FIRST YEAR B.TECH.Curriculum 2018 (Common for all branches)

(Applicable to students admitted during 2018 and later)

First Year: Course Structure (Physics Group)   Total: 44 Credits

FIRST SEMESTER

Year	Sub. Code	Subject Name	L	T	P	C
I	MAT 1151	Engineering Mathematics - I	3	1	0	4
	PHY 1051	Engineering Physics	2	1	0	3
	CIE 1051	Mechanics of Solids	2	1	0	3
	ECE 1051	Basic Electronics	3	0	0	3
	MME 1051	Basic Mechanical Engineering	3	0	0	3
	HUM 1051	Communication skills in English	1	0	3	2
	PHY 1061	Engineering Physics Lab	0	0	3	1
	MME 1061	Workshop Practice	0	0	3	1
	MME 1161	Engineering Graphics - 1	0	1	3	2
			14	4	12	22
		Total Contact Hours (L + T + P)				30

SECOND SEMESTER

Sub. Code	Subject Name	L	T	P	C
MAT 1251	Engineering Mathematics - II	3	1	0	4
CHM 1051	Engineering Chemistry	2	1	0	3
BIO 1051	Biology for Engineers	2	1	0	3
ELE 1051	Basic Electrical Technology	2	1	0	3
CSE 1051	Problem Solving Using Computers	2	1	0	3
CIE 1052	Environmental Studies	1	0	3	2
CHM 1061	Engineering Chemistry Lab	0	0	3	1
CSE 1061	PSUC Lab	0	0	3	1
MME 1261	Engineering Graphics - II	0	1	3	2
		12	6	12	22
	Total Contact Hours (L + T + P)				30

First Year: Course Structure (Chemistry Group)   Total: 44 Credits

FIRST SEMESTER

Year	Sub. Code	Subject Name	L	T	P	C
I	MAT 1151	Engineering Mathematics - I	3	1	0	4
	CHM 1051	Engineering Chemistry	2	1	0	3
	BIO 1051	Biology for Engineers	2	1	0	3
	ELE 1051	Basic Electrical Technology	2	1	0	3
	CSE 1051	Problem Solving Using Computers	2	1	0	3
	CIE 1052	Environmental Studies	1	0	3	2
	CHM 1061	Engineering Chemistry Lab	0	0	3	1
	CSE 1061	PSUC Lab	0	0	3	1
	MME 1161	Engineering Graphics - 1	0	1	3	2
			12	6	12	22
		Total Contact Hours (L + T + P)				30

SECOND SEMESTER

Sub. Code	Subject Name	L	T	P	C
MAT 1251	Engineering Mathematics - II	3	1	0	4
PHY 1051	Engineering Physics	2	1	0	3
CIE 1051	Mechanics of Solids	2	1	0	3
ECE 1051	Basic Electronics	3	0	0	3
MME 1051	Basic Mechanical Engineering	3	0	0	3
HUM 1051	Communication skills in English	1	0	3	2
PHY 1061	Engineering Physics Lab	0	0	3	1
MME 1061	Workshop Practice	0	0	3	1
MME 1261	Engineering Graphics - II	0	1	3	2
		14	4	12	22
	Total Contact Hours (L + T + P)				30

MAT 1151: 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, Lagrange's and divided difference interpolation. Numerical differentiation and integration. Solution of algebraic and transcendental equations, solutions of ordinary differential equations.

Reference Books:
1. B. S. Grewal, Higher Engineering Mathematics, (42e), Khanna Publishers, 2013
2. Kreyzig E., Advanced Engineering Mathematics, (10e), Wiley Eastern, 2011
3. David C. Lay, Linear Algebra and applications, (3e), Pearson Education, 2009
4. Sastry S. S., Introductory methods of Numerical analysis, (4e), PHI, 2007
5. Rainville E. D. and Bedient P.E., A short course in differential equations, (4e), Macmillan Publishers, 1969

ECE 1051: BASIC ELECTRONICS [3 0 0 3]

Diode Characteristics, Breakdown phenomenon in diodes, Zener diode, Diode rectifier, Zener regulator, Regulated Power supplies, Special purpose diodes, BJT characteristics, CB, CE and CC configurations, Transistor biasing, RC coupled Amplifier, Transistor as a Switch, Block diagram and characteristics of Operational Amplifier, Inverting and non-inverting amplifier, Difference amplifier, Op-amp based adder, subtractor, integrator, differentiator, comparator and square wave generator, Number systems and codes, Boolean algebraic theorems, simplification of Boolean expressions, Logic gates, concept of Universal Logic, Flip flops, Fundamentals of analog communication, Introduction to digital communication and communication networks, Introduction to mobile communication.

