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**
IV	Part I –Languages (Tamil)	தமிழும் அறிவியலும்	J1TL41
	Part II – Languages (English)	General English - IV	J2EN41
	Core VII	General Chemistry – IV	JMCH41
	Core VIII	Preparation of Organic and Inorganic compounds and determination of Physical constants – Practical	JMCHP4
	Generic Elective -VI	Programming Language C++	JECS41
	Skill Enhancement – V	Instrumental Methods of Chemical Analysis	JSCH41
	NMC /Substitute Paper	Forensic Science	JNCH41
	Value Education	Value Based Education (Common)	JVBE41

தமிழும் அறிவியலும்

அலகு-1	தமிழரின் அறிவியல் சிந்தனைகள்

- அறிவியலும் மனித வாழ்வும்
- ஐந்திணைப் பகுப்பும் சூழலியலும்
- தொழில்நுட்ப மேலாண்மை
- நீர் நில மேலாண்மை

அலகு-2	பழந்தமிழ் இலக்கியங்களில் அறிவியல் சிந்தனைகள்

1. நிலவியல்
2. உலோகவியல்
3. வானவியல்
4. உயிரியல்
5. உளவியல்

அலகு-3	இடைக்கால இலக்கியங்களில் அறிவியல் சிந்தனைகள்

1. காப்பியங்களில் அறிவியல்
2. சிற்றிலக்கியங்களில் அறிவியல்
3. உரைநூல்களில் அறிவியல்

அலகு-4	இணையத் தமிழ்

1. இணையத் தமிழ் பயன்பாடு - அறிமுகம்
2. இணையத்தமிழ்க் கல்விக்கழகம்
3. இணைய நூலகம்
4. செயற்கை நுண்ணறிவியல்
5. தமிழ்நாட்டு அறிவியல் ஆளுமைகள்

அலகு-5	கடிதம் எழுதுதலும் கட்டுரை எழுதுதலும்

- உறவு முறைக் கடிதப் பயிற்சி
- அலுவலகக் கடிதப் பயிற்சி
- விண்ணப்பப் படிவம் எழுதும் பயிற்சி
- தன் விவரப் படிவம் எழுதும் பயிற்சி
- கருத்து விளக்கக் கட்டுரைகள் எழுதும் பயிற்சி
- பத்திரிகைகளுக்குக் கட்டுரை எழுதும் பயிற்சி

Text books

Reference Books
1.தமிழர் வேளாண்மை மரபுகள் - இல).செ.கந்தசாமி • 2. சங்க இலக்கியத்தில் வேளாண் சமுதாயம், பெ.மாதையன், நியூ செஞ்சுரி புக் ஹவுஸ் 3. தமிழில் அறிவியல் இதழ்கள்சாமுவேல்- ரா.பார்வேந்தன் ஃபிஷ்கிரீன் பதிப்பகம், கோவை 4. அறிவியல் தமிழ் - பதிப்பாசிரியர் இராதா செல்லப்பன்,பாரதிதாசன் பல்கலைக்கழகம், திருச்சிராப்பள்ளி. 5. இணையத் தமிழ் வரலாறு, மு.பொன்னவைக்கோ, பாரதிதாசன் பல்கலைக்கழகம் 6. இணையத் தமிழ், சந்திரிகா சுப்பிரமணியம் - சந்திரோதயம் பதிப்பகம்

7. இணையமும் இனிய தமிழும் - துரை. மணியரசன், இசை பதிப்பகம் 8. கணினித் தமிழ், இல. சுந்தரம் - விகடன் பிரசுரம் 9. மாண்புமிகு மண், பாமயன், வம்சி புக்ஸ் 10. தமிழ் இலக்கியத்தில் அறிவியல் சிந்தனைகள் வானதி பதிப்பகம், சென்னை

