A.VEERIYA VANDAYAR MEMORIAL

SRI PUSHPAM COLLEGE (AUTONOMOUS)

POONDI-613 503, THANJAVUR (DT)

SYLLABUS

M.Sc., Chemistry

(From 2020 - 2021 onwards)

PROGRAM SPECIFIC OUTCOME

On completion of M.Sc. Chemistry, Students will acquire a knowledge on organic synthesis and medicinal chemistry which will be useful to get job in research and development (R ɑ D) in all pharmaceutical industry. R ɑ D is the heart of the pharma industry so they may get good salary. Students acquire knowledge about analytical chemistry. This can be useful to get placement in quality control and formulation department in analytical lab. Students can get Government job in forensics science department by writing Tamil Nadu Public Service Commission, forensic science- scientific assistant grade - II examination. After completing M.Sc Chemistry, students are able to become a industrialist in various field like Textile, dye, plastic, fertilizer industry, etc.,

PROGRAM OUTCOME

Students are able to demonstrate and apply the fundamental knowledge of the basic principles in various fields of Chemistry. Create awareness and sense of responsibilities towards environment and apply knowledge to solve the issues related to Environmental pollution. Apply knowledge to build up small scale industry for developing endogenous product.

M.Sc., Chemistry (2020 – 2021) on wards

Semester	Category	Course Code	Title of the course	Maximum Marks			Minimum Marks			Hours/ Week	Credits
				C.I.A	E.E.	Total	C.I.A.	E.E	Total		
I	Core	20P1CHC1	Physical Chemistry – I	25	75	100	10	30	50	7	5
	Core	20P1CHC2	Inorganic Chemistry – I	25	75	100	10	30	50	6	5
	Core	20P1CHC3	Analytical chemistry	25	75	100	10	30	50	6	5
	Core	20P1CHCP1	Physical Chemistry Practical–I (non Electrical)	40	60	100	16	24	50	6	3
	Major Elective	20P1CHEL1A/ 20P1CHEL1B	Medicinal Chemistry/ Spectroscopy	25	75	100	10	30	50	5	3
II	Core	20P2CHC4	Organic Chemistry – I	25	75	100	10	30	50	5	5
	Core	20P2CHC5	Physical Chemistry – II	25	75	100	10	30	50	5	5
	Core	20P2CHC6	Inorganic Chemistry - II	25	75	100	10	30	50	5	5
	Core	20P2CHC7	Industrial Chemistry	25	75	100	10	30	50	5	4
	Core	20P2CHCP2	Physical Chemistry Practical-II (Electrical)	40	60	100	16	24	50	5	3
	Major Elective	20P2CHEL2A 20P2CHEL2B	Material Chemistry/ Cheminformatics	25	75	100	10	30	50	5	4
	Extra credit		MOOC (**M**assive **O**pen **O**nline **C**ourse)	-	-	-	-	-	-	-	-
III	Core	20P3CHC8	Organic Chemistry – II	25	75	100	10	30	50	5	5
	Core	20P3CHC9	Physical Chemistry-III	25	75	100	10	30	50	5	5
	Core	20P3CHC10	Inorganic Chemistry - III	25	75	100	10	30	50	5	5
	Core	20P3CHCP3	Organic Practical – I	40	60	100	16	24	50	5	3
	Core	20P3CHCP4	Organic Practical – II	40	60	100	16	24	50	5	3
	EDC	20P3CHEDC	Chemistry in Every Day life	25	75	100	10	30	50	4	
		Communicative skill & Personality development(N.S)								1	
	Extra credit		MOOC (**M**assive **O**pen **O**nline **C**ourse)	-	-	-	-	-	-	-	-
IV	Core	20P4CHC11	Organic Chemistry – III	25	75	100	10	30	50	6	6
	Core	20P4CHCP5	Inorganic Practical – I	40	60	100	16	24	50	6	3
	Core	20P4CHCP6	Inorganic Practical – II	40	60	100	16	24	50	6	3
	Major Elective	20P4CHC3A/ 20P4CHC3B	Recent Trends in Chemistry/ Applied Chemistry	25	75	100	10	30	50	6	4
		20P4CHCK	Comprehensive Knowledge Test	-	-	100	-	-	-	4	2
		20P4CHPR	Industrial internship/Project (Along with Industrial visit)	40	60	100	16	24	50	2	4
		Communicative skill and personality development								1	

M.Sc., Chemistry (2020 – 2021)

Nature of Courses	Total No. of course	Total Marks	Total Credits	Classification
Core	**17**	**1700**	**72**	
Elective	**03**	**300**	**12**	
EDC	**01**	**100**	**-**	
Project	**01**	**100**	**04**	
Comprehensive viva	**01**	**100**	**02**	
Communicative skill and personality development	**-**	**-**	**0**	
Extra credit-online course MOOC	-	-	**-**	**-**
Total	**23**	**2300**	**90**	

GRADING OF COURSE PERFORMANCE (10 POINT SCALE)

Aggregate Marks	Grade	Grade point
96 and above	**S+**	**10**
91-95	**S**	**9.5**
86-90	**D++**	**9.0**
81-85	**D+**	**9.0**
76-80	**D**	**8.0**
71-75	**A++**	**7.5**
66-70	**A+**	**7.0**
61-66	**A**	**6.5**
56-60	**B**	**6.0**
50-55	**C**	**6.5**

Comprehensive Knowledge Test: Objective type question pattern with 100 compulsory questions carrying 100 marks to be answered in 3 Hours with 2 Credits. The portion is entire core courses.

Industrial Internship: Students have to undergo In-Plant training in Industry or Organization where any process related to Chemistry is going on. The period of training should be minimum 10 days. Students have to submit the report of the training underwent with the certificate from the concerned authority of the Industry /Organanisation.

Industrial visit: Students have to attach a report on the Industrial visit made with the counter signature of staff in charge for the Industrial visit while submitting the Project /Industrial internship report.

MOOC: Massive open online course is introduced in the second and third semester as an extra credit course from this academic year 2020-2021. Students can avail any one or more of the courses available in MOOC to equip their skill and knowledge themselves.

Field Visit / Industrial Visit / Hands on training programme having minimum 15 hours of contact time as Extra Credit course is introduced for I year PG students to gain experiential learning

Evaluation of the visit report will be held at the end of II Semester.

Components of Evaluation

Internal Marks	40
External marks	60
Total	100

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
I	**20P1CHC1**	**Physical Chemistry – I**	**7**	**6**

OBJECTIVES

- To learn about the basics of group theory, symmetry of molecules, building a character table and its applications.
- To know about the mathematics of quantum chemistry and the concepts of Schrodinger equation.
- To identify about the theories of reaction rates.
- To expose theconcepts and applications of reaction kinetic chemistry.
- To acquire knowledge on the principle and chemical reactions involve in photo chemistry.

UNIT – 1 Group theory

Principles – Elements of group theory –properties of a group and subgroup-classes-group multiplication tables – symmetry elements and operations – inter relations among symmetry operation -point groups of molecules - Matrix representations theory– reducible and irreducible representations – Great orthogonality theorem and its consequences –construction of character tables (C_{2V}, C_{3V})

Applications of group theory: Hybridization schemes for atoms in molecules of different geometry - AB_4 tetrahedral, AB_3trigonal planar - Symmetry selection rules for IR and Raman Spectra. -Mutual exclusion rule -Symmetries of vibrational modes in non-linear molecules (H_2O, NH_3 and BF_3 only) and IR & Raman active - Vibration modes -Comparison of crystal symmetry with molecular symmetry.

UNIT – 2 Quantum Chemistry – I

Inadequacy of classical mechanics, Black body radiation, Planck's quantum concepts, Photoelectric effect. Bohr's theory of hydrogen atom: Hydrogen spectra, de Broglie principal , Uncertainty principle, Inadequacy of Bohr theory.

Wave equation, Derivation of time dependent and independent Schrodinger equation-Postulates of quantum mechanics, well behaved function- orthogonality and normalization. Operator algebra: operator, linear and hermitian, Verification of operators Hamiltonian - Eigen functions and Eigen values, angular momentum operator, communication relations, related theorems.

Applications of wave mechanics to simple systems – particle in a box, one,two and three – dimensional, distortion of the box, quantum numbers, zero – point energy, finite potential barrier

UNIT 3 : Chemical Kinetics – I

Theories of reaction rates and reaction mechanism - Arrhenius equation - Potential energy surfaces and reaction coordinates - Collision theory – ARRT(thermodynamic treatmentonly)–Applications of ARRT to unimolecular, bimolecular and termolecular reactions - Kinetic isotope effect, iso kinetic relation and temperature - Theories of unimolecular reactions - Lindemannand RRK - Principle of microscopic reversibility-Steady state approximationChain reactions. Thermal and photochemical reactions between hydrogen and halogens – Explosions and hydrogen – oxygen reactions.

UNIT 4: Chemical Kinetics – II

Application of ARRT to solution kinetics - Factors affecting reaction rate in solution-. Internal pressure - Solvent dielectric constant - Ionic strength -Hydrostatic pressure - Ion-dipole and dipole-dipole reactions – van't Hoffequation and volume of activation - Catalysis Characterics of a catalyst –Factors affecting Catalytic reactions - Types of Catalysis – homogeneous catalysis – Acid base catalysis – Van't Hoff and Arrhenius intermediates-Mechanism - protolytic and prototropic catalysis laws - Acidity functions -Hammett - Zucker hypothesis - Catalysis in biological systems. Michaelis -menten equation – Lineweaver - Burk and Eadie-Hofstee plots - influency of substrate concentration, pH, and temperature on rate - Influence of substituent's on reaction rates – Hammett and Taft equations - Linear free energy relations

UNIT – 5 Photochemistry:

Introduction - Difference between thermal and photochemistry- Jablonski diagram depicting various processes occurring in the excited state- Qualitative description of fluorescence and phosphorescence - Quantum yield and its determination - Actinometry - Reactions with low and high quantum yields - Photo sensitisation – Dissociation of H2, Photosynthesis - Photodimerisation of anthracene, decomposition of HI and HBr - - Photochemical equilibrium - Chemieluminescence-Kinetics of collisional quenching-Stern - Volmer equation - Photo Galvanic cells.

COURSE OUTCOME:

After completion of this course students will be able to

- assess the basics of group theory, symmetry of molecules andconstruction of character table.
- aware the mathematics of quantum chemistry and the concepts of Schrodinger equation.
- categorize the theories of reaction rates.
- analyse the concepts and applications of reaction kinetics.
- identify the principle and chemical reactions involved in photo chemistry.

Reference:

1. Albert Cotton,Chemical Applications of Group Theory, Third Edition John Wiley & Singapore 2003.
2. R.K.Prasad,Quantum chemistry
3. A.K. Chandra, Introduction Quantum Chemistry 4th ed., Tata McGraw Hill 1984.
4. D.A. Mcquarroe, Quantum Chemistry, University Science Books, 1998. F.L. Pillar Elementary Quantum Chemistry, McGraw Hill, 1968.
5. S.Jayanthi and M.Pramesh, Group theory and statistical thermodynamics , saratha pathippagam,2008
6. S.K.Jain, Kinetis of chemical reactions
7. Puri, Sharma and pathania, principles of physical chemistry

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
I	**20P1CHC2**	**Inorganic Chemistry - I**	**6**	**6**

OBJECTIVES

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- To familiarize the basic concept of acids and bases and the basis of Hard-Soft-Acid-Base theory.
- To have an idea about the fundamentals and instrumentation of nuclear chemistry.
- To strengthen the knowledge about the applications of nuclear chemistry in theoretical and analytical fields.
- To demonstrate the extention of the conceptabout the structures and properties of inorganic chains, rings, cages and clusters.
- To motivate the learnerabout the chemistry of inner transition elements and their applications.

UNIT – 1 :**Acids and Bases**

Bronsted and Lewis acids and bases pH, pKa, acid – base concept in non aqueous medium buffer solution , Protonic Acids – Proton Affinities – Differentiating and leveling solvents – Acidic-Behaviour of the Binary hydrides – strength of oxyacids – Hydrolysis – Amphoteric oxides – Non protonic concepts of acid – Base Reactions – Lux concept –Solvent ion theory of Acids and Bases – Liquid Ammonia, Acetic acid, bromine trifluoride, Dinitrogen tetroxide, liquid hydrogen fluoride as solvents – classification on Acids and Bases as Hard or Soft – Acid-Base strength and Hardness and softness –Theoretical basis of Hardness and softness – Electro negativity and Hardness and Softness.

UNIT –2

Nuclear Chemistry: Radioactive decay - Theories of decay processes – Laws of radioactivity – Detection and Measurements of radiations – Nuclear structure – Composition of nuclei – properties of nuclei – nuclear radii – nuclear spin etc. nuclear stability – nuclear models – liquid drop, shell and collective models – Nuclear forces – meson field theory.

Artificial Radioactivity: Nuclear reactions – transmutation – Stripping and pick up, Fission products and fission yields, fusion, spallation and fragmentation reactions scattering reactions – nuclear cross section–Q–value Nuclear reactors – charged particle accelerators – neutron sources –gamma ray and X – ray sources . Radioactive techniques – tracer technique neutron activation and isotopic dilution analysis, counting techniques such as G.M. ionization and proportional counter. Applications of nuclear science in agriculture and biology. Radiation risks and medical benefits – Natural and manmade isotopes.

UNIT –3 Inorganic chains, rings, and cages

Silicate minerals – *ortho-*, *pyro-*, and *meta*-silicates – pyroxene, amphiboles– two-dimensional silicates – talc, mica and three dimensionalaluminosilicates, feldspar, zeolites, ultramarine – **Silicones**-preparation,properties and uses – **Iso and hetero polyacids and salts:** – Structures and reactivity of isopolymolybdates and isopolytungstates; heteropolyanions-structure and reactivity– Polymeric sulphur nitride,phosphonitrilic compounds-trimers and tetramers - **homocyclic inorganicring systems** – Concept of multi-centered bond – structure of B_4H_{10},$[B_{12}H_{12}]^{2-}$, B_6H_{10}, B_8H_{12}, $B_{10}H_{14}$ – Wade's rules, *closo*, *nido*, *arachno***boranes and carboranes**- metalloboranes, metallocarboranes – The "*styx*" code.

UNIT –4

Solid state chemistry: Crystal structure – classification of ionic structure – Ax_1, Ax_2, Ax_3 types – Ax type (Zns, Nacl, CsCl) structure only – AX_2 type (fluorite, rutile, betocrystobalite) structure only – layer structure – CdI_2, nickel arsenate. schottky and frenkel defects – explanation and calculation of number of defects per cm – metal excess defect – F-centre and interstitial ions – metal deficiency defects – positive ion absent – extra interstitial negative ions

UNIT – 5

Inner Transition Elements -position in the periodic table – electronic configuration, oxidation states, solubility, colour and spectra, magnetic properties – Separation of lanthanides – lanthanide contraction: Causes and consequences – Gadolinium break, shift reagents – Extraction of thorium and uranium. Comparison of actinides and lanthanides.

