MA1001 - MATHEMATICS – I

L	T	P	C
3	1	0	3

Module I: Preliminary Calculus & Infinite Series (9L + 3T)

Preliminary Calculus : Partial differentiation, Total differential and total derivative, Exact differentials, Chain rule, Change of variables, Minima and Maxima of functions of two or more variables.

Infinite Series : Notion of convergence and divergence of infinite series, Ratio test, Comparison test, Raabe's test, Root test, Series of positive and negative terms, Idea of absolute convergence, Taylor's and Maclaurin's series.

Module II: Differential Equations (13L + 4T)

First order ordinary differential equations: Methods of solution, Existence and uniqueness of solution, Orthogonal Trajectories, Applications of first order differential equations.

Linear second order equations: Homogeneous linear equations with constant coefficients, fundamental system of solutions, Existence and uniqueness conditions, Wronskian, Non homogeneous equations, Methods of Solutions, Applications.

Module III: Fourier Analysis (10 L+ 3T)

Periodic functions : Fourier series, Functions of arbitrary period, Even and odd functions, Half Range Expansions, Harmonic analysis, Complex Fourier Series, Fourier Integrals, Fourier Cosine and Sine Transforms, Fourier Transforms.

Module IV: Laplace Transforms (11L + 3T)

Gamma functions and Beta functions, Definition and Properties. Laplace Transforms, Inverse Laplace Transforms, shifting Theorem, Transforms of derivatives and integrals, Solution of differential Equations, Differentiation and Integration of Transforms, Convolution, Unit step function, Second shifting Theorem, Laplace Transform of Periodic functions.

Text Book:

Kreyszig E, 'Advanced Engineering Mathematics' 8th Edition, John Wiley & Sons New York, (1999)

Reference Books:

1. Piskunov, 'Differential and Integral Calculus, MIR Publishers, Moscow (1974).

2. Wylie C. R. & Barret L. C 'Advanced Engineering Mathematics' 6th Edition, Mc Graw Hill, New York, (1995).

3. Thomas G. B. 'Calculus and Analytic Geometry' Addison Wesley, London (1998).

MA1002 - MATHEMATICS II

L	T	P	C
3	1	0	3

Module I **(11 L + 3T)**

Linear Algebra I: Systems of Linear Equations, Gauss' elimination, Rank of a matrix, Linear independence, Solutions of linear systems: existence, uniqueness, general form. Vector spaces, Subspaces, Basis and Dimension, Inner product spaces, Gram-Schmidt orthogonalization, Linear Transformations.

Module II **(11 L+ 3T)**

Linear Algebra II: Eigen values and Eigen vectors of a matrix, Some applications of Eigen value problems, Cayley-Hamilton Theorem, Quadratic forms, Complex matrices, Similarity of matrices, Basis of Eigen vectors – Diagonalization.

Module III **(10L+3T)**

Vector Calculus I: Vector and Scalar functions and fields, Derivatives, Curves, Tangents, Arc length, Curvature, Gradient of a Scalar Field, Directional derivative, Divergence of a vector field, Curl of a Vector field.

Module IV **(11 L+4T)**

Vector Calculus II: Line Integrals, Line Integrals independent of path, Double integrals, Surface integrals, Triple Integrals, Verification and simple applications of Green's Theorem, Gauss' Divergence Theorem and Stoke's Theorem.

Text Book:

Kreyzig E, Advanced Engineering Mathematics, 8th Edn, John Wiley & Sons, New York (1999).

Reference Books:

1. Wylie C. R & Barrret L. C, Advanced Engineering Mathematics, 6th Edn, Mc Graw Hill, New York (1995).

2. Hoffman K & Kunze R, Linear Algebra, Prentice Hall of India, New Delhi (1971).

PH1001 PHYSICS

L	T	P	C
3	0	0	3

Module 1 – Theory of Relativity (6 hours)

Frames of reference, Galilean Relativity, Michelson-Morley experiment, postulates of Special Theory of Relativity, Lorentz transformations, simultaneity, length contraction, time dilation, velocity addition, Doppler effect for light, relativistic mass and dynamics, mass energy relations, massless particles, Description of General Theory of Relativity.

Module 2 - Quantum Mechanics (10 hours)

Dual nature of matter, properties of matter waves, wave packets, uncertainty principle, formulation of Schrödinger equation, physical meaning of wave function, expectation values, time-independent Schrödinger equation, quantization of energy – bound states, application of time-independent Schrödinger equation to free particle, infinite well, finite well, barrier potential, tunneling, Simple Harmonic Oscillator, two-dimensional square box, the scanning tunneling microscope.

Module 3 – Statistical Physics (12 hours)

Temperature, microstates of a system, equal probability hypothesis, Boltzman factor and distribution, ideal gas, equipartition of energy, Maxwell speed distribution, average speed, RMS speed, applications – Lasers and Masers, Quantum distributions – many particle systems, wave functions, indistinguishable particles, Bosons and Fermions, Bose-Einstein and Fermi-Dirac distribution, Bose-Einstein condensation, Specific heat of a solid, free electron gas and other applications.

Module 4 – Applications to Solids (14 hours)

Band theory of solids, conductors, semi-conductors and insulators, metals – Drude model and conductivity, electron wave functions in crystal lattices, E-k diagrams, band gaps, effective mass, semiconductors, Fermi energy, doping of semiconductor, conductivity and mobility of electrons, Hall effect, Fundamentals of mesoscopic physics and nano technology: size effects, interference effect, quantum confinement and Coulomb blockade. Quantum wells, wires, dots, nanotubes, semiconductor nano materials, Magnetism: dipole moments, paramagnetism, Curie's law, magnetization and hysterisis, Ferromagnetism and Anti-Ferromagnetism.

