MANONMANIAM SUNDARANAR UNIVERISTY,
TIRUNELVELI-12

SYLLABUS

UG - COURSES – AFFILIATED COLLEGES

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

Semester-III				
Part	**Subject Status**	**Subject Title**	**Subject Code**	**Credit**
III	CORE	ORGANIC SYNTHESIS AND PHOTOCHEMISTRY	WCHM31	5
III	CORE	COORDINATION CHEMISTRY-I	WCHM32	5
III	PRACTICAL	INORGANIC CHEMISTRY PRACTICAL-II	WCHL31	4
III	PRACTICAL	ANALYTICAL CHEMISTRY PRACTICAL	WCHL32	4
III	Elective- V	BIOMOLECULES AND HETEROCYCLIC COMPOUNDS	WCHE32	4
III	SEC - 2	FORENSIC CHEMISTRY	WCHSE31	2
		INTERNSHIP / INDUSTRIAL VISIT / FIELD VISIT / KNOWLEDGE UPDATING ACTIVITIES SUCH AS RESEARCH INSTITUTE VISIT	WCHI31	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

ORGANIC SYNTHESIS AND PHOTOCHEMISTRY

Objectives

- To understand the molecular complexity of carbon skeletons and the presence of functional groups and their relative positions.
- To study various synthetically important reagents for any successful organic synthesis.
- To apply disconnection approach and identifying suitable synthons to effect successful organic synthesis.
- To learn the concepts of pericyclic reaction mechanisms.
- To gain the knowledge of organic photochemical reactions.

UNIT-I

Planning an Organic Synthesis and Control elements: Preliminary Planning – knowns and unknowns of the synthetic system studied, analysis of the complex and interrelated carbon framework into simple rational precursors, retrosynthetic analysis, alternate synthetic routes, key intermediates that would be formed, available starting materials and resulting yield of alternative methods. Linear Vs convergent synthesis based on umpolung concepts of Seeback, regiospecific control elements. Examples on retrosynthetic approach, calculation of yield, advantages of convergent synthesis, synthesis of stereochemistry-controlled products.

UNIT-II

Organic Synthetic Methodology: Retrosynthetic analysis; Alternate synthetic routes. Synthesis of organic mono and bifunctional compounds via disconnection approach. Key intermediates, available starting materials and resulting yields of alternative methods. Convergent and divergent synthesis, Synthesis based on umpolung concepts of Seebach. Protection of hydroxyl, carboxyl, carbonyl, thiol and amino groups. Illustration of protection and deprotection in synthesis. Control elements: Regiospecific control elements. Use of protective groups, activating groups, and bridging elements. Stereospecific control elements. Functional group alterations and transposition.

UNIT-III

Pericyclic Reactions: Woodward Hoffmann rules; The Mobius and Huckel concept, FMO, PMO method and correlation diagrams. Cycloaddition and retrocycloaddition reactions; [2+2], [2+4], [4+4, Cationic, anionic, and 1,3-dipolar cycloadditions. Cheletropic reactions. ; Electrocyclization and ring opening reactions of conjugated dienes and trienes. Sigmatropic rearrangements: (1,3), (1,5), (3,3) and (5,5)-carbon migrations, degenerate rearrangements. Ionic sigmatropic rearrangements. Group transfer reactions. Regioselectivity, stereoselectivity and peri selectivity in pericyclic reactions.

UNIT-IV

Organic Photochemistry-I: Photochemical excitation: Experimental techniques; electronic transitions; Jablonskii diagrams; intersystem crossings; energy transfer

processes; Stern Volmer equation. Reactions of electronically excited ketones; $\pi \rightarrow \pi^*$ triplets; Norrish type-I and Norrish type-II cleavage reactions; photo reductions; Paterno-Buchi reactions;

UNIT-V

Organic Photochemistry-II: Photochemistry of α, β- unsaturated ketones; cis-trans isomerisation. Photon energy transfer reactions, Photo cycloadditions, Photochemistry of aromatic compounds; photochemical rearrangements; photo-stationery state; di- π-methane rearrangement; Reaction of conjugated cyclohexadienone to 3,4-diphenyl phenols; Barton's reactions.

Recommended Text

1. F.A.Carey and Sundberg, Advanced Organic Chemistry, 5th ed, Tata McGraw-Hill, New York, 2003.
2. J.March and M. Smith, Advanced Organic Chemistry, 5th ed., John-Wiley and sons, 2007.
3. R.E.Ireland, Organic synthesis, Prentice Hall India, Goel publishing house, 1990.
4. Clayden, Greeves, Warren, Organic Chemistry, Oxford University Press, Second Edition, 2016.
5. M.B.Smith, Organic Synthesis 3rd edn, McGraw Hill International Edition, 2011.

