MANONMANIAM SUNDARANAR UNIVERSITY -TIRUNELVELI

UG **PROGRAMMES**

OPEN AND DISTANCE LEARNING (ODL) PROGRAMMES

(FOR THOSE WHO JOINED THE PROGRAMMES FROM THE ACADEMIC YEAR 2023-2024 ONWARDS)

B.Sc. Chemistry

Semester	Course	Title of the Course	Course Code
III	Part I –Languages (Tamil)	தமிழக வரலாறும் பண்பாடும்	J1TL31
	Part II – Languages (English)	General English III	J2EN31
	Core V	General Chemistry-1II	JMCH31
	Core VI	Qualitative Inorganic analysis -Practical	JMCHP3
	Generic Elective -111	Programming Language C	JECS31
	Skill Enhancement –IV	Entrepreneurial skills in Chemistry	JSCH31
	NMC /Substitute Paper	Pesticide Chemistry	JNCH31
	EVS	Environmental Studies (Common)	JEVS31

General Chemistry-III

Unit	Details
I	Gaseous state Kinetic molecular model of a gas: postulates and derivation of the kinetic gas equation; The Maxwell –Boltzmann distribution of speed of molecules-average,root mean square and most probable velocity and average kinetic energy, law of equipartition of energy, degrees of freedom and molecular basis of heat capacities. Collision frequency; collision diameter; meanfree path and viscosity of gases. Real gases: Deviations from ideal gas behaviour, (Andrew's and Amagat's plots); compressibility factor,Z, and its variation with pressure for different gases. Equations of states for real gases –Vander Waal's equation; Virial equation; Boyle temperature; Numerical problems based on equations of states for real gases,isotherms of real gases–critical phenomena–isotherms of CO2 -continuity of state –Vanderwaal'sequation and the critical state; law of corresponding states-liquefaction of gases; numerical problems involving the core concepts.
II	Liquid and Solid State Properties of Liquids-Surface tension, viscosity and their applications. Crystalline and amorphous– differences-geometry, isotropy and anisotropy, melting point; isomorphism, polymorphism. Crystals–size and shape; laws of crystallography; symmetry elements –plane, Centre and axis; Miller indices, unit cells and space lattices; classification of crystal systems; Bravais lattices; X – ray diffraction – Bragg's equation Packing in atomic solids – simple cubic, body centered cubic, face centered and hexagonal close packing; Co-ordination number in typical structures - NaCl, CsCl, ZnS, TiO2; comparison of structure and properties of diamond and graphite; Numerical problems involving coreconcepts Defects in solids- stoichiometric and non-stoichiometric defects. Liquid crystals–classification and applications
III	Nuclear Chemistry Natural radioactivity -α, β and y rays; half-life period; Fajan–Soddy group displacement law; Geiger–Nattal rule; isotopes, isobars, isotones, mirror nuclei, isodiapheres; nuclear isomerism; radioactive decay series; magic numbers; units – Curie, Rutherford, Roentgen; nuclear stability - neutron- proton ratio; binding energy; packing fraction; mass defect. Simple calculations involving mass defect and B.E., decay constant and t1/2and radioactive series. Isotopes – uses – tracers – determination of age of rocks by radiocarbon dating. (Problems to be worked out) Nuclear energy; nuclear fission and fusion–major nuclear reactors in India; radiation hazards, disposal of radioactive waste and safety measures.
IV	Halogen derivatives Aliphatic halogen derivatives Nomenclature and classes of alkyl halides – isomerism, physical properties, Chemical reactions. Nucleophilic substitution reactions – SN1, SN2 and SNimechanisms with stereochemical aspects and effect of solvent. Di,Tri&Tetra Halogen derivatives: Nomenclature, classification, preparation, properties and applications. Aromatic halogen compounds Nomenclature, preparation, properties and uses Mechanism of nucleophilic aromatic substitution–benzyne intermediate. Aryl alkyl halides Nomenclature, benzyl chloride – preparation – properties and uses Alcohols: Nomenclature, classification, preparation, properties, use; conversions–ascent and descent of series; test for hydroxyl groups.Oxidationof diols by per iodic acid and lead tetra acetate.
V	Phenols Nomenclature; classification, Preparation from diazonium salts, cumene, Dow's process, Raching process; properties – acidic character and effect of substitutiononacidity. Reactions–Fries, claisen rearrangement, Electrophilic substitution reactions, Reimer - Teimen, Kolbe, Schmidt, Gatermann synthesis,

	Libermann, nitro reaction, phthalein reaction. Resorcinol, quinol, picric acid – preparation, properties and uses. Aromatic alcohols Nomenclature, benzyl alcohol – methods of preparation – hydrolysis, reduction of benzaldehyde, Cannizzaro reaction, Grignard synthesis, physical properties, reactions – reaction with sodium, phosphorus pentachloride, thionyl chloride, acetic anhydride, hydrogen iodide, oxidation–substitution on the benzene nucleus, uses. Thiols: Nomenclature, structure, preparation and properties.

