(Common Scheme to all disciplines)

Revised First Year Scheme: Academic Year 2018-19 onwards

GROUP A

(Electrical/Electronics/ Electronics and Telecommunication/Computer/Information Technology)

SEM- I

	Course Code	Course Name	Hr/Week			Credits
			L	T	P	
1	R4CH1011T	Applied Chemistry –I	2	0	0	2
	R4CH1011P	Applied Chemistry Laboratory -I	0	0	2	1
2	R4PH 1011T	Applied Physics-I	3	0	0	3
	R4PH 1011P	Applied Physic Laboratory -I	0	0	2	1
3	R4MA1011S	Applied Mathematics-I	3	1	0	4
4	R4SA1001T	Engineering Mechanics	3	0	0	3
	R4SA1001P	Engineering Mechanics-Laboratory	0	0	2	1
5	R4ME1002T	Engineering Graphics	2	0	0	2
	R4ME1002P	Engineering Graphics laboratory	0	0	2	1
6	R4HM1011L	Business English	1	0	2	2
TOTAL			14	1	10	20

SEM-II

	Course Code	Course Name	Hr/Week			Credits
			L	T	P	
1	R4CH1021T	Applied Chemistry-II	2	0	0	2
	R4CH1021P	Applied Chemistry Laboratory -II	0	0	2	1
2	R4PH 1021T	Applied Physics-II	3	0	0	3
	R4PH 1021P	Applied Physic Laboratory -II	0	0	2	1
3	R4MA1021S	Applied Mathematics - II	3	1	0	4
4	R4EE1001T	Basic of Electrical Engineering	2	0	0	2
	R4ME1003T	Elements of Mechanical Engineering	2	0	0	2
5	R4CO1001T	Computer Programming	2	0	0	2
	R4CO1001P	Computer Programming Laboratory	0	0	4	2
6	R4ME1001L	Workshop (Mechanical)	0	0	2	1
			14	1	10	20

Revised First Year Scheme for the Academic year 2018-19 onwards

GROUP B

(Mechanical/Production/Civil/Textile)

SEM I

	Course Code	Course Name	Hr/Week			Credits
			L	T	P	
1	R4CH1011T	Applied Chemistry-I	2	0	0	2
	R4CH1011P	Applied Chemistry Laboratory -I	0	0	2	1
2	R4PH 1011T	Applied Physics-I	3	0	0	3
	R4PH 1011P	Applied Physic Laboratory -I	0	0	2	1
3	R4MA1011S	Applied Mathematics- I	3	1	0	4
4	R4EE1001T	Basic of Electrical Engineering	2	0	0	2
	R4ME1003T	Elements of Mechanical Engineering	2	0	0	2
5	R4CO1001T	Computer Programming	2	0	0	2
	R4CO1001P	Computer Programming Laboratory	0	0	4	2
6	R4ME1001L	Workshop (Mechanical)	0	0	2	1
			14	1	10	20

SEM II

	Course Code	Course Name	Hr/Week			Credits
			L	T	P	
1	R4CH1011T	Applied Chemistry –II	2	0	0	2
	R4CH1011P	Applied Chemistry Laboratory -II	0	0	2	1
2	R4PH 1011T	Applied Physics-II	3	0	0	3
	R4PH 1011P	Applied Physic Laboratory -II	0	0	2	1
3	R4MA1011S	Applied Mathematics-II	3	1	0	4
4	R4SA1001T	Engineering Mechanics	3	0	0	3
	R4SA1001P	Engineering Mechanics-Laboratory	0	0	2	1
5	R4ME1002T	Engineering Graphics	2	0	0	2
	R4ME1002P	Engineering Graphics laboratory	0	0	2	1
6	R4HM1002L	Business English	1	0	2	2
Total			14	1	10	20

Programme Name			:	F. Y. B. Tech			Semester I	
Course Code			:	PH1011T				
Course Title			:	Applied Physics I				
Teaching Scheme				Examination Scheme				
L	T	P		TA %	IST%	ESE%	ESE (Hr)	Credit
3	0	0		20	20	60	3	3

Course Outcomes (CO's) for Applied Physics -I

1. Classify, draw, describe, and distinguish crystal structures and their defects.
2. Analyze crystal structures by X-Ray diffraction, distinguish bonds in solids and compute forces between atoms.
3. Analyze the band theory of solids and semiconductors.
4. Identify and summarize properties and applications of dielectric materials and crystals.
5. Classify and analyze magnetic materials and superconductors.

Course Contents

1 Crystal Structures **16hr**

Classification of solids, space lattice, atomic basis, unit cell, Crystal systems, Cubic crystals (Monoatomic), CCP and HCP, Diatomic Cubic crystals ($CsCl_2$, NaCl, Diamond, ZnS, Barium Titanate), ligancy 3-8, Crystallographic planes, Miller Indices and Direction, Inter-planar separation. **Crystal defects**: Point defects, linear defects, planer of interfacial defects and bulk or volume defects. **X-ray Diffraction**: Bragg's law, Bragg's spectrometer, Brags law for determination of crystal structure, x-ray diffraction methods-Laue's method, Powder method, Rotating crystal method

2 Bonding in solids **3hr**

Force between atoms, bonding in solids, ionic bonding, and cohesive energy of ionic crystals, Covalent bonding, Metallic bonding, Inert gas crystals, and Hydrogen bonded crystals.

3 Semiconductor Physics **6hr**

Band Theory of Solids: Electrical Conduction, Formation of energy bands, Energy Gap, Classification of Solids, Energy Band structure of lithium, magnesium and silicon. Density of states, Fermi-Dirac distribution function, Energy band structure of a Conductor, Insulator and Semiconductor.

Semiconductors and Insulators: Intrinsic semiconductor-electron and hole concentration, carrier density, conductivity. Doping– n-type and p-type semiconductor, Position of Fermi level in extrinsic semiconductor, Hall Effect.