Text Books

1. *Modern Physics for Scientists and Engineers*, J. R. Taylor, C.D. Zafiratos and M. A. Dubson, 2nd Ed., Pearson (2007)

2. *Concepts of Modern Physics* Arthur Beiser, 6th Ed., Tata Mc Graw –Hill Publication (2009)

References

1. *Quantum Physics of atoms, Molecules, Solids, Nuclei and Particle,* Robert Eisberg and Robert Resnick, 2nd Ed., John Wiley(2006)

2. *Solid state Devices*, B. G. Streetman, 5th Ed., Pearson (2006)

CY1001: Chemistry

L	T	P	C
3	0	0	3

Pre-requisites: Nil

Module 1: Chemical Bonding (8 hours)

Quantum mechanical methods in chemical bonding: molecular orbital theory, symmetry of molecular orbitals, MOs for homonuclear diatomic molecules, application of MO theory to heteronuclear diatomics, valence bond theory, hybridization, hybridization involving d orbitals, conjugated molecules, Huckel molecular orbital theory of conjugated systems, metallic bonding, band theory .

Module2: Spectroscopy (14 hours)

General features of spectroscopy, interaction of radiation with matter, theory and application of rotational, vibrational, Raman, electronic, mass, NMR, fluorescence and photoelectron spectroscopy.

Module 3: Transition Metal Chemistry (12 hours)

Bonding in transition metal complexes: coordination compounds, crystal field theory, octahedral, tetrahedral and square planar complexes, crystal field stabilization energies, Jahn-Teller theorem, spectral and magnetic properties.

Bio-Inorganic chemistry: Trace elements in biology, heme and non-heme oxygen carriers, haemoglobin and myoglobin-cooperativity; Bohr effect, Hill coefficient, oxy and deoxy haemoglobin, reversible binding of oxygen.

Module 4: Aromaticity (8 hours)

Electron delocalization, resonance and aromaticity; molecular orbital description of aromaticity and anti-aromaticity, annulenes; ring current, NMR as a tool, diamagnetic anisotropy; aromatic electrophilic substitutions, aromatic nucleophilic substitutions, benzyne; reaction mechanisms, reactivity and orientation.

Text Books:

1. J. E. Huheey, E.A. Keiter and R.L. Keiter, *Inorganic Chemistry, Principles of Structure and Reactivity*, Harper Collins, New York 1997.
2. F. A. Cotton and G Wilkinson, *Advanced Inorganic Chemistry*, 5th Edition, Wiley Interscience, New York, 1988.
3. J. D. Lee, *Concise Inorganic Chemistry,* Chapman & Hall, London, 1996.
4. W. L. Jolly, *Modern Inorganic Chemistry*, McGraw-Hill International, 2nd Edition, New York, 1991.
5. R. T. Morrison and R N Boyd, *Organic Chemistry*, 6th Edition, Prentice Hall, New Delhi, 1999.
6. P. Bruice, *Organic Chemistry*, 3rd Edition, Prentice Hall, New Delhi , 2001.
7. F. Carey, *Organic Chemistry*, 5th Edition, McGraw Hill Publishers, Boston, 2003.
8. J. Mc Murray, *Organic Chemistry,* 5th Edition, Brooks/ Cole Publishing Co, Monterey, 2000.
9. C.N. Banwell and E. M. McCash, *Fundamentals of Molecular Spectroscopy,* McGraw-Hill, International, UK, 1995.
10. William Kemp, *Organic Spectroscopy,* 3rd edition, Palgrave, New York, 2005.
11. R.M. Silverstein, F.X. Webster and D.J. Kiemle, *Spectrometric Identification of Organic* C*ompounds***,** 7th edition**,** John-Wiley and Sons, New York, 2005.
12. D. L. Pavia, GM. Lampman, GS. Kriz and J.R Vyvyan, I, *Spectroscopy,* Cengage Learning India Pvt. Ltd, New Delhi, 2007.
13. B. R.Puri, L. R. Sharma and M. S. Pathania, *Principles of Physical Chemistry*, Vishal Publishing CO. Delhi, 2008.
14. P.W. Atkins, *Physical Chemistry,* 6th Edition, Oxford University Press, Oxford, 1998.

MS1001 PROFESSIONAL COMMUNICATION

L	T	P	C
3	0	0	3

Module 1 (11 hours)

Verbal Communication: received pronunciation; how to activate passive vocabulary; technical/non-technical and business presentations; questioning and answer skills; soft skills for professionals; role of body postures, movements, gestures, facial expressions, dress in effective communication; Information/ Desk/ Front Office/ Telephone conversation; how to face an interview/press conference; Group discussions, debates, elocution.

Module 2 (9 hours)

Reading Comprehension: skimming and scanning; factual and inferential comprehension; prediction; guessing meaning of words from context; word reference; use and interpretation of visuals and graphics in technical writing.

Module 3 (11 hours)

Written Communication: note making and note taking; summarizing; invitation, advertisement, agenda, notice and memos; official and commercial letters; job application; resume and curriculum vitae; utility, technical, project and enquiry reports; paragraph writing: General – Specific, Problem – Solution, Process – Description, Data – Comment.

Module 4 (11 hours)

Short essays: description and argument; comparison and contrast; illustration; using graphics in writing: tables and charts, diagrams and flow charts, maps and plans, graphs; how to write research paper; skills of editing and revising; skills of referencing; what is a bibliography and how to prepare it.