Recommended Text

1. B.R.Puri, L.R.Sharma, M.S.Pathania; Principles of Physical Chemistry, 46th edition, Vishal Publishing, 2020.
2. B.R. Puri, L.R. Sharma and K.C. Kalia, Principles of Inorganic Chemistry, Milestone Publishers and Distributors, New Delhi, thirtieth edition, 2009.
3. P.L.Soni and Mohan Katyal, Textbook of Inorganic Chemistry, Sultan Chand & amp; Sons, twentieth edition, 2006.
4. M.K.Jain, S.C.Sharma, Modern Organic Chemistry, Vishal Publishing, fourth reprint,2003.
5. S.M. Mukherji, and S.P. Singh, Reaction Mechanism in Organic Chemistry, Macmillan India Ltd., third edition, 1994.

Qualitative Inorganic Analysis - Practical

Semi-Micro Qualitative Analysis
1. Analysis of simple acid radicals: Carbonate, sulphide, sulphate, chloride, bromide, iodide, nitrate 2. Analysis of interfering acid radicals: Fluoride, oxalate, borate, phosphate. 3. Elimination of interfering acid radicals and Identifying the group of basic radicals 4. Analysis of basic radicals (group wise): Lead, copper, bismuth, cadmium, iron, aluminium, arsenic, zinc, manganese, nickel, cobalt, calcium, strontium, barium, magnesium, ammonium. 5. Analysis of a mixture I to VIII containing two cations and two anions – of which one is interfering type.

Text Books
V.Venkateswaran, R.Veera swamy and A.R.Kulandivelu, Basic Principles of Practical Chemistry, Sultan Chand & Sons, New Delhi, second edition, 1997.

Programming Language C with Practical

Unit	Details
I	Introduction – Character set – C Tokens –Keywords and Identifiers – Constants – Variables – Data types. (Chapter 2: Sections - 2.1 to 2.7)
II	Operators: Arithmetic – Relational –Logical – Assignment– Increment and Decrement – Conditional – Bitwise – Special – Precedence of Arithmetic operators – Managing input and output operation: Reading and writing a character – Formatted input and output. (Chapters 3 and 4: Sections - 3.1 to 3.9, 3.12, 4.2 to 4.5)
III	Decision making and branching: Statements: IF, IF … ELSE, Nesting of IF … ELSE, ELSE IF Ladder and Switch statements – The ?:operator – The GOTO statement – Decision making and looping: The WHILE, DO and FOR statements –Jumps in loops. (Chapters 5 & 6: Sections - 5.3 to 5.9, 6.2 to 6.5)
IV	Array: One dimensional and two-dimensional arrays– Declaration, Initialization of arrays – Multidimensional arrays Character arrays and strings:Declaring and initializing string variables – Reading and writing of strings – Stringh and ling functions.(Chapters 7 & 8: Sections 7.1 to 7.7, 8.1 to 8.8)
V	User defined functions: Definition of function –Return values and their types – Function calls – Function declaration – Category of functions – Nesting of functions – Recursion. (Chapter 9: Sections 9.5 to 9.9, 9.15, 9.16)

Recommended Text
E.Balaguruswamy-Programming in ANSIC–Tata McGraw Hill Publishing company limited –III Edition, 2017.

List of Practicals:

1. Programtoprinttheevennumbersfrom1to100.
2. Programtoreadthreevaluesusingscanstatementandprintthefollowingresults:
   a)Sum of the values b)Average of the three values c) Largest of the three
3. Program to read and display the following table of data:

Name	Code	Price
Fan	67831	1234.50
Motor	450	5786.70

The name and code must be left justified and price must be right justified.

4. Program to compute the real roots of a quadratic equation.
5. Program to evaluate the investment equation $V = P\ 1 + r\ n$ and print the tables which would give the value of V for various combination of the following values of P, r and n.