4 Dielectric Materials **7hr**

Dielectric Constants, Polarizability - Polar dielectric, non-polar dielectrics, macroscopic approach, dielectric constant and polarized medium, dielectric susceptibility, Gauss law in dielectrics, Types of polarization - Electronic, ionic, orientation, space and total. Internal fields in solids, ClausiusMossotti equation, Dielectrics in alternating fields, Frequency dependence of the Dielectric constant, Dielectric loss, Dielectric strength, Ferroelectrics, Piezoelectric and application

5 Magnetic Materials **9hr**

Basics Concepts, Classification of magnetic materials, Diamagnetism, Langevin theory of diamagnetism, paramagnetism, Langevin theory of paramagnetism, ferromagnetism and its properties, exchange and bonding energy, Anti-ferromagnetism, Ferrimagnetism, Weiss theory of ferromagnetism, Heisenberg exchange interaction,

Domain theory of ferromagnetism, Hysteresis, Magnetostriction, soft and hard magnetic materials and applications.

Superconductivity

Persistent current, critical current density, critical magnetic field- Meissner effect, type I and type II superconductor, flux quantization, penetration depth, phase diagram, BCS theory, superconductor junctions, applications

Text Books

1 Applied Physics P K. Mittal I k international
2 Applied Physics I For Science and Engineering, DattatrayWavhal , SELF Publications (2017)

Reference Books

1. Modern Physics, 3rd edition, R Serway, C Moses and C Moyer, Thomson Learning inc., 2005
2. Material Science and Engineering: An Introduction, 6th Edn., Callister W.C. Jr., John Wiley & Sons
3. Introduction to Magnetic Materials, 2nd Edition, B D Cullity, C D Graham, , IEEE Press, A John Wiley and Sons Inc. Publications, 2009
4. A textbook of Engineering Physics, M N Avadhanulu and P. G. Kshirsagar

Programme Name			**:**	**F. Y. B. Tech**	**Semester I**
Course Code			**:**	**PH1011P**	
Course Title			**:**	**Applied Physics I Laboratory**	
Teaching Scheme				**Examination Scheme**	
L	**T**	**P**		**100% CIE**	**Credit**
0	**0**	**2**			**1**

Course Outcomes (CO's) for Applied Physics -I, Laboratory

1. Calculate resistivity, band gap / susceptibility of given materials.
2. Infer magnetic properties of the given material using Hysteresis.
3. Determine Hall Voltage and Carrier concentration of the given semiconductor.
4. Determine velocity of ultrasound in water / dielectric constant and Curie temperature of given samples.
5. Draw and analyze unit cells, Miller planes and Miller directions

Course Contents

Any 10 experiments from the following

1. Crystal Structure I Unit Dell
2. Crystal Structure II Miller Indices
3. Band gap of Semiconductor by four probe methods
4. Resistivity of solids by four probe method
5. Hall Effect in Semiconductors
6. Hysteresis by Magnetometer
7. Hysteresis loop tracing for a ferromagnetic material
8. Curie temperature by two probe method
9. Dielectric Constant by Parallel Plate Capacitor
10. Susceptibility of solids by Gouy's method
11. Ultrasonic Interferometer
12. Flaw detection using Ultrasonic
13. Diffusion potential and band gap of P-N junction
14. Diode Characteristics

Programme Name		:	F. Y. B. Tech			Semester II	
Course Code		:	PH1021T				
Course Title		:	Applied Physics II				
Teaching Scheme			Examination Scheme				
L	T	P	TA %	IST%	ESE%	ESE (hour)	Credit
3	0	0	20	20	60	3	3

Course outcomes (CO) for Applied Physics -II

1. Describe properties of light using interference and its applications.
2. Apply concepts of diffraction, polarization and Quantum concepts.
3. Explain basic concepts of Thermodynamics and comprehend the different laws.
4. Apply thermodynamic principles and make conclusions
5. Define the concepts of Special Theory of Relativity.

Course Contents

1 Optics **14hr**

Interference: Coherent sources, conditions for sustained interference. Division of Wave-Front - Fresnel's Biprism, Division of Amplitude- Wedge-shaped film, Newton's Rings, Michelson Interferometer, applications (Antireflection coating, dielectric mirror, determination of wavelengths).

Diffraction: Difference between interference and diffraction Fraunhofer and Fresnel diffraction. Fraunhofer diffraction through a single slit, Plane transmission diffraction grating, absent spectra, dispersive power, resolving power and Rayleigh criterion of resolution and Applications

Polarization: Polarized and un-polarized light, Malus law Uniaxial crystals double refraction, Nicol prism, quarter and half wave plates, Detection and Production of different types of polarized light, Polarimetry; Optical and specific rotation, Biquartz and Laurent's half shade polarimeter, Applications.

2 Quantum Mechanics **4hr**

Difficulties with Classical physics, Black Body radiations, Discovery of Planck's constant, Concept of de Broglie‟s Matter waves, phase velocity and group velocity, derivation of wavelength of matter waves in different forms, Heisenberg's Uncertainty principle, illustration- why an electron cannot exist in the nucleus; Concept of wave function Ψ and interpretation of $|\Psi|^2$

3 Thermodynamics **16hr**

Basic concepts of thermodynamics, Concept of temperature and Zeroth law, work, heat and first law of thermodynamics and its application, Carnot's cycle, Second law of thermodynamics, Kelvin-Plank and Clausius statement, Carnot theorem, Heat Pump, Stirling Engine, Entropy, disorder and second law, Clausius-clapeyrons latent heat equation, Third law of thermodynamics

4 Special theory of relativity **6hr**

Frame of Reference (Inertial and Non-inertial), Galileo Principle of Relativity, Galilean Transformations, Failure of Galilean Transformations, Einstein principle of Relativity, The Lorentz Transformations (Co-ordinate and velocity) and conclusion, Michelson –Morley Experiment, Consequences of special Relativity, Simultaneity of

two Events, Length Contraction, Time Dilation, The Relativistic mass, Momentum, Relation between momentum and energy.

Text Book

1. Engineering thermodynamics P.K. Nag, CRC press,2nd edition (2004)
2. Optics, Brijlal&Subramaniam, S.Chand& Co. (2008)
3. Applied Physics II, For Science and Engineering, DattatrayWavhal, SELF Publications (2016),

Reference Books

1. Thermodynamics & Statistical Mechanics, Keith Stowe, 2nd Edition, Cambridge University Press
2. Quantum Computation & Quantum Information, Nielsen M. A., I. L. Chuang, Cambridge Univ. Press
3. Thermodynamics: An Engineering Approach, Cengel& Boles, Tata McGraw-Hill, New Delhi ,Vth Edition (2007)
4. Concepts of Modern Physics Arthur Beiser, McGraw-Hill-Science, edition no.6,(2002-03)
5. Relativity A. Einstein, Walker & Co publisher.