References:
1. Robert L. Boylestad, Louis Nashelsky., Electronic Devices & Circuit Theory (11e), PHI 2012.
2. Malvino and Leach., Digital Principles & applications (7e), TMH 2010.
3. George Kennedy, Bernad Davis., Electronic Communication Systems, (4e), TMH, 2004
4. Garcia, Widjaja., Communication Networks, McGraw Hill 2006.
5. Raj Pandya, Mobile and Personal Communication Services and Systems, Wiley-IEEE Press, 1999.

MME 1051: BASIC MECHANICAL ENGINEERING [3 0 0 3]

Properties of Steam and Boilers: Steam properties Working principle of Babcock & Wilcox Boiler. Prime Movers: Classification, working principle of steam, gas and water turbines Power plants: Working principle of thermal, nuclear, hydel and solar power plants Refrigeration: Principle and working of vapour compression refrigeration system, I.C. Engines: Classification, Working of 2-stroke, 4 - stroke C.I and S.I Engines Power Transmission: Belt drives, Introduction to rope drive and chain drives, Gear Drives. Machine Tools: Introduction to Lathe, Drilling Machine and operations Casting and Forging: Two box moulding procedure, moulding sand and its desirable properties, Pattern allowances, Introduction to forging. Welding: Principle of Resistance spot welding, Electric arc welding and Oxy-acetylene gas welding, Introduction to soldering and brazing

References:
1. K. R.Gopalakrishna, Text book of elements of Mechanical Engineering, Subhash Publications, Bangalore, 2005.
2. Roy & Choudhury, Elements of Mechanical Engineering, Media Promoters & Publishers Pvt. Ltd, Mumbai, 2000.
3. Mishra B.K., Mechanical Engineering Sciences, Kumar & Kumar Publishers (P) Ltd, Bangalore, 1999
4. Trymbaka Murthy S., A text book of elements of Mechanical Engineering, I. K. International Publishing House Pvt. Ltd, 2010.

5. Rajput R. K., Elements of Mechanical Engineering, Fire Wall Media, 2005.
6. B.S. Raghuvanshi, A course in Workshop Technology, Vol. 1, Dhanpat Rai & sons, New Delhi, 2005.

HUM 1051: COMMUNICATION SKILLS IN ENGLISH [1 0 3 2]

Reading- Analysis of reading passages – Articles, Text, Online reading material; Types of reading- skimming, scanning, critical reading; comprehension, analysis, response; Familiarization- pronunciation, accent, intonation. Writing- Structures- grammar and usage competence, writing a paragraph, writing an evaluative response, writing an argumentative response, writing a creative response, writing a critical response; Composition -editing and writing; Vocabulary building – etymology, words of foreign origin; Sensitivity in communication- Social Networks and Public communication – Etiquette. Speaking - Discussion and debates on contemporary topics – current affairs, scientific enquiry, philosophical debates, literary sensibilities, socio-political awareness and cultural sensitivity; Exploring multiple perspectives- critical reasoning, constructive feedback, persuasive arguments and effective interpersonal communication. Listening - Response to audio/video texts- comprehension, analysis, critical evaluation; Listening to groups and individuals- active listening, feedback and response.

Reference:
1. Raman, M & Sharma, S., Technical Communication: Principles and Practice. Oxford University Press, New Delhi 2014.
2. Swan, Michael, Practical English Usage, (4e) Oxford University Press, London 2017
3. Lewis, Norman, Word Power Made Easy 2010.
4. Balasubramanian. P., Phonetics for Indian Students, (2e), Mc Milan, Mumbai 2013.