Text Books

1. Adrian Doff and Christopher Jones: ***Language in Use*** – Upper intermediate, self-study workbook and classroom book. (Cambridge University Press)[2000]
2. Sarah Freeman: ***Written Communication*** (Orient Longman)[1978]
3. Mark Ibbotson: ***Cambridge English for Engineering*** (Cambridge University Press) November 2008
4. T Balasubramanian: ***English Phonetics for Indian Students: A Workbook*** (Macmillan publishers India) 2000

Reference

1. Chris Mounsey: ***Essays and Dissertation*** (Oxford University Press) February 2005.
2. Sidney Greenbaum: ***The Oxford English Grammar*** (Oxford University Press) March 2005
3. Krishna Mohan and Meera Banerji: ***Developing Communication Skills*** (Mac Millan india Ltd)[2000]
4. Krishna Mohan and Meenakshi Raman: ***Effective English Communication*** (Tata Mc-Graw Hill)[2000]

ZZ1003 BASIC ELECTRICAL SCIENCES

L	*T*	*P*	*C*
3	*0*	*0*	*3*

Pre-requisites: None

Module – 1 (11 Hours)

Two Terminal Element Relationships

Inductance - *Faraday's Law of Electromagnetic Induction-Lenz's Law -Self and Mutual Inductance-Inductances in Series and Parallel-Mutual Flux and Leakage Flux-Coefficient of Coupling-Dot Convention-Cumulative and Differential Connection of Coupled Coils-*

Capacitance - *Electrostatics-Capacitance-Parallel Plate Capacitor-Capacitors in series and parallel- Energy Stored in Electrostatic Fields-.*

v-i relationship for Inductance and Capacitance - v-i relationship for Independent Voltage and Current Sources –

Magnetic Circuits

MMF, Magnetic Flux, Reluctance- Energy Stored in a Magnetic Field-Solution of Magnetic Circuits.

Analysis of Resistive Circuits

Solution of resistive circuits with independent sources-

Node Analysis and Mesh Analysis-Nodal Conductance Matrix and Mesh Resistance Matrix and symmetry properties of these matrices-Source Transformation-

Circuit Theorems - Superposition Theorem-Thevenin's Theorem and Norton's Theorem-Maximum Power Transfer Theorem

Module – 2 (10 Hours)

Single Phase AC Circuits

Alternating Quantities- Average Value - Effective Value - Form and Peak factors for square, triangle, trapezoidal and sinusoidal waveforms - Phasor representation of sinusoidal quantities - phase difference -Addition and subtraction of sinusoids - Symbolic Representation: Cartesian, Polar and Exponential forms-

Analysis of a.c circuits R, RL, RC, RLC circuits using phasor concept - Concept of impedance, admittance, conductance and susceptance –

Power in single phase circuits – instantaneous power – average power – active power – reactive power – apparent power – power factor – complex power – Solution of series, parallel and series-parallel a.c circuits-

Module - 3 (14 hrs)

Introductory Analog Electronics

Semiconductor Diode: Principle, Characteristics - Applications: Rectifier Circuits -Zener Diode, LED, Photo diode, IR diode

Bipolar Junction Transistor: Principle, Operation, Characteristics (CB, CE, CC)

Principle of working of CE, CB and CC amplifiers, quantitative relations for midband operation, input and output resistance levels – qualitative coverage on bandwidth - cascading considerations.

Introductory Digital Electronics

Transistor as a switch – switching delays, inverter operation

Digital Electronics : Number Systems and Conversions- Logic Gates and Truth Tables – Boolean Algebra – Basic canonical realizations of combinatorial circuits.

Standard Combinatorial Circuit SSI and MSI packages (Adder, Code Converters, 7-Segment Drivers, Comparators, Priority Encoders etc)

MUX-based and ROM-based implementation of combinatorial circuits.

Module - 4 (7 hours)

Measuring instruments

Basics of electronic/digital voltmeter, ammeter, multimeter, wattmeter and energy meter. Measurement of Voltage, Current and Resistance. Introduction to Cathode Ray Oscilloscope - CRT, Block diagram of CRO

(a) Text Books :

1. Electric Circuits, James W Nilsson and Susan A Riedel, Pearson, 8th Edn, 2002
2. Electronic Devices and Circuit Theory, Robert L Boylestead & L Nashelsky, Pearson, 9th Edition, 2007
3. Digital Design , Morris Mano , PHI, 3rd Edition, 2005
4. Golding & Widdis, Electrical Measurements an Measuring Instruments;- Wheeler Publishers 5th edition, 1999.
5. Rangan, Sarma and Mani, Instrumentation Devices and Systems, Tata McGraw Hill, 1997
6. A.K. Sawhney: A course in Electrical and Electronic Measurements and Instrumentation, Dhanpat Rai and Co,16th Edition, 2006

(b) Reference Books :

1. Electric Circuits & Networks, Suresh Kumar K.S, Pearson Education, 2009
2. Microelectronics, Adel S Zedra and Kennath C Smith, Oxford University Press, 2004

ZZ1001 ENGINEERING MECHANICS

L	T	P	C
3	0	0	3

Part A--Statics

MODULE 1 (12 hours)

Fundamentals of mechanics: idealisations of mechanics, vector and scalar quantities, equality and equivalence of vectors, laws of mechanics.

Important vector quantities: Position vector, moment of a force about a point, moment of a force about an axis, the couple and couple moment, couple moment as a free vector, moment of a couple about a line.

Equivalent force systems: Translation of a force to a parallel position, resultant of a force system, simplest resultant of special force systems, distributed force systems.

Equations of equilibrium: Free body diagram, free bodies involving interior sections, general equations of equilibrium, problems of equilibrium, static indeterminacy.

MODULE 2 (10 hours)

Applications of Equations Equilibrium: Trusses: solution of simple trusses, method of joints, method of sections; Friction forces: laws of Coulomb friction, simple contact friction problems.

Properties of surfaces: First moment, centroid, second moments and the product of a plane area, transfer theorems, rotation of axes, polar moment of area, principal axes, concept of second order tensor transformation.

Part B—Dynamics

MODULE 3 (10 hours)

Kinematics of a particle: Introduction, general notions, differentiation of a vector with respect to time, velocity and acceleration calculations, rectangular components, velocity and acceleration in terms of cylindrical coordinates, simple kinematical relations and applications.

