MANONMANIAM SUNDARANAR UNIVERISTY,
TIRUNELVELI-12

SYLLABUS

UG - COURSES – AFFILIATED COLLEGES

Course Structure for B. Sc. Chemistry
(Choice Based Credit System)
(with effect from the academic year 2023-2024 onwards)

Semester-IV				
Part	**Subject Status**	**Subject Title**	**Subject Code**	**Credit**
I	LANGUAGE	TAMIL/MALAYALAM/HINDI	E1TL41/ E1MY41/ E1HD41	3
II	ENGLISH	ENGLISH	E2EN41	3
III	CORE	GENERAL CHEMISTRY-IV	EMCH41	4
III	CORE	PREPARATION OF ORGANIC AND INORGANIC COMPOUNDS AND DETERMINATION OF PHYSICAL CONSTANTS	EMCHP4	2
III	ELECTIVE	ALLIED PHYSICS	EEPH41	4
		ALLIED PHYSICS PRACTICAL	EEPHP4	2
IV	SEC 5	INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS	ESCH41	2
IV		VALUE BASED EDUCATION	EVBE41	2
IV	NAAN MUDHALVAN	* FORENSIC SCIENCE	ENMCH4	2

Total Marks: 100 Internal Exam: 25 marks + External Exam: 75 marks

A. **Scheme for internal Assessment**:
Maximum marks for written test: **20 marks**
3 internal tests, each of **I hour** duration shall be conducted every semester.
To the average of the **best two** written examinations must be added the marks scored in. The **assignment** for 5 marks.

The break up for internal assessment shall be:
Written test- 20 marks; Assignment -5 marks Total - 25 marks

B. Scheme of External Examination
3 hrs. examination at the end of the semester
A – Part : 1 mark question two - from each unit
B – Part : 5 marks question one - from each unit
C – Part : 8 marks question one - from each unit

- **Conversion of Marks into Grade Points and Letter Grades**

S.No	Marks	Letter Grade	Grade point (GP)	Performance
1	90-100	O	10	Outstanding
2	80-89	A+	9	Excellent
3	70-79	A	8	Very Good
4	60-69	B+	7	Good
5	50-59	B	6	Above Average
6	40-49	C	5	Pass
7	0-39	RA	-	Reappear
8	0	AA	-	Absent

- **Cumulative Grade Point Average (CGPA)**

$$\mathbf{CGPA} = \frac{\mathbf{\Sigma\,(GP \times C)}}{\mathbf{\Sigma C}}$$

- **GP** = Grade point, **C** = Credit
- CGPA is calculated only for Part-III courses
- CGPA for a semester is awarded on cumulative basis

- **Classification**
  a) First Class with Distinction : CGPA $\geq$ 7.5*****
  b) First Class : CGPA $\geq$ 6.0
  c) Second Class : CGPA $\geq$ 5.0 and $<$ 6.0
  d) Third Class : CGPA$<$ 5.0

Part 1 TAMIL

பொதுத்தமிழ் 4 - தமிழும் அறிவியலும்

அலகு 1: தமிழரின் அறிவியல் சிந்தனைகள்

1. அறிவியலும் மனித வாழ்வும்
2. ஐந்திணைப் பகுப்பும் சூழலியலும்
3. தொழில்நுட்ப மேலாண்மை
4. நேர் நிலம் 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. இணையத் தமிழ் கல்விக்கழகம்
3. இணைய நூலகம்
4. செயற்கை நுண்ணறிவியல்
5. தமிழ்நாட்டு அறிவியல் ஆளுமைகள்

அலகு 5: கடிதம் எழுதுதலும் கட்டுரை எழுதுதலும்

1. உறவு முறைக் கடிதப் பயிற்சி
2. அலுவலகக் கடிதப் பயிற்சி
3. விண்ணப்பப் படிவம் எழுதும் பயிற்சி
4. தன் விவரப் படிவம் எழுதும் பயிற்சி
5. கருத்து விளக்கக் கட்டுரைகள் எழுதும் பயிற்சி
6. பத்திரிகைகளுக்குக் கட்டுரை எழுதும் பயிற்சி

Text Books;