Programme Name			**:**	**F. Y. B. Tech**	**Semester II**
Course Code			**:**	**PH1021P**	
Course Title			**:**	**Applied Physics -II Laboratory**	
Teaching Scheme				**Examination Scheme**	
L	**T**	**P**		**100% CIE**	**Credit**
0	**0**	**2**			**1**

Course Outcomes (CO's) for Applied Physics -II, Laboratory

1. Calculate diameter and radius of curvature of lens using Newton's Rings.
2. Determine thickness of wire by interference and optical activity by polarimeter.
3. Develop proficiency in making measurements using spectrometer / interferometer.
4. Test the functions of a CRO by measurements and calculate grating element using Laser Diffraction.
5. Use photoelectric effect to determine Planck's constant.

Course Contents

Any 10 experiments from the following

1. Newton's Ring Experiment
2. Wedge shape Method
3. Michelson Interferometer
4. Wavelength and energy measurement of spectral lines using spectrometer
5. Laser diffraction method
6. Specific rotation of Cane sugar solution using polarimeter.
7. Polarization of light and verification of Malus law
8. CRO based measurements
9. Plank's constant determination
10. e/m by Thomson Method
11. Fresnel Biprism
12. Refractive Index of hollow prism
13. Heat conduction in solids
14. Specific heat capacity measurements
15. Heat conduction in bad conductor

Course Name	**:**	**F.Y. B. Tech.**	**SEMESTER - I**
Course Code	**:**	**CH1011T**	
Subject Title	**:**	**Engineering Chemistry-I**	
Teaching and Examination Scheme:			

Teaching Scheme			**Examination Scheme**				
L	**T(tutorial)**	**P**	**TA (%)**	**IST (%)**	**ESE (%)**	**Credits**	**ESE [W] Hrs**
02	**-**	**2**	**20**	**20**	**60**	**02**	**03**

Course Outcome (CO) of Engineering Chemistry - I

The students will be able to

1. Correlate the different chemical reaction mechanisms that are used in the synthesis of organic materials.
2. Analyse water for its different types of hardness & adopt suitable method of treatment suitable for various industrial applications.
3. Select appropriate Lubricant for different service conditions based on the mechanism of lubrication and alloys based on their composition and properties.
4. Differentiate different polymers based on their structure, mechanism of polymerization, and fundamental properties.
5. Rationalise the concept of adsorption theory and it's relevance in catalysis.

CourseContents: -

Module1: FUNDAMENTALS OF REACTION MECHANISMS 2 L

Classification of reactions,Organic reactions involving substitution, addition, elimination, oxidation, cyclization, and ring opening reactions.

Module2:POLYMER CHEMISTRY 6

BasicsofPolymerChemistry, classification of polymers, Molecularweight and the determination, ,Molecularshape,Crystallinity,Glasstransitiontemperatureandmeltingpoint,Visco-elasticity,polymerization mechanisms, structure property relationship of thermoplastics, thermosets and elastomers with examples (PE,PVC,PMMA, Formaldehyde resins)., characterization of polymeric materials

Module3:WATERCHEMISTRY

8

Waterindifferentsector,waterqualityparameters,Hardnessofwater,Typesofhardness,Units,Determination ofhardnessbyEDTAmethod,(includingNumericalproblems),SofteningmethodsandNumericalproblemsbas edonthesemethods, Problems with Boiler feedwaterandits treatments, Testing of waste water (dissolved oxygen, COD, BOD,toxic elements)

Module4:LUBRICANTS 4L

Typesoflubricants,Mechanismoflubrication,PhysicalandChemicalpropertiesoflubricants,A dditivesof lubricants,Selectionof lubricants

Module5:ALLOYS 3 L

Purposesofmakingalloys**,**TypesofAlloys:ferrousandnon-ferrous alloys,Carbonsteel:Advantagesofaddingcarbon,Types,%composition,Alloysteel:Heatresist antsteel,corrosionresistant steel,Non-ferrousalloys: AlloysofCu,Al andPb.

Module6:SURFACE CHEMISTRY AND CATALYSIS 3 L

Classification of Adsorption, Langmuir's theory of adsorption, Characteristics of colloidal solutions, Protective colloids, emulsions, gels. Types of catalysis reactions, Theory of catalysis, Characteristics of catalytic reactions.

Text books

1) EngineeringChemistry - JainandJain,Danpatraipublications;16thedn(2013)
2) Engineering Chemistry - Dr.S.S.Dara, Dr.S.S. Umare, S.Chand& Company Ltd, 12 thed
3) A Text Book of Engineering Chemistry - ShashiChawla, Danpatrai publications ; 4 thedn; (2010)

Reference Books: -

1) Polymer Science - Billmayer, F. John Willey & Sons, N.Y.; 3 rdedn(1984)
2) Introduction to Material Science - William Callister, John Willey & Sons, N.Y.; 9th edn; (2013)
3) Engg. Chemistry - NPTEL web- book, by T.L. Tembe, Kamaluddin and M.S. Krishnan
4) Fundamentals of Molecular spectroscopy : C.N. Banwell

Course Name	**:**	**F.Y. B. Tech.**	**SEMESTER - I**
Course Code	**:**	**CH1011P**	
Subject Title	**:**	**Engineering Chemistry-I Laboratory**	
Teaching and Examination Scheme:			

Teaching Scheme			**Examination Scheme**	
L	**T**	**P**	**100 % CIE**	**Credits**
-	**-**	**2**		**1**

Course Outcome (CO) of Engineering Chemistry - I Laboratory

The students will be able to

1. Determine the quality of water suitable for different sectors.
2. Determine physical characteristics of lubricating oils.