Particle dynamics: Introduction, rectangular coordinates, rectilinear translation, Newton’s law for rectangular coordinates, rectilinear translation, cylindrical coordinates, Newton’s law for cylindrical coordinates.

MODULE 4 (10 hours)

Energy and momentum methods for a particle: Analysis for a single particle, conservative force field, conservation of mechanical energy, alternative form of work-energy equation, Linear momentum, impulse and momentum relations, moment of momentum.

Vibrations: Single degree of freedom systems, free vibration, undamped and damped, forced vibration, sinusoidal loading, introduction to multi degree of freedom systems, illustration using two degree-of-freedom systems.

Text Book

I. H. Shames, Engineering Mechanics—Statics and Dynamics, 4th Edition, Prentice Hall of India, 1996.

Reference Books

1. F.P. Beer and E.R. Johnston, *Vector Mechanics for Engineers – Statics,* McGraw Hill Book Company, 2000.
2. J.L. Meriam and L.G. Kraige, *Engineering Mechanics – Statics*, John Wiley & Sons, 2002.

ZZ1002 ENGINEERING GRAPHICS

L	T	D	C
2	0	3	3

Module 1 **(4Lecture+6drawing hours)**

Introduction to Engineering Graphics – Drawing instruments and their use – Different types of lines - Lettering & dimensioning – Familiarization with current Indian Standard Code of Practice for Engineering Drawing.

Scales, Plain scales, Diagonal scales, Vernier scales.

Introduction to orthographic projections- Horizontal, vertical and profile planes – First angle and third angle projections – Projection of points in different coordinates – Projections of lines inclined to one of the reference planes

Module II

Projections of lines inclined to both the planes – True lengths of the lines and their angles of inclination with the reference planes – Traces of lines. **(4Lecture+6 drawing hours)**

Projection of plane lamina of geometric shapes inclined to one of the reference planes – inclined to both the planes, Traces of planes **(2Lecture+3 drawing hours)**

Projections on auxiliary planes **(2 lecture +3 drawing hours)**

Module III

Projections of polyhedra and solids of revolution, projection of solids with axis parallel to one of the planes and parallel or perpendicular to the other plane – Projections with the axis inclined to one of the planes. Projections of solids with axis inclined to both the planes – Projections of spheres and combination of solids. **(4Lecture+6 drawing hours)**

Module IV

Sections of solids by planes perpendicular to at least one of the reference planes – True shapes of sections. **(2 lectures, 3 drawing hours)**

Developments, development of the lateral surface of regular solids like, prisms, pyramids, cylinders, cones and spheres, development of truncated solids **(2 lectures +3 drawing hours)**

Isometric projection – Isometric scale – Isometric views – Isometric projection of prisms, pyramids, cylinders, cones, spheres and solids made by combination of the above. **(2 lectures +6 drawing hours)**

Text book

Bhatt N. D**,** Elementary Engineering Drawing, Charotar Publishing House, Anand, 2002

References

1. Narayana K L & Kannaiah P, Engineering Graphics, Tata McGraw Hill, New Delhi, 1992

2. Luzadder W J, Fundamentals of Engineering Drawing, Prentice Hall of India, New Delhi, 2001

3. Thomas E French & Charkes J V, Engineering Drawing & Graphing Technology,

   McGraw Hill Book Co, New York, 1993

4. Venugopal K, Engineering Drawing & Graphics, New Age International Pvt. Ltd., New Delhi, 1994

ZZ1004 COMPUTER PROGRAMMING

Pre-requisite: NIL

L	T	P	C
2	0	0	2

Module 1 (7 Hours)

Data Types, Operators and Expressions: Variables and constants - declarations - arithmetic, relational and logical operators – Assignment operator and expressions – conditional expressions – precedence and order of evaluation.

Control Flow: Statements and blocks – if-else, switch, while, for and do-while statements – break and continue statements, goto and labels.

Module 2 (7 Hours)

Functions and Program structure: Basics of functions, Parameter passing – scope rules - recursion.

Module 3 (7 Hours)

Pointers and Arrays: Single and multidimensional arrays - Pointers and arrays – address arithmetic - Passing pointers to functions.

Module 4 (7 Hours)

Structures and Unions: Basics of structures, Structures and functions – Arrays of Structures – Pointers to structures – self referential structures – Type definitions – Unions.

Input and Output: Standard input and output – Formatted output – variable length argument list – file access.

Text Book:

1. B. W. Kernighan and D. M. Ritchie, *The C Programming Language* (2/e), Prentice Hall, 1988.

References:

1. B.S. GottFried, *Schaum's Outline of Programming with C*(2/e), McGraw-Hill, 1996.
2. *C. L. Tondo and S. E. Gimpel, The* C Answer Book(2/e), Prentice Hall, 1988.
3. B. W. Kernighan, The Practice of Programming, Addison-Wesley, 1999.

PH1091 PHYSICS LAB

L	T	P	C
0	0	2	1

LIST OF EXPERIMENTS

1. Magnetic Hysteresis loss - Using CRO
2. Band gap using four probe method
3. Hall effect- determination of carrier density, Hall coefficient and mobility
4. Solar cell characteristics
5. Double refraction – measurement of principle refractive indices.
6. Measurement of N.A & Attenuation
7. Measurement of e/m of electron – Thomson's experiment
8. Determination of Planck's constant
9. Measurement of electron charge – Milliken oil drop experiment
10. Determination of Magnetic Field along the axis of the coil
11. Newton's rings
12. Laurent's Half shade polarimeter –determination of specific rotatory power
13. Study of P-N junction
14. Study of voltage-current characteristics of a Zener diode.
15. Laser – measurement of angle of divergence & determination of λ using grating
16. Measurement of Magnetic susceptibility- Quincke's Method / Gouy's balance.
17. Mapping of magnetic field

NOTE: Any 8 experiments have to be done.

Reference:

1. *Experiments in Engineering physics*, Avadhanulu, Dani and Pokley, S. Chand & Company ltd (2002).