1. அறிவியல் தமிழ் இன்றைய நிலை - இராதா செல்லப்பன், உலகத் தமிழாராய்ச்சி நிறுவனம், சென்னை
2. மாணவ முஸ்தபா. தமிழில் அறிவியல் படைப்பிலக்கியம், மணவை பூப்பிளிகேஷன், சென்னை.
3. கலைச்சொல்லாக்கம் - மங்கை, ரங்கராசபுரம், சென்னை

Reference Books:

1. தமிழர் மேலாண்மை மரபுகள் - இல). செ. கந்தசாமி
2. சங்க இலக்கியத்தில் வேளாண் சமுதாயம், பொ. மாதையன், நியூ செஞ்சுரி புக் ஹவுஸ்

Websites:

1. https://www.chennailibrary.com/
2. முகப்பு - சிறுகதைகள்
3. www.tamilvirtualuniversity.org
4. Buy tamil books online 10% to 50% discount, Tamil Novels, Tamil Audio Books online – Buy tamil books online – Established 2010
5. www.katuraitamilblogspot.com

Part I MALAYALAM

DESKTOP PUBLISHING AND PRINTING IN MALAYALAM

UNIT I

This unit introduces basics of the printing technology, History of Malayalam printing-publishing-Newspapers-Journals-Social commitment -Propagation of ideas- Social struggle against invasion product of industrialization-printing in new era- - Data entry, DTP, editing, layout and Book publishing, e-publishing -: Significance of ISBN and ISSN..

UNIT II e -Malayalam – Malayalam in cyber space Detailed Study :

1. Malayalam computing-charithravalokanam.Dr.Mahesh Mangalatt ,Cyber Malayalam Sunitha T.V.(Ed)
2. Vayana, Ezhuthu, prasadhanam digital yugathil Dr.B.Iqbal(Grandhalokam- June 2013)

UNIT III e-Vayana- Reading in digital era Detailed Study :

1. E.vayana innathe Vayana– E-malayalam.Sunitha T.V State Institute of Languages.Thiruvananthapuram
2. Malayalam wiki media samrambhangal.Shiju Alex Cyber Malayalam .Sunitha T.V (Ed).Current Books.
3. Web magazinukal-Ini Vayana E Vayana.V.K Adarsh D C Books

UNIT IV Modern Media

Tools in Cyber space-editing tools

Unicode- Fonts- Drawing Tools, Painting tools. M S Paint- File Types (jpg ,IMG, XMP, Gif, PNG)

Resolution-Layers-Palattes, Greyscale, image, image recognition, Colour space, image transformation- image preview.

Detailed Study:

Unicode – Ini vayana e vayana – V.K Adarsh - D C Books

UNIT V

Proof reading techniques and cataloguing, cover designing, blurb writing

Detailed study:

Proof thiruthal.Vanijyaparamaya kathidapadukal.G.R.Pilla,
State Institute of Languages.Thiruvananthapuram

Reading List (Print and Online)

1. https://www.amazon.com/Desktop-publishing-Bittukumar/dp/9350570130
2. Computer parichayavum prayogavum.Dr.Achythsankar S Nair State Institute of languages.Thiruvananthapuram
3. Malayalam computing parimithikalum sadhyathakalum (Combiled.) Dr.Smitha K Nair
4. Sankethika patham-kerala University Publications
5. Computer Gurukulam-DTP ,Kairali Publications Thiruvananthapuram
6. Pusthaka nirmaanam - The state Institute of languages, Thiruvananthapuram
7. Proof reading - The state Institute of languages
8. Printing A to Z - K.J. Sam kutti
9. Ini vayana e vayana- V.K. Adarsh, D.C. books.
10. 1Printing Technology and Compositing- The State institute of Language s . T Thiruvananthapuram
11. Navamadhyamangal Bhaasha sahityam samskaram- Jose K Manuel, N B S
12. Cyber aadhunikata @ Malayalam – Jose K Manuel ,Athma Books
13. Bookstalgia- P.K. Rajasekharan- Mathrubhumi books
14. Pusthakam Untakunnathu- V.K. Haridas, Poorna publications, Kozhikode
15. An Introduction to Book Publishing D,Raghavan
16. Copy Editing- Judith Butcher
17. E Malayalam –Sunitha T.V- The State Institute of Language s

