

First Year B.Tech Curriculum 2020(Common to all branches)

First Year Course Structure (Physics Group):

YEAR	FIRST SEMESTER						SECOND SEMESTER					
I	Course Code	Course Name	L	T	P	C	Course Code	Course Name	L	T	P	C
	MA1101	Engineering Mathematics-I	3	1	0	4	MA1201	Engineering Mathematics-II	3	1	0	4
	PY1001	Engineering Physics	3	1	0	4	CY1001	Engineering Chemistry	2	1	0	3
	CV1001	Basic Civil Engineering	2	1	0	3	EE1001	Basic Electrical Technology	2	1	0	3
	CY1002	Environmental Studies	3	0	0	3	CS1001	Problem Solving Using Computers	2	1	0	3
	EC1001	Basic Electronics	2	1	0	3	ME1001	Basic Mechanical Engineering	2	1	0	3
	ME1002	Engineering Graphics	0	0	6	3	LN1001	Communication Skills in English	2	0	0	2
	PY1030	Engineering Physics Lab	0	0	2	1	CS1030	Problem Solving Using Computers Lab	0	0	2	1
	ME1030	Workshop Practice	0	0	2	1	CY1030	Engineering Chemistry Lab	0	0	2	1
							DA1001	Experiential Learning	0	0	4	2
			13	04	10	22			13	05	08	22
Total Contact Hours (L + T + P)			27			Total Contact Hours (L + T + P)			26			

First Year Course Structure (Chemistry Group):

YEAR	FIRST SEMESTER						SECOND SEMESTER					
I	Course Code	Course Name	L	T	P	C	Course Code	Course Name	L	T	P	C
	MA1101	Engineering Mathematics - I	3	1	0	4	MA1201	Engineering Mathematics – II	3	1	0	4
	CY1001	Engineering Chemistry	2	1	0	3	PY1001	Engineering Physics	3	1	0	4
	EE1001	Basic Electrical Technology	2	1	0	3	CV1001	Basic Civil Engineering	2	1	0	3
	CS1001	Problem Solving Using Computers	2	1	0	3	CY1002	Environmental Studies	3	0	0	3
	ME1001	Basic Mechanical Engineering	2	1	0	3	EC1001	Basic Electronics	2	1	0	3
	LN1001	Communication Skills in English	2	0	0	2	ME1002	Engineering Graphics	0	0	6	3
	CS1030	Problem Solving Using Computers Lab	0	0	2	1	PY1030	Engineering Physics Lab	0	0	2	1
	CY1030	Engineering Chemistry Lab	0	0	2	1	ME1030	Workshop Practice	0	0	2	1
	DA1001	Experiential Learning	0	0	4	2						
			13	05	08	22			13	04	10	22
Total Contact Hours (L + T + P)			26			Total Contact Hours (L + T + P)			27			

FIRST SEMESTER

MA1101: ENGINEERING MATHEMATICS – I [3 1 0 4]

Matrices-inverse and rank, solution of linear system of equations, Eigen value problems. Vector spaces, basis, linear transformations, inner product spaces and Orthogonalization. First and higher order differential equations and their solutions; finite difference and interpolation for equal and unequal intervals, Numerical differentiation and integration. Solution of algebraic and transcendental equations, solutions of ordinary differential equations.

References:

1. Grewal B. S., *Higher Engineering Mathematics*, (42e), Khanna Publishers, 2013
2. Kreyszig E., *Advanced Engineering Mathematics*, (10e), Wiley Eastern, 2011
3. Lay David C., *Linear Algebra and applications*, (3e), Pearson Education, 2009
4. Sastry S. S., *Introductory methods of Numerical analysis*, (4e), PHI, 2007
5. Iyengar S.R.K. and Jain, Rajendra K. , *Advance Engineering Mathematics (3e)*, Narosa book distributors Pvt Ltd-New Delhi, 2007
6. Ramana B. V., *Higher Engineering Mathematics* (6th reprint), Tata Mcgraw-Hill, New Delhi, 2008