Reference Books

1. Gill and Wills, Pericyclic Reactions, Chapman Hall, London, 1974.
2. J.A. Joule, G.F. Smith, Heterocyclic Chemistry, Garden City Press, Great Britain, 2004.
3. W.Caruthers, Some Modern Methods of Organic Synthesis 4thedn, Cambridge University Press, Cambridge, 2007.
4. H.O.House. Modern Synthetic reactions, W.A. Benjamin Inc, 1972.
5. Jagdamba Singh and Jaya Singh, Photochemistry and Pericyclic Reactions, New Age International Publishers, New Delhi, 2012.

Website and e-learning source

1. https://rushim.ru/books/praktikum/Monson.pdf

COORDINATION CHEMISTRY – I

Objectives

- To gain insights into the modern theories of bonding in coordination compounds.
- To understand and construct correlation diagram and predict the electronic transition that are taking place in the complexes and magnetic properties of complexes.
- To learn various methods to determine the stability constants of complexes

- To describe various substitution and electron transfer mechanistic pathways of reactions in complexes
- To study the reactions of octahedral and tetrahedral complexes.
- To analyze different types photochemical reaction and their application in coordination complexes

UNIT-I

Modern theories of coordination compounds: Crystal field theory splitting of d orbitals in octahedral, tetrahedral and square planar symmetries, factors affecting 10Dq , crystal field stabilisation energy for high spin and low spin Oh and Td complexes, Applications CFSE, Jahn Teller distortions and its consequences. Ligand filed theory-.Molecular Orbital Theory and energy level diagrams: Sigma and pi bonding in octahedral, square planar and tetrahedral complexes.

UNIT-II

Spectral and Magnetic characteristics of coordination compounds: Spectral Characteristics: Microstate and Term symbol for d ions Characteristics of d-d transitions, charge transfer spectra, selection rules for electronic spectra - Orgel diagrams for d^1 to d^9 configurations - Tanabe Sugano diagram for octahedral d^6 complexes, nephelauxetic effect- Racha parameter and calculation of β and 10Dq octahedral d^2 and d^8 complexes

Magnetic characteristics: Basic terminology – Types of magnetic behavior-Determination of magnetic susceptibility by Guoy Balance and

Faraday methods -Spin-orbit coupling, effect of spin-orbit coupling on magnetic moments, quenching of orbital magnetic moments- Spin –state cross over - Magnetic properties of complexes with A , E and T terms. Magnetic properties of Lanthanides and Actinides – Comparison of magnetic properties of Oh, Td and square planar complexes of Fe(II),Co(II),Ni(II) and Cu(II).

UNIT-III

Stability of Coordination of complexes

Kinetic and thermodynamic stability - Inert and Labile complexes - Factors affecting stability of complexes, Stepwise and overall formation constants, Stability correlations - statistical factors, Irving William series, Macrocyclic and chelate effect. Determination of stability constant and composition of complex ions: Solubility method, Electrochemical method, Potentiometric method, Spectrophotometric method, Polorographic method and Continuous variation method (Job's method).

UNIT-IV

Kinetics and mechanisms of substitution reactions in coordination complexes:

Classification of inorganic reaction and reaction mechanism- Associative S_N2, Dissociative S_N1,interchange, S_N^1CB mechanistic pathways for substitution reactions in octahedral complexes; acid and base hydrolysis of octahedral complexes; Classification of metal ions based on rate of water replacement reaction and their correlation to Crystal Field Activation Energy; Substitution reactions in square planar complexes: Eigen-Wilkins mechanism; Trans effect, theories of trans effect and

applications of trans effect in synthesis of square planar compounds; Kurnakov test.

UNIT-V

Electron Transfer reactions and Photochemistry of coordination complexes:

Electron Transfer reactions in octahedral complexes: Outer sphere electron transfer reactions and Marcus-Hush theory; inner sphere electron transfer reactions - nature of the bridging ligand in inner sphere electron transfer reactions. Complementary and Non Complementary electron transfer reactions.