PART I HINDI
Hindi Bhasha aur Computer

Course Objectives
The Main Objectives of this course are to:
- Knowing about computer in Hindi
- Understanding Technical Hindi
- E-Learning and its aspects
- Hindi application with the Technical tools

Unit I
Computer aur Hindi
- Computer ka Parchay aur Vikas
- Computer mein Hindi ke Vividh Prayog

Unit II
Proudyogiki aur Hindi
- Unicode
- Dewanagari Lipi
- Hindi ki Vibhinna Website – Ek Parichay

Unit III
Computer ke madhyam se Hindi shikshan
- Vibhinna Shikshan Takkini ki
- Sarkari aur gair sarkari sansthao mein prayukt Hindi Bhasha

Unit IV
Vividh Paksh
- Internet par Hindi Bhasha
- Hindi SMS
- Hindi Tankan
- Hindi ke Vibhinna Prayukthi

Unit V
Pratiyogi priksha par aadharit Computer sambandhit prashikshan Karya
- Hindi mein Powerpoint banana
- Hindi mein Google Document thaiyar karna
- Hindi mein Google form taiyar karna
- Vibhinna pratiyogi parikshao ke bare mein suchna pradan karna

Reference Books

1. Social Networking: Naye Samay ka Samvad – Ed. Sanjay Dwivedi
2. Jansanchar aur Maas Culture – Jagdeeshwar
3. Media: Bhumandalikaran aur Samaj – Ed. Sanjay Dwivedi
4. Naye Jamane ki Patrakarita – Sourabh Shukla
5. Patrakarita se Media tak – Manoj Kumar

Related Online Contents (MOOCs, SWAYAM, NPTEL, YouTube, Websites, etc.)

1. https://techshindi.com/%E0%A4%AB%E0%A4%BC%E0%A5%89%E0%A4%A8%E0%A5%8D%E0%A4%9F%E0%A4%95%E0%A5%8D%E0%A4%AF%E0%A4%BE-%E0%A4%B9%E0%A5%88%E0%A4%82-%E0%A4%94%E0%A4%B0-%E0%A4%AF%E0%A5%87-%E0%A4%95%E0%A4%BF%E0%A4%A4%E0%A4%A8/
2. https://www.techyukti.com/2020/12/computer-font-kya-hai.html
3. https://chti.rajbhasha.gov.in/pdf/Chap4HindiShabadSansadhan2ndEditionPart2.pdf

Part II ENGLISH

UNIT I GOAL SETTING (UNICEF)

Life Story

1.1 From Chinese Cinderella – Adeline Yen Mah
1.2 Why I Write - George Orwell

Short Essay

1.3 On Personal Mastery – Robin Sharma
1.4 On the Love of Life – William Hazlitt

UNIT II INTEGRITY

Short Story

2.1 The Taxi Driver – K.S. Duggal
2.2 Kabuliwala - Rabindranath Tagore
2.3 A Retrieved Reformation – O Henry

Extract from a play

2.4 The Quality of Mercy (Trial Scene from the Merchant of Venice - Shakespeare)

UNIT III COPING WITH EMOTIONS

Poem

3.1 Pride – Dahlia Ravikovitch
3.2 Phenomenal Woman – Maya Angelou

Reader's Theatre

3.3 The Giant's Wife A Tall Tale of Ireland –William Carleton
3.4 The Princess and the God : A Tale of Ancient India

UNIT IV Language Competency Sentences

4.1 Simple Sentences
4.2 Compound Sentences
4.3 Complex Sentences

Direct and Indirect Speech

UNIT V Report Writing

5.1 Narrative Report
5.2 Newspaper Report

Drafting Speeches

5.3 Welcome Address
5.4 Vote of Thanks

Text Books (Latest Editions)

1. Oxford Practice Grammar , John Eastwood, Oxford University Press
2. Cambridge Grammar of English , Ronald Carter and Michael McCarthy
3. George Orwell Essays, Penguin Classics

Web Resources

1. http:/www.gradesaver.com/George-orwell-essays/study/summary
2. O' Henry. A Retrieved Reformation. https://americanenglish.state.gov/files/ae/resource_files/a-retrieved-reformation.pdf
3. Maya Angelou. Phenomenal Woman. https://www.poetryfoundation.org/poems/48985/phenomenal-woman
4. The Quality of Mercy, https://poemana1ysis.com
5. https://www'.oxfordscho1ar1yeditions.coin/disp1ay/10.1093/actrade/9780199235742.book.1/actrade-9780199235742-div1-106-William Hazilitt

GENERAL CHEMISTRY-IV

Objectives of the course

- This course aims to provide a comprehensive knowledge on
- Thermodynamic concepts on chemical processes and applied aspects.
- Thermochemical calculations
- Transition elements with reference to periodic properties and group study of transition metals.
- the organic chemistry of ethers, aldehydes and ketones
- the organic chemistry of carboxylicacids.