COURSE OUTCOME:

After completion of this course students will be able to

- know the various concepts of acids and bases and Hard-Soft-Acid- Base theory.
- acquire knowledge on the fundamentals and instrumentation of nuclear chemistry.
- Know the structures and properties of inorganic chains, rings, cages and clusters.
- identify chemistry of inner transition elements and their applications.

References:

1. BadieE.Duglas and Danl H. McDaniel Concepts and models in Inorganic Chemistry, Indian Edition, 1970, Oxford and IBH Publishing Co., New Delhi.
2. J.D. Lee. A New concise Inorganic Chemistry, 4th Edition, ELBS, 1995
3. G. Friedlander, J.W. Kennedy and J.M. Miller, Nuclear and Radiochemistry
4. Keith F.P Purchell and John C. Kotz, Inorganic Chemistry, Saunders Golden Sunburst series, W.B. Saunders company, Philadelphia.
5. James E. Huheey, Ellen A. Keiter and Richard L. Richard L. Keiter, Inorganic Chemistry Principles of structure and Reactivity, 4th Edition, Addition –Wesley, New York
6. Arnikar, Nuclear chemistry
7. A.R.West, solid state chemistry and its applications, latest edition.
8. W.E.Addision,Structural principles in inorganic compounds, latest edition

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
I	**20P1CHC3**	**Analytical Chemistry**	**6**	**5**

OBJECTIVES

- To get and insight on the use of several analytical techniques for structural investigation of chemical compounds
- To explain the knowledge on analytical and statistical tools
- To learn about the basis of computational chemistry and polarography
- To know the principle and applications of atomic absorption and flame emission spectroscopy
- To understand the chromatographic techniques and their theory and uses

UNIT I :Data and Error Analysis:

Errors-Various types of Error – Accuracy, precision, significant figures – Frequency distributions, the binomial distribution, the Poisson distribution and normal distribution – **Describing data**-mean mode, variance, standard deviation, population and sample**. Way of quoting uncertainty-** robust estimators, repeatability and reproducibility of measurements – **Hypothesis testing**- levels of confidence and significance, test for an outlier, testing variances, means t-Test, Paired t-Test – Analysis of variance (ANOVA) – Correlation and Regression – **Curve fitting** - Fitting of linear equations, simple linear cases, weighted linear case, analysis of residuals – General polynomial equation fitting , linearizing transformations, exponential function fit – r and its abuse – linear regression analysis, elementary aspects.

UNIT II: Chromatography:

Principles of ion exchange, paper, thin layer and column Chromatography techniques – Columns, adsorbents, methods, Rf values, McReynold's constants and their uses – HPTLC, HPLC techniques – Adsorbents, columns, detection methods, estimations, preparative column – GC-MS, LV-MS techniques: methods, principles and uses.

UNIT III: basics of Computer

Introduction to Computer:Characteristics of computer -History and Evolution of computer - Generation of computer - Functioning of a computer system - Applications of computer in Chemistry.

Hardware and Software components: components of computer system -Hardware of components of computer -Input and Output devices - Memory unit.Software components of computer system -Types of System software &application software.

Information and Communication Technology (ICT): General abbreviations and terminology, Basics of the Internet, Intranet, E-mail, Audio and Video-conferencing.

Self-study: Computer and Chemistry: Computer Software and Chemistry - Computing Techniques Used in Chemistry - Some Important 'C' Programs for Chemistry.

UNIT IV

Atomic Absorption Spectroscopy : Principle – difference between AAS & FES, theory – instrumentation – hallow cathode lamp- burners- oxidants – fuels – interference and applications – Flame Emission Spectroscopy – Principles – instrumentation – interference – limitations of FES – factors that influence the intensity of Emitted radiations – applications – Standard addition and internal standard methods.

UNIT V

Voltametry: Principles – polarography – principles and introduction instruments current voltage- relationship polarographic waves – equation – half wave potential- reversible and irreversible waves- residual current – migration current – polarographic cells- dropping mercury electrode – advantages of DME – aqua salt bridge- saturated calomel electrode – applications- qualitative and quantitative analysis – inorganic and organic polarography. Tensametry- chloropotentiometry- instrumentation and applications- Cyclic and stripping Voltametry- principles and applications

COURSE OUTCOME:

After completion of this course students will be able to

- analyse the data and apply the principle of separation techniques to different experimental conditions
- discuss the bases and application of computer
- acquire knowledge the principle instruments and applications of atomic absorption and flame emission spectroscopy
- illustrate the basis of electroanalytical techniques and its applications
- describe the components of computer and communication technology

References:

1. D.B.Hibbert and J.J. Gooding, Data Analysis for chemistry, Oxford University Press, 2006
2. J.Topping, Errors of Observation and their treatment, Fourth Edn., Chapman Hall, London, 1984
3. R. Stock and C. B. F. Rice, Chromatographic Methods, Chapman and Hall, New York.
4. V.K.Srivastava& K.K. Srivastava, Introduction to Chromatography, S. Chand & Co.,
5. New Delhi, 2nd ed, 1981.
6. Willard, Merrit, Dean and Settle, Instrumental methods of Analysis CBS Publishers and Distributors, 6th ed. 1986.
7. Skoog, D. A., West, D. M., Holler, F. J., Fundamentals of Analytical Chemistry, 7th edition,Harcourt College Publishers, Singapore.
8. B.K. Sharma, Instrumental methods of Chemical analysis, Himalaya Publ. House, Delhi, 2006.
9. PundirBansal "Computers for chemists" A Pragati Edition, 10th Edition (2013).
10. V.Rajaraman "Fundamentals of Computers" PHI Learning Pvt Ltd. 6th Edition (2015).

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
I	**20P1CHCP1**	**Physical ChemistryPractical-I (non Electrical)**	**5**	**3**

OBJECTIVES

- To learn the determination of molecular weights experiments

Non –Electricals

1. Determination of CST and study of the effect of impurity on CST
2. Determination of distribution coefficient and determination of equilibrium Constant for the formation of KI_3(Demonstration only)
3. Determination of the rate constant for Persulphate oxidation both by titrimetry and Colorimetry.
4. Comparison of acid strengths by Kinetics.
5. Determination of the energy of activation and frequency factor.
6. Association factor of benzoic acid between benzene and water
7. Determination of molecular weight by Rast macro method
8. Phase diagram – simple eutectic system
9. Phase diagram – three component system
10. Adsorption of oxalic acid on charcoal.
11. Determination of molecular weight by Transition Temperature Method

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credit
I	**20P1CHEL1A**	**Major Elective-I Medicinal Chemistry**	**5**	**4**

OBJECTIVES

- To list the causes and the symptoms of various diseases.
- Classify different types of drugs under each category.
- Synthesis of anticonvulsant, CNS stimulants, antihistamine, NSAID and antiparkinson drugs.
- To illustrate importance of anesthetics and psychedic drugs.
- Prioritise drug for treatment of cancer and diabetes

UNIT-I

Defintions: The nature and source of drugs, pharmacologically active principles in plants. The terms- Drugs, pharmacology, pharmacognosy, pharmacy, therapeutics, toxicology, pharmo kinetics, pharmaco dynamics, chemotherapy, pharmacopoeia, First aid- Important rules of first aid – cuts, abrasion and ruises, fractures, bleeding for blood, maintain breathing. Burns and fainting. First aid box-T.B, Asthma, Jaundice, Piles, Leprosy, Typhoid, Malaria, Cholera, Filariasis - Causes- Symptoms- Diagnosis-Prevention and Treatment.

UNIT-II

Anticonvulsants, Muscle relaxants, Central nervous system stimulants and Antipyretic Analgesics

Anticonvulsants: Convulsion-classification of anticonvulsant- Barbutirates: parabanic acid; barbutric acid, Hydantoin derivatives: phenytoin sodium, Oxazolidinediones: trimethadione, Sucinimides: phensuximide- Synthesis- mode of action of anticonvulsants.

Muscle relaxants: Muscle relaxant- classification - Non-depolarising muscle relaxant: gallaminetriethiodide, Depolarising neuro muscular blocking, drugs: suxamethonium chloride, Centrally acting muscle relaxants: mephenism – Synthesis – Mode of acid of muscle relaxants.

Central nervous system stimulants: CNS stimulants- classification- Caffeine - synthesis, Analpetics- nikethamide-Synthesis, Mode of action of CNS.

Antipyretic analgesics: Antipyretic analgesics- pyrexia- classification of antipyretic analgesic- Aniline and p-Aminophenol analogues: paracetomol, Salicyclic acid derivative: aspirin- Synthesis and Mode of action.

UNIT-III

Antihistamines, Non- SteriodalAnti inflammatory Drugs (NSAID), Antiparkinson Agents

Antihisatmines: Histamine- Histamine synthesis from histidine-classification of histamine H1-receptor antagonist- Amino alkyl ethers: diphenhydramine hydrochloride- Ethylene diamine: mepyramine maleate, Thiophene derivatives: methapyriline hydrochloride, cyclic basic chain analogues – Imidazoline derivative: antazoline hydrochloride- Synthesis-Prevention of histamine release, Histamine H_2 receptor blockers- ranitine, cimitidine- structures only – Mode of action of antihistamine, Structure activity relationship amongst H1 receptor blockers.

Non- Steriodal Anti Inflammatory Drugs (NSAID) - Inflammation- classification of NSAID-heteroanylacetic acid analogues: indometacin, Aryl acetic acid analogues: Ibuprofen, Aryl propoinic acid analogues: flurbiprofen – Synthesis.

Antiparkinson Agents: Parkinson disease- classification of Antiparkinson agent-piperdine analogues: biperideneHcl, Pyrolidine analogues: procyclidineHcl, Phenothiazine Analogue-EthoPropazineHcl- Synthesis.

UNIT-IV

Anesthetics: Ideal anaesthetic agent-classification according to mode of action, General Anaesthetics- volatile ether, vinyl ether, halothane, trichloro ethylene- structure, advantages and disadvantages, non-volatile- thiopental sodium- properties, structure, advantages and disadvantages, local anaesthetics- requisties, cocaine- structure and advantages.

Antiseptics and Disinfectants: Distinction between disinfectants and antiseptics, phenol-coefficient.

Psychedelic drugs: Lysergic acid diethylamide (LSD) – Pharmacological action of LSD – mechanism of action- therapeutic uses adverse effects. Marijuana-Pharmacological action and therapeutic uses.

UNIT-V

Cancer: Cancer- types, causes, spread treatment- antineoplastic drugs- alkylating agent, antimetabolise, hormones, antibiotics, radioactive isotopes, adrenocorticosteriods.

Diabetes-types- control of diabetes insulin, oral hypoglycaemic sulphonylureas- tolbutamide, chloropropamideglibenclamide- structure and uses. Bigunadies- phenformin and metformin.**AIDS**- Causes –symptoms- prevention and treatment.

COURSE OUTCOME:

On the successful completion of the course the student will be able to

- name the causes, symptoms and treatment to be given for various diseases.
- illustrate the drug belong to which categories.

REFERENCES

1. AshutoshKar, Medicinal Chemistry, 1st Ed., Wiley Eastern Ltd, New Delhi,1993.
2.Jayashree Ghosh, A Text Book of Pharmaceutical Chemistry; 5th Ed., S.Chand and Company Ltd., New Delhi,2014.
3. S.Lakshmi; Pharmaceutical Chemistry; 1st Ed., S.Chand and Company Ltd., New Delhi, 1995.
4. BhagavathiSundari; Applied Chemistry; 1st Ed., MJP Publishers, Chennai, 2006.

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
I	**20P1CHEL1B**	**Major Elective-I Spectroscopy**	**5**	**4**

OBJECTIVES

- To introduce the salient aspect about the concepts and applications of UV-Vis spectroscopy
- To have an idea about the IR stretching frequency of organic functional groups.
- To impact the awareness about the principles, techniques and applications of theNMRand ESR spectroscopy for the structural elucidations.
- To apply the principle about the structure of organic compounds by various spectroscopic.

UNIT – I

U.V. Spectroscopy – Basic principles of electronic transitions – solvent effects – woodwards – fisher rules Differentiation of cis& trans isomers, ORD & CD Theory –Axial haloketon rule – Octant Rule Comparison between ORD & CD X- Ray – Photo Electron spectroscopy –Theory – instrumentation – application – types – AES – ESCA – applications.

UNIT – II

IR & Raman Spectroscopy – Principles - instrumentation – applications – structure elucidation – vibrational spectra Harmonic and unharmonic oscillators – vibrational spectra of diatomic molecule and polyatomic molecules – Fourier transform IR – vibrational spectra of carbonyl compounds. Finger print region – identification of functional groups – H – bonding – Factors influencing vibrational frequency – Raman Spectroscopy – Principles – polarization of light and Raman effect – comparison of IR & Raman for simple molecules – combined uses of IR & Raman spectroscopy in the structural elucidation of molecules like CIF_3 NO_3 CIO_3

UNIT – III

Nuclear Magnetic Resonance Spectroscopy: Nuclear Magnetic resonance spectroscopy – chemical and magnetic non – equivalency – coupling constant First and Non First order spectra – Dependence of J on dehydral angle – Karplus equation – Double Resonance shift reagent – NOE, Decoupling of protons, off resonance. C^{13} -NMR - Basic principles – FT NMR – Importance of NOE and applications.

UNIT – IV

Mossbauer Spectroscopy: Mossbauer transition – Doppler effectIsomer shift – quadrupole splitting. Magnetic field effect – Application to iron and tin compounds NQR : Theory Instrumentation – application . Mass spectroscopy: Base peak – isotopic peak – metastable peak – Nitrogen rule – McLafferty rearrangement, Ring rule – CI FI and FAB technique – GC /MS Application.

UNIT – V

Application of IR, UV, NMR and Mass spectroscopy in the structural elucidation of organic compounds (Minimum 25 problems worked out) ESR : Factors affecting "g" value – Hyperfine splitting – Kramer degeneracy – zero field splitting . Application to organic and inorganic compounds – CIDNP – Technique.

COURSE OUTCOME:

After completion of this course students will be able to

- gains the basic aspects of various spectral techniques.
- operating knowledge of various spectral instruments.
- interprets the various spectral values and assign the structure.