   P : 1000, 2000, . . . ,10000
   r : 0.10,0.11, . . . ,0.20
   n : 1, 2, . . . ,10

6. Program to print all integers that are not divisible byeither2or3andliebetween1 and100and also should account the number of sets integers and print the result.
7. Program to merge two given one dimensional arrays A and B (which are sorted in ascending order) into a single sorted array C which is in ascending order.
8. Programtoreadastringfromthekeyboardanddeterminewhetherthestringisapalindromeor not.
9. Develop a modular interactive program using functions that reads the value of three sides of a triangleanddisplayseitheritsareaoritsperimeteraspertherequestoftheuser.Giventhethree sides a, b and c, perimeter is$a + b + c$ and area is $s(s - a)(s - b)(s - c)$where $s = (a + b + c)/2$.
10. Developyourownfunctionsforperformingfollowingoperationsinstrings.
    a) Copying one string to another
    b) Comparing two stings
    c) Adding a string to the end of another string

Entrepreneurial Skills In Chemistry

Unit	Details
I	**Food Chemistry** Food adulteration – contamination of food items with clay stones, water and toxic chemicals -Common adulterants. Food additives, Natural and synthetic anti-oxidants, glazing agents (hazardous effect), food colour ants, Preservatives, leavening agents, Baking powder and baking soda, yeast, MSG, vinegar. Dyes Classification– Natural, synthetic dyes and their characteristics – basic methods and principles of dyeing.
II	**Hands on Experience (Students can choose any four)** Detection of adulterants in food items like coffee, tea, pepper, chilli powder, turmeric powder, butter, ghee, milk, honey etc., by simple techniques. Preparation of Jam, squash and Jelly, Gulkand, cottage cheese. Preparation of products like candles, soap, detergents, cleaning powder, shampoos, painbalm, toothpaste/ powder and disinfectants in small scale. Extraction of oils from spices and flowers. Testing of water samples using testing kit.Dyeing –cotton fabrics with natural and synthetic dyes Printing–tie and dye, batik.

Recommended Text
1. George S & Muralidharan V, (2007) Fibre to Finished Fabric– A Simple Approach, Publication Division, University of Madras, Chennai. 2. Appaswamy G P, A Handbook on Printing and Dyeing of Textiles.

Pesticide Chemistry

Unit	Details
I	**Introduction**: History of pesticides. Chemistry of Pesticides: Brief introduction to classes of pesticides (Chemical class, targets), structures, chemical names, physical and chemical properties. Toxicity of pesticides: Acute and chronic toxicity in mammals, birds, aquatic species etc. Methods of analysis of pesticides.
II	**Insecticides:** Classification and study of following insecticides with respect to structure, chemical name, physical properties, chemical properties, synthesis, degradation, metabolism, formulations, Mode of action, uses , toxicity. Organophosphates and Phosphothionates: Acephate, Chlorpyriphos, Monocrotophos, and parathion-methyl. Organochlorine – Endosulfan,heptachlor;Carbamate:Cartaphydrochloride,Methomyl,Propoxur.
III	**Pesticides residues:** Introduction- application of agrochemicals, dissemination pathways of pesticides, causes of pesticide residues, remedies. Pesticides residues in atmosphere- entry into atmosphere, action of pesticides, effects on environments. Pesticides residues in water - entry into water systems, action and effect in aquatic environment. Pesticides residues in soil. entry into soil, absorption, retention and transport in soil, effects on microorganism, soil condition and fertility, decomposition and degradation by climatic factors and microorganism.

IV	**Pesticide Residues effect and analysis**: Effects of pesticides residue on human life, birds and animals-routes for exposure to pesticides, action of pesticides on living system. Analysis of pesticides residues- sample preparation, extraction of pesticides residues (soil, water and vegetables/fruits) simple methods and schemes of analysis, multi-residue analysis.
V	**Biopesticides:** Pheromones, attractants, repellents–Introduction, types and application 8- Dodecen-1-ol, 10-cis-12-hexadecadienoic, Trimedlure, Cuelure, methyl eugenol, N,N- Diethyl-m-toluamide, Dimethyl phthalate, Icaridin. Baits-Metaldehyde, Iron (II) phosphate, Indoxacarb, Zinc Phosphide, Bromadiolone.

Text Books

1. Handa .S.K,Principles of pesticide chemistry. Agrobios(India);2012.
2. Matolcsy. G, Nádasy. M, Andriska.V, Pesticide chemistry. Elsevier;1989.
3. J. Miyamoto and P. C. Kearney, Pesticide Chemistry, Human Welfare and the Environment
vol. IV Pesticide Residue and Formulation Chemistry, Pergamon press,1985.
4. R. Cremlyn: Pesticides, JohnWiley.