3. Find the purity and suitability of lubricating oils based on chemical characteristics.

4. Measure the fundamental properties such as viscosity, conductance of solutions.

Titleofthe Experiment[A n y Ten]

1. Determination of Hardnessof Water (Total, carbonate and non-carbonate hardness)
2. Determination of Chemical oxygen Demand (COD) of waste water sample
3. Determination of Chloride Content and alkalinity inWater
4. Methodofremovalofhardnessofwater usingionexchangecolumn
5. Saponification Valueof anOil
6. Acid valueofanOil
7. Viscosity& ViscosityIndexbyRedwoodViscometer
8. Flash PointbyAbel's and Pensky - Marten's Apparatus
9. Characterization of polymer sample- hardness, Impact strength, tensile strength
10. Determination of Viscosity of using by Ford cup viscometer.
11. Determination of conductance of solution using conductometers

Text Books :-

1. Lab. Manual for Engineering Chemistry - Dr.S.K.Basin&Dr. S.K. Rani, DhanapatRai Publishing Company; (2009)
2. Practical Manual for Chemistry of Engineering Materials - D.D. Shah, Nandu Publication, Mumbai
3. Post Graduate Practical Chemistry - H.N. Patel, S.P. Turakhia, S.S. Kelkar, S.R. Puniyani, Himalaya Publishing House, 5thedn; (2008)
4. A Manual of Practical Engineering chemistry Sudha Jain &ShradhaSinha , S.Chand Company Ltd 1st edn (2002)

Course Name	**:**	**F.Y. B. Tech.**	**SEMESTER - II**
Course Code	**:**	**CH1021T**	
Subject Title	**:**	**Engineering Chemistry-II**	

Teaching and Examination Scheme:

Teaching Scheme			**Examination Scheme**				
L	**T(tutorial)**	**P**	**TA (%)**	**IST (%)**	**ESE (%)**	**Credits**	**ESE [W] Hrs**
02	**-**	**01**	**20**	**20**	**60**	**02**	**03**

Course Outcome (CO) of Engineering Chemistry - II

The students will be able to

1. Apply the concepts of electrochemistry and corrosion science to solve corrosion problems.
2. Classify the fossil fuels and determine the different physical and chemical parameters of fuel.
3. Recognize scope of advanced materials such as nano materials, conducting polymers and liquid crystalline polymers for Engineering applications.
4. Choose environmentally friendly technology for manufacturing & utility aspect of materials using green chemistry principles and using the concept of sustainability.
5. Analyse the materials using spectroscopic and chromatographic techniques.

CourseContents: -

Module1: CORROSION **6L**

Directchemicalcorrosion,Electrochemicalcorrosionandits reaction mechanisms,Typesofelectrochemicalcorrosion,(differentialaeration,galvanic,concentrationcell),ElectrochemicalcorrosionlikePitting,Inter granular,Soil,Waterline.Factorsaffectingcorrosion,Protectionofcorrosion, Applicationswithfewpracticalproblemsofcorrosion.

Module2:FUELS **8L**

Typesoffuels,Calorificvalue,Determination ofCalorificvalue, Numericalproblemsbased onit.Analysisofcoal,RefiningofPetroleum by fractional distillation,FuelsforICengines,Knockingandantiknock agents,Octaneand Cetanevalues,Effect of structure of hydrocarbon on knocking of fuels.

Module3: ADVANCEDMATERIALS **6L**

Advancedpolymers: Conductingpolymers,Liquid crystalpolymers.
Composites: Basicsofcomposites,CompositionandCharacteristicpropertiesofcomposites.TypesofComposites:Particle,Fiber,Reinforced,Structural,applications.
Nanomaterials: Introduction,Fullerenes,Carbonnanotubes,Nanowires,Electronicandmechanicalproperties,Synthesisofnanomaterials,Applicationsofnanomaterials-Catalysis,Electronics&Telecommunication,Medicines, Energysciences.

Module4: PRINCIPLES OF SUSTAINABLE AND GREEN CHEMISTRY **3L**

Principles of Green Chemistry, Waste minimization and Atom Economy, Reduction of Materials and Energy requirement, Significance, concept of sustainability, Industrialapplicationsofgreen chemistry.

Module5: SPECTROSCOPIC AND CHROMATOGRAPHIC TECHNIQUES **4 L**

FundamentalsofSpectroscopy, Molecular spectroscopy, ApplicationsofUV-visible,IRSpectroscopy,Atomicabsorptionspectroscopy,Flamephotometry,Principlesand applicationsofchromatographictechniques.

Text books

1) EngineeringChemistry - JainandJain,Danpatraipublications;16thedn(2013)
2) Engineering Chemistry - Dr.S.S.Dara, Dr.S.S. Umare, S.Chand& Company Ltd, 12 thed
3) A Text Book of Engineering Chemistry - ShashiChawla, Danpatrai publications ; Third edn; (2003)

Reference Books: -

1) Polymer Science - Billmayer, F. John Willey & Sons, N.Y.; 3 rdedn (1984)
2) Introduction to Material Science - William Callister, John Willey & Sons, N.Y.; 9th edn; (2013)
3) Nano: The essentials - T.Pradeep;McGraw-HillEducation,(2009)

Course Name	**:**	**F.Y. B. Tech.**	**SEMESTER - II**
Course Code	**:**	**CH1021P**	
Subject Title	**:**	**Engineering Chemistry-II Laboratory**	

Teaching and Examination Scheme:

Teaching Scheme			**Examination Scheme**	
L	**T**	**P**	**100 % CIE**	**Credits**
-	**-**	**2**		**1**

Course Outcome (CO) of Engineering Chemistry - II Laboratory

The students will be able to

1. Estimate metal content from alloys by iodometric method.
2. Determine metal content from their alloys by complexometric method.
3. Analyse quality of solid and liquid fuels based on different tests.
4. Use chromatography and spectroscopy for qualitative analysis of materials.
5. Use conductometric method for quantitative analysis of materials.

Titleofthe Experiment[AnyTen]

1) Determination ofIron bycolorimetricmethod.
2) To determineIron in theplaincarbonsteelsample.
3) To determineZincin thebrasssample by complexometric titration
4) To estimateNickelinthealloysteelsample.
5) Determine the percentage of available chlorine in bleaching powder .
6) AnalysisOf fuel:Proximateanalysisofthe givencoalsample
7) Determination ofthe percentageofNitrogen inthe givencoalsample.
8) Determination ofadulterationintransport fuels
9) Determination ofthe percentageofSulphurinthe givencoalsample.
10) DemonstrationOf TLC/Paperchromatography
11) Determine the concentration of a solution by Spectrophotometric method .
12) Determination of toxic elements by Flame photometry