Reference :

1. William kemp, Organic spectroscopy
2. Sharma, Y.R. Absorption spectroscopy of organic molecules.
3. Sylverstein and Basler and Morril, Spectral identification of organic compounds.
4. Jagmohan, organic spectroscopy, principles.
5. Dash A.N. Analytical chemistry
6. Vogal A.I. Text book of quantitative inorganic Analysis.
7. Sharma B.L. Spectroscopy
8. Sharma B.K. Instrumental methods of Chemical Analysis
9. Kalsi P.S. Organic spectroscopy. New agri international
10. Drago. R.S. Physical methods in chemistry
11. Ebsworth, structural Inorganic Chemistry

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
II	**20P2CHC4**	**Organic Chemistry – I**	**5**	**5**

OBJECTIVES

- To know about thechemistry of important heterocyclic compound
- To understand the terms of chemical reactions and the mechanisms viadifferent intermediates
- To interpret the principle and importance of stereochemical aspects ofstructure and properties
- To aquirethe concept of aromatic character in some molecules
- To have an idea about the better knowledge on the synthetic uses of the differentoxidants and reductants used in organic synthesis

UNIT: 1 - Nomenclature and Heterocyclics

Nomenclature of alicyclic, bicyclic,tricyclic compounds (Basic skeletal structures only with or without one substituent

Heterocyclics: synthesis and reactivity of the following heterocyclics – pyrazoles, oxazole, imadazole, thiazole, pyridazines, pyrazine,carbazoles, uracil and uric acid (synthesis of simple alkyl and aryl substituted derivatives are also expected)

UNIT 2: Reactive intermediates and methods of determining reaction mechanism

Generation, reactivity, structure and stability of Carbocations, Carbanions,CarbenesNitrenes and arynes. **Free radicals** – Configurations – Identification by chemical and spectral methods – Free radical halogenation - NBS.

Mechanism and methods of determination: Thermodynamic and kinetic control-Hammond postulate-Microscopic reversibility-intermediate versus transition state. **Kinetics and non-kinetic methods of determining mechanism** - Product analysis, Determination of the presence of intermediates-isolation, detection and trapping-crossover experiments-isotopic labeling, isotopic effects- stereo chemical evidence-kinetic evidence.

UNIT- 3: Stereochemistry

principles of symmetry - enantiomers and diastereomers– **R, S and E, Z** nomenclature – optical activity and chirality –absoluteconfiguration - **sequence rule** –molecules with more than one chiral centre(including biphenyls and allenes), **alicyclic compounds**. Helicity and chirality-Topicity and prostereoisomerism - topocity of ligands and faces – enantiotopic ligandsand faces - diastereotopic ligands and faces - Conformations of mono and disubstituted three-, four-, five and six- membered ring systems and their optical activity – conformations ofdecalin. Quantitative correlation between conformationand reactivity:Winstein-Eliel equation and Curtin-Hammett principle.

UNIT4: Aromaticity

Aromatic character: Five - Six, seven-, and eight-membered rings - Other systems with aromatic sextets – Huckel's theory of aromaticity, Concept of homo aromaticity and anti aromaticity, Electron occupancy in MO's and aromaticity - NMR concept of aromaticity and anti aromaticity, systems with 2,4,8,10 electrons and more than 10 electrons, alternant and non-alternant hydrocarbons. Bonding properties of systems. Heteroaromatic molecules. Annulenes ,sydnones and fullerenes.

UNIT 5: Reagents in organic synthesis: Complex metal hydrides-$LiAlH_4$,$NaBH_4$, ,tri-tertiarybutoxy aluminium hydride, $NaCNBH_3$ and tri n-butyl tin hydride DIBAL-H. Wilkinson's catalyst, alkali metals (Na, Li), birch reduction,K- selectride, L- selectride, Lithium dimethyl cuprate, lithium di-isopropylamide, DCC, 1,3-dithane,trimethyl silyl iodide, PCC, PDC, DDQ, SeO2,MnO2, Jones reagent , IBX ,Phase transfer catalysis, crown ethers.

COURSE OUTCOME:
After completion of this course students will be able to

- name the chemistry of important in heterocyclic compound
- find the chemical reactions and the mechanisms via different intermediates.
- identify the importance of stereochemical aspects of structure and properties.
- categorize the concept of aromatic character in some molecules
- know to synthetic uses of the different oxidants and reductant used in organic synthesis.

References

1. Finar I.L, Organic Chemistry, Vol.2, 6th edition England, Addison Wesley. Longman Ltd. (1996)
2. Powel and claude.Richer, IUPAC nomenclature organic
3. D. Nasipuri, Stereochemistry of organic compounds-Principles and applications, New AgeInternational, 2nd Edition, 2002.
4. S.M.Mukherji and S.P.Singh, Reaction mechanism in organic chemistry.
5. Jonathan.Clayden,Nick. Greeves, Staurt.Warren and Petter.Wothers, Organic Chemistry, 2nd ed. Oxford University press
6. Francis A. Carey and Richard J. Sundberg, Advanced organic chemistry part A: Structure and Mechanisms. 5thed.springer
7. Eliel, Stereo chemistry
8. Badger,Aromaticity
9. V.K.Ahluwalia, Heterocyclic chemistry, Narosa publishing house
10. Herbert.O.House, Organic synthesis
11. Williamcarruthers and Iain coldham, Modern methods of organic synthesis, 4thedn.Cambridge university press.

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
II	**20P2CHC5**	**Physical Chemistry - II**	**5**	**5**

OBJECTIVES

- To apply the mathematical concept and the calculation of thermodynamic probability of a system
- To apply the principle about the concepts of mathematics of quantum chemistry
- To motivate the learner to know about the concepts of electrical double layer
- To study about the theory of strong electrolytes and its applications.
- To identify about theconcepts of polarization and derivation of Butler -Volmer equation.
- To look learn about thesurface phenomena of adsorption isotherms

UNIT –1: Molecular Thermodynamics

Calculation of thermodynamic probability of a system – difference between thermodynamic probability and statistical probability – Phase space – Microstate and macro state – methods of determination - derivation of Boltzmann distribution equation – physical significance of partition function – translational, rotational vibrational and electronic partition function.

Relationship between partition function and thermodynamic properties such as E, H, CP, CV, P. Derivation of PV=RT molecular interpretation of entropy – derivation of S=KlnwSackurTetrode equation-Calculation of S, A, G etc from partition functions – calculation of equilibrium constants for very simple reactions.

UNIT –2 :Quantum Chemistry – II

Rigid rotator – harmonic oscillator – rotational and vibrational quantum numbers and selection rules for rotational and vibrational transitions – Bohr's correspondence principle – hydrogen atom – functions, shapes and nodal properties of orbital. Principles of approximation methods – many electron atoms – wave functions – one electron orbital – Pauli's principles and Slater determinants – variation methods application to hydrogen and helium atoms – perturbation method for non degenerate systems – application of perturbation theory to helium atom. Hartree – Folk self consistent field method – L.S. and J-J coupling. Born – Oppenheimer approximation Huckel pi – election theory and its application to ethylene, butadiene and benzene.

UNIT –3:Ionics

Transport of ions in solution – Debye – Huckel Onsager theory – Debye – Falkenhagen and wein effects – Modification to Debye – Huckel Onsager theory – Activity of ions in solutions – Experimental determinations – Debye – Huckel limiting law. Activity coefficient at higher concentration – Bejrum model. Electrode – electrolyte equilibrium – Nernst equation and its limitations – equilibrium electrode potential – Classification of electrodes, concentration cells, liquid junction potentials – thermodynamic quantities from EMF data. Electrochemical energy – storage systems – primary and secondary batteries – fuel cells.

UNIT –4: Electrode Kinetics

Theories of electrical double layer - Electric double layer at the electrode -Electrolyte interface - Helmholtz model of double layer - Law of electrical neutrality – Gouy - Chapman diffused charged model-Adsorption theory ofdouble layer - Stern's model, Triple-layer theory-Electro capillary phenomenon - Electro capillary curves for solutions containing anions,cations and molecular substances - Electro capillarymaximum-Lipmannequations and Lipmann potential– **Electro kinetic phenomena** – Classification- Electro osmosis and electrophoresis - Streaming potential, Sedimentation potential and Zeta potential.**Kinetics of electrode process**– Theory of electrochemical overpotential - Derivation and verification of the equations - Butler Volmerequation - Tafel equation.

UNIT – 5:Surface Phenomena

Surface Phenomena: Terminology – Differences between adsorption and absorption-classification- Physisorption and chemisorption– solid – liquid interfaces, solid – gas interfaces,– Factors influencing adsorption of gases on solids- Adsorption isotherms- Freundlich's, Langmuir and BET isotherms – surface area determination. Applications of adsorptions-Activated carbon-application in the treatment of polluted water and air- other applications of activated carbon. Some interfacial aspects on Micelles, Reverse micelles, Micro emulsions and membranes.

COURSE OUTCOME:

After completion of this course students will be able to

- compare the calculation of thermodynamic probability of a system
- predict the concepts of mathematics in quantum chemistry
- assess the concepts of electrical double layer
- explain the theory of strong electrolytes and its applications.
- acquire knowledge on surface phenemenon.

Reference:

1. S. Glasstone, Introduction to Electrochemistry
2. Bockris and Reddy, Electro chemistry
3. P.W. Atkins, Physical Chemistry, ELBS 6th edition.
4. A.K.Chandra, Introduction to Quantum chemistry
5. Donald.A.mcquarrie, Quantum chemistry
6. R.K.prasad, Quantum chemistry
7. S.Jayanthi and M.Pramesh, Group theory and statistical thermodynamics,sarathapathippagam, 2008.
8. Visvanathan, Electrochemistry

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
II	**20P2CHC6**	**Inorganic Chemistry – II**	**5**	**5**

OBJECTIVES

- To provide the option for the students to learn about the theories of bonding in coordination compounds.
- To impact the awarenessabout the mechanisms of reactions of complexes.
- To motivate the learnerabout the basics of organometallics and structure and bonding in organometallic compound.
- To aquire the students learn about the industrial applications of organometallic catalysts.
- To know about theconcept of inorganic photochemistry of electronic transitions in metal complexes.

UNIT –1: Coordination Chemistry:

Nomenclature of mono and polynuclear complexes – Crystal field theory – shapes of d orbitals in octahedral symmetry –Splitting in tetrahedral symmetry – only weak field splitting – reasons. Tetragonal symmetry – differences between tetrahedral and tetragonal symmetry. CFSE – Strong Field and weak field splitting – Calculation of CFSE for d^1 to d^{10} system. Splitting pattern in trigonal, square planar, trigonalbipyramidal, square pyramidal & cubic symmetries. Factors affecting the magnitude of splitting (10 Dq) – spectro chemical series. Jorgensen's principles. Evidences for CFT. Jahn – Teller distortion – Magnetism and color of transition metal ions, LFT, Nephelauxetic effect.

M.O. Theory – Octahedral, tetrahedral and square planar complexes. Pi bonding and M.O. theory – ligands having filled and empty pi bonds – effect on 10 Dq. Evidences for pi bonding from X-ray Crystallography, IR spectroscopy.

UNIT – 2 :Stability of Coordination compounds

Labile and inert complexes - Detection of complex formation in solution, stability constants, stepwise and overall formation constants – pH metric, polarographic and photometric methods of determining of formation constants. Factors affecting stability – statistical and chelate effects.

Kinetics and mechanisms of reactions in solutions: Ligand displacement reactions – hydrolysis, equation in octahedral and square planar complexes – Trans effect. Electron transfer reactions – Complementary and non-complementary types – inner sphere and outer sphere mechanism– isomerization and recemization. Reactions of coordinated ligands, Template effect and **syntheses of macro cyclic ligands**.

UNIT – 3 :Inorganic Photochemistry

Electronic transitions in metal complexes –Various photophysicalproceses of coordination compounds – Photsubstitution, photo isomerisation, photo oxidation, photo reduction photochemistry of chromium (III) complexes. Adamson's rules – photochemistry of organometallic compounds and metal carbonyl compounds.

UNIT –4 :Organometallics -I

Hapticity- ligand classification, synthesis and structure- the 18 electron rule- limitations and applications- preparations, properties, structure and bonding in metal carbonyls, nitrosyls, metal olefins, acetylenes, metallocenes- ferrocence and half- sandwich compounds – arene complexes, isolobal analogy and its applications.

UNIT –5 :Organometallic chemistry-II

Organometallic chemistry- ligand association and dissociation, oxidative addition and reductive elimination, insertion reactions, reactions of coordinated ligands in organometallics, reaction mechanism for hydrogenation, hydroformylation (oxo process), olefin oxidation (Wacker process) and carbonylation of methanol, epoxidation, alkene metathesis , Ziegler- Natta catalyst.

COURSE OUTCOME:

After completion of this course students will be able to

- know the theories of bonding in coordination compounds.
- compare and examine about the mechanisms of reactions of complexes.
- asses the bonding in organometallic compound.
- acquire knowledge on industrial applications of organometallic catalysts.
- Solve the concept of inorganic photochemistry of electronic transitions in metal complexes.

References:

1. 1James E. Huheey, Ellen A. Keiter and Richard L. Keiter, Inorganic Chemistry 4th ed., Addision – Wesley
2. Cotton and Wilkinson, Advanced Inorganic Chemistry, 5th Edition, John Wiley & sons, New York
3. A.W. Adamson, Inorganic photochemistry
4. Keith F. Purcell and John C.Kotz, Inorganic Chemistry, Saunders Golden Sunburst Series, W.B. Saunders Company, Philadelphia, 2012.
5. W. Kain and B. Sehwederski, Bio – Inorganic Chemistry; Inorganic Elements in the Chemistry of life, John Wiley & Sons, New York.
6. Shriver, Alkins and Longford, Inorganic Chemistry, ELBS, 1994

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credit
II	**20P2CHC7**	**Industrial chemistry**	**5**	**4**

OBJECTIVES

- To prepare the student to gain in depth knowledge in industrial products like cement and glass and theirmanufacturing processes and their uses in day today life
- To develop the skill in specific areaabout the techniques of studying battery and fuel cell and their uses
- To impart the students understand about the renewable and non – renewable energy.
- To know the principle and process of refining petroleum.
- To learn about theconcept of dyes, pigments and paints and theirpreparation and uses.

Unit – I: Silicate Industries

Glass: Glassy state and its properties. Classification (silicate and non silicate glasses). Manufacture and processing of glass. Composition and properties of the following types of glasses: Soda lime glass, lead glass, armoured glass, safety glass, borosilicate glass, fluorosilicate, coloured glass, photosensitive glass.**Ceramics** : Important clays and feldspar, ceramic, their types and manufacture. High technology ceramics and their applications, super conducting and semi conducting oxides, fullerenes carbon nanotubes and carbon fiber. **Cements:** Classification of cement, ingredients and their role, Manufacture of cement and the setting process, quick setting cements.

Unit – II: Battery and Chemical explosive

Primary and Secondary batteries, battery components and their role, Characteristics of Battery. Working of following batteries: Pbaci, Li – Battery, Solid state electrolyte battery. Fuel Cells, Solar cell and polymer cell.Orgin of explosive properties in organic compounds, preparation and explosive properties of lead azide, PETN, cyclonite (RDX). Introduction of rocket propellant.