UNIT-I

Thermodynamics 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.

Thermochemistry - 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

Zeroth law of thermodynamics – Absolute Temperature scale.

.

Unit-II

Thermodynamics II

Second Law of thermodynamics- Limitations of first law, spontaneity and randomness; Carnot's cycle; Concept of entropy, entropy change for reversible 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 thermodynamics –Nernst heat theorem; Applications of third law - evaluation of absolute entropies from heat capacity measurements, exceptions to third law.

UNIT-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, catalytic properties 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

UNIT-IV

Ethers, Thioethers 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 LiAlH4, 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 reactions with mechanism- Aldol, Cannizzaro's reaction, Perkin reaction, Benzoin condensation, Haloform reaction, Knoevenagel reaction. Oxidation of aldehydes. Baeyer- Villiger oxidation of ketones. Reduction: Clemmensen reduction, Wolf - Kishner reduction, Meerwein – Pondorf Verley reduction, reduction with LiAlH4and NaBH4.

Addition reactions of unsaturated carbonyl compounds: Michael addition.

UNIT-V

Carboxylic Acids: Nomenclature, structure, preparation and reactions of aliphatic and aromatic monocarboxylic acids. Physical properties, acidic nature, effect of substituenton acidic strength. HVZ reaction, Claisenester condensation, Bouveault Blanc reduction, decarboxylation, Hunsdiecker reaction. Formic acid-reducing property.

Reactions of dicarboxylic acids, hydroxyl acids and unsaturated acids.

Carboxylic acid Derivatives: Preparations of aliphatic and aromatic acid chlorides, esters, amides and anhydrides. Nucleophilic substitution reaction at the acyl carbon of acyl halide, anhydride, ester, amide. Schottan- Baumann reaction. Claisen condensation, Dieckmann and Reformatsky reactions, Hofmannbromamide degradation and Curtiusre arrangement.

Active methylene compounds: Keto– enol tautomerism. Preparation and synthetic applications of diethyl malonate and ethyl acetoacetate

Halogen substituted acids–nomenclature; preparation by direct halogenation, iodination from unsaturated acids, alkylmalonic acids

Hydroxy acids – nomenclature; preparation from halo, amino, aldehydic and ketonicacids, ethylene glycol, aldol acetaldehyde; reactions–actionofheat on α, β and γ hydroxy acids.

Recommended Text

1. B.R.Puri and L.R.Sharma, Principles of Physical Chemistry, Shoban Lal Nagin Chand and Co., thirty three edition, 1992.
2. K.L.Kapoor, A Textbook of Physical chemistry, (volume-2and3), Macmillan, India Ltd, third edition, 2009.
3. P.L.SoniandMohanKatyal,TextbookofInorganicChemistry,SultanChand&Sons, twentiethedition,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.

Reference Books

1. Maron, S. H. and Prutton C. P. Principles of Physical Chemistry, 4th ed.; The Macmillan Company: Newyork,1972.
2. Lee,J.D. Concise Inorganic Chemistry, 4th ed.; ELBS William Heinemann: London, 1991.
3. Gurudeep Raj, Advanced Inorganic Chemistry, 26thed.; Goel Publishing House: Meerut, 2001.
4. Atkins,P.W. & Paula,J. Physical Chemistry, 10th ed.; Oxford University Press: NewYork, 2014.
5. Huheey, J. E. Inorganic Chemistry: Principles of Structure and Reactivity, 4th ed; Addison Wesley Publishing Company: India, 1993.