PY1001: Engineering Physics [3 1 0 4]

Optics: Two source interference, double slit interference, coherence, intensity in double slit interference, thin film interference, air-wedge, Newton's rings, Michelson's interferometer, diffraction and wave theory of light, single-slit diffraction, intensity in single-slit diffraction (using phasor method), diffraction at a circular aperture, double-slit interference and diffraction, combined-intensity in double-slit diffraction (qualitative approach), diffraction of light through multiples slits, diffraction gratings, dispersion and resolving power of gratings, polarization of electromagnetic waves, polarizing sheets, polarization by reflection, double refraction; Quantum Physics: Black body radiation and Planck's hypothesis, Stefan's Law, Wein's displacement law, Photoelectric effect, Compton effect, photons and electromagnetic waves, wave properties of particles, de Broglie hypothesis, Davisson-Germer experiment, quantum particle (wave packet, phase velocity, group velocity), the uncertainty principle; Quantum Mechanics: An interpretation of quantum mechanics, wave function and its significance, Schrödinger equation, particle in a box, particle in a well of finite height (qualitative), Tunneling through a potential barrier and its applications, the simple harmonic oscillator (qualitative); Atomic Physics & Molecular Physics: Atomic spectra of gases, energy states and spectra of molecules (rotational and vibrational energy levels), X-rays spectrum, Moseley's law, spontaneous and stimulated transitions, He-Ne and Ruby laser, application of lasers; Solid State Physics: band theory of solids, electrical conduction in metals, insulators and semiconductors, Superconductivity, type-I and type-II superconductors, Meisner effect, BCS theory (Introductory) and applications of superconductivity.

References:

1. Halliday D., Resnick R., Krane K. S., *Physics* (5e), Wiley, 2016.
2. Beiser A., Mahajan S., Rai Chaudhary S., *Concepts of Modern Physics*, (7e), McGraw Hill Education, 2017.
3. Serway R. A., Jewett J. W., *Physics for Scientists and Engineers with Modern Physics*, Thomson, 2013.

CV1001: BASIC CIVIL ENGINEERING [2 1 0 3]

Introduction: Scope of Civil Engineering, Role of Civil Engineer in Society, Impact of infrastructural development on economy of country. Buildings: Properties, uses of Stones, bricks, cement, timber, steel, plastics and paints. Properties of concrete. Selection of site for Buildings, Layout of building Plan, Types of buildings, Plinth Area, Carpet Area, Super built up area, floor space index, building bye laws, ventilation, components of buildings and their functions, Functional design of buildings, basic concepts of R.C.C., Type of foundations. Surveying:-Principles and types of surveying, Site plans, Linear measurements, Angular measurements, Levelling, ordinary levels and total stations, Use of theodolite and plane table, contouring, L-section and cross sections, Mechanics of Solids:- Forces and Equilibrium, Graphical and analytical treatment of concurrent and non-concurrent co-planer forces, Free body diagram, Analysis of plane truss, Method of joints, Method of sections, Frictional force in equilibrium problems, Centroid and centre of gravity, Moment of inertia of simple and composite areas. Normal stress and strain, Hooke's law, modulus of elasticity, modulus of rigidity, allowable stress, shear stress and shear strain. Estimation and Costing:

Types of estimates and Contracts, Tenders, NIT, EMD and Security deposits, Award of work, measurements, billing and payments.

References:

1. Ramamrutham S., *Basic Civil Engineering* (3e), Dhanpat Rai Publishing Company (P) Ltd, 2013.
2. Punamia B. C., Jain A. K., Jain A. K., *Surveying Volume 1*, (16e), S Chand, 2016.
3. Dutta B. N., *Estimation and Costing in Civil Engineering*, (28e), UBS Publishers Distributors LTD., 2016.
4. Punamia B.C., Jain A. K., Jain A. K., *Building Construction*, (11e), S Chand, 2016.
5. Timoshenko S., Young D.H., Rao J.V., Pati S., *Engineering Mechanics*, (5e), McGraw Hill, 2013.
6. SP41 *Handbook on Functional Design of Buildings*, Bureau of Indian Standards 2013.