Unit – III: Fuel Chemistry

Review of energy spurces (renewable and non – renewable). Classification of fuels and their calorific value.**Coal:** Uses of coal (fuel and non fuel) in various industries, its composition, carbonization of coal. Coal gas, producer gas and water gas – composition and uses. Fractionation of coal tar, uses of coal tar bases chemicals, requisties of a good metallurgical coke, Coal gasification (Hydro Gasification and catalytic gasification), Coal liquefaction and solvent Refining. **Petroleum and Petrochemical Industry**: Composition of crude petroleum, Refining and different types of pertroleum products and their applications. Fractional Distillation (Principle and process), Cracking (Thermal and catalytic cracking), Reforming Petroleum and non – petroleum fuels (LPG, CNG, LNG, bio – gas, fuels derived from biomass), fuel from waste, synthetic fuels (gaseous and liquids), clean fuels. **Petrochemicals:** Vinyl acetate, propylene oxide, Isoprene, Butadiene, Toluene and its derivatives Xylene. **Lubricants:** Classification of lubricants, lubricating oils (conducting and non – conducting) Solid and semisolid lubricants, synthetic lubricants. Properties of lubricants (viscosity index, clud point, pore point) and their determination.

Unit –IV :Dye Chemistry

Textile fibre : Classification of fibres – properties. Such count, denier, tex, staple length, spinning properties. Strength, elasticity and creep, general characterstics of cotton, silk, wool, viscose Nylon polyster.**Pretreatment of fibre:** Techniques, sizing &Desizing (enzymatic desing) scouring – kier boiling bleaching (hyphochlorite, peroxide and bleaching powder)

Unit –V :

Dyeing classification of dyes: According to structure and application. Technical term in dyeing MLR, % of shade, % of exhaustion, equilibrium absorption.**Dyebath assistant and mechanism:**Exhausting agent, wetting agent levelingagent.**Technology of Textile finishing** : Define textile finishing, classification of textile finishing, water repellent finishes, flame retardant finishes moth proof finish, antistatic finishes, anti microbial finish, moth proof finish.

COURSE OUTCOME:

After completion of this course students will be able to

- categorize the silicate Industries like Glass, Ceramics and Cements.
- explain about battery and chemical explosive
- gain knowledge about Fuel Chemistry with Coal, Petroleum & Petrochemical Industry and Lubricants.
- identify the Dye Chemistry with Textile fibre and knowledge about pretreatment of fibre.
- Choose job opportunity in textile, glass ceramics and explosive industries.

References:

1. Norrish Shreve. R. and Joseph A. Brink Jr Chemical Process Industries, McGraw Hill, Industrial Book Company London.
2. Mohapatra – elements of Industrial chemistry 1988 in Delhi – Kalyani publications.
3. B.K.Sharma Industrial Chemistry Ist edition – Goel publications – Meerat 1983.

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
II	**20P2CHCP2**	**Physical Chemistry Practical-II** (Electrical)	**5**	**3**

OBJECTIVES

- To acquire quantitative analytical skill by electrical experiments.
- Realise and to verify Oswald's dilutionlawand Debye - HuckelOnsagar equation.
- To improve the skill in using the electrical instruments.

ELECTRICAL

1.CONDUCTOMETRIC TITRATIONS

I.acid – base titrations

i) Strong acid Vs strong base
ii) Weak acid Vs strong base
iii) Mixture of acids Vs strong base
iv) Mixture of bases Vs strong acid

II. precipitaion titrations

i) Kl Vs $AgNO_3$
ii) Mixture of halides (KCl + KI) Vs $AgNO_3$
iii) K_2 SO_4 Vs $BaCl_2$

III. verification of ostwald's dilution law

IV. Verification of Debye HuckelOnsagar equation

V.determination of solubility of sparingly soluble salt.

2. POTENTIOMETER TITRATIONS

I. acid – base titrations

i) Strong acid Vs strong base
ii) Weak acid Vs strong base
iii) Mixture of acids Vs strong base

II. precipitationtitrations

i) Kl Vs $AgNO_3$
ii) Mixture of halides (KCl + KI) Vs $AgNO_3$

III .Rredox titrations

i) $KMnO_4$ Vs KI, FAS
ii) K_2Cr2O_7 Vs KI, FAS

IV.Determination of pH of buffer solutions

V. Determination of activity coefficient

VI. Determination of dissociation constant of an organic acid

VII. Determination of Redox potential of Fe^{3+} / Fe^{2+} system

Outcomes:

After completion of this course students will be able to

- interpret data from the physical chemistry practical experiments including the constructions of appropriate tables and graph.
- find the results for the unknown concentration of the mixture of acids, bases, mixture of precipitates and redox titrations.
- predict the PH of the unknown concentration of buffer.

Semester	Subject code	Title of the paper	Hours of Teaching/ Week	No. of Credits
II	**20P2CHEL2A**	**Major Elective-II Material Chemistry**	**5**	**4**

OBJECTIVES

- To introduce the salient aspect touse X-ray data to determine the crystal structure, lattice parameter and crystallite size.
- To strengthen the knowledge about the differentiate wurzite and zinc blende structure
- To have an idea about the physical basis of different classes of magnetic materials: paramagnetism, diamagnetism and ferromagnetism.
- To understand the basics of ceramics and superconductors.

UNIT I: STRUCTURE OF SOLIDS

Introduction to solids – Crystalline and Amorphous unit cell – Bravais lattice and x-ray structure determination (Nacl and Kcl only), Powder and single crystal – methods and its applicationwith NLO properties – Identification of the cubic lattice and indexing of the x-ray diffraction lines Radius ratio rules – co-ordination number packing arrangement – different structure types in Solid – rock salt, Zinc blende wurzite, fluorite and antifluorite, spinel and inverse – spinel and perovskitestructures.

UNIT II: MAGNETIC PROPERTIES

Types of Magnetism – Dia – Para – Ferro and antiferromagnetism.Magnetic properties of free ions – First order second order Zeeman Effect – states KT – States <<KT Determination of Magnetic moments and their application to elucidation of structures of inorganic compounds temperature – temperature independent paramagentism. Magnetic properties of lanthanides and actinides – orbital contribution to magnetic moment, range of μeff for various complexes Guoy's method spin crossover in co-ordination compounds.

UNIT III: X-RAY DIFFRACTION

X-ray diffraction by single crystal, space groups – systematic absences in x-ray data and identification of lattice types, glid planes and screw axis- x-ray intensities, structure factor(R-value) and its relation to intensity and electron density – phase problem.Electron diffraction by gases – scattering intensity vs scattering angle, wierl equation, measurement technique.Neutron diffraction by crystals – magnetic scattering – measurement techniques.

UNIT IV: CERAMICS

Ceramics – types and application – composites – classification – processing of fiber Reinforced plastics – metallic glasses types, glass – glass forming ability of alloys – melt spinning process – applications – shape memory effect – Nano material preparation (bottom up and top down approaches) proportion and its application – carbon – nano tubes.

UNIT V: SUPER CONDUCTORS

Super conductors – materials – Basic concept – types characteristics - application solar energy materials – Photo thermal conversion , Solar electric coating enhanced solar thermal energy collection – photovoltic conversion – solar cells, silicon, Cadmiumsulphide and Gallium arsenic – organic solar cells.

COURSE OUTCOME:

After completion of this course students will be able to

- apply the X-ray data to determine the crystal structure, lattice parameter and crystallite size.
- predict the differentiate wurzite and zinc blende structure
- classify the magnetic materials as paramagnetism, diamagnetism and ferromagnetism.
- Know the basics of ceramics and superconductors.

REFERENCES :

1. Solid State chemistry by M.G. AroraAmmol Publications, New Delhi 2001
2. Raghavan. V, Material Science and Engineering : A First Coursell PHI Learning 2015
3. Dekker A.J. Electrical Engineer Materials Prentice Hall of India
4. Indulkar O.S and Thiruvengadam. S, An Introduction to Electrical Engineer Material S.Chand

Semester	Subject code	Title of the paper	Hours of Teaching/ Week	No. of Credits
II	**20P2CHEL2B**	**Major Elective-II Cheminformatics**	**5**	**4**

OBJECTIVES

- To learn about the information of cheminformatics and its applications
- To familiarize the basic concept ofrepresentation of Molecules and Chemical Reactions
- To provide the option for the students to identify about the Searching Chemical Structure
- Tounderstand about theComputer Assisted Virtual screening design:
- To acqiure about theApplication of Cheminformatics in Drug Design.

Unit I

Introduction to Cheminformatics: Introduction to cheminformatics, History and Evolution of cheminformatics, Use of cheminformatics, Prospects of cheminformatics, Molecular Modeling and Structure Elucidation

Unit II

Representation of Molecules and Chemical Reactions: Nomenclature; Different types of Notations; SMILES coding; Matrix Representations; Structure of Molfiles and Sdfiles; Libraries and toolkits; Different electronic effects; Reaction classification

Unit III

Searching Chemical Structure: Full structure search; sub structure search; basic ideas; similarity search; Three dimensional search methods; Basics of Computation of Physical and Chemical Data and structure descriptors; Data visualization.

Unit IV

Computer Assisted Virtual screening design: Structure Based Virtual Screening- Protein Ligand Docking, Scoring Functions for Protein Ligand docking, Practical aspects of structure based Virtual Screening; Prediction of ADMET Properties, 2 D and 3D data searching, Chemical databases, Role of computers in Chemical Research.

Unit V

Self Study

Application of Cheminformatics in Drug Design: Quantitative Structure-Property Relations; Descriptor Analysis; Computer Assisted Structure elucidations; Target Identification and Validation; Lead Finding and Optimization; Analysis of HTS data; Design of Combinatorial Libraries; LigandBased and Structure Based Drug design.

COURSE OUTCOME:

On completion of the course the student will be able to

- know the basic concepts of Cheminformatics.
- representation of Molecules and Chemical Reactions.
- explain Searching Chemical Structure.
- predict Computer Assisted Virtual screening design.
- evaluate the application of Cheminformatics in Drug Design.

Text Book

1 Andrew R. Leach, Valerie J. Gillet, Cluwer , Introduction to Cheminformatics, Academic Publisher, Netherlands, 2003

Reference Books

1. Lisa B. English (Editor), Combinatorial Library Methods and Protocols, Humana Press Inc, Volume:201, 2002

2. Frank Jensen, Introduction to Computational Chemistry, Wiley Publisher, Second Edition, 2006

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
III	**20P3CHC8**	**Organic Chemistry – II**	**5**	**5**

OBJECTIVES

- To know the importance of reactions, mechanisms of necleophilic substitution reactions and the effect of NGP's on rate of reactions.
- To understand the different types of electrophilic substances reactions in aliphatic and aromatic compounds.
- To study the mechanisms of addition reactions and elimination reactions.
- To synthesis and applications of various photochemical reactions.
- To develop interest and understanding the theoretical basis for pericyclic reactions and skills for the utilization of these reactions in the organic synthesis.

UNIT 1: Nucleophilic Substitution

Aliphatic nucleophillic substitution: S_N1 S_N2, S_Ni mechanism -effect of substrate, structure, leaving group, attacking nucleophile and solvent - neigbouring group participation-substitution at allylic carbons and reactivity, ambient nucleophiles-alkylation and acylation of amines, von braun reaction-hydrolysis of esters.

Aromatic nucleophillic substitution: S_NAr, $S_N1$and benzyne Mechanism - effect of substrate structure leaving group, attacking nucleophile and solvent. zeigler alkylation, Chichibabin reaction -reaction involving diazonium ion, cine substitution, Von Richter reaction

UNIT 2: Electrophilic substitution

Aliphatic electrophilic substitution: SE1,SE2andSEi mechanism effect of substrate structure,leaving group, attacking electrophilicand solvent. Stork-enamine reaction decarboxylation of aliphatic acids-halogenation of aldehydes and ketones.

Aromatic electrophilic substitution: Arenium ion mechanism-evidence-orientation and reactivity-nitration,halogenations,sulphonation, Friedal crafts reactions-Formylation reaction-Gattermann,Gattermann-koach, Reimer-Tieman and Vilsmeyer-Hack reactions.

UNIT 4: Addition and Elimination Reactions

Addition reactions: Addition to carbon-carbon multiplebond-mechanistic and sterochemical aspects of electrophilic, nucleophilic additions-orientation and reactivity-addition reaction of bromine and hydrogen bromide,hydroxylation, hydroboration, epoxidation, oxymercuraton,Michael addition. **Addition to carbonyl groups:**Mannich, stobbe, oppenauer oxidation, MPV reduction, Darzen'sglycidic ester condensation, wittig reaction.

Elimination reactions: E1,E2,E1CB and Ei mechanism - stereochemistry of elimination, Hofmann and Saytzeff rules- competition between elimination and substitution - chugaev reaction-dehydration of alcohols - dehydro halogenations - Hoffman degradation-cope elimination - Breddt's rule with examples.

UNIT 1: Organic Photochemistry

Fundamental concepts – Jablonski diagram – Energy transfer, Types of excitation, Photosensitization- **photo reduction -Photo addition-** PaternoBuchi reaction and its drawback, photo addition of olefins to aromatic compounds**,** Photo dimerisation- **Photo rearrangement-** Cis – Trans isomerization-Photorearragement of enones -Photo isomerisation of benzenoid compounds- Photo fries rearrangement- Di-π - methane rearrangement. **Photo oxidation-** Formation of peroxy-compounds- Oxidative coupling of aromatic compounds. **Photochemical fragmentation-** Photochemistry of carbonyl compounds-Norrish Type I, II and related reactions.Photolysis of nitrites**-**– Barton reaction.

UNIT 2: Pericyclic Reactions

Pericyclicreactions-types-stereochemistry-conservation of orbital symmetry-**FMO method**-selection rules-electrocyclic, cycloaddition,and sigmatropic reactions-1,3 and 1,5 hydrogen shift-cope, oxy cope and claisen rearrangement - fluxional molecule. Woodward Hoffmann rule-**correlation diagram method**- electrocyclic and cycloaddition only.

COURSE OUTCOME:

On completion of the course the student will be able to

- Know the reaction mechanisms and determine NGP effects on rates of reactions.
- acquire knowledge about various new modern organic reactions and their mechanism involving the formulation of C-C, C=C bonds.
- distinguish the types of mechanisms involved in photochemical reaction.
- identify the stereochemistry and products of the pericyclic reactions.

