CY101: Engineering Chemistry

L-T-P: (3-1-0) Credit: 04

Module I

Catalysis and Adsorption: Criteria of catalysis, Types of catalysis, Catalytic promoters and catalytic poisons, Negative catalysis and inhibition, Autocatalysis, Theories of catalysis, Homogenous catalysis (Acid-base and Enzyme catalysis), Kinetics of Enzyme catalysis, Catalysis by metal salts–Wilkinson's Catalyst, Heterogeneous catalysis, Types and Theories of adsorption.

Module II

Water: Introduction and Specifications for water, sources of impurities, Hardness, Types and its determination (EDTA method only). Numerical problems on Hardness, Analysis of water – alkalinity, Numerical problems on alkalinity, Dissolved Oxygen, Boiler feed water, boiler problems-scale, sludge, priming and foaming, caustic embrittlerment and corrosion, their causes and prevention, Water softening processes – Lime – Soda process, Zeolite process, Ion exchange Process, Numerical problems on Lime-soda Process. Water for domestic purpose: Sedimentation, Coagulation, Filtration, Disinfection, Chlorination (breakpoint chlorination) Ozonization.

Module III

Fuels: Classification, Characteristics of fuel, Comparison between Solid, liquid and gaseous fuel, Combustion and chemical principles involved in it, Calorific value: gross and net calorific values, Determination by bomb calorimeter and Boy's gas calorimeter. Numericals. Solid Fuels: Coal: Classification, Analysis: Proximate and Ultimate analysis of coal and their importance, Metallurgical coke: Characteristics Types of carbonization process (High and low temperature carbonization.), Manufacture by Otto Hoffman process. Liquid Fuels: Petroleum: its chemical composition and fractional distillation, Cracking of heavy oil residues – thermal and catalytic cracking, Synthetic Petrol: Fischer-Tropsch process and Bergius Process, Knocking and chemical structure, octane number and cetane number and their significance, Gaseous Fuels: Natural gas, artificial gas (water gas, producer gas, coal gas).

Module IV

Polymers: Polymer, Degree of Polymerization, Classification based on, origin, structure, intermolecular forces, tacticity, chemical structure, type of monomer, molecular weight of the different molecules present in the polymer, synthesis), Thermoset and Thermoplast polymer and their applications, Degradation of polymers, Conducting polymer and Biopolymers, Introduction to polymeric composites, Types of composite materials.

Module V

Corrosion and its control: Introduction, Types: Dry, Wet, Galvanic, Pitting, Intergranular, Waterline, Stress, Mechanism of Dry and Wet corrosion, Pilling-Bedworth rule, Galvanic series, Factor influencing corrosion, Corrosion control (protection from corrosion).

Module VI

Miscellaneous materials: Abrasive Natural abrasives, Artificial abrasives, Cement, Classification, Chemical composition of cement, Manufacture of Portland cement, Concrete and RCC, Glasses and ceramics, Manufacture of glass, Types of glass, Paints, Constituents of paint, Formulation of paint, Explosives, Classification, Manufacture of some important explosives {Diazodinitrophenol (DDNP), Trinitrotoluene, Nitroglycerine, RDX }.

Text Books:

1. S.S. Dara, Engineering Chemistry, S. Chand Pvt. Ltd.
2. Jain & Jain, Engineering Chemistry, Dhanpat Rai & Company.

Reference books:

1. J.C. Kuriacose & J. Rajaram, Chemistry in Engineering & Technology (Vol I & II),Tata McGraw Hill.
2. V.R.Gowarikar, V.Viswanatha, Jayadev sreedhar, Polymer Science, Wiley.
3. G. T. Austin, Shreve's Chemical Process Industries, Tata McGraw Hill.
4. H.D. Gesser, Applied Chemistry, Springer.

MA101: Mathematics I

L-T-P: (3-1-0) Credit: 04

Module I

Differential Calculus I: Leibnitz theorem, Partial differentiation, Euler's theorem, Curve tracing, Change of variables, Expansion of functions of several variables.

Module II

Differential Calculus II: Jacobians, Approximation of errors, Extrema of functions of several variables, Lagrange's method of multipliers (Simple applications).

Module III

Matrices: Elementary row and column transformations Rank of a matrix, Linear Dependence/Independence of vectors, Consistency of linear system of equations and their solutions, Characteristic equations, Caley-Hamilton theorem, Eigen values and Eigen vectors, Diagonalisation, Complex and unitary matrices, Application of matrices to engineering problems.