2. *Experiments in Modern Physics*, A.C. Melissinos, J. Napolitano, Academic Press (2003)

3. *Practical physics*, S.L. Gupta and V. Kumar, Pragathi Prakash (2005)

CY1094: Chemistry Laboratory

L	T	P	C
0	0	2	1

Pre-requisites: Nil

Total Hours: 28

Potentiometric and conductometric titrations, complexometric and iodimetric estimations, polarimetry, determination of pH, single step organic / inorganic preparations, colorimetry, determination of eutectic point.

References:

1. G.H Jeffery, J Bassett, J Mendham, R.C Denny, *Vogel's Text Book of Quantitative Chemical Analysis*, Longmann Scientific and Technical, John Wiley, New York.

2. J.B Yadav, *Advanced Practical Physical Chemistry*, Goel Publishing House, 2001.

3. A.I Vogel, A.R Tatchell, B.S Furnis, A.J Hannaford, P.W.G Smith, *Vogel's Text Book of Practical Organic Chemistry*, Longman and Scientific Technical, New York, 1989.

CIVIL ENGINEERING WORKSHOP (Part of ZZ1091 Workshop Practice I)

L	T	P	C
0	0	3	2

Introduction to Construction Materials: Cement, sand, coarse aggregate, structural steel, brick, timber, concrete – methods of testing **(3 hours)**

Masonry: English bond – Flemish bond –wall –junction – one brick – one and a half brick - Arch construction. **(6 hours)**

Plumbing: Study of water supply and sanitary fittings—water supply pipe fitting –tap connections - sanitary fittings. **(3 hours)**

Surveying: Introduction to land surveying and linear measurements; Introduction to leveling. **(9 hours)**

There will be an evaluation in the last week which will be in the form of a *written test.*

Total duration of the work shop – 24 hours (3×7 = 21 hours (lab work) + 3 hours test).

ZZU1091 WORKSHOP PRACTICE I

L	T	P	C
0	0	3	2

Electrical & Electronics Engineering Workshop (4 weeks)

Four exercises from the following list of Exercises are to be carried out.

1. a. Familiarization of wiring tools, lighting and wiring accessories, various types of wiring systems.
   b. Wiring of one lamp controlled by one switch.

2. a. Study of Electric shock phenomenon, precautions, preventions; Earthing
   b. Wiring of one lamp controlled by two SPDT Switch and one 3 pin plug socket independently.
3. a. Familiarization of types of Fuse, MCB, ELCB etc.

   b. Wiring of fluorescent lamp controlled by one switch from panel with ELCB & MCB.

4. a. Study of estimation and costing of wiring
   b. Domestic appliance – Wiring, Control and maintenance: Mixer machine, Electric Iron, fan motor, pump motor, Battery etc.

5. a. Familiarization of electronic components colour code , multimeters.

   b. Bread board assembling - Common emitter amplifier

6. a. Study of soldering components, solders, tools, heat sink.

   b. Bread board assembling – phase shift oscillator

7. a. Soldering practice - Common emitter amplifier

   b. Soldering practice - Inverting amplifier circuit

8. a. Study of estimation and costing of soldering –PCB: 3 phase connections
   b. Domestic appliances – Wiring PCB, control, Identification of fault: Electronic Ballast, fan regulator, inverter, UPS etc.

Reference:

1. K B Raina & S K Bhattacharya: Electrical Design Estimating and costing, New Age International Publishers, New Delhi, 2005

Uppal S. L., Electrical Wiring & Estimating, Khanna Publishers---5th edition, 2003

2. John H. Watt, Terrell Croft :American Electricians' Handbook: A Reference Book for the Practical Electrical Man - McGraw-Hill, 2002

3. G. Randy Slone - Tab Electronics Guide to Understanding Electricity and Electronics, McGrawHill, 2000

4. Jerry C Whitaker - The Resource Handbook of Electronics, CRC Press-2001

ZZU1092 WORKSHOP PRACTICE II

L	T	P	C
0	0	3	2

Electrical & Electronics Engineering Workshop (4 weeks)

Four exercises from the following list of Exercises are to be carried out.

1. a. Familiarization of wiring tools, lighting and wiring accessories, various types of wiring systems.
   b. Wiring of one lamp controlled by one switch.

2. a. Study of Electric shock phenomenon, precautions, preventions; Earthing
   b. Wiring of one lamp controlled by two SPDT Switch and one 3 pin plug socket independently.

3. a. Familiarization of types of Fuse, MCB, ELCB etc.

   b. Wiring of fluorescent lamp controlled by one switch from panel with ELCB & MCB.

4. a. Study of estimation and costing of wiring
   b. Domestic appliance – Wiring, Control and maintenance: Mixer machine, Electric Iron, fan motor, pump motor, Battery etc.

5. a. Familiarization of electronic components colour code , multimeters.

   b. Bread board assembling - Common emitter amplifier

6. a. Study of soldering components, solders, tools, heat sink.

   b. Bread board assembling – phase shift oscillator

7. a. Soldering practice - Common emitter amplifier

   b. Soldering practice - Inverting amplifier circuit

8. a. Study of estimation and costing of soldering –PCB: 3 phase connections
   b. Domestic appliances – Wiring PCB, control, Identification of fault: Electronic Ballast, fan regulator, inverter, UPS etc.

Reference:

1. K B Raina & S K Bhattacharya: Electrical Design Estimating and costing, New Age International Publishers, New Delhi, 2005

Uppal S. L., Electrical Wiring & Estimating, Khanna Publishers---5th edition, 2003

2. John H. Watt, Terrell Croft :American Electricians' Handbook: A Reference Book for the Practical Electrical Man - McGraw-Hill, 2002

3. G. Randy Slone - Tab Electronics Guide to Understanding Electricity and Electronics, McGrawHill, 2000

4. Jerry C Whitaker - The Resource Handbook of Electronics, CRC Press-2001

ZZ1092 WORKSHOP PRACTICE II

(Eight classes of 3 hour duration each)

L	T	P	C
-	-	3	2

The course is intended to expose the student to the manufacturing processes through hands on training in the sections of Central Workshop. After the course, the student acquires the skill in using various tools, measuring devices, and learns the properties of different materials at varying conditions.