GENERAL CHEMISTRY – IV

UNIT	Details
I	**Thermo dynamics I** Terminology – Intensive, extensive variables, state, path functions; isolated, closed and open systems; isothermal, adiabatic, isobaric, isochoric, cyclic, reversible and irreversible processes; First law of thermodynamics– Concept and significance of heat(q), work(w), internal energy(E), enthalpy(H); calculations of q, w, E and H for reversible, irreversible expansion of ideal and real gases under isothermal and adiabatic conditions; relation between heat capacities (Cp & Cv); Joule Thomson effect- inversion temperature. Thermo chemistry - heats of reactions, standard states; types of heats of reactions and their applications; effect of temperature (Kirchhoff's equations) and pressure on enthalpy of reactions; Hess's law and its applications; determination of bond energy; Measurement of heat of reaction–determination of calorific value of food and fuels Zero thlaw of thermo dynamics–Absolute Temperature scale.
II	**Thermo dynamics II** Second Law of thermodynamics- Limitations of first law, spontaneity and randomness;Carnot'scycle;Conceptofentropy,entropychangeforreversible and irreversible processes, entropy of mixing, calculation of entropy changes of an ideal gas and a van der Waals gas with changes in temperature, volume and pressure, entropy and disorder. Free energy and work functions - Need for free energy functions, Gibbs free energy, Helmholtz free energy - their variation with temperature, pressure and volume, criteria for spontaneity; Gibbs-Helmholtz equation– derivations and applications; Maxwell relationships, thermodynamic equations of state; Thermodynamics of mixing of ideal gases, Ellingham Diagram-application. Third law of thermo dynamics–Nerns theat theorem; Applications of third law -evaluation of absolute entropies from he at capacity measurements, exceptions to third law.
III	**General Characteristics of d-block elements Transition Elements-** Electronic configuration - General periodic trend variable valency, oxidation states, stability of oxidation states, colour, magnetic properties, cataly ticproperties and tendency to form complexes. Comparative study of transition elements and non-transition elements– comparison of II and III transition series with I transition series. Group study of Titanium, Vanadium, Chromium, Manganese, Iron, Cobalt, Nickel and Zinc groups
IV	**Ethers, Thioe thers and Epoxides** Nomenclature, isomerism, general methods of preparations, reactions involving cleavage of C-O linkages, alkyl group and ethereal oxygen. Zeisel's method of estimation of methoxy group. Reactions of epoxides with alcohols, ammonia derivatives and $LiAlH_4$, Thioethers-nomenclature, structure, preparation, properties and uses.

	Aldehydes and Ketones Nomenclature, structure and reactivity of aliphatic and aromatic aldehydes and ketones; general methods of preparation and physical properties. Nucleophilic addition reactions, base catalyzed reaction swith mechanism- Aldol, Cannizzaro's reaction, Perkin reaction, Benzoin condensation, Halo formreaction, Knoevenagel reaction. Oxidation of aldehydes. Baeyer- Villiger oxidation of ketones. Reduction: Clemmensen reduction, Wolf - Kishner reduction, Meerwein – Pond or f Verley reduction, reduction with Li AlH_4 and $NaBH_4$. Addition reactions of unsaturated car bonyl compounds: Michael addition.
V	**Carboxylic Acids** :Nomenclature, structure, preparation and reactions of aliphatic and aromatic monocarp boxylic acids. Physical properties, acidicnature, effect of substituenton acidic strength. HVZ reaction, Claisenester condensation, Bouveault Blanc reduction, decar boxylation, Huns diecker reaction. Formic acid-reducing property. Reactions of dicar boxylicacids, hydroxylacids and unsaturated acids. **Carboxylic acid Derivatives:** Preparations of aliphatic and aromatic acid chlorides, esters amides and anhydrides. Nucleophilic substitution reactionat the acyl carbon of acyl halide, anhydride, ester, amide. Schottan- Baumann reaction. Claisen condensation, Dieckmann and Reformat sky reactions, Hofmann bromamide degradation and Curtiusre arrangement. **Active methylene compounds:** Keto–enoltautomerism.Preparation and synthetic applications of diethyl malonate and ethyl ace to acetate **Halogen substituted acids**– nomenclature; preparation by directhaloge nation, iodination from unsaturated acids, alkylm alonicacids **Hydroxy acids** – nomenclature; preparation from halo, amino, aldehydic and ketonicacids, ethy leneglycol, aldolacetald ehyde; reactions–action of heat on α, β and γ hydroxy acids.
Reference Books	1. Maron,S.H.andPruttonC.P.*PrinciplesofPhysicalChemistry,*4th ed.; TheMacmillanCompany:Newyork,1972. 2. Lee,J.D.*ConciseInorganicChemistry,*4th ed.;ELBSWilliamHeinemann:London,1991. 3. GurudeepRaj,*AdvancedInorganicChemistry,*26th ed.;Goel Publishing House: Meerut, 2001. 4. Atkins,P.W.&Paula,J.*PhysicalChemistry*,10th ed.;OxfordUniversityPress:NewYork,2014. 5. Huheey,J.E.*Inorganic Chemistry: Principles of Structure and Reactivity,*4th ed;AddisonWesleyPublishingCompany:India,1993.