Module IV

Multiple Integrals: Double and triple integrals, Change of order, Change of variables, Beta and Gamma functions, Application to area, volume, Dirichlet integral and applications.

Module V

Vector Calculus: Point function, Gradient, divergence and curl of a vector and their physical interpretations, Line, surface and volume integrals, Statement and problems of Green's, Stoke's and Gauss divergence theorems (without proof).

Test Books:

1. G. B., Thomas & R. L. Finney, Calculus and Analytical Gemetry, Pearson Education Asia, 2000.
2. E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2005.

Reference Books:

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2005.
2. C. Ray Wylie & Louis C. Barrett, Advanced Engineering Mathematics, Tata McGraw-Hill Publishing Company Ltd. 2003
3. Peter V. O'Neil, Advanced Engineering Mathematics, Thomson (Cengage) Learning, 2007.
4. James Stewart, Calculus, Cengage Learning, Sixth Edition.
5. R. K. Jain & S. R. K. Iyenger, Advance Engineering Mathematics, Narosa Publishing House, 2002.
6. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Ltd., 2008.

CE101: Engineering Mechanics

L-T-P: (2-1-0) Credits: 03

Module I

Statics: Introduction to Engineering Mechanics, Units and Dimension, Basic Mechanics, Law of mechanics, Representation of a Vector.

Module II

Statics of particles: Force, system of forces, Resultant of forces, Equilibrium of particle, Principle of Transmissibility of forces, parallel forces, System of force, moment, moment of force, moment of force about line, Equilibrium of three forces in a plane, Varignon's theorem of moments, Couple.

Module III

Rigid body Equilibrium: Free body diagram, condition of equilibrium of rigid body in two dimensions, Type of beams, loads, supports, determination of support reactions, Lami's theorem.

Module IV

Structure of Equilibrium: Truss and Method of joints, Truss and method of sections.

Module V

Centroid and centre of mass: Centroids of composite plane figures and curves, Pappus-Guldinus Theorem, Center of gravity, moment of inertia, parallel axis theorem, perpendicular axis theorem, mass moment of inertia.

Module VI

Friction: Classification of friction, Laws of friction, Coefficient of friction, Limiting friction, Angle of Repose, Wedge Friction, Belt Friction.

Module VII

Kinematics of particles: Position, velocity, Acceleration, Curvilinear motion, Relative Motion.

Module VIII

Kinetics of particles: Equations of motion of rigid body in plane, D'Alembert's principle.

Text Books:

1. Stephan Timoshenko and D. Young, Engineering Mechanics, Tata McGraw Hill.
2. Ferdinand Singer, Engineering Mechanics, McGrawHill.

Reference Books:

1. Ferdinand P Beer & R. R. Johnson (Jr.), Mechanics for Engineers, McGraw Hill.
2. J. L. Mariam & L. G. Kraige, Engineering Mechanics (Vol. I & II), John Wiley & Sons.
3. Basudeb Bhattacharyya, Engineering Mechanics, Oxford University Press.
4. R. K. Bansal, A Text Book of Engineering Mechanics, Laxmi Publishers.
5. David Kleppner and Robert Kolenkow, An Introduction to Mechanics, Tata McGraw. Hill.
6. L. H. Shames, Engineering Mechanics, Prentice Hall India.

CS101: Computer Programming - I

L-T-P: (2-0-0) Credit: 02

Module I

Introduction to Computer: Definition, Characteristic, Generation of Computers, Basic Components of a Computer System, Memory, Input, Output and Storage units, Hard Copy Devices, High level language and Low level language, Software, System Software, Application software, Hardware, Firmware, Compiler, Interpreter and Assembler.

Module II

Introduction to Programming Concept: Introduction to algorithm and Flow chart, Representation of an algorithm using Flow chart symbols, Pseudo code, Basic algorithm design, characteristics of good algorithm, developing algorithms.

Module III

Introduction to C Programming Language: Declaring Variables, Preprocessor Statements, Arithmetic Operations, Programming Style, Keyboard Input, Relation Operators, features of C language, concepts, uses, Basic program structure, Simple data types, variables, constants, operators, comments, Control Flow statements: If, while, for, do-while, switch.