1) Carpentry: Study of tools and joints – plaining, chiseling, marking and sawing practice, one typical joint- Tee halving/Mortise and Tenon/ Dovetail

2) Fitting: Study of tools- chipping, filing, cutting, drilling, tapping, about male and female joints, stepped joints- one simple exercise of single V joint for welding exercise.

3) Welding: Study of arc and gas welding, accessories, joint preparation, Exercise of a single V joint

4) Smithy: Study of tools, forging of square or hexagonal prism/ chisel/bolt

5) Foundry: Study of tools, sand preparation, moulding practice.

6) Sheet Metal work: Study of tools, selection of different gauge sheets, types of joints, fabrication of a tray or a funnel

7) Plumbing Practice: Study of tools, study of pipe fittings, pipe joints, cutting, and threading

8) Lathe Exercise: Study of the basic lathe operations, a simple step turning exercise.

References

1) Chapman W.A.J., Workshop Technology. Parts 1 & 2, 4th Edition, Viva Books P. Ltd., New Delhi, 2002

2) Hajra Choudhury.Workshop Technology Vol 1 & 2, Media Promoters & Publishers P.Ltd, Bombay, 2004

3) Welding Handbook. Miami, American Welding Society, 2000

4) Metals Handbook. Vol 6, Welding, Brazing & Soldering. Metals Park, Ohio, American Society of Metals, 1998

5) Serope Kalpakjian. Manufacturing Engineering & Technology. Pearson Steven R. Schmid Education (Asia) Inc., Delhi, 2002.

6) Anderson J., Shop Theory. Tata McGraw Hill, New Delhi, 2002

7) Olson D.W., Wood and Wood working. Prentice Hall India. 1992

8) Douglass J.H., Wood Working with Machines. McKnight &McKnight Pub. Co. Illinois, 1995

9) Tuplin W.A., Modern Engineering Workshop Practice Odhams Press, 1996

10) P.L. Jain. Principles of Foundry Technology. 4th Edition, Tata McGraw Hill, 2008.

11) R.K.Singal, Mridul Singal, Rishi Sringal. Basic Mechanical Engineering. 2007

CH1001 INTRODUCTION TO CHEMICAL ENGINEERING

L	T	P	C
2	0	0	2

Module 1 8 hours

Definition, Origins and Development of the Chemical Process Industry. The Present Day Chemical Industry, The systematic Analysis of Chemical, Processes, Representation of a Chemical Process in terms of Flow sheet. Scale of Chemical Processes.

Module 2 6 hours

Definition, Origin and History of Chemical Engineering. Functions of a Chemical Engineer. Professional and General Aspects of Chemical Engineering. Difference in Chemical Engineering Science & Technology.

Module 3 8 hours

Brief description of important Chemical Industries in terms of Unit Operations and Unit Processes. Analyses of Flow Charts in terms of Chemical Engineering subjects. Measuring Techniques, Devices and Control in Process Industries. Pollution and its Abatement.

Module 4 6 hours

Conceptual Developments in Chemical Engineering and the associated persons. The use of Mathematics and Computers in Chemical Engineering. Future challenges in Chemical Engineering.

REFERENCES

1. Bhatt B.I., Vora S.M, Stoichiometry. 3rd Edition. Tata MCGraw-Hill,1977
2. S.K Ghosal, S.K. Sanyal and Dutta.S, Introduction to Chemical Engineering TMH Publications, 1998.
3. W.L Badger and J.T Banchero, Introduction to Chemical Engineering McGraw-Hill Edition.
4. George T Austin, Shreve's Chemical Process Industries-International Student Edition, 5th Edn., McGraw Hill Inc., 1985.
5. Gopal Rao, R. and Sittig, M., Dryden's Outlines of Chemical Technology, 3rd Edn., Affiliated East-West Publishers, 1997
6. Richard M Felder, Ronald W Rousseau, Elementary Principles of Chemical Processes, 3rd Edn., Wiley Publishers.
7. Jacob A Moulijn, Michiel Makkee, Annelies Van Diepen, Chemical Process Technology, Wiley Publishers.

EC1001 INTRODUCTION TO ELECTRONICS ENGINEERING

L	T	P	C
2	0	0	2

Module 1: Basics of Electronics: Semiconductors, Band structure of Silicon, doping, PN junctions, MOSFET, simple inverter configurations, large scale integration concepts.

[7 hours]

Module 2: Signal Processing basics: Filtering, sampling, simple analog and digital filter configurations.

[7 hours]

Module 3: Communication basics: Signals and noise, ideas of AM and FM, PCM, noise immunity.

[7 hours]

Module 4: Basics of linear circuit design: Transfer function, speed and bandwidth, superposition of signals and noise, signal-to-noise ratio.

[7 hours]

Reference:

1. Millman & Halkias: Electronic Devices & Circuits, MGH, 2007
2. George Kennedy: Electronic Communication Systems, MGH, 1992
3. B P Lathi: Signal Processing & Linear Systems, Oxford University Press, 2000

BT1001 INTRODUCTION TO LIFE SCIENCES

L	T	P	C
2	0	0	2

Prerequisite: Nil

Module 1 (07 hours)

Origin and evolution of life, Theories for origin of life-Primordial soup theory, Miller-Urey experiment, Biogenesis and Louis Pasteur, Darwinian selection, Oparin-Haldane hypothesis.