CY1002: ENVIRONMENTAL STUDIES [3 0 0 3]

Meaning, multidisciplinary nature of environmental science, applications in engineering disciplines, environmental ethics, sustainable development, Natural (renewable and non-renewable) resources, Resource consumption, Biodiversity and conservation methods, different types of energy, Conventional sources & Non-Conventional sources of energy, Types and Structure of Ecosystem, Environmental Pollution and control, Disaster Management meaning, natural disasters especially earthquakes & Manmade disasters, Environmental Engineering:- Water demand, Water quality standards, basics of water treatment, Conservation of water, Characteristics of sewage, treatment and disposal, Environmental crisis & legislations, Environmental acts, Laws and Policies, EIA, Case studies of the past related to environmental issues, crisis, disasters, hazard, pollution, climate change & its effects, Practical activity related to environmental problems and its impacts on environment.

References:

1. Rajagopalan, R., *Environmental Studies: From Crisis to Cure*, (2e), Oxford University Press, 2016.
2. De, A. K. and De, A. K., *Environmental Studies* (2e), New Age Publishers, New Delhi, 2009.
3. Bharucha E., *Text book of Environmental Studies for undergraduate courses*, (4e), Universities Press, Hyderabad, 2013.

EC1001: BASIC ELECTRONICS [2 1 0 3]

PN Junction: Formation of depletion region, Effect of forward and reverse bias on depletion region, I-V characteristics and equivalent circuits of ideal and practical diode, Diode equation. Application of Diode: Series and parallel combination of diodes circuits, Half Wave and Full Wave rectifiers, capacitor filter, clipper, clamper circuits, Zener Diode; I-V Characteristics, Zener Regulators. BJT: Construction, schematic diagram and characteristic of CE, CB Configuration, CC configuration w.r.t. CE, Relation between α and β , transistor biasing, Q-point, load line, fixed bias, self-bias. Operational Amplifier: Ideal characteristics of an Op. Amp., Inverting and Non-inverting, amplifiers, Linear Circuit applications as voltage follower, integrator, differentiator, summing amplifier, subtractor. Digital Electronics: Number systems, Boolean algebra, De Morgan's Theorem, logic gates; Truth tables, SOP, POS form, K-map for minimization of Boolean expressions, Implementation of Boolean expressions with logic gates, Introduction to combinational & sequential circuits. Communication Systems: Elements of communication systems, Analog modulation scheme.

References:

1. R. L. Boylestad, L. Nashelsky, *Electronic Devices and Circuit Theory*, (10e), Pearson, 2009.
2. S. Salivahanan, S. Arivazhagan, *Digital circuits and Design*, (5e), Oxford University Press, 2018.
3. G. Kennedy, B. Davis, S R M Prasanna, *Electronic Communication systems*, (6e), Mcgraw Hill, 2017.
4. V. K. Mehta, Rohit Mehta, *Principles of Electronics*, (10e), S. Chand Publication, 2006.
5. B. L. Thereja, *Basic Electronics: Solid state*, (5e), S. Chand Publication, 2005

ME1002: ENGINEERING GRAPHICS [0 0 6 3]

Introduction to Engineering Graphics. Principle of Orthographic Projections: Points, straight lines. Straight lines inclined to both HP and VP and its traces. Projections of Planes. Projections of Solids (right regular). Drawing sectional views and true shape of sections. Development of surfaces: Parallel line development, Radial line development. Isometric projections: Plane surfaces and simple solids (prisms & cylinders), Frustum and combination of solids, conversion of isometric to orthographic, Simple machine elements. Introduction to Computer Aided Drafting.