Website and e-learning source

MOOC components

1. https://nptel.ac.in/courses/112102255Thermodynamics
2. https://nptel.ac.in/courses/104101136 Advanced transition metal chemistry

PREPARATION OF ORGANIC AND INORGANIC COMPOUNDS AND PHYSICAL CONSTANT

Objectives of the course

This course aims at providing knowledge on

- Preparation of organic compounds
- Preparation of Inorganic compounds
- Crystallization of crude sample.
- Study the principle/equation of the experiment.
- Determination of boiling and melting point of organic compounds

UNIT I

Preparation of Organic Compounds

1. Nitration-picric acid from Phenol
2. Halogenation-p-bromo acetanilide from acetanilide
3. Oxidation-benzoic acid from Benzaldehyde
4. Benzoic acid from Benzamide
5. Methyl benzoate to Benzoic acid
6. Salicylic acid from MethylSalicylate
7. Rearrangement- Benzil to BenzilicAcid
8. Methyl orange from sulphanilic acid

Unit II

Preparation of Inorganic compounds-

1. Potash alum
2. Tetraammine copper (II) sulphate
3. Hexammine cobalt (III) chloride
4. Mohr's Salt
5. Hexathiourea lead (II)nitrate
6. Sodium ferrioxalate
7. Tris thiourea copper (I) chloride
8. Sodium cobalti nitrate

Purification of organic / inorganic compounds by crystallization(from water/alcohol) and distillation.

UNIT III

Determination of boiling point and melting point of organic substance / solvents.

Experiments for demonstration

1. Steam distillation-Extraction of essential oil from citrusfruits/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- anthracene picrate.
3. Electrophoresis–Separation of amino acids and proteins.
4. Isolation of casein from milk/Determination of saponification value of oil or fat/Estimation of aceticacid from commercial vinegar.(Any one Group experiment)

Reference Books

1. Venkateswaran, V.; Veeraswamy, R.; Kulandaivelu, A.R. Basic Principles of Practical Chemistry, 2nd ed.; Sultan Chand: New Delhi, 2012.
2. Manna, A.K. Practical Organic Chemistry, Books and Allied: India, 2018.

3. Gurtu,J.N;Kapoor,R.AdvancedExperimentalChemistry(Organic), Sultan Chand: New Delhi, 1987.
4. Furniss,B.S.; Hannaford, A.J.;Smith, P.W.G.; Tatchell, A.R. Vogel's Textbook of Practical Organic Chemistry, 5thed.; Pearson: India,1989.

Website and e-learning source

1. https://www.vlab.co.in/broad-area-chemical-sciences

ALLIED PHYSICS –II

COURSE OBJECTIVES

- To understand the basic concepts of optics, modern Physics, concepts of relativity and quantum physics, semiconductor physics, and electronics.

UNIT-I

OPTICS: interference – interference in thin films –colors of thin films – air wedge – determination of diameter of a thin wire by air wedge – diffraction – normal incidence – experimental determination of wavelength using diffraction grating (no theory) – polarization – polarization by double reflection – Brewster's law – optical activity – application in sugar industries

UNIT-II

ATOMIC PHYSICS: atom models – Bohr atom model – mass number – atomic number – nucleons – vector atom model – various quantum numbers – Pauli's exclusion principle – electronic configuration – Bohr magneton – Stark effect – Zeeman effect

UNIT-III

NUCLEAR PHYSICS: nuclear models – liquid drop model – magic numbers– nuclear energy – mass defect – binding energy – radioactivity – uses – half life – mean life - radio isotopes and uses nuclear fission – chain reaction – critical reaction – critical size- atom bomb - introduction to DAE, IAEA – nuclear fusion – thermonuclear reactions – differences between fission and fusion.

UNIT-IV

INTRODUCTION TO RELATIVITY

Frame of reference – postulates of special theory of relativity – Galilean transformation equations – Lorentz transformation equations – derivation – length contraction – time dilation –

UNIT-V

SEMICONDUCTOR PHYSICS: p-n junction diode – forward and reverse biasing – characteristic of diode – zener diode – characteristic of zener diode – voltage regulator – full wave bridge rectifier – construction and working – advantages (no mathematical treatment) – USB cell phone charger

TEXT BOOKS

1. R.Murugesan (2005), Allied Physics, S.Chand and Co, NewDelhi.
2. K.Thangaraj and D.Jayaraman (2004), Allied Physics, Popular Book Depot, Chennai.
3. Brijlal and N.Subramanyam (2002), Textbook of Optics, S.Chand and Co, NewDelhi.
4. R.Murugesan (2005), Modern Physics, S.Chand and Co, NewDelhi.
5. A.Subramaniyam Applied Electronics, 2nd Edn., National Publishing Co., Chennai.