Photochemistry: Photochemical excitation in the transition metal complexes: Properties of THEXI states- Photophysical processes: bimolecular deactivation and energy transfer, Photochemical processes: Photo-redox, photo-substitution and photo-isomerisation reactions of Cr (III) and Co (III) complexes- Photophysical and photochemical properties of [Ru(bpy)3]2+. Applications of inorganic photochemistry: photochemical conversion and storage of solar energy-photochemical conversion of N2 to NH3. – TiO2 as a green photocatalyst in removing air and water pollutants.

Recommended Text

1. J.E. Huheey, E.A Keiter, R.L Keiter and O.K Medhi, Inorganic Chemistry – Principles of structure and reactivity, 4th Edition, Pearson Education Inc., 2006
2. G.L. Meissler and D A.Tarr, Inorganic Chemistry, 3rd Edition, Pearson Education Inc., 2008
3. D.Bannerjea, Co-ordination Chemistry, TATA Mcgraw Hill, 1993.
4. B.N.Figgis, Introduction to Ligand Fields, Wiley Eastern Ltd, 1976.
5. F.A. Cotton, G. Wilkinson.; C. A. Murillo; M. Bochmann, Advanced Inorganic Chemistry, 6thed.; Wiley Inter-science: New York, 1988.
6. Asim K Das and Mahua Das, Fundamental concepts of inorganic chemistry,1st eBook edition, Volume 4, CBS publishers and distributors PVT Ltd,2019.
7. B.R.Puri,L.R.Sharma and K.C.Kalia,Principles of inorganic chemistry,Vishal publications,33rd edition,2016.
8. S.K.Agarwal and Keemti Lal, Advanced inorganic chemistry, Pragati Prakashan Educational publication,5th edition,2016.
9. R.L.Carlin,Magnetochemistry,Springer erlag,Berlin,Germany,1986.
10. A.Earnshaw, Introduction to Magneto-chemistry, Acdamic Press, Newyork, USA, 1968.

Reference Books

1. Keith F. Purcell and John C. Kotz, Inorganic Chemistry, Saunders Publications, USA, 1977.
2. Peter Atkins and Tina Overton, Shriver and Atkins' Inorganic Chemistry, 5th Edition, Oxford University Press, 2010.
3. F.A. Cotton, G. Wilkinson, P. L. Guas, Basic Inorganic Chemistry John Wiley, 2002, 3rd edition.
4. B. Douglas, D. McDaniel, J. Alexander, Concepts and Models of Inorganic Chemistry,John Wiley, 1994, 3rd edition.
5. Asim K Das and Mahua Das, Fundamental concepts of inorganic chemistry,1st eBook edition, Volume 5, CBS publishers and distributors PVT Ltd,2019.
6. Ajai Kumar, Coordination chemistry, Aaryush Educations publications, 1st

edition, 2014.
7. D.M.Roudhill, Photochemistry and Photophysics of metal complexes, Springer science + Business, media New York, 1st edition 1994.
8. R.Gopalan and V.Ramalingam, Concise Coordination chemistry, Vikas publishing house PVT Ltd 1st edition,2001.

Website and e-learning source

1. https://ocw.mit.edu/courses/5-04-principles-of-inorganic-chemistry-iifall-2008/pages/syllabus/
2. https://teachmint.storage.googleapis.com/public/555766642/StudyMaterial/4730da7d-1f2a-4a70-a473-0cc7cd84dc13.pdf

INORGANIC CHEMISTRY PRACTICAL-II

Objectives

- To understand and enhance the analytical tool for the quantitative estimation of ions.
- To recall the principle and theory in preparing standard solutions.
- To train the students for improving their skill in estimating the amount of ions accurately present in the solution
- To estimate metal ions, present in the given solution accurately without using instruments.
- To determine the amount of ions, present in a binary mixture by volumetric and gravimetric methods.

UNIT-I

Preparation and analysis of metal complexes by titrimetric analysis:

1. Preparation of tris(thiourea)copper(I)sulphate dihydrate
2. Preparation of potassium tris(oxalato)chromate(III) trihydrate
3. Preparation of tetramminecopper(II) sulphate
4. Preparation of hexa(thiourea)copper(I) chloride dihydrate
5. Preparation of potassium tris(oxalato)ferrate(III) trihydrate

Unit- II

Quantitative estimation of a mixture containing two metal ions (Volumetric and Gravimetric Estimations)

1. Estimation of mixture of Cu2+(V) and Ni2+(G)ions.
2. Estimation of mixture of Fe2+(V)and Cu2+(G)ions.
3. Estimation of mixture of Fe2+(V) and Ni2+(G)ions.
4. Estimation of Cu2+(V) and Ba2+(G) ions.
5. Estimation of Cu2+(V)and Zn2+(G) ions.