Module IV

User defined Data types, arrays, declaration and operations on arrays, Structure, Member accessing, Structure and Union, Array of Structures, Functions, declaration and usages of functions, parameter passing, Dynamic Memory Allocation.

Module V

Fundamentals of pointers: Declaration and usages of pointers, operations that can be performed on computers, use of pointers in programming exercises, parameter passing in pointers, Call by value, Call by references.

Module VI

Introduction to LINUX: LINUX structure, Directory, LINUX commands.

Text Books:

1. C Programming by Herbert Shield. Pu
2. ANSI C by Balaguruswami.

Reference Books:

1. “C” programming by Dennis Ritchie.
2. The C Puzzle Book by Alan R. Feuer.
3. Expert C Programming by Peter van der Linden.
4. Introduction to UNIX: Sumitabaha Das.
5. C: A Reference Manual (5^{th} Edition) by Samuel P. Harbison & Samuel P. Harbison.
6. Programming Using the C Language by Hutchison, R.C, McGraw Hill, New York.

EC101: Basic Electronics

L-T-P: (2-0-0) Credits: 02

Module I

Basic Electronics Concepts: Signals, Frequency Spectrum, Analogue and Digital Signals, ICs. Intrinsic Semiconductor Materials, Energy levels, valence band and conduction band, mobility, conductivity, n-and p-type semiconductors, Concept of hole, majority and minority carriers, mechanism of current flow in n and p type semiconductors.

Module II

Semiconductor Diode: p-n junction, Forward and reverse bias condition, V-I characteristic, Diode equation, Zener region and avlanche breakdown, concept of AC and DC resistance, Simplified equivalent circuits of a Diode, diode specification sheets, Application of Diode as rectifier, Clamper, Clipper and Detector.

Module III

Bipolar Junction Transistors: Transistor operation; Common Emitter, common base and Common collector transistors, V-I Characteristics of transistors, Biasing, Load line analysis, Transistor testing.

Module IV

Field Effect Transistors: Structure and Principle of operation of the enhancement and Depletion MOSFETS. V-I characteristics, DC – Biasing, Load – line, Small Signal Equivalent Circuit Model, Basic Configuration of Single Stage, MOS amplifier, CMOS common source and common drain amplifiers analysis, CMOS digital, logic inverter, Voltage transfer characteristics, Current flow and power dissipation in a transistor amplifier.

Module V

Amplifiers and Oscillators: Concept of amplification, circuit and functioning of single stage transistor amplifier, Applications of amplifier, concept of feedback, types of feedback, advantages of negative feedback, Barkhausen criterion of oscillation, amplifier as oscillator, other types of oscillator, Crystal oscillator.

Module VI

Displays: Seven segment display, Fourteen segment display and dot matrix display. LED Display: Introduction, Construction, Advantage of LEDs in electronic display, LCD Display; Introduction, Types of LCD Display, Dynamic scattering and field effect type, Types of liquid crystal cells, Transmitting type and reflective type; Advantage and disadvantage of LCD display common applications.

Text Books:

1. Robert L.Boylestad, Electronic Device Circuit Theory Eight Edition, PHI (Selected portion from chapters 1, 2,3,4,8 and 11, 17 and 21).
2. A.S Sedra and Kenneth C.Smith, Microelectronic circuits, Fourth Edition, Oxford University Press (Selected portions of Chapters 1, 2, 5, 8).
3. Thoma L.Floyd, Digital Foundation, 8th Edition Selection potions.

Reference Books:

1. Millman and Halkias, Integrated Electronics Analogue and Digital Circuits and Systems.
2. Donald L. Schilling, Charles Belove, Electronic Circuit: Discrete and Integrated, Mc Graw Hills.
3. Millmann & Halkias, Integrated Electronics, Tata Mc Graw Hills New Delhi.
4. Hughes, Electrical and electronic technology, Pearson Edition.
5. I. J. Nagrath, Electronic Devices and Circuits, PHI New Delhi.
6. Muhammad H. Kashid, Microelectronics Cricuits: Analysis and Design, Cenage Learming.

HU101: English Proficiency

L-T-P: (2-0-0) Credits: 02

Module I

Communication: Definition, Nature & Scope, Verbal/Non verbal Communication, English Proficiency: Functional Grammar, Figures of Speech, Words in context, Expository Writing: Technical vs. Creative Writing.

Module II

Pre-requisites for Effective Communication, Language Skills & Communication, Language Skills: Listening, Speaking, Reading and Writing, Strategies for Effective Listening, Strategies for Effective Speaking, Speaking in public.