REFERENCE BOOKS

1. Resnick Halliday and Walker (2018), Fundamentals of Physics, 11th Edn., John Willey and Sons, Asia Pvt. Ltd., Singapore.
2. D.R.Khanna and H.R. Gulati (1979).Optics, S.Chand and Co. Ltd., New Delhi.
3. A.Beiser (1997), Concepts of Modern Physics, Tata Mc Graw Hill Publication, NewDelhi.
4. Thomas L. Floyd (2017), Digital Fundamentals, 11th Edn., Universal Book Stall, NewDelhi.
5. V.K.Metha (2004), Principles of electronics, 6th Edn. ,S.Chand and Company, New Delhi.

WEB RESOURCES

1. https://www.berkshire.com/learning-center/delta-p-facemask/https://www.youtube.com/watch?v=QrhxU47gtj4https://www.youtube.com/watch?time_continue=318andv=D38BjgUdL5Uandfeature=emb_logo
2. https://www.youtube.com/watch?v=JrRrp5F-Qu4
3. https://www.validyne.com/blog/leak-test-using-pressure-transducers/
4. https://www.atoptics.co.uk/atoptics/blsky.htm
5. https://www.metoffice.gov.uk/weather/learn-about/weather/optical-effects

ALLIED PRACTICAL– II

COURSE OBJECTIVES

- Apply various Physics concepts to understand concepts of Light, electricity and magnetism and waves, set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results

Minimum of SIX Experiments from the list:

1. Radius of curvature of lens by forming Newton‘s rings
2. Spectrometer-grating—normal incidence method
3. LCR Series resonance circuit
4. LCR Parallel resonance circuit
5. Determination of AC frequency using sonometer
6. Thermal conductivity of poor conductor using Lee‘s disc
7. Determination of figure of merit table galvanometer
8. Characterisation of Zener diode
9. Construction of Zerner regulated power supply
10. Verification of truth tables of basic logic gates using ICs
11. Verification of De Morgan‘s theorems using logic gate ICs.
12. Deflection Magnetometer (Tan A)

Note : Use of digital balance, digital screw gauge, digital calipers are permitted

INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS

Objectives of the course

The course aims at providing an overall view of the

- Operation and troubleshooting of chemical instruments
- Fundamentals of analytical techniques and its application in the characterization of compounds
- Theory of chromatographic separation and
- Theory of thermo/electro analytical techniques
- Stoichiometry and the related concentration terms

UNIT-I

Qualitative and Quantitative Aspects of Analysis

S.I Units, Distinction between Mass and Weight. Moles, Millimoles, Milliequivalence, Molality, Molarity, Normality, Percentage by Weight and Volume, ppm, ppb. Density and Specific Gravity of Liquids. Stoichiometry 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.

UNIT- II

Atomic Absorption Spectroscopy: Basic principles of instrumentation- choice of source, monochromator, detector, choice of flame and Burner designs. Techniques of atomization and sample introduction; Method of background correction, sources of chemical interferences and their method of removal. Techniques for the quantitative estimation of trace level of metal ions from water samples.

UNIT- III

UV-Visible and IR Spectroscopy

Origin of spectra, interaction of radiation with matter, fundamental laws of spectroscopy and selection rules, validity of Beer-Lambert's law.

UV-Visible Spectrometry: Basic principles, instrumentation – choice of source, monochromator 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 Spectroscopy: Basic principles of instrumentation - choice of source, monochromator & detector for single and double beam instrument; sampling techniques.

UNIT-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.

UNIT-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 chromatograms and Rf value.