Text Books :-

1. Lab. Manual for Engineering Chemistry - Dr.S.K.Basin&Dr. S.K. Rani, DhanapatRai Publishing Company; (2009)
2. Practical Manual for Chemistry of Engineering Materials - D.D. Shah, Nandu Publication, Mumbai
3. Post Graduate Practical Chemistry - H.N. Patel, S.P. Turakhia, S.S. Kelkar, S.R. Puniyani, Himalaya Publishing House, 5thedn; (2008)

Applied Mathematics – I

Programme Name	**:**	F.Y. B.Tech	SEMESTER-I
Course Code	**:**	**MA10011S**	
Course Title	**:**	Applied Mathematics – I	

Teaching Scheme				**Examination Scheme**				**Scheme of Evaluation**			
Lectures (Hrs/week	L	Tutorial	P	ESE Hrs	MST Hrs	MST	ESE	TA	MST	ESE	Credits

)											
(3+1)	03	01	00	03	1.5	40	100	20	20	60	04

Course Outcomes:

1) **To develop logical thinking and understand the basic concepts of complex numbers to find nth roots, expansion of trigonometric functions and hyperbolic functions.**
2) **To study the different theorems related to differential calculus, expansion of functionand the infinite series.**
3) **To understand the basic concepts of partial derivativesand its application to solve engineering problems.**
4) **To understand basics of vector and matrices theory as applied to different areas of linear algebra.**

1. Module -I: Complex Numbers [12 Hrs]

Revision: Complex Numbers as ordered pairs, Argand's diagram, Cartesian, Polar and Exponential form of Complex Numbers, De'moivre's Theorem and its application to determine powers of complex numbers

1.1 Roots of complex numbers by De'moivre's Theorem
1.2 Expansion of $cosn\theta$ and $sinn\theta$ in terms of powers of $sinn\theta$and $cosn\theta$.
1.3 Expansion of $cos^n\theta$ and $sin^n\theta$ in terms of sines and cosines of multiple of θ.
1.4 Hyperbolic Function: Exponential form, Circular function and relation between circular and hyperbolic function, Inverse hyperbolic functions.
1.5 Separation of real and imaginary parts of complex numbers.
1.6 Logarithm of complex numbers

2. Module -II: Differential Calculus [11Hrs]

2.1 Successive Differentiation: n^{th} derivative of Standard functions. Use of De'moivre's theorem.
2.2 Lebnitz's Theorem on n^{th} derivative of product of two functions.
2.3 Review of the continuity and differentiability of a function. Roll's, Lagrange's and Cauchy's Mean Value Theorems with geometric interpretation.
2.4 Infinite series. Tests for its convergence and divergence. Maclaurian's series(without proof) Expansion of standard function, Expansion of function in power series by using i) Maclaurian's series ii) Standard Series Method iii) Method of differentiation and Integration Method iv) Method of Substitution.
2.5 Taylor's Series (Without Proof) Expansion of function $f(x+h)$ in power of x and h and $f(x)$ in power of$(x-a)$.
2.6 Indeterminate forms: $\frac{0}{0},\frac{\infty}{\infty}, 0X\infty, \infty-\infty, 1^\infty, 0^\infty, \infty^0$ by L'Hospital's rule.

3. Module -III: Partial Differentiation [11Hrs]

3.1 Partial derivatives of first and higher order, total differential coefficient and total derivative. Partial derivatives of Composite and Implicit functions, Change of Independent variables.

3.2 Euler's theorem on homogeneous functions with two and three independent variables, deduction from Euler's theorem

3.3 Application of partial derivatives:

i) Error and Approximation

ii) Maxima and Minima of functions of two variables.

iii) Lagrange's Method of undetermined multipliers.

4. Module -IV: Matrix and Vectors [08 Hrs]

Revision: Revision of basic matrix and vectors.

4.1 Rank of Matrix, definition, Normal form, and Echelon form.

4.2 Consistency and solution of simultaneous linear homogeneous and Non-homogeneous equations.

4.3 Linear dependence and independence of vectors.

Text Books:

1. Applied Mathematics-I -G V Kumbhojkar, Jamnadas and Co--5th Edition,2009

2. Higher Engineering Mathematics - Dr. B S Grewal, Khanna Publication-39th Edition 2005

Reference Books:

1. Higher Engineering Mathematics -B V Ramana, Tata McGrawhill Pub Co. Ltd 1st Edition,2007

2. Advance Engineering Mathematics - Erwin Kreyzig 9 th Edition

3. Applied Mathematics-I - Dr. U B Jungam, K P Patil& N Kumtekar – NanduPublication 1998

4. A Textbook of Applied Mathematics - P N Wartikar& J N Wartikar– 2nd Edition,1997

5. Calculus and Analytical Geometry- G B Thomas & R L Finney, Narosa

Publication House, N. Delhi – 6th Edition.

Programme Name	**First Year Bachelor of Technology**	**Semester II**
Course Code		**All Branches**
Course Title	**Business English**	

Course Outcomes:

1. Acquire basic proficiency in English grammar and vocabulary.

2. Develop enhanced writing skills required for technical communication.

Programme Name	**B. Tech SEMESTER – I / II**
Course Code	**EE1001T**
Course Title	**Basics of Electrical Engineering**

3. Analyze a given text critically for logical consistency and organizations.

Detailed contents :

1. Vocabulary Building

1.1 The concept of Word Formation 1.2 Root words from foreign languages and their use in English 1.3 Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives1.4 Technical vocabulary specific to engineering fields.

2. Basic Writing Skills

2.1 (This unit involves interactive practice sessions in Language Lab) Sentence Structures 2.2 Use of phrases and clauses in sentences 2.3 Importance of proper punctuation 2.4 Creating coherence 2.5 Organizing principles of paragraphs in documents

3. Identifying Common Errors in Writing

3.1 Subject-verb agreement 3.2 Noun-pronoun agreement 3.3 Misplaced modifiers 3.4 Articles 3.5 Prepositions

5. Writing Practices – Summarisation, email, business letters

6. Critical Reading – Reading a text with enhanced clarity and comprehension

Suggested Readings:

(i) Practical English Usage. Michael Swan. OUP. 1995.

(ii) Remedial English Grammar. F.T. Wood. Macmillan.2007

(iii) On Writing Well. William Zinsser. Harper Resource Book. 2001

Course Outcomes:
After completing the course, students will be able to
1. Apply knowledge of DC circuits for analysing network theorems.
2. Analyse single phase AC circuits.
3. Apply concepts of resonance, bandwidth in series and parallel AC circuits
4. Analyse three phase AC circuits.