Module 2 (08 hours)

Diversity of life, Prokaryotic and eukaryotic cells, Functions of different organelles in the cells, Mitosis and Meiosis, Classical genetics, Mendel's laws of inheritance-Law of segregation and law of independent assortment.

Module 3 (07 hours)

Structure of biomolecules-Deoxyribonucleic acid, Ribonucleic acid, Carbohydrates, Lipids, Proteins, Functions of biomolecules, Metabolism, Photosynthesis, Molecular genetics,

Module 4 (06 hours)

Membrane biology, Cell signaling and transport system, Developmental biology, Cell differentiation, Embryonal development, Regeneration, Techniques in cell and molecular biology.

a) Text Books

1. D. L. Nelson and M. M. Cox, Lehninger Principles of Biochemistry, 4th Edn, WH Freeman and Company, 2005.
2. J.M. Berg, J.L. Tymoczko, and L. Stryer, Biochemistry, 6th Edn., WH Freeman and Company, 2007.
3. B. Alberts, A. Johnson, J. Lewis, and M. Raff, Molecular Biology of the Cell, 5th Edn., Garland Science, 2008.

b) References

1. M.J. Pelczar, E.C.S. Chan, and N.R. Krieg, Microbiology, 5th Edn., McGraw-Hill, 2007.
2. H. Lodish, A. Berk, C. A. Kaiser, and M. Krieger, Molecular Cell Biology, 6th Edn., W. H. Freeman, 2007.
3. S. F. Gilbert, Developmental Biology, 9th Edn., Sinauer Associates, Inc., 2010

EE1001 INTRODUCTION TO ELECTRICAL ENGINEERING

Pre-requisites: None

L	T	P	C
2	0	0	2

Module 1 : Introduction to Electrical Engineering (7 hrs)

Introduction to Engineering Profession, History of EE and milestones, Professional ethics, Professional organisations in the field of EE, about standards and certification of EE equipment and concerned organisations in the country, codes of practice in EE.

Structure and components of an Electrical Energy System – Generation, Transmission, Distribution and Utilisation overview – DC power versus AC power – DC transmission versus AC transmission – common voltage levels – major components of residential , commercial and industrial loads – guaranteed voltage and frequency values – Tariff structures – study of tariff structure of local Electrical utility (KSEB)

Brief introduction to various renewable energy sources

Module 2 : Batteries and Battery Charging (5 hrs)

Principle of operation of Lead-acid Batteries, AH rating, available capacity at different discharge rates, types of lead-acid batteries, different factors that affect battery life, abnormal conditions during charging and discharging, high discharge versus deep discharge, desirable charging profile, energy efficiency, float voltage, trickle charge current, need to avoid over-charging, constant current – constant voltage charging algorithm.

Different ways to charge a Lead-acid battery : (i) Capacitor + diode system (ii) full-wave or full-bridge rectifier with ac side choke (iii) full-wave or full-bridge rectifier with dc side resistor – qualitative description of more precise battery charging systems.

Areas of application of Lead-acid batteries and application requirements – in UPS, DG Sets cranking, Automobiles, Emergency lamps, Solar Power Systems etc.

Ni-Cd batteries and their charging, Lithium batteries and charging.

Module 3 : Analysis of Circuits with Dependent Sources (8 hrs)

Linear Dependent sources : VCVS, VCCS, CCVS and CCCS - node analysis and mesh analysis of circuits containing resistors, independent sources and linear dependent sources - effect of dependent sources on the symmetry of nodal admittance matrix and mesh impedance matrix - determination of Thevenin's and Norton's equivalent for circuits containing dependent sources

Dependent source equivalent circuits for coupled coils – a.c steady-state analyis of circuits containing coupled coils – the perfectly coupled two-winding transformer and the ideal two- winding transformer

Module 4 : Study of three-phase balanced and unbalanced circuits (8 hrs)

Thevenin's Theorem, Norton's Theorem and Maximum Power Transfer Theorem for a.c circuits - Polyphase working - 3 phase a.c systems - balanced system - phase sequence - Star Delta Transformation Theorem - Balanced 3 phase a.c source supplying balanced 3 phase star connected and delta connected loads - Three phase loads with mutual coupling between phases - 3 wire and 4 wire systems - neutral shift - neutral current - active power, reactive power, complex power, apparent power and power factor in balanced and unbalanced three phase systems -Measurement of Power in Balanced and Unbalanced Systems.

(a) Text books :

1. 'Rechargeable Batteries Applications Handbook', Technical Marketing Staff of Gates Energy Products, BPB Publications, 1994
2. 'Electric Circuits & Networks' , Suresh Kumar K.S, Pearson Education, 2009
3. 'Engineering Circuit Analysis', Hayt & Kemmerly, 6th Edition, TMH, 2003

(b) Reference :

National Electrical Code, ISI, 1985

ME1001 - Introduction to Mechanical Engineering

L	T	P	C
2	-	-	2

1) General Introduction (Engineering, ingeniere-ingenious, Mechanical Engg profession, Historical aspects, Overview of curriculum)
2) a) Creativity and Problem Solving skills (Levels of thinking, intelligence & creativity, invention & innovation, Basic steps in problem formulation & solving, Units and significant digits).

   b) Communication Skills (Oral, written and graphical communication, Presentation skills)
3) Role of Mathematics (Applications in Mechanical Engg., Concepts from algebra, calculus, vector analysis, statistics etc.)
4) Mechanics in Mechanical Engineering (Overview, salient features of various mechanics courses, basics of forces and kinematic parameters)
5) Materials and Stresses (Fundamental properties, classifications, applications, simple problems).
6) Motion and Power transmission (Kinematics and dynamics of machinery, power transmission elements, concepts from friction and wear)
7) Fluids Engineering (fluid mechanics – basics & historical aspects, hydraulic machines, advanced topics like gas dynamics)
8) Thermodynamics and Heat Transfer (Basic principles, significance of thermodynamics in Mechanical Engg., relationship with mechanics subjects, modes of heat transfer)
9) Thermal Engineering and Energy Systems (Historical aspects, Internal and external combustion engines, gas turbines, heating, ventilation and air-conditioning, power plants, energy conservation)
10) Manufacturing Processes (Basic processes like machining, casting, forging etc.)
11) Manufacturing Systems (Machine tools, Production systems, advanced systems like CNC, robots, assembly lines etc.)
12) Mechanical Design (Basic steps in design, material selection, design for manufacturability etc.)
13) Industrial Engineering and Principles of Management (Work study, optimization, software tools, interesting problems transportation planning, job sequencing etc., basic concepts of management)

References

1) An Introduction to Mechanical Engineering, J. Wickert, Cengage Learning, 2nd Edn., 2006

2) Engineering Basics, Saeed Moaveni, Cengage Learning.