References

1. J. March, Advanced Organic Chemistry: Reactions, Mechanisms and structure, 5th ed. Wiley, 2000
2. Jonathan.Clayden,Nick. Greeves, Staurt.Warren and petter.Wothers, Organic Chemistry, 2nd ed. Oxford University press
3. Francis A. Carey and Richard J. Sundberg, Advanced organic chemistry part A: Structure and Mechanisms. 5thed.springer
4. Francis A. Carey and Richard J. Sundberg, Advanced organic chemistry part B. 5thed.springer
5. Peter Sykes, A Guide book to Mechanism in organic chemistry, 6th edition Longman, 1986
6. V.K.Ahluwalia and R.K.Parashar, Organic reaction mechanisms.3rd edition, Alpha Science Int'l Ltd
7. S.M.Mukherji and S.P.Singh, Reaction mechanism in organic chemistry. 3rd edition Macmillan India Limited.
8. J.D. Coyle, Organic Photochemistry - Wiley, 1985.
9. J.M. Coxon, B. Halton, Organic Photochemistry, Camb. Uni. Press, 2nd edition, 1987.
10. Jagdambasingh, Jaya singh., Photochemistry and pericyclic reactions, 3rd revised edn., New age international

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
III	**20P3CHC9**	**Physical Chemistry - III**	**5**	**5**

OBJECTIVES

- To learn about theconcept andapplication of statistical thermodynamics.
- Toidentify theradiation chemistry and its concept are understood
- To understand about the theory and principles of vibrational spectroscopy and its techniques.
- To know the physics behind NMR and ESR spectroscopy and its instrumentation.

UNIT –1

Quantum Statistics

Quantum statistics – Bose Einstein and Fermi – Dirac statistics – Comparison of them with MB. Statistics – application of B.E. statistics of photon gas and super fluidity of liquid helium. Application of F.D. statistics to electron gas and thermionic emission. Heat capacity of solids – Einstein and Debye's treatment – Concepts of negative Kelvin temperature.

Third law of Thermodynamics:

Law of Thermodynamics: Need for the third law – Nernst heat theorem and other forms of stating the third law. Thermodynamic quantities as absolute zero – statistical meaning of third law – apparent exception to the third law.

Non – equilibrium Thermodynamics: Thermodynamics of irreversible processes – Onsager reciprocal relations – steady state conditions.

UNIT –2

Radiation Chemistry:

Interaction of radiation with matter: range of alpha, beta and gamma radiations - Differences between radiation chemistry and photochemistry – sources of high energy radiation and interaction with matter – machine source – Isotopes source – Radio chemical reaction – basic units in radiation chemistry - specific ionisation – Roentgen – Erg - definition of G value, Curie, linear energy transfer (LET) and Rad – scavenging techniques –– Detection of radiations - Dosimeters - Primary and secondary processes – Radiolysis of water - Mechanism - hydrated electron - applications of radiation chemistry -- Radiation safety precaution - Safety standards and safe-working methods.

UNIT –3

Rotational Spectroscopy: Rotational Spectra of Diatomic molecules-Rigid and Non-rigid rotors-population and Intensity of spectral lines-Effect of Isotopic substitution-Microwave spectra of Polyatomic Molecules-Linear Symmetric Top Molecules

Electronic Spectroscopy: Electronic spectra of molecules-Born-Oppenheimer approximation-Vibrational coarse structure-Franck Condon principle-Dissociation energy&Dissociation products-Rotational Fine structure in electronic transition Fortrate Diagram

UNIT –4

Infrared Spectroscopy : Diatomic Vibrating rotator- Simple harmonic and anharmonic oscillator-Rotation vibration Spectrum of CO-Interaction of rotation and vibration (break down of Born Oppenheimer approximation) – Influence of rotation on spectra of di-atomic molecules – Parallel and perpendicular vibrations.

Raman Spectra: Raman effect – Elastic and In elastic scattering – Selection rule – Pure rotational vibrational Raman spectra – Polarization of light – Mutual Exclusion Rule – Fermi resonance – Laser Raman spectroscopy.

Laser: Nature of simulated emission – Types of laser – Solid state, gas, chemical and dye laser – Applications of laser.

UNIT –5

NMR spectroscopy

Theory**-** nuclear spin and magnetic nuclei, nuclear magnetic moment, behavior of a bar magnet in a magnetic field, the NMR transition, relaxation mechanisms.**Parameters of NMR:** measuring the chemical shift, shielding and deshielding of magnetic nucleus, chemical shifts in aliphatic and aromatic compounds, factors affecting chemical shift inductive effect, anisotropy of chemical bonds, hydrogen bond, temperature, solvent. **Spin-spin splitting:** effect of spin-spin splitting on the spectrum, mechanism of spin – spinsplitting, chemical exchange, coupling constants; application of spin-spin splittingto structure determination-geminal-, vicinal- , long-range coupling; factors influencinggeminal and vicinal coupling. **FT and two dimensional NMR spectroscopy**: principle of FT NMR-FIDs, Fouriertransformation; ^{13}C, ^{19}F, ^{31}P NMR-range of chemical shift values, spectra of typicalexamples; 2D NMR spectra- introduction and types of 2D techniques.

COURSE OUTCOME:

After completion of this course students will be able to

- know the concept and application of statistical thermodynamics.
- acquire the knowledge about radiation chemistry
- identify the theory and principles of raman and vibrational spectroscopy and its techniques.
- analysis the application of NMR spectroscopy.

REFERENCES:

1. R.S.Drago, Physical Methods in Chemistry, W.B. Saunders Company, Philadelphia, London.
2. P.J. Wheatley, The Determination of Molecular Structure.
3. Puri, Sharma and pathania, principles of physical chemistry
4. ArunBahl, B.S.Bahl and G.D.Tuli, Essential of physical chemistry, S.Chand
5. C.N. Banwell, Fundamentals of molecular Spectroscopy, 3rd ed., TMH, New Delhi, 1983.
6. B.P. Straughan and S.Walker Spectroscopy Vol.3, Chapman Hall London, 1976.
7. G.M. Barrow, Introduction to Molecular Spectroscopy, McGraw Hill, New York, 1964
8. S.Jayanthi and M.Pramesh, Group theory and statistical thermodynamics , saratha pathippagam,2008
9. Radiation chemistry by Huges

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
III	**20P3CHC10**	**Inorganic Chemistry - III**	**5**	**3**

OBJECTIVES

- To have an idea about the role of metal ions in biological process
- To impact the awarenessabout the Structure and function of Haemoglobin and Myoglobin
- To strengthen the knowledge about the spectral characterization of inorganic compounds

UNIT –1: Bio-inorganic Chemistry-I

Introduction -Essential and trace elements and their role in biological process – Function and transport of alkali and alkaline earth metal ions: characterization of K^+, Na^+, Ca^{2+} and Mg^{2+} – complexes of alkali and alkaline earth metal ions with macrocycles – ion channels – ion pumps, catalysis and regulation of bio energetic processes by the alkaline earth metal ions – Mg^{2+} and Ca^{2+}. Metals at the center of photosynthesis – primary processes in photosynthesis – photosystems I and II-light absorption (energy acquisition) – exciton transport (direct energy transfer) – charge separation and electron transport – manganese catalyzed oxidation of water to O_2.

UNIT – 2: Bio-inorganic Chemistry-II

Structure and function of Haemoglobin and Myoglobin:

The biological roles of metal ions, calcium biochemistry, oxygen transport and storage-heme proteins: haemoglobin and myoglobin-structure, mechanism oxygen transport. Copper proteins: type-I, type-II, and type-III copper. Photosynthesis: chlorophyll, photosystem I and photosystem II, photosynthetic reaction centre. Enzymes: superoxide dismutase, carboxypeptidase - carbonic anhydrase, , Fe-S proteins and non-heme iron cytochromes of the electron transport chain, cytochrome P-450 enzymes, coenzyme B_{12}, nitrogen fixation-biological electron transport system-Ruberdoxin-Ferrodoxin.

Unit-3: Electronic spectroscopy

Term symbols of atoms, ion and molecules- microstates- energy levels for d1-d9 ions in cubic and square fields- intensity of bands- group theoretical approach to selection rules- effect of distortion and spin- orbit coupling on spectra- suganotanabe diagrams. Orgal diagram for d1-d9 systems. Evaluation of 10Dq and beta for octahedral complexes of cobalt and nickel-applications to simple coordination compounds- charge transfer spectra

Mossbauer Spectroscopy: Introduction - Isomer Shfit - Magnetic interactions - Applications to iron and tin compounds.

Unit-4: Infra red spectroscopy

Vibrations in simple molecules (H_2O, CO_2) and their symmetry notation for molecular vibrations, group vibration concept and its limitations. Effect of coordination on ligand vibration, uses of groups vibrations in the structural elucidation of metal complexes of urea, thiourea, cyanide, thiocyanate, nitrate, sulphate and dimethyl sulfoxide. Effect of isotopic substitution on the vibrational spectra of metal carbonyls with reference to the nature of bonding, structure and geometry.Combined uses of IR and raman spectroscopy in the structural elucidation of simple molecules like N_2O, ClF_3, NO_3^-, ClO_3^-

Unit-5 :NMR spectroscopy

Different spin systems- chemical shifts and coupling constants (spin-spin coupling) involving different nuclei (1H, 19F, 31P, 13C) interpretation and application to inorganic compounds- Effect of quadrupolar nuclei (2H,10B,11B) on the 1H NMR spectra.Systems with chemical exchange- study of fluxional behavior of molecules – an elementary treatment of second order spectra- examples –NMR of paramagnetic molecules- isotropic shifts contact and pseudo-contact interactions.

COURSE OUTCOME:

After completion of this course students will be able to

- analyse the Structure and function of Haemoglobin and Myoglobin.
- know what are the essential and trace elements in the biological process.
- explain the basic aspects of electronic spectroscopy.
- assess the various metal complexes with the help of spectral data.
- characterise the inorganic compounds using NMR.

References:

1. James E. Huheey, Ellen A. Keiter and Richard L. Keiter, Inorganic Chemistry 4th ed., Addision – Wesley (Unit I, II, III, IV)
2. Keith F. Purcell and John C.Kotz, Inorganic Chemistry, Saunders Golden Sunburst Series, W.B. Saunders Company, Philadelphia, 1977.
3. Asim K. Das, Bioinorganic Chemistry, 2008.
4. R.S. Drago, Physical Methods in Inorganic Chemistry, 3rd Ed., Wiley Eastern Company,2014
5. R.S.Drago, Physical Methods in Chemistry, W.B. Saunders Company, Philadelphia, London.

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
III	**20P3CHCP3**	**Organic practical-I**	**5**	**3**

OBJECTIVES

- To make the students to develop skills in quantitative analysis and preparative skillsin organic double stage preparations
- To make the students impart sound theoretical knowledge inorganic analysis estimations and chromatography
- To make the students to enhance the skill of handling chemicals glasswares and apparatuses used in organic analysis estimations and chromatography
- To make the students to determine the functional group of an unknown organic compounds

1. Qualitative analysis of organic mixture:

a. Pilot separation
b. Bulk separation
c. Analysis
d. Derivative

2. Separation of amino acids using paper chromatography

3. Separation of organic compounds using TLC (CIA) only

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
III	**20P3CHCP4**	**Organic practical-II**	**5**	**3**

I. Estimations

Estimation of phenol

1. Estimation of aniline
2. Estimation of ketone
3. Estimation of glucose
4. Estimation of Ascorbic acid

II. Two Stage Preparations:

1. Preparation of m-nitro benzoic acid from methyl benzoate
2. Preparation of p – nitro aniline from acetanilide
3. Preparation of aspirin from methyl salicylate
4. Preparation of p-bromoacetanilide from aniline

Course outcomes

On the successful completion of course student will be able to

- find the groups and characters present in thegiven organic substance throughqualitative analysis
- demonstrate the experiments to separate the organic compounds using paper chromatography and thin layer chromatography
- develop the skill to prepare organic compounds.

Semester	Subject code	Title of the paper	Hours of Teaching/ Week	No. of Credits
III	**20P3CHEDC**	**Extra Disciplinary Course Chemistry in Every Day Life**	**4**	

OBJECTIVES

Students learn about the scientific and chemical principles underlying in everyday life.

- To learn about the cleaning agents and water chemistry,
- Tounderstand about the food chemistry,
- To know about the cosmetic
- To look about the green chemistry and nano technology

Unit-I

Cleaning agents - manufacture and uses of soaps, detergents, baking powder, shampoo, washing powder and bleaching powder **Water –** Characteristics' of water, soft water and hard water - types **-** removal of hardness – ion exchange method. Reverse osmosis method, Water pollution, causes and prevention.

Unit-II

Food – importance – spoilages – causes, preservation – additives – colouring flavouring agents, beverages. Soft drinks aerated water – manufacturing – mineral water. Fruits, vegetables, dairy product – storage, preservation. Minerals in food and anti oxidants. Preparation of fruit Jam and pickle.

Unit-III

Cosmetics – Face powder – constituents, uses – side – effects. Nail polish, hair dye – composition and side effects. Tooth powder – composition and manufacturing – lotions. Preparation of phenyl, liquid blue and incense sticks.

Unit-IV

Basic concepts of Green chemistry and its significance in day to day life.

Polymers – Classification – Types of polymerization – plastics – classification – types of plastics – PVC, Teflon, PET, Bakelite – Rubber – Natural and synthetic – Bunas rubber, Butyl Rubber. Vulcanization of rubber, neoprene rubber, Plastic pollution and prevention.

Unit-V

Basic concepts of Nano Technology and its importance in day to day life.

Dyes – importance of food colours – PFA (Prevention of Food Adulteration Act) Natural dyes – Classification importances – Uses of the following Synthetic dyes - Direct dyes, acid dye, Basic dye, mordant dye, Reactive dye, Disperse dye, Fastness – Light and Washing. Application of dyes in food, paper, plastic and lather.

COURSE OUTCOME:

After completion of this course students will be able to

- distinguish the various cleaning agents and characterise the water .
- gain knowledge about the food chemistry,
- know the ingredients of various cosmetics.
- acquire knowledge about the green chemistry and nano technology

References:

1. Norrish Shreave. R. and Joseph A. Brink Jr Chemical Process Industries, McGraw Hill, Industrial Book Company London.
2. Brain A.C.S. Reinhold, Production and properties of Industrial chemicals –– New York.
3. Burgh, A. Fermentation Industries, Inter science, New York.
4. Ramani,V.Alex,Food Chemistry(2009),MJP publishers

SEMESTER	SUBJECT CODE	TITLE	HOURS OF TEACHING/ WEEK	NO·OF CREDITS
III & IV (NS)	**20P4CHCPD**	**Communication Skill and Personality Development**	**1**	

COURSE OBJECTIVES:

- To cultivate positive personality traits for successful life.
- To groom Winning Attitude among the learners.
- To assist the learners to identify their own potential and realize their aspirations.
- To enable a holistic development.
- To facilitate optimum means of improving personal performance.