Module	Detailed Contents
01	**DC Circuits(Only Independent Sources):** Kirchhoff 's laws, Ideal and practical voltage and current source, Mesh and Nodal analysis, Supernode and Supermesh analysis, Source transformation, Star-delta transformation, Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem,
02	**AC Circuits:** Generation of alternating voltage and currents, RMS and Average value, form factor, crest factor, AC applied to resistance, inductance and capacitance, R-L, R-C and R-L-C series and parallel circuits, phasor diagrams, calculations of power and power factor, series and parallel resonance, Q factor and bandwidth in AC circuits..

03	**Three Phase Circuits:** Three phase voltage and current generation, star and delta connections(balanced load only), relationship between phase and line currents and voltages, Phasor diagrams, Basic principle of wattmeter, measurement of power by one and two wattmeter methods.

Books:

Text Books

1. V. N. Mittle and Arvind Mittal "Basic Electrical Engineering" Tata McGraw Hill, Second Edition, 2005
2. Vincent Del Toro, "Electrical Engineering Fundamentals", PHI Second Edition, 2011

Additional Reading

1. B.L.Theraja "A Textbook of Electrical Technology Volume-I", S. Chand, 2008
2. Edward Hughes, "Electrical and Electrical Technology", Pearson Education, Tenth Edition
3. D P Kothari and I J Nagrath "Theory and Problems of Basic Electrical Engineering", PHI, Thirteenth edition 2011.

Programme Name	**Bachelor of Technology**	**Semester – I**
Course Code	**CO0001T**	
Course Title	**Computer Programming & Problem Solving**	
Prerequisites	**NIL**	

Course Objectives

Upon completion of this course students will be able to

1. Understand the fundamental of computing & Object Oriented systems development.
2. Solve simple and moderately complex problems using C++.
3. Understand the implementation of various user-defined data types and its applications.

Course name	**Hr/week**			**Credits**	**(Examination Scheme (Evaluation in% weightage)**				
	L	T	P		TA	IST	ESE	TOTAL	ESE (W) (HRS)
Computer Programming and Problem Solving	3	0	-	3	20	20	60	100	3
Total	3	0	-	3					

Course Outcomes:

Student will be able to:

1. Implement programs in C and C++

2. Write algorithm and flowchart for the specified problem.
3. Understand Object- Oriented modelling.
4. Use constructs like arrays, functions, pointers, structures and classes.
5. Apply inheritance, polymorphism, and work with files

Syllabus:

1. Principles of Object-Oriented Programming
Elements of computer systems, OS Commands & Linux environment, Language Processors, Object-Oriented Programming Paradigm and benefits, Applications of OOP.

2. Object-Oriented Systems Development
Object-Oriented Analysis: static and dynamic modeling, and Design: class design and algorithm design, case studies.

3. Beginning with C++
Tokens, Expressions, Control Structures, Array, Functions, Structures and Unions.

4. Class and Objects
Specifying a Class, Defining Member Functions, Private Member Functions, Static Data and Member Functions, Arrays of Objects, Friend Functions.

5. Constructors and Destructors
Constructor, Parameterized Constructors, Multiple Constructors in a Class, Copy Constructors, Dynamic Constructors, Destructors.

6. Inheritance
Single Inheritance, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Virtual Base Classes, Abstract Classes

7. Polymorphism
Operator Overloading, Function Overloading. Virtual Functions, Pure Virtual Functions.

8. Files
I/O stream operation, File Stream Operations, Opening and Closing a File, Detecting end-of-file, more about Open(): File Modes, Sequential Input and Output operations.

Text Books:

1. "Object-Oriented paradigm with C++", Dr. BanduMeshram, Shroff Publisher & Distributors Pvt. Ltd, 2016.
2. "Object-Oriented Programming with C++", E. Balagurusamy, 5th Edition, Published by Tata McGraw Hill in year 2011.

Reference Books:

1. "Programming workbook for Object-Oriented paradigm with C++", Dr. BanduMeshram, Shroff Publisher & Distributors Pvt. Ltd, 2016.
2. "Mastering C++", K. R. Venugopal, Rajkumar, 2nd Edition, Published by Tata McGraw Hill in the year 1997.

Programme Name	**Bachelor of Technology**	**Semester – I/II**
Course Code	**CO0001P**	
Course Title	**Computer Programming & Problem Solving Lab**	
Prerequisites	**NIL**	

Course Objectives:

1. Understand fundamentals of programming such as variables, conditional and iterative execution methods, etc.
2. Understand fundamentals of object-oriented programming in C++.
3. Have the ability to write an algorithm and develop computer program to solve specified problems.
4. Be able to use the g++ compiler to create, debug and run simple C and C++ programs.

Course name	**Hr/week**			**Credits**	**(Examination Scheme (Evaluation in% weightage)**				
	L	T	P		TA	IST	ESE	TOTAL	ESE (W) (HRS)
Computer Programming and Problem Solving Lab	0	0	2	1.5	100% CIE				-
Total	0	0	2	1.5					

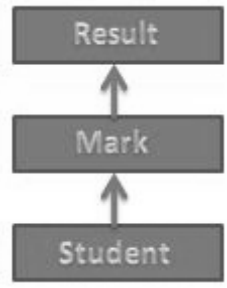
Course Outcomes:

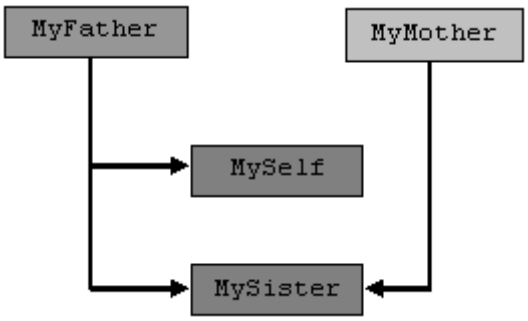
The students would be able to

1. Apply and practice logical ability with help of algorithms and flowcharts to solve the problems.
2. Understand C++ programming development environment, compiling, debugging, linking and executing a program using the development environment.

3. Modularize the problems into small modules and then convert them into programs.
4. Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.