Comments

1. The intended purpose of this course is to give an overview, introduce and motivate the students towards Mechanical Engineering.
2. A main purpose of the course is to give the clear inter-relationship with various courses in Mechanical Engg., and even with courses of other branches of engineering.
3. The course contains a set of 13 lectures (of 2 hour duration each), as given in the syllabus above. The guideline for contents is given with each lecture, while the detailed list of topics will be decided by the lecturer.
4. Preferably, each lecture should be given by a different faculty member. A faculty member should never give lecture on more than two topics, as it is important for the students to get various perspectives, and also each topic should be handled by a faculty member specialized in that area.
5. It is suggested that the lectures should not be made completely descriptive, and assignments should be given as part of each lecture.
6. The evaluation can be completely based on a final examination (end semester examination), where there shall be one question of 10 marks from each topic. Students shall have the option of answering any 10 questions. The faculty member, who handled a specific topic will be responsible for setting the question from that topic and valuing the answer to that question, for all students.

L	T	P	C
2	0	0	2

CE1001 INTRODUCTION TO CIVIL ENGINEERING

Prerequisite: Nil

Objective: *The Course is primarily meant to provide an overall introduction to Civil Engineering Profession and to cover broadly the various disciplines of Civil Engineering programme. The course will be delivered by faculty of the department drawn from different areas of Civil Engineering.*

Module 1(7 hours)

General introduction to Civil Engineering, various disciplines of civil engineering and its relevance to overall infra-structural development of the country.(1hour)

Topics to be covered are:

(1) Building Technology (2 hours)

(2) Material Engineering (2 hours)

(3) Surveying (2 hours)

Module 2 (7 hours)

(4) Structural Engineering (1) (2 hours)

(5) Structural Engineering (2) (2 hours)

(6) Geotechnical Engineering and Foundation Engineering (3 hours)

Module 3 (7 hours)

(7) Environmental Engineering (2 hours)

(8) Transportation Engineering (2 hours)

(9) Hydrology & Water Resources Engineering (3 hours)

Module 4 (7 hours)

(10) Construction Engineering and Management (2 hours)

(11) Earthquake Engineering (2 hours)

(12) Offshore Engineering & Coastal Engineering (3 hours)

NOTE:

The overall guideline for the delivery of the topics is:

Introduction, subsections, relevance, various systems, basic principles underlying the systems, the role of civil engineers, current trends.

CS1001 FOUNDATIONS OF COMPUTING

Pre-requisite: NIL

L	T	P	C
2	0	0	2

Module 1 : Logic (7 hours)

Propositional logic, implications and inference, equivalence, truth tables. Normal forms. duality, minimization. logic gates and combinational Circuit design, Introduction to first order logic.

Module 2 : Sets and Relational structures (7 hours)
Sets, relations, functions, transitive closures, partial order, lattices, boolean lattices, boolean algebras.

Module 3 Proof Techniques and Recursion (7 hours)
Methods of proof using Induction, deduction proofs and contradiction. Recursion and recursive definitions.
Writing recursive programs.

Module 4 Graphs: (7 hours)
Basic definitions, trees, paths, cycles and elementary properties.

References:

1. E. Mendelson, Shaum's outline on boolean algebra and switching circuits, McGraw Hill, 1970.
2. B. Kolman, R. Busby, R. C. Ross, Discrete Mathematics, Pearson (6/e), 2008.

PH 1002 INTRODUCTION TO ENGINEERING PHYSICS PROFESSION

L	T	P	C
2	0	0	2

Module 1 (8 Hours)

Understanding engineering: The engineering profession, what it means to be an engineer. Examining topics, communicating information to others. Traditional problem and engineering solution integration based on fundamental sciences. Correctly applying the course material to new situations. Relationship of engineering to the environment. Engineering challenges; engineering employment; engineering education; creativity; design and development. Salaries and other rewards. Professional registration, and practical engineering issues.

Module 2 (10 Hours)

Engineering physics: Course description. Understanding the science behind a problem. Physics and Engineering physics. How Engineering Physics is linked to other fields. The need for Multidisciplinary approach. The Engineering Physics profession .How Engineering Physics is structured and what engineering physicist do at different levels. Combining Know-how with Know why. Contents of Engineering Physics. Career opportunities. Higher studies. Project implementation and research.

Module 3 (4 Hours)

Course & Instructor Policies: Assignments, attendance, examination rules and evaluation. Grades and credits., Make – up exams. Student Grievance Procedures.

Module 4 (6 Hours)

Academic Integrity: Students ethics: ethical responsibility and team-work dynamics. Standards of conduct. Scholastic dishonesty. Plagiarism. Copy right and fair use.. professional obligations to protect the public's health, safety, and welfare. Engineering societies; intellectual property; and product liability. Codes of ethics, and guidelines for professional employment.

Text Books

1. John Dustin Kemper, Introduction to the Engineering Profession, Oxford University Press (1996)
2. W. Lionel Craver, Darrell C. Schroder and Anthony J. Tarquin, Introduction to Engineering (1996)