References:

1. Bhatt N.D., *Engineering Drawing*, (53e), Charotar Publishing House, 2014.

2. Bhattacharyya Binoy and Bera S.C., *Engineering Graphics*, I K International Publishing House, 2008.
3. Jolhe Dhananjay, *Engineering Drawing with an Introduction to AutoCAD*, (1e), McGraw Hill Education, 2017.

PY1030: Engineering Physics Lab [0 0 2 1]

Experiments on interference, diffraction and dispersion, experiments on quantum theory of radiation, Experiments on band theory of solids, semiconductors, Experiments on resonance circuits, Hall-effect.

References:

1. Jewett & Serway, *PHYSICS for Scientists and Engineers with Modern Physics* (7e), Cengage Learning, 2008.
2. Worsnop & Flint, *Advanced Practical Physics for Students* (9e), Methuen & Co. Ltd, London 1987.

ME1030: Workshop Practice [0 0 2 1]

Mechanical Engineering Practices: Demonstration and working of Lathe machine with different operations. Study of Arc welding and Spot welding with applications. Preparation of different types of joints on Arc welding and spot welding. Study of two stroke and four stroke engines. Civil Engineering Practices: Layout of a building plan on ground. Levelling by dumpy/tilting level. Measurement of tensile strength of reinforcement bar using UTM. Measurement of compressive strength of Brick/Cement by CTM. Electrical and Electronics Engineering Practices: Designing of residential wiring. Study of three phase induction motor. Study of the working of fluorescent lamp and ceiling fan. Use of electronic Instruments and tools. Building DC Regulated Power Supply.

References:

1. Hajra Choudhury S. K and Bose S. K, *Elements of Workshop Technology*, Vol I, Media Promoters & Publishing Pvt. Ltd., Mumbai, 2012.
2. Raghuvanshi S.S, *Workshop Technology*, Dhanpat Rai and Sons, Delhi, 2002.
3. Punmia B. C, *Surveying*, Laxmi Publications, Bangalore, 2012.
4. Raina K. B., *Electrical Design Estimating and Costing*, New Age International Publishers, 2017.
5. R. L. Boylestad, L. Nashelsky, *Electronic Devices and Circuit Theory*, Tenth edition, Pearson, 2009.

SECOND SEMESTER

MA1201: ENGINEERING MATHEMATICS – II [3 1 0 4]

Differential calculus: curvatures, asymptotes, curve tracing; Partial differentiation, total derivatives, errors and expansions, Taylor's theorem, maxima and minima, Lagrange's method. Infinite series, tests for convergence of series with positive terms, alternating series, power series. Analytical solid geometry- spheres. Cones and cylinders. Multiple integrals and their applications, beta and gamma functions. Laplace transforms, periodic functions, step functions, inverse transforms, convolution, solution of differential equations and applications.

References:

1. Grewal B. S., *Higher Engineering Mathematics*, (42e), Khanna Publishers, 2013
2. Rainville E. D. and Bedient P. E., *A Short Course in Differential Equations* (6e), Macmillan Pub., Mumbai, 1981.
3. Kreyszig E., *Advanced Engineering Mathematics*, (10e), Wiley Eastern, 2011
4. Ramana B. V., *Higher Engineering Mathematics* (6th reprint), Tata McGraw-Hill, New Delhi, 2008
5. Iyengar S.R.K. and Jain, Rajendra K. *Advance Engineering Mathematics* (3e), Narosa book distributors Pvt Ltd-New Delhi, 2007

CY1001: ENGINEERING CHEMISTRY [2 1 0 3]

Theory and application phase rule (up to two component system). Chemistry of primary and secondary batteries. Working principles of fuels cells and their applications. Concept of corrosion and its importance, types of corrosion, factors affecting corrosion, Corrosion control methods. General methods of chemical analysis, Instrumental methods. Introduction to spectroscopic methods of analysis: Electromagnetic radiation (EMR), Interaction of EMR with matter, Numerical Problems. Concepts of rotational, vibrational and electronic spectra, Laws of spectrophotometry. Classification of Fuels, Gross Calorific value and Net Calorific value. Solid, Liquid and Gaseous

fuels. Water treatment technology. Advanced materials and polymers: Liquid crystals, ceramics, composites, bio-materials, nanomaterials, thin films and their properties and applications.