UNIT 1

1. Personality- Definition.
2. Determinants of Personality.
3. Perceptual Process.
4. Personality Traits.
5. Developing Effective Habits.
6. Self Esteem (Freud and Erikson).
7. Self Appraisal and Self Development.
8. Dos and Don'ts to develop positive self esteem.
9. Interpersonal Relationship.
10. Difference between Aggressive, Submissive and Assertive behaviour.
11. Mind Mapping, Competency Mapping, 360 degree assessment.
12. Presentation Skills – Opening, ending, Handling nerves, Handling audience, Power Storytelling, Visual aids, Question and answer session

UNIT 2

1. Projecting Positive Body Language.
2. Conflict Management.
3. Change Management.
4. Stress Management.
5. Time Management.
6. Goal Setting.
7. Assertiveness and Negotiating Skill.
8. Problem Solving Skill.
9. Decision Making Skills.
10. Leadership Qualities of a Successful Leader.
11. Attitudes – Positive Attitudes.
12. Public Speaking –Engaging, Connecting, and Influencing the audiences.
13. Employability Skill – Group Discussion, Interview Questions, Psychometric analysis.

COURSEOUTCOMES:

At the end of the programme learners will be able to:

- Gain self confidence and broaden perception of life.
- Maximize their potential and steer that into their career choice.
- Enhance one's self image & self esteem.
- Find a means to achieve excellence and derive fulfilment.

References:

Hurlock.E.B (2006) : Personality Development, 28th Reprint. New Delhi: Tata McCraw Hill.
Stephen.P.Robbins and Timothy. A.Judge (2014) : Organisation Behaviour.16th Edition.Prentice Hall.
Andrews, Sudhir. How to Succeed at Interviews. 21st (rep) New Delhi.Tata McGrew Hill 1988.
Lucas, Stephen. Art of Publication. New Delhi. Tata McGrew Hill. 2001.
Kumar, Pravesh. All about Self Motivation. New Delhi. Goodwill Publication House. 2005.

Semester	Subject code	Title of the paper	Hours of Teaching/ Week	No. of Credits
IV	**20P4CHC11**	**Organic Chemistry - III**	**6**	**6**

OBJECTIVES

- To import knowledge about the mechanism and importance of the new synthetic reactions.
- To provide training on isolation of natural products by various experimental methods.
- To study the principles and applications of IR, UV visible spectroscopic techniques for the determination of structure of molecules.
- To learn the principles and applications of mass and ESR spectroscopy.
- Toidentify the spectral properties of organic compounds

Unit 1: Modern synthetic reactions

Molecular rearrangement: Mechanism of the followings - Wagner Meerwin, Wolf, Schmidt, Bayer-Villeger, Stevens, sommelet-Hauser,Neber,wittig and Favorski rearrangements. Tiffenev-Deminov ringexpansion, Payne, Brook rearrangement **Coupling reactions:** Heck reaction, Suzuki coupling, Stillecoupling,and Fukuyama Coupling reactions. **Reactions of enolates:** Lithium enolates of carbonyl compounds, alkylation of lithium enolatesof ketone, eters,carboxylic acids, alkylation of beta dicarbonyl compounds.

UNIT : 2.Alkaloids,Terpenoids and steroids

Alkaloids: Structural elucidation of Papaverine, Morphine, Cocain

Terpenoids: Isoprene rule – structural elucidation of Camphor, Zingibereneand Squalene.

Steroids: Synthesis of cholestrol, Conversion of cholesterol into progesterone and Testosterone

S**elf study:** Occurrence, isolation, extraction and classification of alkaloids and terpenoids.

UNIT 3

IR , UV –Visible spectroscopy and ORD

Infrared Spectroscopy: Introduction - factors influencing group frequencies- application of IR Spectroscopy.

UV-Visible Spectroscopy: Introduction -Woodward–Fieser and Scott rules for conjucateddienes,ketones, aldehydes, α,β-unsaturated acids, esters,nitriles, and amides. Differentiation of geometrical isomers and positional isomers – Disubstituted benzene derivatives - Study of steric effect in aromaticity.

Optical rotatory dispersion and circular dichroism : Cotton effect and ORD curves. Axial haloketone rule, octant rule and its applications.

Self study: Application of ORD to determine absolute configuration of simple monocyclic ketones

UNIT 4

NMR Spectroscopy

Proton NMR Spectroscopy: Chemical and magnetic non-equivalence - chemical shift – Factors influencing δ values - coupling constant - spin-spin splitting dependence of J on dihedral angle, vicinal and geminal coupling constants. Karplus equation, Long range coupling constants. Influences of streochemical factors on chemical shift of protons –first and second order spectra - simplification of complex spectra - double resonance techniques, shift reagents. Chemical spin decoupling of rapid, exchangeable protons (DH, SH, COOH, NH2.) an elementary treatment of NOE phenomenon - 2D techniques (COSY, NOSEY and ROSY).DEPT & MRI Spectroscopy.

13C NMR Spectroscopy: Basic principles - FT/NMR/relaxation - broad band decoupling, off-resonance decoupling, α, β and γ-effects of substituents. Calculation of chemical shifts for simple aliphatic and aromatic compounds - peak assignments.Importance of NOE phenomenon in ^{13}C NMR spectroscopy.

UNIT 5

Mass Spectrometry: Instrumentation – Resolution, EI and CI methods – Base peak, isotopic peaks, metastable peak, parent peak, determination and use of molecular formula, recognition of molecular ion peak – FAB. Fragmentation – General rules – Pattern of fragmentation for various classes of compounds, McLafferty rearrangement - Nitrogen rule, Ring rule

ESR spectroscopy - basic principle –hyperfine splitting-predicting number of ESR lines for simple organic free radicals such as methyl, ethyl, phenyl and naphthyl radicals.

Application of IR, UV, NMR and Mass spectroscopy in the structural elucidation of organic compounds (Minimum 15 problems should be worked out).

COURSE OUTCOME:
After completion of this course students will be able to

- know the mechanisms for the various molecular rearrangements.
- elucidate the structure of natural products.
- interpret IR and UV spectral data for a given compound.
- characterise the structures of organic compounds by apply Mass and ESR spectroscopy.

Reference:

1. I.L. Finar, Organic Chemistry, Vol.II, 5th ed., ELBS 1975
2. V.K.Ahluwalia and R.K.Parashar, Organic reaction mechanisms
3. Jonathan.Clayden,Nick. Greeves, Staurt.Warren and petter.Wothers, Organic Chemistry, 2nd ed. Oxford University press
4. P.M. Silverstein, F. X. Webster, Spectroscopic Identification of Organic Compounds, 6th ed. Wiley 1998.
5. W. Kemp, Organic Spectroscopy, 3rd Ed., MacMillon, 1994.
6. Y.R. Sharma, Elementary Organic Spectroscopy – Principles and Chemical applications, S.Chand,1992.
7. P.S.Kalsi, Spectroscopy of Organic Compounds.

Semester	Subject code	Title of the paper	Hours of Teaching/ Week	No. of Credits
IV	**20P4CHEL3A**	**Major Elective - III** **Recent Trends in Chemistry**	**6**	**4**

OBJECTIVES

- To know the fundamentals of nano chemistry.
- To understand the basic concepts of green chemistry.
- To learn the concepts and reactions of supramolecules.

Unit – I

Nano Chemistry – Introduction – discovery of CNT, preparation of CNT – arc method – laser ablation method – chemical vapour deposition method, properties – thermal, mechanical, optical, electrical and other properties – uses of CNT. Nano sensors – chemical sensors and biosensors and their uses. Uses of nanotechnology in computers solar energy, fuel cells, medicine and metallurgy.

Unit - II

Nano Synthesis - Preparation of nano materials by micro wave synthesis – sol-gel method – chemical co-precipitation – hydrothermal and solvothermal methods. Preparation and uses of TiO_2 and ZnO. Fullerene – preparation – properties and uses. Principle and uses of AFM. Implications of nano science and nano technology on society. Nano shells and their applications.

Unit – III

Green Chemistry – Introduction, Designing of green synthesis – choice of starting materials, reagents, catalysts and solvents. Twelve principles of green chemistry and their explanation with examples.

Biocatalysts in organic synthesis: Introduction – oxidoreductases-transferase**s –**hydrolases-lyases-isomerases-ligases. biochemical oxidations and biochemical reductions-applications

Unit – IV

Green reagents – dimethyl carbonate, polymer supported reagents – (eleven reagents). Green catalysts – acid catalysts, oxidation catalysts, basic catalysts, and polymer supported catalysts – polystyrene aluminium chloride, polymeric super acid catalysts, polymer supported photo sensitizers and phase transfer catalysts. Ionic liquids as green solvents – reactions in acidic ionic liquids and neutral ionic liquids, hydrogenation, Diels – Alder reaction, Heck reaction, O-alkylation and N-alkylation, Methylene insertion reactions.

Unit – V

Supra Molecular Chemistry – Concepts and Languages of supramolecular Chemistry – Supramolecular Reactivity and Catalysis.

Catalysis by Reactive MacrocyclicCation Receptor Molecules. Catalysis by Reactive Anion Receptor Molecules. Catalysis with Cyclophanes. Type Receptors. SupramolecularMetallocatalysis. Cocatalysis: Catalysis of Synthetic reactions. Biomolecular and Abiotic catalysis.

Supramolecular Chemistry in solution: Cyclodextrin, Micelles, Dendrimmers, Gelators. Classification and typical reactions- Applications.

COURSE OUTCOME:

Upon completion of the course, the students will be able to

- know the nano sensors, chemical sensors and biosensors.
- explain the applications of nano science and nanotechnology in society.
- aquire the knowledge about the green reagents and green solvents.
- know the principles of green chemistry and biocatalysts in organic synthesis
- identify the reactivity of supramolecular catalysis.

References:

1. New Trends in Green Chemistry by V.K. Ahluwalia & M. Kidwai, Anamaya publishes, New Delhi.
2. Chemistry for Green Environment by M.M. Srivastava, RashmiSanghi, Narosa publishers, New Delhi.
3. Nano the Essential by T. Pradeep. Tata McGraw Hill Education Private Limited, New Delhi.
4. Supramolecular and cluster chemistry by john.
5. Environmental chemistry by B.K.Sharma
6. Bioorganic, bioinorganic and Supramolecular chemistry by P.S.Kalsi and J.P kalsi.
7. Supramolecular chemistry – Fundamental and application by katsuhikoariga–ToyakiKunitake

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
IV	**20P4CHEL3B**	**Major Elective – III Applied Chemistry**	**6**	**4**

OBJECTIVES

- To gain knowledge in dye and paint chemistry.
- To study the applications of sonochemistry in organic synthesis.
- To understand thebasic concepts of bioorganic molecules and drugs.

Unit-I: Dye Chemistry

Pre-treatment: Sizing, Desizing- acid method, Scouring- kier boiling method, Bleaching – hypochlorite method, Mersirization, fastness properties – washing, rubbing and light fastness
Dyeing: Dye fibre bond, % of shade, M:L ratio, % 0f exhaustion, equilibrium absorption, effect of electrolyte.
Reactive dye - principles of dyeing. **Polyester dyes** - carrier dyeing - mechanism and high temperature dyeing. **Mordant dyes** – principles – specific examples **Acid dyes**-dyeing mechanism – role of electrolyte and dye bath assistants **Vat dyes** – vatting – dyeing – oxidation and after treatment

Unit-II: Paint Chemistry

Paint – definitions – ingredients and their role – terminology – emulsion, lacquer. Enamel – pot life, shelf life –varnish – thixotropy –classification of paints based on drying mechanism - under coats – Pigments – classification (organic & inorganic) – functions – properties such as hiding power, light fastness, particle size and shape Solvents used for paints – flash point.
Vehicles: Oil – drying mechanism, Description of Alkyd, Epoxy, Polymetyl methacrylate, Urea formaldehyde, Melamine formaldehyde, urethane resins. Additives – Anti skinning agents Powder coating, Solvent less finish

Unit- III Sonochemistry
The use of Ultrasound in Organic synthesis

Introduction – Instrumentation – The physical aspects – Types of Sonochemical reactions – Homogeneous reactions – Heterogeneous liquid – liquid reactions – Heterogeneous solid – liquid reactions – Synthetic Application – Esterification – Saponification – Hydrolysis / Solvolysis – Substitutions – Addition reactions – Alkylations – Oxidation – Reduction – Hydroboration – Hydrosilation and hydroalkylation – Coupling reactions – Dichlorocarbene – Other Reactions – Bourgveault reaction – Cannizzaro reaction – Strecker synthesis – The Reformatsky reaction – The barbier reaction of carbonyl compounds – Condensations – Carbohydrates – formation of acetals and benzylidene derivatives of alkylaglycopyranosides

Unit – IV

Bio Organic Chemistry – Introduction – definition – Branches of Bio chemistry – Scope – Biomerkenes – functions.
Carbohydrate – Introduction – Classification, Mutarotation, Pyronose form, furanose form, Glycogen – structure. **Protein –** Introduction – Classification structure. **Vitamins –** Introduction – Source structure – deficient diseases of B_1, B_6, B_{12}, A, D– Uses classification. **Alkaloids –** Introduction – occurrence classification. **Nucleic Acid –** RNA, DNA – types of RNA – Differences – Structure of DNA.

Unit – V

Medicinal Chemistry - Mechanism of drug action and Metabolism of Drugs: Mechanism of action – Drug Receptors and Biological responses – Mechanism of different types of drug action – Metabolism of drugs – Chemical pathway of drug metabolism absorption of drugs – Routes of administration - factors affect absorption – Digestion and absorption of protein – Digestion of fat.

COURSE OUTCOME:

Upon completion of the course, the students will be able to

- know the pre-treatment and dyeing process in textile industry.
- acquire knowledge in paints, pigments, drying mechanisms of film formers.
- identify the structure and applications of bioorganic molecules.
- know the mechanism of drug action and metabolism of drugs.

Books for Reference:

1. V.A.Shenai, vol. I, II, III Textile fibres, Principle of dyeing, Techniques of bleaching Sevakpublication , Mumbai.

2. G.P.A. Turner –Principles of Paint Chemistry and Introduction to paint Technology Oxford & IBH Publishing & Co .
3. Organic Sonochemistry: Challenges and Perspectives for the 21st Century Jean-Marc Lévêque, Giancarlo Cravotto, François Delattre – 2018.
4. Introduction to Bioorganic chemistry and Chemical Biology David Van Vranken, Gregory A. Weiss – 2018.

5. Bahl B.S. ArunBahl, Advanced Organic Chemistry, S. Chand & Company Ltd., New Delhi, (2005).

6. JayashreeGhosh, A Text Book of Pharmaceutical Chemistry; 5th Ed., S.Chand and Company Ltd., New Delhi, 2014.

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
IV	**20P4CHCP5**	**Inorganic Practical - I**	**6**	**3**

OBJECTIVES

- The qualitative analysis clearly illustrate identification of common and less common cations

Qualitative Analysis of common and less common cations by Semi – micro technique in mixtures

Common Cations :

Lead Bismuth, Copper, Cadmium, Antimony, Tin, Iron, Aluminum, Chromium, Manganese, Nickel, Cobalt, Zinc, Calcium, Barium, Strontium, Magnesium and Ammonium.