Recommended Text

1. Vogel, Arthur I: A Test book of Quantitative Inorganic Analysis (Rev. by G.H. Jeffery and others) 5th Ed., The English Language Book Society of Longman.
2. R.Gopalan, P.S.Subramanian and K.Rengarajan, Elements of Analytical Chemistry, Sultan Chand, New Delhi, 2007
3. Skoog, Holler and Crouch, Principles of Instrumental Analysis, Cengage Learning, 6th Indian Reprint (2017).
4. R.Speyer,Thermal Analysis of Materials, CRC Press, 1993.
5. R.A. Dayand A.L. Underwood, Quantitative Analysis, 6thedn., Prentice Hall of India Private Ltd., New Delhi, 1993

Reference Books

1. D.A. Skoog, D. M. West and F. J. Holler, Analytical Chemistry: An Introduction, 5th edn., Saunders college publishing, Philadelphia, 1998.
2. DashU.N, Analytical Chemistry; Theory and Practice, Sultan Chand and sons Educational Publishers, New Delhi, 2011.
3. Christian, Gary D; Analytical Chemistry, 6th Ed., John Wiley & Sons, New York, 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's Textbook of Quantitative Chemical Analysis, sixth edition Pearson Education, 2000

Website and e-learning sources

1. http://www.epa.gov/rpdweb00/docs/marlap/402-b-04-001b-14-final.pdf
2. http://eric.ed.gov/?id=EJ386287
3. http://www.sjsu.edu/faculty/watkins/diamag.htm
4. http://www.britannica.com/EBchecked/topic/108875/separation-and-purification
5. http://www.chemistry.co.nz/stoichiometry.htm

VALUE BASED EDUCATION

Unit-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

Unit-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.

Unit 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

Unit 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

Unit 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

References:

1. Allport, G.W., Vermon, P.E., and Lindzey, G. (1970) study of values, Buston: Houghton Mifflin.
2. Central 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.

Web Resources

1. https://testbook.com/ugc-net-paper-1/value-education

FORENSIC SCIENCE **Naan Mudhalvan (substitute)**

Objectives of the course

This course aims at giving an overall view of

- Crime detection through analytical instruments
- Forgery and its detection
- medical aspects involved

UNIT-I

Poisons

Poisons - types and classification - diagnosis of poisons in the living and the dead - clinical symptoms - postmortem appearances. Heavy metal contamination (Hg,Pb,Cd) of sea foods-use of neutron activation analysis in detecting arsenic in human hair. Treatment in cases of poisoning–use of antidotes for common poisons.

Unit-II

Crime Detection

Accidental explosion during manufacture of matches and fireworks (as in Sivakasi).

Human bombs-possible explosives(gelatin sticks and RDX)-metal detector devices and other security measures for VVIP-composition of bullets and detecting powder burns.

UNIT-III

Forgery and Counterfeiting

Documents - different types of forged signatures - simulated and traced forgeries – inherent signs off or gery methods-writing deliberately modified - uses of ultraviolet rays -comparison of type written letters – checking silver line water mark in currency notes – alloy analysis using AAS to detect counterfeit coins–detection of gold purity in 22carat ornaments– detecting gold plated jewels-authenticity of diamond.

UNIT-IV

Tracks and Traces

Tracks and traces – small tracks and police dogs –footprints – costing
of footprints – residue prints, walking patternorty 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.

UNIT-V

Medical Aspects

Aids – causes and prevention- misuse of scheduled drugs-burns and their treatment by plastic surgery. Metabolite analysis using mass spectrum - Gas chromatography-Arson -natural fires and arson - burning characteristics andchemistryofcombustiblematerials-natureofcombustion.Ballistics- classification - internal and terminal ballistics - small arms -laboratory examination of barrel washing and detection of powder residue by chemical tests.

Reference Books

1. Richard Saferst in and Criminalistics-An Introduction to Forensic Science (College Version), Sopfestein, Printice hall, eighth edition,2003
2. Suzanne Bell, Forensic Chemistry, Pearson, second international edition, 2014.
3. JaySiegel,Forensicchemistry:Fundamentalsandapplications,Wiley- Blackwell, first edition,2015.
4. Max. M.Houck&Jay.A.Segal,(2006), FundamentalsofForensicScience, Elsevier Academic press.
5. HenryC.Lee,TimothyPalmbach,MarilynT.Miller,(2006), Henry Lee's Crime Scene Book Elsevier Academic press.

Website and e-learning source

1. http://www.library.ucsb.edu/ist/03-spring/internet.html
2. http://www.wonderhowto.com/topic/forensic-science/