References:

1. Kuriacose J. C. and Rajaram J., *Chemistry in Engineering and Technology*, volume I/II (7e) Tata McGraw - Hill, New Delhi, 2010.
2. Jain P. C. and Jain M., *Engineering Chemistry*, (16e), Dhanpat Rai and Sons, New Delhi, 2015.
3. Fischer T., *Materials Science for Engineering Students*, Academic Press, London, 2009.

EE1001: BASIC ELECTRICAL TECHNOLOGY [2 1 0 3]

DC circuits, Independent sources, Resistance, Network reduction techniques, Mesh and Node voltage analysis, Superposition, Thevenin's and Maximum power transfer theorems, Transient behavior of inductance and capacitance, Self and Mutual inductances, Coupled coils, Dot rule, Average and RMS values of sinusoidal waves, Series and Parallel AC circuits, Phasor Analysis, Power factor improvement, Series and Parallel resonance, Three phase star and delta connected loads, Measurement of power in three phase circuits, Electrical power system, EMF Equation, Construction & Types of Transformers, DC motors, BLDC motors, Induction motors, Synchronous motors, Stepper motors, Fundamentals of Electrical Measuring Instruments.

References:

1. Hughes E., *Electrical and Electronic Technology*, (9e), Pearson Education, 2008
2. Kulshreshtha D. C., *Basic Electrical Engineering*, McGraw Hill, 2012.
3. Kothari D. P. and Nagarath I. J., *Basic Electrical Engineering*, (3e), McGraw Hill, 2016
4. Nagsarkar T. K. and Sukhija M. S., *Basic Electrical Engineering*, (3e), Oxford University Press, 2017

CS1001: PROBLEM SOLVING USING COMPUTERS [2 1 0 3]

Introduction to computing, Importance of Problem solving using computers, Algorithms and Flow charts, Introduction to C language, Simple C programs, Syntax and Logical Errors in compilation, Object and executable code, Variable names and declaration, Data types, Sizes and Constants, Various operators, Type conversion and expressions, Precedence and order of evaluation, Statements and blocks, Control, flow, Break and continue, 1-D and 2-D Arrays and Strings, Searching and Sorting, Multidimensional Arrays and Matrices, Modular programming and Recursive functions, Structure and Pointers, Defining Structures and Array of Structures, Pointer arithmetic, Pointer to Structures, File Management.

References:

1. Dromey. R. G, *How to solve it by computers*, Pearson, 1982.
2. Brian W. Kernighan and Dennis M. Ritchie, *The C Programming language* (2e), Pearson Education, 1988.
3. Deitel. P. J and Deitel. H. M, *C: How to program* (7e), Pearson Education, 2010.
4. Balagurusamy, E, *Computing fundamentals and C programming* (1e), McGraw-Hill, 2008.

ME1001: Basic Mechanical Engineering [2 1 0 3]

Working Fluid: Properties of steam, Steam tables, Steam Generators, Classification, Construction and working of Simple boiler. Laws of thermodynamics, Refrigeration and Air Conditioning: Definition, concept, Vapour Compression cycle, C.O.P., working principles and schematic diagrams of Refrigerator, Air Conditioner. Internal Combustion Engine: Classification, Otto and Diesel cycles, Construction and working of SI and CI engine, Two stroke and Four stroke engine, Calculation of thermal efficiency of cycles. Power Transmission: Classification and applications of mechanical drives like belts, ropes, chains and gear drives and their velocity ratios, length of belts, ratio of tensions in belts and ropes, gear train. Machine Tools: Construction, Working and specification of Lathe, Drilling machine and Milling machine. Foundry: Foundry tools and equipment's, Procedure for moulding. Welding: Definition, Gas and Arc welding, Soldering and Brazing. Forging: Definition, applications, tools, Different Forging operations.

