering Graphics

Drawing Basics: drawing instruments; lines and lettering; dimensioning; scales. In simple words: the alphabet of engineering drawing — line types, letters and measurements.

Projections: 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: 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: 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.

2.7 (Q) — Environmental Sciences (Audit — 60 Marks External)

What this subject aims to do: build awareness of the environment engineers work in — pollution, resources and sustainability — and the engineer's responsibility towards them. You must appear and pass; the marks are not counted for percentage or division.

Environment & Ecosystems: what an ecosystem is; biodiversity in brief; natural resources. In simple words: the natural systems that engineering draws on and affects.

Pollution: 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: 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.

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Environmental Laws & Responsibility: 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.

What Comes Next

After the 2nd-semester examination, a 4-week summer internship (Internship–I) is organised and evaluated in the 3rd semester. In the 3rd semester the branch subjects begin: for CSE — Operating Systems (3.1), Database Management System, Computer Network, Web Technologies and Computer Programming Using C. The KAMALDNP syllabus library already covers the 3rd semester subject by subject, and the complete Operating Systems book is available on the Books page.

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Sources: BTEUP 1st Year common curriculum (folder2627), NEP-2020, approved in C.D.C. meeting held on 16.07.2026 (scheme and subject areas, as published on the KAMALDNP BTEUP syllabus library pages); BTEUP Mathematics–II and Applied Physics–II detailed unit lists and recommended books as published in the official curriculum. The syllabus belongs to BTEUP — the Board is the official source, and its website (bteup.ac.in) is final in any doubt. This document is KAMALDNP’s branded copy of that official syllabus: same content, presented cleanly with our header and border, free for every student. No topic has been added or removed.

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