PHY 1051: ENGINEERING PHYSICS [2 1 0 3]

Double-slit interference of light, Interference from thin films (Air-wedge, Newton's rings), Michelson interferometer. Single-slit and Double-slit diffraction of light, Circular apertures, Diffraction gratings and applications, Diffraction of X-rays, Polarization of light, Double refraction, Optical activity.
Black body radiation and Planck's hypothesis, Photoelectric effect, The Compton effect, Wave packet, phase speed, group speed. Uncertainty principle. One-dimensional wave functions and expectation values, Particle in a box, Boundary conditions on particles in general, The schrodinger equation, Particle in a well of finite height, Tunneling through a potential barrier and its applications, The simple harmonic oscillator. Atomic spectra of gases and Bohr's model of the hydrogen atom, The quantum model of the hydrogen atom, The wave functions for hydrogen, Quantum numbers, X-ray spectra, Spontaneous and stimulated transitions, Lasers and applications.
Molecular bonds, Energy states and spectra of molecules, Bonding in solids, Free electron theory of metals, Band theory of solids, Electrical conduction in metals, Insulators and Semiconductors, Superconductivity.

References:
1. Jewett & Serway; PHYSICS for Scientists and Engineers with Modern Physics (7e), Cengage Learning 2008.
2. Halliday, Resnick, Krane, PHYSICS (5e), Volume 2, John Wiley & Sons, Inc 2002.

CIE 1051: MECHANICS OF SOLIDS [2 1 0 3]

Introduction to mechanics of rigid bodies, Resolution of force, Composition of forces, Moment of a force, Varignon's theorem, couple, Conditions of Equilibrium, Space and free body diagrams, Lami's theorem, Types of beams, Support reactions, Types of loading, Friction, Centroid and moment of inertia of simple and composite areas, Introduction to rigid bodies, Normal stress and strain, Mechanical properties of materials, Hooke's law, Modulus of elasticity, Stress – Strain behaviour of ductile and brittle materials, Factor of safety,

Allowable stress, Stresses and deformations in tapered bars, Stepped bars, Poisson's ratio, Shear stress and Shear strain, Modulus of rigidity, Relationship between modulus of elasticity, modulus of rigidity and bulk modulus, Compound bars, stresses due to temperature, Stresses in thin cylinders, Concepts of bending moment & shear force diagrams.

References:
1. Meriam J. L., Kraige L. G., Engineering Mechanics: Statistics (5e), John wiley & sons, 2004.
2. Beer F. P., Johnston Jr. E. R., Dewolf J. T., Mazurek D. F., Sanghi S., Mechanics of Materials (7e), Tata McGraw-Hill, 2017.
3. Pytel A., Singer F.L., Strength of Materials (4e), HarperCollins College Div, 1987.
4. Bhavikatti S. S., Strength of Materials (4e), Vikas Publishers, 2013.
5. Basavarajaiah B. S., Mahadevappa P., Strength of Materials (3e), Universities Press, 2010.

MME 1161: ENGINEERING GRAPHICS – I [1 0 3 2]
Introduction – Geometrical constructions, Dimensioning and conventions of lines. Projection of points in first Quadrant only. Projection of straight lines inclined to both horizontal and vertical planes, Traces of lines, Application problems on lines. Projection of regular plane when the surface is inclined to both HP and VP. Projection of regular solids like prisms, pyramids cone and cylinder when the axis is inclined to both HP and VP.

References:
1. Gopalkrishna K. R. and Sudhir Gopalkrishna., A textbook of Computer Aided Engineering Drawing, (37 e), Subhas Stores, Bangalore 2012.
2. Bhat N. D. and Panchal V. M., Engineering Drawing, (50 e), Charotar Publishing House, Anand, India 2010.
3. Venugopal K., Engineering Drawing and Graphics + Auto CAD, Newage International Publishers, Delhi 2002.
4. Narayana K. L. and Kannaiah P., Text book on Engineering Drawing, Scitech Publications, Chennai, 2002.
5. Basant Agrawal and Agrawal C. M., Engineering Drawing, Tata McGraw Hill, New Delhi 2010.

PHY 1061: ENGINEERING PHYSICS LAB [0 0 3 1]
Experiments on interference of mechanical waves, Experiments on interference, diffraction and double refraction of light. Experiments on quantum theory of radiation. Experiments on free-electron theory of metals, 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.