Module III

Oral Presentation Skills, Communication in Group, Reading: Skimming and Scanning, Strategies for effective Writing, Paragraph, Precise and Expository Writing, Logical Ordering of Ideas and Contents, Pragmatics.

Module IV

Learning through Thematic Texts (10 stories and 10 Essays to be selected).

Text Books:

1. Greenbaum, Sidney (1996). Oxford English Grammer. Oxford and New Yark: Oxford University Press.
2. Word for Word, Pointon & Clark, Oxford University Press.

Reference Books:

1. Carter, Ronald, McCarthy, Michael (2006). Cambridge Grammar of English: A Comprehensive Guide. Cambridge University Press.
2. An English Pronouncing Dictionary, Landon: Dent, rpt in facsimile in Jones (2002). 17th edn, P. Roach, J. Hartman and J. Setter (eds), Cambridge: CUP, 2006.
3. Oxford Guide to Effective Writing and Speaking, Oxford.

SS101: Human Values and Buddhist Ethics

L-T-P: (2-0-0) Credits: 02

Module I

Introduction: Understanding value system: concept and process, Basic human aspirations: strive for happiness and prosperity, harmony in self / family and society.

Module II

Basic concepts about society: Society and community: meaning and characteristics, study of society for human development, Socialization: Concept, agent and personality development, Individual and society, social norms and individual behavior.

Module III

Understanding self Social Institutions: Family, marriage kinship, Culture: Meaning, characteristics, function, Social attitude, prejudices, stereotypes and social perception, Motivation: meaning, concept. Social motive and achievement motivation.

Module IV

Buddhist Concept and Teaching: Buddhist concept and naturalistic view, Buddhist Teaching the three Characteristics, the five aggregates, Dependent Arising, Karma and Rebirth, The Wheel of Life, The Four Noble Truths, The Eight Fold Path, The Six Paramitas (Excellence in Moral Expression), Buddhist ethics and foundation of morality.

Module V

Modern Buddhism: Understanding Buddhist Epistemology, Holism and Justification for Ethical Holism, Modern Buddhism in Asia and Indian Society.

Reference books:

1. Gaur RR, Sangal R, Bagaria GP (2010). A foundation course in Human Values and Professional Ethics, Excel Books, New Delhi
2. Sankar Rao CN (2008). An introduction to Sociology.
3. Gerald F Gaus (1990). Values and Justification. The foundation of Liberal theory. Cambridge University Press.
4. Mohapatra, P.K. (2008). Ethics and Society. An Essay in Applied Ethics.
5. Sharma A & Malhotra D (2007). Personality and Social Norms.
6. Prasad, Hari Shankar. The centrality of Ethics in Buddhism: Exploratory Essays. Motilal Banarsidas Publication, Delhi, 2007
7. Mitchell, Donald W. Buddhism: Interoducing the Buddhist Experience. Oxford University Press, 2008
8. Hanh, Thich Nhat. The Heart of Buddha Teaching. The Random House Group Limited Reg. No. 954009

CY103: Chemistry Lab

L-T-P: (0-0-2) Credit: 01

List of Experiments

1. To determine the alkalinity of the water sample.
2. To determine the amount of Sodium Carbonate in the given mixture of Sodium Carbonate and Sodium Bicarbonate
3. To determine NaOH and Na_2CO_3 in the given alkali mixture solution.
4. To determine the strength of calcium in the given $CaCO_3$ solution by complexometric titrations
5. To determine the strength of magnesium in the given $MgSO_4$ solution by complexometric titrations .
6. To estimate the amount of nickel present in the given solution of nickel sulphate by using EDTA murexide indicator
7. To determine the of dissolved Oxygen in given sample of water.
8. To determine the total residual chlorine in the given water sample.
9. Determine the TDS (Total dissolved Solid) of given water sample.
10. Determine the amount of Cu in the copper sulphate solution provided 0.1N sodium thiosulphate solution
11. To estimate the total iron in an iron alloy
12. Determine the strength in grams per litre of a given $AgNO_3$ solution by Mohr's method
13. Determine the cell constant of a conductivity cell and Titration of strong acid/strong base conduct metrically
14. Preparation of urea-formaldehyde resin
15. Preparation of phenol-formaldehyde resin

Reference Books :

1. Lab Manual by School of Engineering
2. Applied Chemistry: Theory and Practice by O.P. Vermani and A.K. Narula
3. Vogel's Textbook of Quatitative Chemical Analysis, Revised by G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denney.
4. Laboratory Manual on Engg. Chemistry by S.K. Bhasin and Sudha Rani.