PREPARATION OF ORGANIC AND INORGANIC COMPOUNDS

AND PHYSICAL CONSTANT

UNIT	Details
I	**Preparation of Organic Compounds** i. Nitration-picric acid from Phenol ii. Halo genation-p-bromoacet anilide from a cetanilide iii. Oxidation-benzoicacid from Benzal dehyde iv. Benzoic acid from Benza mide v. Methyl benzoate to Benzoic acid vi. Salicylic acid from Methyl Salicylate vii. Rearrangement-Benzil to Benzilic Acid viii. Methy lorange from sulphanilic acid
II	**Preparation of Inorganic Compounds-** i. Potashalum ii. Tetraammine copper (II) sulphate iii. Hexammine cobalt (III) chloride iv. Mohr's Salt v. Hexathioure alead (II) nitrate vi. Sodium ferrioxalate vii. Tristhiourea copper (I) chloride **viii.** Sodium cobalti nitrate Purification of organic/inorganic compounds bycry stallization (from water/alcohol) and distillation.
III	Determination of boiling point and melting point of organic substance / solvents. Experiments for demonstration 1. **Steamdistillation**-Extractionofessentialoilfromcitrusfruits/eucalyptus leaves. 2. **Chromatography(anyone(Group experiment)** (i) Separation of amino acids by Paper Chromatography (ii) Thin Layer Chromatography-mixture of sugars/plant pigments /permanganate, dichromate. (iii) Column Chromatography-extraction of carotene, chlorophyll and xanthophylls from leaves /separation of anthracene-anthracenepicrate. 3. **Electrophoresis**–Separation of amino acids and proteins. Isolationofcaseinfrommilk/Determinationofsaponificationvalueofoilor fat/Estimation of acetic acid from commercial vinegar.(Any one Group experiment)
Reference Books	1. Venkateswaran, V.;Veeraswamy, R.;Kulandai velu, A.R.*Basic Principles of Practical Chemistry*, 2nded.; Sultan Chand: New Delhi, 2012. 2. Manna, A.K.*Practical Organic Chemistry*, Books and Allied: India, 2018. 3. Gurtu, J.N;Kapoor, R.*Advanced Experimental Chemistry (Organic)*, Sultan Chand: New Delhi, 1987. 4. Furniss,B.S.;Hannaford,A.J.;Smith, P.W.G.;Tatchell, A.R.*Vogel's Text book of Practical Organic Chemistry*, 5thed.; Pearson:India,1989.

