

Table 3 Energy and Environment Group Key words and Text Books

	Subject	Key words	Text Books and References
Basic Subject	Mathematics	Differential, Integral, Series, Partial differential, Double integral, Ordinary differential equation, Matrix, Vector, Determinant, Eigenvalue	R.L. Borrelli and C. S. Coleman, "Differential Equations — A Modeling Perspective", John Wiley & Sons, Inc. H. G. Moore and A. Yaqub, "A First Course in Linear Algebra with Applications", Academic Press
	Physics	Motion of a particle and particles, Motion of a rigid body, Oscillation of a particle, Static electric field, Static magnetic field, Electromagnetic induction (Interaction with material is excluded)	R. P. Feynman, R. B. Leighton and M. Sands, <i>The Feynman: Lectures on Physics</i> , Addison-Wesley Publishing Company, 1977 (Chapters 1 to 25). A. P. French, <i>Newtonian Mechanics</i> , The MIT Introductory Physics Series, W. W. Norton & Company, 1971. L. Shen and J. Kong, <i>Applied Electromagnetism</i> , Third Edition, PWS Publishing Company, 1995, ISBN 0-534-94722-0 (Chapters 1,2,9,10,11,12,13,15,16).
	Chemistry	Inorganic Chemistry : Property of elements, Chemical bond [Including Quantum chemistry], Crystal structure, Amorphous, Acid and base, Oxidation and reduction, Complex, Quantitative Analysis [Titration, Gravimetry] Instrumental analysis [X-ray diffraction, Surface analysis] Physical Chemistry : Chemical thermodynamics [Heat capacity, Entropy, Enthalpy, Gibbs energy, Chemical potential, Phase rule, Phase equilibrium, Activity] Organic Chemistry : Nomenclature of Organic Compound, Geometric Isomer [cis-trans isomers], Functional groups and their reactivity, Hybrid orbital and molecular structure, Chemical reaction [Substitution, Addition, Elimination, Condensation, Rearrangement], Determination of chemical structure [Including Spectrometry (MS, NMR, IR)], Hydrocarbon [Alkane, Alkene, Allene], Oxygen-containing compounds, Nitrogen-containing compounds, Oxidation and reduction	Physical Chemistry, W. J. Moor, Prentice-Hall Inc. Physical Chemistry, P. W. Atkins, Oxford University Press Chemistry and the Living Organism, Fifth edition by Molly M. Bloomfield, Wiley & Sons, Inc. New York
	Fluid Dynamics	Bernoulli's equation, Momentum theorem, Flow in pipes, Boundary layer, Dimensional analysis and law of similarity, Drag force acting on objects, Fluid measurement, Law of conservation of mass, One-dimensional compressive flow, Ideal fluid	H. Schlichting, K. Gersten, <i>Boundary Layer Theory</i> , Springer D. J. Tritton, <i>Physical Fluid Dynamics</i> , Oxford Science Publication
	Liner systems, measurement and instrumentation	Principles of linear systems, Principle of measurement and instrumentation, Phasor representation, AC circuit, Equivalent circuit, Complex spectrum, 2-port circuit, Transfer function, Sensors, Noise	Circuits, Devices, and Systems, R. J. Smith, R. C. Dorf, Fifth Edition, Wiley ISBN 0-471-83944-2, Part 1 Circuits
	Strength of Materials	Simple stress, Combined stresses and trusses, Torsion of shafts, Shearing force and bending moment in beams, Stresses in beams, Deflection of beams, Statically indeterminate beams, Strain energy and energy methods, Buckling of bars	S. Timoshenko, D. H. Young, "Elements of Strength of Materials", D. Van Nostrand Company, Inc., Maruzen Company, Ltd.
	Physical Chemistry	Solution [pH, Solubility, Oxidation and reduction, Complex], Molecular motion in gases, Reaction kinetics and mechanism, Interfacial physical chemistry, Chemical process engineering	Physical Chemistry, W. J. Moor, Prentice-Hall Inc. Physical Chemistry, P. W. Atkins, Oxford University Press Aquatic Environmental Chemistry, A. G. Howard, Oxford Sci. Pub.
	Environmental Chemistry	Select two problems from four problems (in the field of biochemistry and atmospheric chemistry).  Biochemistry: Components of living organism [Including Inorganic compounds], Optical isomer, Character of bio-polymer, Physical chemistry of living organism [Isoelectric point, Osmosis, Buffer action, Entropy], Enzymatic reaction [Including Kinetics, Inhibitor], Coenzyme, Metabolism [Including Energy, Amino acid, Fatty acid], Structure and function of biomembrane, Nucleic acid, Genetic information and regulation, environmental pollutants and biological effects.  Atmospheric chemistry : Global warming [Greenhouse gas], Sulfur oxides (SO <sub>x</sub> ), Nitrogen oxides (NO <sub>x</sub> ), Acid rain, Photochemical smog	Environmental Chemistry, J. W. Moor & E. A. Moor, Academic Press, Inc. Physical Chemistry, W. J. Moor, Prentice-Hall Inc. Chemistry and the Living Organism, Fifth edition by Molly M. Bloomfield. Wiley & Sons, Inc. New York Instant notes in Biochemistry second edition, B. D. Hanes & N. M. Hooper, BIOS scientific Publishers Limited 2000 Organic Chemistry, Third edition, M. Jones, W. W. Norton Co.
	Earth Science	Rock-forming mineral and rock classification, Crystal and crystal structure, Magma process, Natural resources, Plate tectonics, Geochronology, Geological structure and deformation, Subduction zone and island arc, Geochemical cycle	Principles of Physical Geology, third edition, Arthur Holmes, Thomas Nelson and Sons Ltd., U. K.