CE103: Engineering Graphics

L-T-P: (0-0-3) Credits: 02

Module I

Computer aided drafting (CAD), basic fundamental of CAD tool, Basic object construction, Introduction to drawing IS Code.

Module II

Engineering curves, Orthographic projections, Computer aided drafting of Engineering curves and orthographic projections, Dimensioning.

Module III

Sectional views, Sectioning through CAD; Projection on Auxiliary planes through CAD; Development and Intersection of surfaces through CAD.

Module IV

Pictorial drawings, Isometric pictorial drawings through CAD, Tolerancing, Tolerancing in CAD, Threads and Fasteners, Assembly Drawings, Creating assembly drawings through CAD.

Text Books:

1. N. D. Bhatt, Introduction to Engineering Drawing, Charotar Publishing House.
2. T. Jeyapoovan, Engineering Graphics using AutoCAD, Vikas Publishing House.
3. D. M. Kulkarni, Engineering Graphics With AutoCAD, Prentice-hall of India Pvt Ltd.
4. Pohit, Machine Drawing with AutoCAD, Pearson Education.
5. N. D. Bhatt, Machine drawing, Charotar Publishing house.

Reference Books:

1. James D. Bethune, Engineering Graphics with AUTOCAD, Prentice Hall.
2. Alan Kalameja, AutoCAD Tutor for Engineering Graphics, Autodesk Pr.

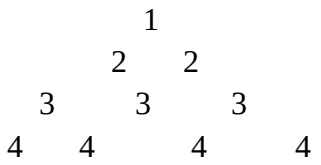
CS103: Computer Programming Lab - I

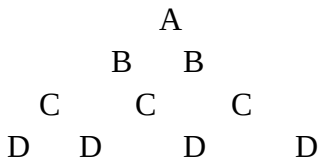
L-T-P: (0-0-3) Credit: 02

List of Programs:

1. Write a C program to reverse a given number, find the sum of digits of the number.
2. Write a C program to concatenate two strings.
3. Write a C program to take marks of a student as input and print the his/her grade bases on following criteria using if – else statements
    a. Marks <40 FAIL
    b. 40<= Marks <59 GOOD
    c. 59 <= Marks < 80 Excellent
    d. 80 <= Marks Outstanding
4. Perform experiment 3 using switch case statement.
5. Write a C program to compute the length of a string using while loop.
6. Write a C program to convert all the lowercase letter to uppercase letter and all uppercase letters to lower case letter given a string as input.
7. Write a C program to compute the roots of a quadratic equation.
8. Write a C program to check whether a given number is prime or not, also check whether it is divisible by a number or not.
9. Write a C program to check whether a given year is leap year or not.
10. Write a C program to take two matrices as input and print the sum of two matrices.
11. Write a C program to display the address of a variable using pointer.
12. Write a C program to compute the length of a string using pointer.
13. Create a structure called STUDENT having name, registration number, class, session as its field. Compute the size of structure STUDENT.
14. Write a C program to check weather a given string is palindrome or not.

15. Write a C program to generate following patterns.





EC103: Basic Electronics Lab

L-T-P: (0-0-2) Credit: 01

List of Experiments:

1. To find equivalent resistance in different combinations (series & parallel) of resistance.
2. To find equivalent capacitance in different combinations (series & parallel) of capacitor.
3. To draw the V-I characteristics of p-n junction diode.
4. To draw the V-I characteristics of Zener diode.
5. To design the half-wave rectifier using a diode.
6. To design the full-wave rectifier using the diodes and also find out peak inverse voltage of diode.
7. To design the full-wave bridge rectifier using the diode and also find the peak inverse voltage of diode
8. To design the regulated power supply using the diodes.
9. To draw the input –output characteristics of transistor in common –base configuration.
10. To draw the input-output characteristics of a transistor in common-emitter configuration.
11. To draw the input-output characteristics of a transistor in common-collector configuration.
12. To design an amplifier through common-base configuration.
13. To design an amplifier through common–emitter configuration.
14. To design an amplifier through common-collector configuration.
15. To design the circuit and understanding the functioning of 7 segment display.