PROGRAMMING IN C++

UNIT	Details
I	Introduction, To kens, Key words, Identifiers and constants, Basic data types, User defined data types, storage classes, Derived data types, Symbolic constants.
II	Introduction, The main function, function prototyping, Call by reference, Return by references, Inline functions, Default arguments, constant Arguments, Recursion, Function overloading, Friend and virtual functions, Math library functions, C structures Revisited, Specifying a class, Defining member functions, A C++ program with class, Making an outside functions inline, Nesting member functions, Private member functions, Arrays within a class, Memory allocation for objects, Static member functions, Array of objects, objects as function arguments, Friend functions, Returning objects.
III	Introduction, Constructors, Parameterized constructors, Multiple constructors in a class, Constructors with default arguments, Dynamic initialization of objects, Copy constructor, Constructing Two-Dimensional arrays, constant objects, Destructors.
IV	Introduction, Defining operator over loading, Over loading unary operator, Overloading Binary operator, Overloading Binary operators using Friends, Manipulation of strings using operators, Some other Operator over loading examples, Rules for Over loading Operators
V	Introduction, Defining Derived classes, Single inheritance, Making a private member in heritable, Multi level in heritance, Multiple inheritance, Hierarchical inheritance, Hybrid inheritance.
Reference Books	1.ReemaThareja,ObjectOrientedProgrammingwithC++,Oxford University Press(January 2018)

INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS

UNIT	Details
I	**Qualitative and Quantitative Aspects of Analysis** S.I Units, Distinction between Mass and Weight. Moles, Milli moles, Millie quivalence, Molality, Molarity, Normality, Percentage by Weight and Volume, ppm, ppb. Density and Specific Gravity of Liquids. Stoi chio metry Calculations Sampling, evaluation of analytical data, Errors – Types of Errors, Accuracy, Precision, Minimization of Errors. Significant Figures. Methods of Expressing Precision: Mean, Median, Average Deviation, Standard Deviation, Coefficient of Variation, Confidence Limits, Q- test, F-test, T- test. The Least Square Method for Deriving Calibration plots.
II	**Atomic Absorption Spectros copy**: Basic principles of instrumentation- choice of source, mono chromator, detector, choice of flame and Burner designs. Techniques of atomization and sample introduction; Method of back ground correction, sources of chemical interferences and their method of removal. Techniques for the quantitative estimation of trace level of metal ions from water samples.
III	**UV-Visible and IR Spectros copy** Origin of spectra, interaction of radiation with matter, fundamental laws of spectros copy and selection rules, validity of Beer-Lambert's law. **UV-Visible Spectro metry:** Basic principles, instrumentation – choice of source, monochro mator and detector for single and double beam instrument; Basic principles of quantitative analysis: estimation of metalions from aqueous solution, geometrical isomers, keto-enol tautomers. **Infrared Spectros copy:** Basic principles of instrumentation-choice of source, monochro mator & detector or single and double beam instrument; sampling techniques.
IV	**Thermal and Electro-analytical Methods of Analysis** TGA and DTA- Principle, Instrumentation, methods of obtaining Thermograms, factors affecting TGA/DTA, Thermal analysis of silver nitrate, calcium oxalate and calcium acetate DSC-Principle, Instrumentation and applications. Electro analytical methods: polarography-principle, instrumentation and applications. Derivative polarography- Cyclic Voltammetry - principle.
V	**Separation and purification techniques** Classification, principle, Factors affecting–Solvent Extraction–Liquid -Liquid Extraction, Chromatography: Column, TLC, Paper, Gas, HPLC and Electrophoresis, Principle, Classification, Choice of Adsorbents, Solvents, Preparation of Column, Elution Mechanism of separation: adsorption, partition & ion exchange. Development of chromate grams and Rf value.

Reference Books

1. D. A. Skoog, D. M. West andF. J. Holler, Analytical Chemistry: An Introduction, 5thedn., Saunders college publishing, Philadelphia, 1998.
2. DashU.N,Analytical Chemistry; Theory and Practice, Sultan Chand and sons Educational Publishers, New Delhi, 2011.
3. Christian,GaryD;AnalyticalChemistry,6thEd.,JohnWiley&Sons, NewYork,2004.
4. Mikes, O. &Chalmes, R.A. Laboratory Handbook of Chromatographic & Allied Methods, Elles Harwood Ltd. London
5. G.H.Jeffery,J.Bassett,J.Mendham and R.C. Denney,Vogel'sTextbookofQuantitativeChemicalAnalysis,sixtheditionPearson Education, 2000