Recommended Text

1. Mounir A. Malati, Experimental Inorganic/Physical Chemistry – An Investigative, Integrated Approach to Practical Project Work, Woodhead Publishing Limited, Reprint, 2010.
2. G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denney, Vogel's Textbook of Quantitative Chemical Analysis, Revised 5th edition, ELBS, 1989.
3. Douglas A. Skoog, Donald M. West, F. James Holler and Stanley R. Crouch,

Fundamentals of Analytical Chemistry, 8th Edition, Brooks/Cole- Thomson Learning, USA, 2004.

Reference Books

1. G.Pass, and H. Sutcliffe, Practical Inorganic Chemistry; Chapman Hall, 1965.
2. W.G. Palmer, Experimental Inorganic Chemistry; Cambridge University Press, Reprint 1970.
3. I.M.Kolthoff and V.A.Stenger, Volumetric Analysis ,2nd Edition, Interscience Publishers, New Delhi,1947
4. Vogel's Text book of Quantative Analysis, 5th ed., London.

ANALYTICAL CHEMISTRY PRACTICAL

Objectives

- To design chromatographic for identification of species.
- To analyze different constituents through instrumental methods of analysis.
- To evaluate different contaminants in materials using spectrophotometry.
- To design experiments for analysis of inorganic and organic materials.
- To analyze constituents in materials using potentiometry and cyclic voltammetry.

UNIT-I:

1. Potentiometric titration of HCl Vs NaOH
2. Determination of pKa of weak acid by EMF method.
3. Potentiometric titration of FAS Vs K2Cr2O7
4. Potentiometric titration of KI Vs KMnO4.
5. Potentiometric titration of a mixture of Chloride and Iodide Vs AgNO3.
6. Determination of the pH of buffer solution by EMF method using Quinhydrone and Calomel electrode.
7. Study of the inversion of cane sugar in the presence of acid by Polarimetric method.

UNIT-II:

1. Estimation of Fe and Ni by colorimetric method.
2. Determination of spectrophotometrically the mole ratio of the ferrithiocyanate complex and equilibrium constant for the complex formation.
3. Determination of the amount (mol/L) of ferricyanide present in the given solution using cyclic voltammetry.
4. Determination of the standard redox potential of ferri-ferrocyanide redox couple using cyclic voltammetry.
5. Estimation of the amount of nitrate present in the given solution using spectrophotometric method.
6. Analysis of water quality through COD, DO, BOD measurements.
7. Assay of Riboflavin and Iron in tablet formulations by spectrophotometry
8. Estimation of chromium in steel sample by spectrophotometry
9. Separation of (a) mixture of Azo dyes by TLC (b) mixture of metal ions by Paper chromatography.
10. Estimation of chlorophyll in leaves and phosphate in waste water by colorimetry.

UNIT-III:

Interpretation and identification of the given spectra of various organic compounds arrived at from the following spectral techniques.

1. UV-Visible
2. IR
3. NMR
4. ESR

Recommended Text

1. Vogel's Text book of Practical Organic Chemistry, 5th Ed, ELBS/Longman, England, 2003.
2. G.H.Jeffery, J. Bassett, J. Mendham and R. C. Denney, Vogel's Textbook of Quantitative Chemical Analysis; 6th ed., ELBS, 1989.
3. J.D.Woollins, Inorganic Experiments; VCH: Weinheim, 1995.
4. B.Viswanathan and P.S.Raghavan, Practical Physical Chemistry, Viva Books, New Delhi,2009.
5. Sundaram, Krishnan, Raghavan, Practical Chemistry (Part II), S. Viswanathan Co. Pvt., 1996.

Reference Books

1. N.S. Gnanapragasam and G. Ramamurthy, Organic Chemistry – Labmanual, S. Viswanathan Co. Pvt. Ltd, 2009.
2. J.N. Gurtu and R. Kapoor, Advanced Experimental Chemistry, S. Chand and Co., 2011.
3. J.B. Yadav, Advanced Practical Physical Chemistry, Goel Publishing House, 2001.
4. G.W. Garland, J.W. Nibler, D.P. Shoemaker, Experiments in Physical Chemistry, 8th edition, McGraw Hill, 2009.
5. J.N. Gurthu and R. Kapoor, Advanced Experimental Chemistry, S. Chand and Co., 1987.