Less Common Cations :

Tungsten, Thallium, Selenium, Tellurium, Molybdenum, Cerium, Thorium, Zirconium, Berylium, Uranium, Lithium.

I. Colorimetric Estimation of Copper, Iron, Chromium and Nickel

COURSE OUTCOME

After completion of this course students will be able to

- identify the cation and anion in water sample and any unknown material

Semester	Subject code	Title of the paper	Hours of Teaching/ week	No. of Credit
IV	**20P4CHCP6**	**Inorganic Practical – II**	**6**	**3**

OBJECTIVES

- To learn the qualitative analysis of common metals
- To know the qualitative analysis of rare metals
- To analysis the colorimetric analysis of some common metals
- To experimental conditions and setup for the general methods ofpreparation of complexes.
- To Preparation methods of some inorganic complexes.

I. ESTIMATIONS OF MIXTURE SOLUTIONS

1. Estimation of Copper and Zinc
2. Estimation of Iron and Nickel
3. Estimation of Copper and Nickel
4. Estimation of Calcium and Magnesium

II. Preparation of the following Inorganic Complexes

1. Lead tetra acetate
2. Bis (pyridiniumhexachloroplumbate
3. Tris (thiourea) copper (II) sulphate
4. Potassium bis (oxalate) aluminate (II)
5. Hexathiourea lead (II) nitrate
6. Potassium bisoxalatodiaquo chromate (III)
7. Hemannine cobalt (III) chloride.

Course outcomes

After completion of this course students will be able to

- qualitative analysis of common metals are learnt
- qualitative analysis of rare metals are learnt
- colorimetric analysis of some common metals are learnt
- prepare the inorganic complexes

SEMESTER	SUBJECT CODE	TITLE	HOURS OF TEACHING/ WEEK	NO·OF CREDITS
III & IV (NS)	**20P4-CPD**	**Communication Skill and Personality Development**	**1**	

COURSE OBJECTIVES:

- To cultivate positive personality traits for successful life.
- To groom Winning Attitude among the learners.
- To assist the learners to identify their own potential and realize their aspirations.
- To enable a holistic development.
- To facilitate optimum means of improving personal performance.

UNIT 1

13. Personality- Definition.
14. Determinants of Personality.
15. Perceptual Process.
16. Personality Traits.
17. Developing Effective Habits.
18. Self Esteem (Freud and Erikson).
19. Self Appraisal and Self Development.
20. Dos and Don'ts to develop positive self esteem.
21. Interpersonal Relationship.
22. Difference between Aggressive, Submissive and Assertive behaviour.
23. Mind Mapping, Competency Mapping, 360 degree assessment.
24. Presentation Skills – Opening, ending, Handling nerves, Handling audience, Power Storytelling, Visual aids, Question and answer session

UNIT 2

14. Projecting Positive Body Language.
15. Conflict Management.
16. Change Management.
17. Stress Management.
18. Time Management.
19. Goal Setting.
20. Assertiveness and Negotiating Skill.
21. Problem Solving Skill.
22. Decision Making Skills.
23. Leadership Qualities of a Successful Leader.
24. Attitudes – Positive Attitudes.
25. Public Speaking –Engaging, Connecting, and Influencing the audiences.
26. Employability Skill – Group Discussion, Interview Questions, Psychometric analysis.

COURSEOUTCOMES:

At the end of the programme learners will be able to:

- Gain self confidence and broaden perception of life.
- Maximize their potential and steer that into their career choice.
- Enhance one's self image & self esteem.
- Find a means to achieve excellence and derive fulfilment.

References:

Hurlock.E.B (2006) : Personality Development, 28th Reprint. New Delhi: Tata McCraw Hill.
Stephen.P.Robbins and Timothy. A.Judge (2014) : Organisation Behaviour.16th Edition.Prentice Hall.
Andrews, Sudhir. How to Succeed at Interviews. 21st (rep) New Delhi.Tata McGrew Hill 1988.
Lucas, Stephen. Art of Publication. New Delhi. Tata McGrew Hill. 2001.
Kumar, Pravesh. All about Self Motivation. New Delhi. Goodwill Publication House. 2005.

EXTRA DISCIPLINARY COURSES

Sl. No.	Subject Code	Title of the Paper	Department
1.	20P3HYEDC	**INDIAN ADMINISTRATION**	History
2.	20P3ECEDC	**ISSUES IN INDIAN ECONOMY**	Economics
3.	20P3TAEDC	***தமிழ்மொழி வரலாறு***	Tamil
4.	20P3ENEDC	**SHAKESPEARE STUDIES**	English
5.	20P3CMEDC	**ENTREPRENEURIAL DEVELOPMENT**	Commerce
6.	20P3MAEDC	**APPLICABLE MATHEMATICAL TECHNIQUES**	Mathematics
7.	20P3PHEDC	**FUNDAMENTALS OF NANOTECHNOLOGY**	Physics
8.	20P3CHEDC	**CHEMISTRY IN EVERY DAY LIFE**	Chemistry
9.	20P3BOEDC	**MEDICAL BOTANY AND PHARMACOGNOSY**	Botany
10.	20P3MBEDC	**MUSHROOM TECHNOLOGY**	Microbiology
11.	20P3ZOEDC	**CLINICAL LAB TECHNOLOGY**	Zoology
12.	20P3BTEDC	**RECENT TRENDS IN BIOTECHNOLOGY**	Biotechnology
13.	20P3CSEDC 20P3ITEDC	**E-LEARNING TECHNOLOGIES**	Computer Science
14.	20P3LSEDC	**DOCUMENTATION CENTERS IN INDIA**	Library and Information Science

Semester	Course Code	Title of the Course	Hours of Teaching /Week	No. of Credits
III	**20P3HYEDC**	**Extra Disciplinary Courses – Indian Administration**	**5**	**--**

Objectives:

1. To know the evolution of Indian Administration.
2. To prepare the students for the competitive examination.
3. To give up-to-date knowledge on Indian administration.
4. To trace economic planning of India, through which the students may get practical knowledge on budget, etc.
5. To expose the state administration and the latest issues like Lok Ayukt and LokPal through which the students may get awareness about the latest issues.

Unit I ***Hrs 15***

The evolution of Indian administration: Structure and Functions–Mauryan and Mughal legacy; British Indian system: Company's experiments–Warren Hastings, Lord Cornwallis, Lord Hastings and Lord Dalhousie; Administrative consolidation since 1861 – Famine policy - Financial, Police and judicial administration.

Unit II ***Hrs 15***

Indian Administration since 1950: Parliamentary Democracy–Federation–Structure of Central Administration–Central Secretariat–Cabinet Secretariat, Ministries–Department of Boards.

Unit III ***Hrs 15***

Machinery for planning: Plan formulation at the National level – National Development Council – Planning Commission – Public undertaking – Controls of Public expenditure.

Unit IV ***Hrs 15***

State Administration–Executives–Secretariat–Chief Secretary–Directorates–District and Local Administration–District Rural Development Agency–Special development programmes.

Unit V ***Hrs 15***

Center-State relations – Public services – Police and Judicial administration – Lok Ayukt – Lok Pal – issues on Indian administration – Integrity in administration – Administrative reforms.

General References:

1. Altekar, A.S., State and Government in Ancient India, 1958.
2. Bhambri, C.H., Public Administration in India.
3. Vidya Bhushan, Indian Administration, Delhi, 2000.
4. Vishnoo Bhagawan & Vidhya Bhushan., Indian Administration, New Delhi, 1996.

Course Outcome: The students have clearly understood about the evolution of Indian Administration, State and Central administration, police and judicial administration, Centre State relations, etc.

Semester	Subject code	Title of paper	Hours of Teaching / Week	No. of Credit
III	**20P3ECEDC**	**Extra Disciplinary Courses – Issues in Indian Economy**	**4**	**-**

Objective:

- This Elective paper is offered to the Non-Economics Students to make them familiar with the recent trends in Indian Economy. The syllabus is framed accordingly with the Civil Service Examination.

Course Outcomes

- To understand the status of Indian economy before the reforms
- To assess the rationale of introducing reforms in India
- To familiarize with the package of LPG
- to get insight on the recent trends in EXIM policy

Unit I **Hrs 15**

Economic development and growth – determinants of growth and development – Market Economy – Indian Economy – a shift form mixed economy to Market economy – Reform measures introduced in India – First and second generation reforms – (Brief out line)

Unit-II **Hrs 15**

Economic reforms in India – background, rational – implementation – Trade policy – Industrial policy – exchange rate and capital market reforms

Unit-III **Hrs 15**

Dis-investment of public enterprises – rational – changing profile of PSUs comparison of public and private sector

Unit-IV **Hrs 15**

Privatization – Meaning and scope – Globalization – impact on India – foreign capital – Types FDI and FII, Policies and pattern.

Unit-V **Hrs 15**

Foreign Trade – Exim Policies – Recent exim policy – BOP- Trends in BOP – Economic reforms and BOP.

References:

Uma kapila – Indian Economy (Issues in Development and Planning and Sectoral aspects) Fifth Edition, 2006-07, Academic Foundation, New Delhi

Datt Ruddar &

Sundharam K.P.M. - Indian Economy (2007)

Misrapuri - Indian Economy

Semester	Subject Code	Title of the Paper	Hours of Teaching/Week	No. of Credits
III	**20P3TAEDC**	**கூடுதல் சிறப்புப் பாடம்: தமிழ்மொழி வரலாறு**	**4**	**-**

கூறு: 1 இந்திய மொழிக் குடும்பங்கள் நேரம்: 12

இந்தோ ஆரிய மொழிகள் - ஆஸ்டிக் மொழிகள் - சீன திபெத்திய மொழிகள் - திராவிட மொழிக் குடும்பம் - டாக்டர் கால்டுவெல், திராவிட மொழிகளின் சிறப்பியல்புகள் - தென் திராவிட மொழிகள் - தென் திராவிட மொழிகளில் தமிழ் - நடுத்திராவிட மொழிகள் - வட திராவிட மொழிகள்.

கூறு: 2 தமிழ் நேரம்: 12

தமிழ் என்பதன் வடிவம் பற்றியும் பொருள் பற்றியும் பல்வேறு செய்திகள் - பெயரெச்சங்கள் - வினையெச்சம் - சங்க இலக்கியத்தில் வினையெச்சங்கள் - தொல்காப்பிய உரைகாரர்களும் வினையெச்சங்களும்.

கூறு: 3 நேரம்: 12

தமிழ் எழுத்தின் தோற்றமும் வளர்ச்சியும் - ஆய்வெழுத்து இராசியெழுத்து, நாள், எழுத்து - ஓவியம், பானை ஓடுகள், இலங்கை முத்திரை முதலானவற்றில் காணப்படும் உருவ எழுத்துகள் - வட்டெழுத்து, பண்டைத் தமிழ் எழுத்து. தமிழ்மொழி வரலாறு: தமிழின் தொல் வரலாறு, தமிழ்மொழி வரலாறு - பழந்தமிழ்க் காலம், இடைத்தமிழ்.

கூறு: 4 நேரம்: 12

தொல்காப்பியமும் ஒலியியலும் - தொல்காப்பியமும் சொல்லியலும் - தமிழ் ஒலிகளின் பிறப்பு விளக்கம் - புணர்ச்சி வகை. தமிழ் உருபனியலும் தொடரியலும் - தலைமை இலக்கணக் கூறுகள் - தொடரமைப்பு இலக்கணம். பெயர்த்தொடர் அமைப்புகள்: மொழியின் பெருமை - எழுத்தும் பேச்சும் - கிளை மொழிகள் தோற்றம் - இலக்கியக் கிளைமொழி- வட்டாரக்கிளை மொழிகள்.

கூறு: 5 நேரம்:12

தமிழ் வளர்ச்சி - தமிழ் ஆட்சிமொழி வரலாறு - தமிழ் கல்விமொழி வரலாறு - கலைச் சொல்லாக்கம் - அறிவியல் தமிழ் வளர்ச்சி-உலகத் தமிழ் மாநாடுகள்- உலக அரங்கில் தமிழ் - தமிழ் அமைப்புகள்- உலகத் தமிழாராய்ச்சி நிறுவனம் - தமிழ்ப்பல்கலைக் கழகம்-செம்மொழி ஆய்வுமையம் - அயல் மாநிலங்களில் தமிழ்.

பார்வை நூல்கள்:

1. *தமிழ் வரலாறு - தேவநேயன். ஞா.*
2. *தமிழ் மொழி வரலாறு - பரிதிமாற்கலைஞர்*
3. *பழந்தமிழ் - இலக்குவனார் . சி*
4. *தமிழ் வரலாறு - குணா*
5. *தமிழ் மொழி வரலாறு - தமிழ் வளர்ச்சி இயக்ககம்*
6. *ஆட்சித் தமிழ் - புதுவை மொழியியல் பண்பாட்டுக் கழக வெளியீடு*
7. *இந்திய ஆட்சிப்பணி வழிகாட்டி - முனைவர் ெர. குமரன்.*
8. *உலகத்தமிழ் மாநாடுகள் - சாலை இளந்திரையன்*
9. *தாய்மொழியில் படிக்க வைப்போம் - NCBH வெளியீடு.*
10. *தமிழ் ஆட்சி மொழி வரலாறு - தமிழ்ப்பல்கலைக்கழகம்.*
11. *தமிழ் ஆட்சிமொழி வரலாறு - தெ.பொ.மீ.*
12. *தமிழ் மொழி வரலாறு - சக்திவேல்*

Semester	Course Code	Title of the Course	Hours of Teaching / Week	No. of Credits
III	**20P3ENEDC**	**Extra Disciplinary Course - Shakespeare Studies**	**4**	

Objective

- To initiate the non English majoring students to study Shakespeare's plays, and his sonnets.

Outcome

- Gaining appreciative and analytical understanding of Shakespeare's dramas and sonnets.
- Achieving potentiality to situate and relate Shakespeare's wisdom in various current disciplines and media cultures.
- Obtaining a profound perspectives on handling racism, class divisions, gender roles, crime, love, war, death betrayal, hope, loyalty etc., derived from the works

Unit – I

Shakespeare's Sonnets 1, 18, 29, 33, 35, 65 and 130

Unit – II

The Merchant of Venice

Unit – III

Henry IV, Part I

Unit – IV

Othello

Unit – V

Antony and Cleopatra

References:

- Bates, Jonathan. *The Genius of Shakespeare.* London: Picador, 1997.
- Leishman, J.B. *The Theme and Variation in Shakespeare's sonnets.* London: Routledge, 2005.