FORENSIC SCIENCE

UNIT	Details
I	**Poisons** Poisons - types and classification - diagnosis of poisons in the living and the dead-clinical symptoms - post mortem appearances. Heavy metal contamination (Hg,Pb,Cd) of sea foods- use of neutron activation analysis indetecting arsenic in human hair. Treatment in cases of poisoning–use of antidotes for common poisons.
II	**Crime Detection** Accident alexplosion during manufacture of matches and fireworks (as in Sivakasi). Human bombs-possible explosives (gelatine sticks and RDX)-metal detector devices and other security measures for VVIP-composition of bullets and detecting powder burns.
III	**Forgery and Counter feiting** Documents - different types of forged signatures - simulated and traced forgeries–inherentsignsofforgerymethods-writingdeliberatelymodified - uses of ultraviolet rays -comparison of type written letters – checking silver line water mark in currency notes – alloy analysis using AAS to detect counter feit coins–detection of gold purity in 22 caratornaments– detecting gold plated jewels-authenticity of diamond.
IV	**Tracks and Traces** Tracks and traces–small tracks and police dogs–footprints–costing of footprints – residue prints, walking patter norty remarks–miscellaneous traces and tracks–glass fracture-tool marks-paints-fibres-Analysis of biological substances - blood, semen, saliva, urine and hair - Cranial analysis (head and teeth) DNA Finger printing for tissue identification in dismembered bodies - detecting steroid consumption in athletes and racehorses.
V	**Medical Aspects** Aids–causesandprevention-misuseofscheduleddrugs-burnsandtheirtreatment by plastic surgery. Metabolite analysis using mass spectrum - Gas chromatography-Arson-natural fires and arson-burning characteristics and chemistry of combustible materials-nature of combustion. Ballistics- classification-internal and terminal ballistics-small arms-laboratory examination of barrel washing and detection of powder residue by chemical tests.
Reference Books	1. Rich ard Saferstin and Criminalistics-An Introduction to Forensic Science (College Version), So pfeste in, Printice hall, eighth edition,2003 2. Suzanne Bell, Forensic Chemistry, Pearson, second international edition, 2014. 3. Jay Siegel, Forensic chemistry: Fundamental sand applications, Wiley-Blackwell, first edition,2015. 4. Max. M.Houck & Jay.A.Segal, (2006), Fundamentals of Forensic Science, Elsevier Academic press. 5. Henry C.Lee, Timothy Palmbach, Marilyn T.Miller,(2006), HenryLee's Crime Scene Book Elsevier Academic press.

VALUE BASED EDUCATION

(Common Syllabus)

UNIT	Details
I	**Introduction to Value based Education** a. Value: meaning and Classification b. Value based Education: Meaning, Characteristics, Components and Contents c. Value Erosion and Inculcation: Value crises in social life, economic life, and political life - Value inculcation: need and importance - Role of Parents and Teachers in inculcating values.
II	**Harmony in Being and Living** a. Harmony of the self (I) with the body: Nurturing of the body- Understanding myself as co-existence of the self and the body- Understanding needs of self and needs of the body- Understanding the activities in the self and activities in the body. b. Harmony in the Family, Society and Nature: Family as a basic unit of human interaction and values in relationships - Affection, care, guidance, reverence, Glory, gratitude, and love – Harmony in society: Justice preservation, Production Work, Exchange Storage Harmony in nature: four orders in nature- The holistic perception of harmony in existence.
III	**Social Issues, Social Justice and Human Rights** Social issues – causes and magnitude - alcoholism, drug addiction, poverty, Unemployment Social Justice: Definition and need – factors responsible for social injustice: caste and gender – contributions of social reformers. Human Rights: Concept and Principles of human rights – human rights and Indian constitution – Rights of Women and children – violence against women
IV	**Values and Mass Media** Mass media: Meaning, functions and characteristics – Effects and Influence on youth and children – Media Power – socio, cultural and political consequences of mass mediated culture - consumerist culture – Globalization – new media-prospects and challenges – Role of media in value building
V	**Ethics** Ethics:Meaning and importance Social ethics: tolerance, equity, justice for all, sensitivity towards mankind, love for nature and creatures, nationalism-love for nation, pride for nation, Honour to the law, Indian culture and traditions – Civic Sense: Being a good civilian Professional Ethics: Dedication to work and duty – Commitment to the Profession.