Website and e-learning source

1. https://bit.ly/3QESF7t
2. https://bit.ly/3QANOnX

BIOMOLECULES AND HETEROCYCLIC COMPOUNDS

Objectives

- To learn the basic concepts and biological importance of biomolecules.
- To explain various functions of carbohydrates, proteins, nucleic acids, steroids and hormones.
- To elucidate the structure determination of biomolecules
- To extract and construct the structure of new steroids , hormones, proteins and nucleic acids.

UNIT-I

Chemistry and metabolism of carbohydrates: Definition, classification and biological role of carbohydrates. monosaccharides: Linear and ring structures

(Haworth formula) of ribose, glucose, fructose and mannose (structure determination not required), physical and chemical properties of glucose and fructose. Disaccharides: Ring structures (Haworth formula) –occurrence, physical and chemical properties of maltose, lactose and sucrose. Polysaccharides: Starch, glycogen and cellulose – structure and properties, glycolysis of carbohydrates.

UNIT-II

Steroids and Hormones: Steroids-Introduction, occurrence, nomenclature, configuration of substituents. Diels' hydrocarbon, stereochemistry, classification, biological importance, colour reactions of sterols, cholesterol-occurrence, tests, physiological activity, biosynthesis of cholesterol from squalene. Hormones-Introduction, classification, functions of sex hormones- androgens and estrogens, adrenocortical hormones-cortisone and cortisol structure and functions of non-steroidal hormones-adrenaline and thyroxine.

UNIT-III

The Criteria for Aromaticity and Hückel's Rule Classification of Heterocycles-Nomenclature of Heterocyclic Compounds Hantzsch-Widman rules- Preparation and properties of Aziridine, Oxirane, azetines, azetidines, oxetanes and thietanes-Preparation and properties of triazole and tetrazoles. Six-membered heterocycles with heteroatom: Synthesis and reactions of pyrylium salts and pyrones, coumarins, chromones, pyridine, pyrimidine etc.

UNIT-IV

Fused Ring Heterocyclic Compounds: Benzo fused five membered rings: Indole, isoindole, benzofuran and benzo thiophene, Preparation and properties. Benzo fused six membered rings: Quinoline and isoquinoline: Preparation by ring closure reactions, Reactions: Mechanism of electrophilic and nucleophilic substitutions, oxidation and reduction reactions.

UNIT-V

Proteins and nucleic acids: Separation and purification of proteins – dialysis, gel filtration and electrophoresis. Catabolism of amino acids - transamination, oxidative deamination and decarboxylation. Biosynthesis of proteins: Role of nucleic acids. Amino acid metabolism and urea cycle. Structure, methods for the synthesis of nucleosides - direct combination, formation of heterocyclic base and nucleoside modification, conversion of nucleoside to nucleotides. Primary and secondary structure of RNA and DNA, Watson-Crick model, solid phase synthesis of oligonucleotides.

Recommended Text

1. T.K Lindhorst, Essentials of Carbohydrate Chemistry and Biochemistry, Wiley VCH,North America,2007.
2. I.L. Finar, Organic Chemistry Vol-2, 5th edition,Pearson Education Asia, 1975.
3. V.K. Ahluwalia and M. Goyal, Textbook of Heterocyclic compounds, Narosa Publishing, New Delhi,2000.

4. M.K. Jain and S. C. Sharma, Modern Organic Chemistry, Vishal Publishing Co., Jalandhar, Delhi, 2014.
5. V.K. Ahluwalia, Steroids and Hormones, Ane books pub., New Delhi,2009.

Reference Books

1. Acheson, R.M. (1976). An Introduction to the Chemistry of Heterocyclic Compounds, Wiley India Pvt. Ltd.
2. I.L. Finar, Organic Chemistry Vol-1, 6thedition, Pearson Education Asia,2004.
3. Pelletier, Chemistry of Alkaloids, Van Nostrand Reinhold Co,2000.
4. Shoppe, Chemistry of the steroids, Butterworthes,1994.
5. I.A. Khan, and A. Khanum. Role of Biotechnology in medicinal & aromatic plants, Vol 1 and Vol 10, Ukkaz Publications, Hyderabad,2004.
6. M.P. Singh. and H. Panda, Medicinal Herbs with their formulations, Daya Publishing House, Delhi,2005.