MME 1061: WORKSHOP PRACTICE [0 0 3 1]
Mechanical Engineering Practices - Sheet metal, Plumbing exercises, Study of Automotive systems like Transmission and Suspension, Demonstration on the working of Lathe and Drilling machine, Civil Engineering Practices - Material Testing by conducting Tensile test, Shear test and Compression test, Surveying exercises using chain and tape, Prismatic compass, Dumpy level, Electrical and Electronics Engineering Practices – Study of wiring tools, Fuses, Circuit breakers, Lighting sources, Wiring, Electrical energy in Single phase and three phase circuits, Energy tariff calculations. Testing of Electronic components, IC based experiments comprising Digital counter, Buzzer and Musical door bell, Soldering practice, Building a 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. Uppal S.L., Electrical Wiring, Estimating and Costing, Khanna Publishers, 1978
5. Bishop Owen, Electronics: A First Course, (2e), NEWNES, An Imprint of Elsevier, 2006.

MAT 1251: ENGINEERING MATHEMATICS – II [3 1 0 4]
Mean value theorems, Taylor and Maclaurin's series expansions, indeterminate forms. 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.

Reference Books:
1. B. S. Grewal - Higher Engineering Mathematics, Khanna Publishers.
2. N. Piskunov-Differential Calculus, Vol I and II, Mir Pub.
3. Rainville E.D and Bedient P. E., A short course in differential equations, Macmillan Pub., Mumbai.
4. Kreyzig E, Advanced Engineering Mathematics, Wiley Eastern, Delhi.
5. Shanti Narayan, Differential Calculus, Shyam Lal Charitable Trust, Delhi.

ELE 1051: 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 behaviour of inductance and capacitance, Series and Parallel magnetic circuits, Self and Mutual inductances, Coupled coils, Dot rule, Average and RMS values of sinusoidal waves, Series and Parallel AC circuits, Power factor improvement, Series and Parallel resonance, Three phase star and delta connected loads, Measurement of power in three phase circuits, Electrical power system, Transformers, DC motors, BLDC, Induction motors, Synchronous motors, Stepper motors, Measurement of energy.

References:
1. Hughes E., Electrical and Electronic Technology (9e), Pearson Education, 2008
2. D. C. Kulshreshtha, Basic Electrical Engineering, McGraw Hill, 2012.
3. Kothari D. P. & Nagarath I. J., Basic Electrical Engineering, TMH 2013
4. http://www.nptel.ac.in/courses/108108076/
5. http://www.nptel.ac.in/courses/Webcoursecontents/ IIT%20Kharagpur/Basic%20Electrical%20Technology/New_ index1.htm

BIO 1051: BIOLOGY FOR ENGINEERS [2 1 0 3]
Chemistry of life: Elements of life and their bonding ability, importance of carbon, elemental replacement, different types of bonds and interactions in biological systems, water and phospholipids as well as their importance in the survival of life, Biomolecules such as carbohydrates and proteins, their structures, enzymes, effect of pH and Bioenergetics. Inheritance of life: Mendelian model and its testing, Location of factors and its mode of inheritance, Morgan concept on location of factors, pedigree analysis. Molecular basis of inheritance: Discovery of DNA, Experimental evidence for the existing theories of molecular biology, structure of DNA, DNA copying mechanism and its proof reading as well as editing, RNA synthesis and processing, Protein synthesis and Genetic code. Case studies: Mechanism of viral replications, Lac operon as an example of biological control system, Concepts of cloning, Recombinant DNA technology, vaccination and ascent of sap. Evolution and origin of life: Darwin's theory, Mechanisms of Evolution, Evidence of evolution, Constraints on evolution

References:
1. Sadava D. E., Hillis D. M., Heller H. C. and Hacker S. D. Life the science of biology, (11e), Macmillan Learning, USA ISBN-10: 1-319-01016-4, 2107

2. Urry L. A., Cain M. L., Wasserman S. A., Minorsky P. V. and Reece J. B., Campbell Biology, (11e), Pearson ISBN-10: 0134093410, 2017
3. Johnson A. T., Biology for Engineers, CRC Press Inc., USA, ISBN 9781420077636, 2010

CHM 1051: ENGINEERING CHEMISTRY [2 1 0 3]

Principles and applications of electrochemistry, metal finishing. 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. basic principles and classification of materials, Effect of bonding on properties of materials. Classification of advanced materials-polymers, Liquid crystals, Ceramics, composites, bio materials, nanomaterials, thin films and their properties and applications.