Program List:

Sr No.	**Topics**
1.	A. Write a C++ program to calculate total and percentage of marks, also decide grade of student depending on the percentage using nested if-else statement. B. Write a C++ program for menu driven calculator using switch case Statement
2.	A. Write a C++ program to find Maximum and minimum element from array. B. Write a C++ program for multiplication of nXn matrix
3.	Write a C++ Program to reverse string and check whether it is palindrome or not.
4.	A. Write a C++ program to swap numbers using call by value and call by reference. B. Write a C++ program to calculate factorial of number using recursive function.
5.	Write a C++ program to create class Student and display the information of n number of student using array of objects.
6.	Write a C++ program to explain concept of constructor and destructor
7.	A. Write a C++ program to study concept of function overloading B. Write a C++ program to adding 2 complex numbers using an overloaded operator.
8	A. Write a C++ program to study multilevel inheritance and implement following hierarchy  B Write a C++ program to study Multiple Inheritance and implement following hierarchy



9. Write a C++ program to study abstract class and virtual function**.**

Programme Name	**First Year Bachelor of Technology**
Course Code	SA 100IP
Course Title	Engineering Mechanics lab

CO1: Perform experiments to verify the laws of static equilibrium including friction.

CO2 : Perform experiemtns to find out the unknown forces in plane and space trusses.

CO3 : Perform experiments to compute the frequency of vibration of dynamic SDOFs.

CO4 : Perform experiments to understand the applications of laws of kinematics and dynamics equilibrium.

Title of the Experiment:

1. Bell Crank Lever
2. Simple Beam
3. Simple Jib Crane
4. Link Chain
5. Screw Jack (Friction)
6. Shear Leg Apparatus
7. 'g' by falling weight method
8. Plane motion of bodies
9. M.I. of fly wheel
10. Compound pendulum
11. Torsional pendulum
12. Principle of conservation of energy (connected bodies with flywheel)
13. Stiffness of spring

Programme Name	First Year Bachelor of Technology	Semester – I/II
Course Code	SA 1001T	
Course Title	Engineering Mechanics	

Course Outcomes:

1. Ability to understand &analyse basic theory and principle of forces in Mechanics and their relationship to engineering applications.

2. To analyse motion, forces & motion, work & energy problems and their relationship to engineering applications.

Course Contents:

1. **Fundamental of Mechanics :**
   Review of basic concepts – mass, space, time and force: Particles and rigid bodies: Scalars and vectors: Free, sliding, fixed and unit vectors: Addition, subtraction and multiplication of two vectors. Definition of a force : Classification of forces : Principles of transmissibility.

2. **Force systems:**
   Introduction to different force systems: Composition of forces – triangle, parallelogram and polygon law of forces, addition of two parallel forces: Resolution of forces: Moment of a force, Varignon's theorem: Couple of forces: Force – couple systems: Resultant of a force system: Equilibrium conditions for a force system: Free body diagram: Different types of supports.

3. **Distributed Forces :**
   Line, area and volume distributions of forces: Centre of gravity: Centre of mass: Centroid of plane figures: Cerntroid of composite figures, Moment of Inertia: Area and mass moments of inertia: Perpendicular and parallel axes theorems of moment of inertia: Radius of gyration.

4. **Plane Truss:**
   Statically determinate trusses: Force analysis of a truss – method of joints, method of section and graphical method (Maxwell diagram).

5. **Dry Friction:**
   Laws of dry friction, Co-efficient of friction: Angle and cone of friction: Angle of repose: Applicatrions of friction-wedges and screw jacks. Coil Friction and its applications.

6. **Virtual Work:**
   Work done by forces and couples: Virtual displacement and virtual work: Principle of virtual work for equilibrium bodies in equilibrium: Active force diagram: Degree of freedom.

7. **Kinematics of Particles:**
   Differential equations of kinematics – plane, rectilinear and curvilinear motions: Cartesian co-ordinate system: Normal and tangent co-ordinate system, projectile motion.

8. **Kinetics of Particles:**
   Newton's second law of motion; Work and energy principle – gravitational-potential energy, elastic-potential energy, kinetic energy, power, efficiency, Principle of impulse and momentum; Impact motion – direct central impact.

9. **Rotation of Rigid Bodies:**
   Kinematics of rotation; Kinetics of rotation – equation of motion, principle of work and energy; Principle of impulse and momentum.

10. **Plane Motion of Rigid Bodies:**
    Translaion of a rigid body in a plane; Kinematics of plane motion; Instantaneous centre of rotation, Kinetics of plane motion – equation of motion, principles of work and energy; Principle of impulse and momentum.

Text Books

1. A textbook of Engineering Mechanics, Dr.Sadhu Singh (S.Chand publishing)
2. Tayal A.K., Mechanics for Engineering, Statics and Dynamics**,** Umesh Publication, N. Delhi, 2008.
3. Engineering Mechanics, K.L.Kumar, Veenu Kumar, McGow Higher Education.

Additional Reading

1. Bhavikatti S.S. &Rajashekarappa K.G. Engineering Mechanics, New Age International (P) Limited publishers 1998.

2. Shames I.H, Engineering Mechanics, P.H.I. India 1980.
3. Kumar K. L., Engineering Mechanics, McGraw Hill publishing company New Delhi 2008.
4. Beer and Johnston, Mechanics for Engineers, McGraw Hill, 2009.
5. Timoshenko and Young, Mechanics for Engineers, McGraw Hill, 2010.
6. Mclean and Nelson, Mechanics for Engineers, Schaum Outline Series 2010.
7. Hibbeler R.C., Mechanics for Engineers, Pearson Education, 2012.
8. Singer, Mechanics for Engineers, McGraw Hill, 2013

Programme Name	***First Year Bachelor of Technology***	***Semester – I/II***
Course Code		
Course Title	**Engineering Graphics**	

Course Outcomes

The student should be able to –

1. Represent projections of lines, planes and solids.
2. Draw projections of solids cut by section planes and develop the lateral surfaces.
3. Convert the pictorial view into orthographic projections.
4. Convert the orthographic projections into isometric view.

Course Contents

Introduction to Drawing & Geometrical Contraction

Introduction: Introduction and importance of engineering drawing, Drawing Instruments and their use, Drawing layout, types of lines, lettering and Dimensioning

Geometrical Constructions: Dividing a straight line into number of equal parts, tangents to lines and arcs, construction of polygons.