Reference	1. Allport, G.W., Vermon, P.E., and Lindzey, G. (1970) study of values, Buston: Houghton Mifflin. 2. Centaral Board of Secondary Education (1997), Value Education: A Handbook for Teachers, Delhi: Central Board of Secondary Education. 3. Delors, J. (1996), Learning: The Treasure within- Report of the International Commission on Education for the Twenty-First Century, Paris: UNESCO. 4. Morris, Charles W. (1956). Varieties of Human Values. Chikago: University of Chicago Press. 5. Shukla, R.P.(2005). Value Education and Human Rights. Sarup& Sons, New Delhi 6. Satchidananda. M.K. (1991), "Ethics, Education, Indian Unity And Culture" – Delhi, Ajantha Publications 7. Saraswathi. T.S. (Ed) 1999. Culture", Socialisation And Human Development: Theory, Research And Application In India" – New Delhi Sage Publications. 8. Venkataiah. N (Ed) 1998, "Value Education" New Delhi Ph. Publishing Corporation. 9. Chakraborti, Mohit (1997) "Value Education: Changing Perspectives" New Delhi: Kanishka Publications. 10. Adithya Shetty and K.Pushpanandan Rao (2000): as quoted in Jayarami Reddy, B., (2010): "Values of B.Ed. teacher trainees in relation to certain psycho-sociological variables in Andhra Pradesh", Unpublished Ph.D. Thesis, Department of Education, S.V.University, Tirupati, 11. Amareswaran, N. (2009): "Moral values of intermediate students", Published Ph.D. Thesis, Department of Education, S.V. University, Tirupati. 12. Chetty, K. M. (2004): "Perspective of value oriented education" paper presented at UGC National Seminar on value oriented education, organized by Dept. of education, S.V.University, Tirupati. 13. Chhaganlal, Nandini Man Sukhbai (1992): "A study of the value, adjustment, attitude in the teaching profession and academic achievement of researchers' children as compared to non-teachers children". [Ph.D. Edu. Saurashtra University] 14. Mahatma Gandhi at Wardha Conference (1937) : as quoted in Gawande, E. N., (1994): "Value oriented education vision for better living", Sarup and Sons Publishers 4740/23, Amsari Road, Darya Colony, New Delhi, p. 9. 15. Mohan Reddy (2011): "An analytical study of attitude of intermediate students towards value oriented education in relation to certain psycho-sociological variables", Ph.D. theses, S.V.University, Tirupati. 16. Rajasekhar Reddy (2002) quoted in Nagarjuna, T.I. (2009): "A study of attitudes of DIET students towards value oriented education in relation to intelligence, personality and other variables", Published Ph.D. Thesis, Department of Education, S.V. University, Tirupati. 17. Rajagopal (1989) quoted in Yella Reddy, B. (2009): "A study of moral judgment of intermediate students in relation to certain factors", Published Ph.D. thesis, S.V.University, Tirupati. 18. Awasthi D. Value based Education is the only solution to the problem of Crisis of Moral Values among the youth of India. Retrieved from: worldwide, 2014. journals.com/gra/file:php? 2014. 1411110022_81.pdf. 19. Brubacher, J.S. Modern Philosophies of Education, McGraw Hill Book Companym, INC, New York, 1950, Pp.93-95.

	20. Chetty, K.M., Value Education: A Conceptual Analysis, 70th Session of Indian Philosophical Congress, Haridwar, 1995, Pp.3-4. 21. Dr. Jangaiah, C. Values Classification, APH Publishing Corporation, New Delhi, 1998, . 22. Prahallada, N.N, Value Education in India. Association of Indian Universities, New Delhi, 2000. 23. Rohidekar, S.R. Inculcation of values-how? APH Publishing Corporation, New Delhi, 1998. 24. Seshadri, C. Education in Values, APH Publishing Corporation, New Delhi, 1998, Pp.47- 48.