References:
1. Kuriacose J. C., Rajaram J., Chemistry in Engineering and Technology, volume I/II Tata McGraw - Hill, New Delhi, 2001
2. Jain P. C., Jain M. Engineering Chemistry, (16e)., Dhanpat Rai and Sons, New Delhi, 2015
3. Fischer T., Materials Science for Engineering Students, Academic Press, London, 2009

CIE 1052: ENVIRONMENTAL STUDIES [1 0 3 2]

Meaning, multidisciplinary nature of environmental science, applications in engineering disciplines, environmental ethics, sustainable development, Renewable and non-renewable resources, Resource consumption & conservation methods, different types of energy, Conventional sources & Non-Conventional sources of energy, Types & Structure of Ecosystem, Environmental Pollution and control , Disaster Management meaning, natural disasters especially earthquakes & Man-made disasters, 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. Mohan kanda, Disaster Management in India evolution of institutional arrangements & operational strategies, 2017.
2. Y.Anjaneyulu, Introduction to Environmental science, 2017.
3. R.K.Trivedy, Handbook of Environmental laws, acts, guidelines, compliances & standards, 3rd edition, 2nd volume, 2017.
4. Benny Joseph, Environmental Studies, Tata McGraw-Hill Publishing Company Ltd., New Delhi , 2008.
5. Aloka Debi, "Environmental Science and Engineering", Universities Press (India) Pvt. Ltd. 2012.
6. R.J.Ranjit Daniels and Jagadish Krishnaswamy, "Environmental Studies", Wiley India Private Ltd., New Delhi, 2009.
7. G.Swarajya Lakshmi, Environmental science: A Practical Manual, 2010.
8. Student guide: Environment Reader for Universities, based on UGC syllabus published by Centre for Science and Environment, 2017.

CSE 1051: 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 and Cyber Security.

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. Deital. 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.

CHM 1061: ENGINEERING CHEMISTRY LABORATORY [0 0 3 1]

Alkalimetric titration; Estimation - Total hardness of water, percentage of copper in brass, weight of iron in haematite, percentage of manganese dioxide in pyrolusite, percentage of ammonia nitrogen in a fertilizer; pK value of a weak acid by potentiometric titration; Conductometric acid-base titrations; Determination of concentration of copper using colorimeter; Determination of coefficient of viscosity of liquid; Chloride content of water; Analysis of lead pigment

References:
1. Vogel A.I. Text book of Quantitative Inorganic Analysis, (5e), ELBS, 1998
2. Laboratory Manual for Engineering Chemistry Laboratory, M.I.T., 2014

MME 1261: ENGINEERING GRAPHICS – II [1 0 3 2]

Introduction to Engineering Graphics, Sections of solids – Drawing sectional views and true shape of section, Development of surfaces using parallel line development for prisms and cylinders, Radial line development for pyramids and cones, Isometric projections of simple and sectioned solids, Combined solids, Simple machine components. Orthographic views of Simple and cut solids, combined solids, Simple machine components.

References:
1. Gopalkrishna K. R. and Sudhir Gopalkrishna., A textbook of Computer Aided Engineering Drawing, (37e), Subhas Stores, Bangalore 2012.
2. Bhat N. D. and Panchal V. M., Engineering Drawing, (50e), Charotar Publishing House, Anand, India 2010.
3. Venugopal K., Engineering Drawing and Graphics + Auto CAD, Newage International Publishers, Delhi 2002.
4. Narayana K. L. and Kannaiah P., Text book on Engineering Drawing, Scitech Publications, Chennai, 2002.
5. Basant Agrawal and Agrawal C. M., Engineering Drawing, Tata McGraw Hill, New Delhi 2010.

CSE 1061: PROBLEM SOLVING USING COMPUTERS LAB [0 0 3 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 – MATLAB Programming with Simulink.

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.