Engineering Curves: conic section – ellipse, parabola and hyperbola & Rectangular hyperbola (General method only); Cycloidal curves – Cycloid, Epicycloid, and Hypocycloid; Involutes

Projection of Points. Lines and Planes

Introduction: Method of projections, Orthographic projection, Reference planes, Quadrants, Reference line etc. Projection of Points.

Projections of lines: Line inclined to both the reference planes (excluding the traces), True/Apparent lengths & inclinations.

Projection of Planes: Triangular, Square, Rectangular, Pentagonal, Hexagonal and Circular planes inclined to either HP or VP only (excluding composite planes).

Projection Solids, Sections of Solids and Development of Surfaces

Projections of Solids: Solids (Prism, Pyramid, Cylinder, Tetrahedron, Hexahedron and cone only with their axis inclined to HP or VP only (Excluding Spheres, Composite and Hollow solids) Use change of position or Auxiliary Plane method.

Section of Solids: Section of Prism, Pyramid, Cylinder, Tetrahedron, Hexahedron & cone cut by plane. Use change of Position or Auxiliary plane method.

Development of Lateral Surfaces of sectioned solids: Lateral surface development of Prism, Pyramid, Tetrahedron, Hexahedron, Cylinder, and Cone with Section Plane inclined to HP or VP only (Excluding Reverse Development).

Orthographic Projections

Multi View Orthographic projections of simple machine parts by first angle method, Sectional views of simple machine parts (full & Half Section only)

Isomeric Projection

Isomeric scale, isometric view/Drawing of simple blocks with plain and cylindrical surfaces. (excluding spherical surface)

Note: Only FIRST ANGLE Method of projections must be used throughout the course.

Text books

1. N. D. Bhatt, Engineering Drawing, Charotar publishing house, 53rd Edition, 2014
2. N. H. Dubey, Engineering Drawing Nandu Publishers & printers, 15th Edition, 2015

Programme Name	***First Year Bachelor of Technology***	***Semester – I/II***
Course Code		
Course Title	**Engineering Graphics Laboratory**	

Course Outcomes

The student should be able to –

1. Draft various Geometrical Elements used in Engineering Practice using CAD software.
2. Draft projections of various objects and their representation and dimensioning using CAD software.
3. Visualize any object through Isometric Projections and interpret drawings of engineering parts and objects.

Course Contents

Introduction to Computer Aided sketching

Computer screen, layout of the software, standard tool bar/menus and description of most commonly used tools bars, navigational tools. Co-ordinate system and reference planes.Definitions of HP, VP.Creation of 2D/3D environment.Selection of drawing size and scale. Commands and creation of co-ordinate points, lines, axes, polylines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, offset, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity. Dimensioning, line conventions material conventions and lettering

Minimum 10 Exercises based on above mentioned topics with minimum two problems in each Exercise.

Programme Name	*First Year Bachelor of Technology*	*Semester – I/II*
Course Code		
Course Title	**Elements of Mechanical Engineering**	

Course outcomes

The student should be able to –

1. Understand basic aspects of heat transfer & fluid flow and related equipments.
2. Study aspects of energy engineering and energy conversion equipments.
3. Understand various metal cutting & joining processes required for manufacturing.
4. Identify the applications of mechanical drives and components.

Course Contents

Introduction to Thermal & Fluid Engineering

Heat Transfer: Modes, Equipment

Fluids: Types of flows, Types of Pumps, Compressors, Hydraulic Turbines (Hydro Power Plants) (Simple problems to be solved.)

Introduction to Energy Engineering

Energy Generation: Steam Turbines, Gas Turbines, I.C. Engines (elementary treatment and simple problems)

Conventional & Nonconventional Energy Sources: Comparison

Refrigeration and Air conditioning: (elementary treatment and simple problems)

Introduction to Manufacturing Engineering

Metal cutting processes & Machines: Turning, drilling, shaping, grinding operations, Introduction to NC / CNC machines.

Metal joining processes: Welding, Soldering, Brazing, Riveting & their applications.

Manufacturing materials: Types & Selection

(Simple problems to be solved.)

Mechanical Drives & Devices

Drives: Belt, rope, chain, gear drives

Power transmission system: Shafts, axles, keys, couplings, bearings, friction clutches & brakes.

(Simple problems to be solved.)

Text Books

1. R. K. Rajput, Basic Mechanical Engineering, 3rd Edition, 2015
2. V. M. Domkundwar, A.T., Basic Mechanical Engineering, NiraliPrakashan, 2014
3. T.S.Rajan, Basic Mechanical Engineering,New Age International (P) ltd. Publishers, 4th Edition, 2015
4. D. K. Chavan, G.K.Pathak, Basic Mechanical Engineering, 1st Edition, 2016

Programme Name	*First Year Bachelor of Technology*	*Semester – I/II*
Course Code		
Course Title	**Workshop**	

COURSE OUTCOMES

The student should be able to –

1. Fabricate components with their own hands.
2. Get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
3. Inculcate respect for physical work and hard labor.
4. Hands on experience on various manufacturing processes.

Course Contents

Fitting

Use and setting of fitting tools for chipping, cutting, filing, marking, center punching, drilling, tapping. One job involving following operations: filing to size, one simple male female joint, drilling and tapping.

Carpentry

Use and setting of hand tools like hacksaws, jack planes, chisels and gauges for construction of various joints, wood tuning and modern wood turning methods. One carpentry job involving a joint and report.

Forging (Smithy)

At least one smithy job (Lifting hook and handle)

Welding

Edge preparation for welding jobs.Arc welding for different job like, Lap welding of two plates, butt welding of plates with simple cover, arc welding to join plates at right angles.
One welding job is to be completed using any one welding processes.

Machine Shop

One machine/turning job is to be completed.

Sheet metal working

Use of sheet metal, working hand tools, cutting, bending. One sheet metal job is to be completed.

Text Books

1. Chapman W. A. J., Workshop Technology Parts 1 & 2, Viva Books P. Ltd., New Delhi, 4th Edition, 1998.
2. Welding Handbook. 8th Edition. 3 vols& 7th Edition. 5 vols, Miami, American Welding Society, 1987 & 1976 respectively.
3. Metals Handbook. 9th Edition, Vol 6, Welding, Brazing & Soldering. Metals Park, Ohio, American Society of Metals, 1983.
4. SeropeKalpakjian Manufacturing Engineering & technology Pearson Steven R. Schmid Education (Asia) Inc., Delhi, 2002