Website and e-learning source

1. ps://www.organic-chemistry.org/
2. ps://www.studyorgo.com/summary.php
3. ps://www.clutchprep.com/organic-chemistry

FORENSIC CHEMISTRY

Objectives

- To understand the knowledge of forensic science and biometric methods.
- To acquire knowledge of finger printing.
- To learn the concepts of forensic analysis.
- To help the students to study forensic toxicology.
- To gain the knowledge of cyber crimes.

UNIT I : ELEMENTARY FORENSIC SCIENCE

Definition of Forensic science, The role of Forensic laboratory, Biometrics in Personal Identification- Introduction, Concepts of Biometric Authentication, Role in person Identification, - Face Recognition, IRIS, Retina Geometry, Hand Geometry, Speaker Recognition, Signature Verification.

UNIT II : FINGER PRINTING AND FORENSIC SEROLOGY

Fingerprinting - General principles of Finger Printing, Fingerprint Detection - Powder tests: – dry powder method, detection using cellophane tape,- Chemical tests: – silver nitrate test, iodine fuming, ninhydrin, superglue (cyanoacrylate)and ruthenium oxide tests. Forensic Serology – Blood types, Characterization of Blood stains, Blood stains patterns. Testing of Saliva .

UNIT III: FORENSIC ANALYSIS

Forensic Drug Analysis: How drugs work - analysis of selected drug classes – Gamma hydroxybutyric acid (GHB), Gamma butyro lactone (GBL), Marijuana, Anabolic steroids, Heroin, Cocaine, Amphetamines.

Forensic analysis of Inks and paints :Questioned documents – Physical analysis, chemical analysis of inks and paper – analytical methods – Optical microscopy, fluorescent techniques, TLC, FT-IR.

UNIT IV: FORENSIC TOXICOLOGY

Forensic Toxicology: Overview - Sample types – Blood and Plasma, Urine, Vitreous fluid, Hair. Types of Forensic Toxicology – Alcohol, Postmortem toxicology, Sport Toxicology. Analytical methods in Forensic Toxicology – Breath alcohol test (BrAC). An introduction to DNA, Forensic DNA typing - methods of DNA typing - RFLP and PCR methods – Procedures for DNA typing, Applications of DNA testing.

UNIT V : CYBER CRIME TECHNOLOGY AND FORENSIC SCIENCE

Use of computers in Forensic science: Forensic Databases, Image Databases, DNA Database. Forensic Archiving of X-Ray Spectra, Video Image Processing and Animation Software, Use of Networks in Forensic Science.

Computer related crime: Definitions and types - Framework for Investigating Computer- Related Crime, Human Aspects of Computer- Related Crime.

Recommended Text

1. Anil K. Jain, Arun A. Ross and Karthik Nandakumar, Introduction to Biometrics, Springer, 2011.
2. David E. Newton, Forensic Chemistry, Fact on File, Inc, 2007.
3. Suzanne Bell, Forensic Chemistry, Pearson International, Second Edition, 2014.
4. Edited by Stuart H. James and Jon J. Nordby, Forensic Science – An Introduction to Scientific and Investigative Techniques, CRC Press, 2003.

Reference Books

1. Saferstein R, Criminalistics: An introduction to Forensic Science: Prentice Hall, Eaglewood cliffs, New Jersey, 2001.
2. Editor – G.R. Sinha, Advances in Biometrics - Modern Methods and Implementation Strategies, Springer, 2019.
3. Editor – Jay A. Siegel, Forensic Chemistry -Fundamentals and applications, Wiley-Blackwell, First edition, 2016.
4. Max M. Houck, Forensic Science-Modern methods of solving crime, Praeger Publishers, 2007.
5. Kelly M. Elkins, Introduction to Forensic chemistry, CRC Press, 2019.
6. Matthew Johll, Investigating Chemistry: A Forensic Science Perspective, W.H. Freeman & Co, Second Edition, 2008.

Website and e-learning source

1. https://drive.uqu.edu.sa/_/rajastania/files/Forensic/simpson-forensicmedicine.pdf
2. https://www.gutenberg.org/ebooks/19022
3. https://www.gutenberg.org/ebooks/44552
4. https://drive.google.com/file/d/1-VFFDM8iGlcFjI2yr8wDEhjTxJ7Q7tQ0/view
5. https://drive.google.com/file/d/1plhu7lZnjJpPiYg05lWl4BL1v-XMvMcC/view
6. https://archive.org./details/forensicchemistr0000davi
7. https://www.bg.ac.rs/wp-content/uploads/2021/01/Forensic-chemistry-Handbook-by -Lawrence-Kobilinsky.pdf