References:

1. Mathur, Mehta and Tiwari, *Elements of Mechanical Engineering*, (13e), Jain Brother, 2016.
2. Yunus A.Cengel and Michael A Boles, *Thermodynamics: An Engineering Approach*, (8e), McGraw Hill Education, 2017.
3. Serope Kalpakjian and Steven Schmid, *Manufacturing Engineering and Technology*, (7e), Prentice Hall, 2013.

4. Hajra Choudhury S. K., Hajra Choudhury A.K. and Roy Nirjhar, *Elements of Workshop Technology Vol I & II*, Media Promoters, 2010

LN1001: COMMUNICATION SKILLS IN ENGLISH [2 0 0 2]

Communication: Definition, process, features, types, modes, and barriers; LSRW Skills- Listening: Listening to groups and individuals- active listening, response, and feedback; comprehending conversations and lectures; Reading: Analysis of passages; skimming and scanning; contextual meaning; advanced vocabulary; Writing: Paragraph writing; Writing Creative and Critical responses; Formal letters; Emails; Résumés; Statement of Purpose; Speaking: Presentation, Discussion, and Debate on current affairs, scientific enquiry, philosophical attributions, literary sensibilities, socio-political awareness, and cultural sensitivity; Telephonic Etiquettes; Role Play; Team Work; Time Management; Grooming; Exploring multiple perspectives- critical reasoning, constructive feedback, persuasive arguments, and effective interpersonal communication.

References:

1. Raman M. and Sharma S., *Technical Communication: Principles and Practice*, (2e), Oxford University Press, 2013.
2. Krishnaswamy N., *Modern English: A Book of Grammar Usage and Composition*, Macmillan India, 2018.
3. Kumar Sanjay and Pushplata, *Communication Skills*, Oxford University Press, 2016.
4. Mishra S. and Muralikrishna C., *Communication Skills for Engineers*, Pearson, 2014.

CS1030: PROBLEM SOLVING USING COMPUTERS [0 0 2 1]

Introduction to Computing, Simple C programming, Branching Control Structures, Looping Control Structures, 1D and 2D Array programming, String programming, Modular and Recursive Function Programming – Programs using Pointers, Structures and File manipulation.

References:

1. Brian W. Kernighan and Dennis M. Ritchie, *The C Programming language*, (2e), Pearson Education, 1988.
2. Deital. P. J and Deitel. H. M, *C: How to program*, (7e), Pearson Education, 2010.
3. Balagurusamy. E, *Computing fundamentals and C programming*, (1e), McGraw-Hill, 2008.
4. Duane Hanselman and Bruce Littlefield, *Mastering Matlab 7*, Pearson Publication, 2008.
5. Stormy Attaway, *Matlab: A practical Introduction to Programming and Problem Solving*, Elsevier, ISBN: 978-0-75-068762-1.

CY1030: ENGINEERING CHEMISTRY LABORATORY [0 0 2 1]

Alkalimetric titration; Redox titration; Estimation of total hardness of water; pK value of an acid by pH-metric titration; Conductometric acid base titrations; pH Metric acid base titrations; Synthesis of a resin; Determination of coefficient of viscosity of liquid; Determination cloud and pour point of a given sample of lubricating oil using cloud and pour point apparatus; Determine the water equivalent of bomb calorimeter using benzoic acid as fuel.

References:

1. Nad A. K., Mahapatra B., and Ghoshal A., *An Advanced Course in Practical Chemistry* (8e), New Central Book Agency, 2017.
2. Mangla B., Sachdeva R., and Sethi B., *Engineering Practical Chemistry*, (2e), Manakin press, 2018

DA1001: Experiential Learning [0 0 4 2]

The course will be conducted by various engineering departments and will facilitate branch specific experience based learning for students.