Semester	Subject Code	Title of the paper	Hours of Teaching/ Week	No. of Credits
III	**20P3CMEDC**	**Entrepreneurial Development**	**4**	**-**

Objective:

- To make the students to become a successful entrepreneur and to know the process involved in entrepreneurship.

Course Outcome:

- Learn the incentives and subsidies provided to budding entrepreneurs and Become familiar with institutions offering various forms of assistances.

Unit - I

Entrepreneurship - Nature and Characteristics of an Entrepreneur - Difference between Entrepreneur and Manager - Qualities, Types, and Functions of an Entrepreneur - Role of Entrepreneur in Economic Development.

Unit - II

Business Ideas - Sources of Idea - Idea Processing and Selection - Start up Process - Project Identification and Selection - Project Formulation - Project Appraisal.

Unit - III

Factory Design and Layout - Importance - Factors affecting Factory Design - Factory Layout - Objectives - Types - Consideration in Designing Layout - Design Requirements.

Unit - IV

Institutions Assisting to Entrepreneurs - NSIC - SIDCO - SSIB - DIC – TIIC – KVIC – TCO – ITCOT - Commercial Banks and New Entrepreneurial Development Agency.

Unit - V

Entrepreneurship Development Programmes - Need - Objectives - Institutional efforts in Developing Entrepreneurship – Evaluation of EDPs – Problems in the conduct of EDPs – Suggestions to make EDPs effective – Planning EDPs - Role of SISI, SIPCOT and SIDBI – Recent Development in Small Enterprises in India – Government rules and regulations – Rural Entrepreneurship – Need for Rural Entrepreneurship Problems – SHGs and Rural Development – MUDRA Banking /MSME Loans.

Text book:

1. C.B.Gupta., N.P.Srinivasan, (2018), Entrepreneurial Development, Sultan Chand & Sons, New Delhi.

Reference Books

1. Khanka S.S., (2019) Entrepreneurial Development, S.Chand & Co, New Delhi.
2. Saravanavel, P. (2016), Entrepreneurial Development, Principles, Policies and Programmes, Ess Pee Kay Publishing House, Tanjore.
3. Renu Arora, Sood S.K., (2018)Fundamentals of Entrepreneurship and Small Business, Kalyani Publications, Ludhiana.
4. Jayashree Suresh, (2019)Entrepreneurial Development, Margham Publications, Chennai.

Semester	Subject Code	Title of the Paper	House of Teaching / Week	No.of Credits
III	**20P3MAEDC**	**Extra Disciplinary Course- Applicable Mathematical Techniques**	**4**	**-**

Objectives:

- To discuss various methods of Interpolation

Out comes: After studying this course the student will be able to

- Student will demonstrate the ability to solve financial math problem.

Unit I **12 Hrs**

Interpolation with unequal intervals: Newton's divided difference formula - Lagrange's interpolation formula and inverse interpolation. (Only simple Problems)

Unit II **12 Hrs**

Assignment problems

Unit III **12 Hrs**

Replacement problems (Only simple Problems)

Unit IV **12 Hrs**

Decision Analysis

Unit- V **12 Hrs**

Game Theory

Text Book:

1. *For unit I,* ***Numerical Methods*** *– P. Kandasamy, K. Thilagavathy, K. Gunavathy, S.Chand*
2. *For units II to V,* ***Operation Research 12th Edition 2004:****KanthiSwarap, P.K. Gupta and Manmohan, Sultan Chanda and sons, New Delhi.*

   Unit I : Chapter - 8 (Sec: 8.5, 8.7)

   Unit II : Chapter - 11 (Sec: 11.1 to 11.4)

   Unit III : Chapter - 18 (Sec: 18.1 to18.3)

   Unit IV : Chapter - 16 (Sec: 16.1 to 16.5)

   Unit V : Chapter - 17 (Sec: 17.1 to 17.6)

General Reference:

1. *S.S. Sastry Introductory Methods of Numerical Analysis Prentice Hall of India 2000.*
2. *H.A. Taha Operation Research Prentice Hall of India 1995.*

Semester	Subject Code	Title of the paper	Hours of Teaching / Week	No. of Credits
III	**20P3PHEDC**	**Extra Disciplinary Course- Fundamentals of Nanotechnology**	**4**	**-**

Unit – I Introduction to Nanotechnology

Nanotechnology – Definitions - History of nanotechnology – Nanomaterials: classification – zero, one and two dimensional nanomaterials – Classification based on the composition of materials (metal, semiconductor, ceramic, polymeric and carbon-based nanomaterials) - Properties of nanomaterials – Surface area to volume ratio (S.A/V) – Quantum dots - Challenges in nanotechnology.

Unit – II Preparation Methods

Top-down and Bottom-up approaches – Top down methods: Ball milling - Electron beam lithography – Advantages – Limitations. Bottom-up methods: Vacuum evaporation - Sputter deposition process - Laser ablation

– Advantages – Limitations.

Unit – III Fullerenes

Fullerenes – Types of fullerenes – Bucky ball/Buckminster fullerene - Carbon nano tubes (CNTs) - Single walled CNTs – Multi walled CNTs – Differences – mechanical and electrical properties of CNTs - preparation of CNTs – Plasma discharge method – Applications.

Unit – IV Characterization Techniques

Construction, working principle, merits and demerits of X-ray diffractometer - Scanning Electron Microscope (SEM) – Atomic Force Microscope (AFM) - UV-Vis–NIR double beam spectro photometer – Energy dispersive X-ray analysis (EDAX) .

Unit – V Applications

Nanoelectronics – Nanophotonics – Nanomaterials in energy conversion and storage – Nanomaterials as antibacterial agents – Nanomaterials as photocatalysts – Nanomaterial in industrial applications – Bio-medical applications : Targeted drug delivery – Nanomaterial based radiation therapy – Photodynamic therapy (PDT) – Bio imaging.

Books for Study

1. K. Ravichandran, K. Swaminathan, P.K. Praseetha, P. Kavitha, Introduction to Nanotechnology, JAZYM publications.
2. M.Ratner.et al., Nanotechnology; A Gentle intro Practices – hall ISBN 0-13-101400-5, 2003.
3. Nanotechnology; Basic Science and Emergining Technologies, CRC Press

Books for Reference

1. Charles P.Poole Jr and Frank J.Owens. "Introduction to Nanotechnology" Wiley, 2003.
2. A. S. Edelstien and R.C. Cornmarata, Nanomaterials; synthesis, Properties and Applications, 2ed, Iop (U.K), 1996.

Semester	Subject code	Title of the paper	Hours of Teaching/ Week	No. of Credits
III	**20P3CHEDC**	**Extra Disciplinary Course - Chemistry in Every Day Life**	**4**	

OBJECTIVES

Students learn about the scientific and chemical principles underlying in everyday life.

- Students learn about the cleaning agents and water chemistry,
- Students understand about the food chemistry,
- Students shall learn about the cosmetic and their effect in health aspects
- Students shall know about the green chemistry and their significance for clean environments
- Students learn about the nano technology and their importance.

Unit-I

Cleaning agents - manufacture and uses of soaps, detergents, baking powder, shampoo, washing powder and bleaching powder **Water –** uses of water Characteristics' of water, soft water and hard water - removal of hardness – ion exchange method. Reverse osmosis method, Water pollution, causes and prevention.

Unit-II

Food – importance – spoilages – causes, preservation – additives – colouring and flavouring agents, beverages. Soft drinks aerated water – manufacturing – mineral water. Fruits, vegetables, dairy product – storage, preservation. Minerals in food and anti oxidants. Preparation of fruit Jam and pickle.

Unit-III

Cosmetics – Face powder – constituents, uses – side – effects. Nail polish, hair dye – composition and side effects. Tooth powder – lotions. Preparation of phenyl, liquid blue and incense sticks.

Unit-IV

Basic concepts of Green chemistry and its significance in day to day life. Polymers – Classification – Types of polymerization – plastics – classification – types of plastics – PVC, Teflon, PET, Bakelite – Rubber – Natural and synthetic – Bunas rubber, Butyl Rubber. Vulcanization of rubber, neoprene rubber, Plastic pollution and prevention.

Unit-V

Basic concepts of Nano Technology and its importance in day to day life.

Dyes – importance of food colours – PFA (Prevention of Food Adulteration Act) Natural dyes – Synthetic Classification importances – Uses of the following Synthetic dyes - Direct dyes, acid dye, Basic dye, mordant dye, Reactive dye, Disperse dye, Fastness – Light and Washing. Application of dyes in food, paper, plastic and lather.

COURSE OUTCOME:

- Students should able to learn about the cleaning agents and water chemistry,
- Students should able to understand about the food chemistry,
- Students should able to learn about the cosmetic
- Students shoud able to know about the green chemistry
- Students should able to learn about the nano technology

References:

1. Norrish Shreave. R. and Joseph A. Brink Jr Chemical Process Industries, McGraw Hill, Industrial Book Company London 1978.
2. Brain A.C.S. Reinhold, Production and properties of Industrial chemicals 11th Ed, John Wiley & Sons, New York.
3. Burgh, A. Fermentation Industries, Inter science, 4th Ed, 1983, A *Inter science*, New York.
4. Ramani,V. Alex, Food Chemistry(2009),MJP publishers.

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
III	**20P3BOEDC**	**Extra Disciplinary Course – Medicinal Botany and Pharmacognosy**	**4**	**-**

Objectives

- To enable the students to identify local medicinal plants.
- To enable the students to prepare herbal medicines for curing human ailments.
- To impart knowledge to students on Botany and Phyto chemistry of medicinal plants.

Unit I

Medicinal Botany: Definition, Introduction, History, – Classification – Common medicinal plants cultivation, storage, collection and habitats of medicinal plants (*Catharanthus, Coleus*, *Aloe*) – Importance of medicinal plants.

Unit II

Indian systems of medicine – AYUSH - Siddha, Ayurveda, Homeopathy and Unani – Indigenous medicinal plants – Useful parts –Chemical constituents – medicinal uses – medicinal plant drugs.

Unit III

Herbal medicines for human ailments – Heart, kidney, liver, eye, skin, hair, stomach problems, diabetics, blood pressure, headache, cough, cold, fever, digestive problems, joint pains and wounds.

Unit IV

Pharmacognosy – History, Introduction, commercial drugs, crude drugs – classification of drugs – Chemistry of drug and drug evaluation of natural products.

Unit V

Drug adulteration and detection – Substitution – Detection of Adulterations - Elementary knowledge on alkaloids and flavonoids – Preparation of herbal oil, herbal tooth powder, herbal soup, herbal immune boosters.

Books for Reference

- Kumar, N.C., (1993). An introduction to Medical Botany and Pharmacognosy.
- Shah, S.C. and Quadry (1990). A text book of Pharmacognosy.
- Nadkarni, (1981). Indian MateriaMedica.
- Jain, S.K., (1980). Indian Medicinal Plants.
- Balu, S., Murugan, R. and Pandiyan, P., (2005). Herbal Technology.

Outcome

After completion of this course, students would be able to

- Understand the various Indian system of medicine
- Learn about the vital role of herbal medicines for human ailments
- Outline and classify the crud drugs
- Trained about drugs adulteration and direction

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
III	**20P3MBEDC**	**Extra Disciplinary Course – Mushroom Technology**	**4**	**-**

Objectives

- To know the various types of edible mushroom and their nutritional value.
- To understand the methods of cultivation of mushrooms.
- To know the types of food prepared from mushroom and their importance in human health.
- Marketing of mushrooms in India and abroad.
- Mushroom cultivation unit visit- mandatory –Neighbouring District –one day.

Unit I

Introduction – history – scope of edible mushroom cultivation – Types of edible mushrooms available in India – *Calocybeindica, Volvariellavolvacea, Pleurotuscitrinopileatus*, and *Agaricusbisporus.*

Unit II

Pure culture – preparation of medium (PDA and Oatmeal agar medium) sterilization – preparation of test tube slants to store mother culture – culturing of *Pleurotus*mycelium on petriplates, preparation of mother spawn in saline bottle and polypropylene bag and their multiplication.

Unit III

Cultivation Technology: Infra structure – Mushroom bed preparation – paddy straw, sugarcane thrash, maize straw, banana leaves. Factors affecting the mushroom bed preparation – Low cost technology. Composting technology in Mushroom production.

Unit IV

Storage and nutrition: Short-term storage (Refrigeration – upto 24 hours) Long term Storage (canning, pickles, papads), drying, storage in salt solutions. Nutritive value – proteins – amino acids, mineral elements – Carbohydrates, Crude fibre content – Vitamins.

Unit V

Food Preparation – Types of food prepared from mushroom; Soup, Cutlet, Omlette, Samosa, Pickles, Curry – Research Centres – National level and Regional level – Cost benefit ratio – Marketing in India and abroad, Export value.

Books for Reference:-

- Marimuthu, T., Krishnamoorthy, A.S., Sivaprakasam, K. and Jayaranjan, R., (1991). Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
- Swaminathan, M., (1960). Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No.88, Mysore Road, Bangalore 560 018.
- Tewari, Pankaj Kapoor, S.C., (1988). Mushroom Cultivation, Mittal Publications, Delhi.
- Nita Bahi (1984-1988). Handbook of Mushrooms, II Ed, Vol. I & II.
- Paul Stamets, J.S and Chilton J.s (2004). Mushroom cultivation. A practical guide to graining mushroom at home Agarikon Press.

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
III	**20P3ZOEDC**	**Extra Disciplinary Course – Clinical Lab Technology**	**4**	**-**

Objectives:

1. To study the various sterilization techniques.
2. To know the disposal of waste.
3. To identify the blood group and urine sugar.
4. To identify the bacteria and fungus.
5. To know the various diagnostic equipment.

Unit I **12 Hrs**

Scope for study of Clinical Technology. Sterilization – Methods of Sterilization – Dry heat method – Wet heat method – Chemical method of sterilization – Disposal of hospital wastes and infected material - Disinfection laboratory glassware and equipments.

Unit II **12 Hrs**

Composition of blood–ABO blood typing–Rh blood typing–Blood cells counting – Total erythrocyte count, total WBC count and differential count – Sugar level in Blood – Hypoglycemia, Hyperglycemia conditions. Composition of urine – Physical characters of urine–Method of urine analysis for sugars.

Unit III **12 Hrs**

Analysis of Semen, Sputum and stool, Identification of blood parasites, Bacterial culture in NA medium, Fungal culture in PDA medium, Histological study of cells – Histological procedure for the preparation of tissue slides.

Unit IV **12 Hrs**

Diagnostic equipment and apparatus – ECG, EEG, Colorimeter, pH meter, PCR, laminar airflow inoculation chamber, Binocular microscope and Incubator.

Unit V **12 Hrs**

Immuno techniques – ELISA, HLA typing, VDRL Test.

Viral , bacterial and fungal diseases, First aid- definition and types and applications

Reference:

1. Medical Laboratory Technology (1994) (4th edition), By Ramik Sood, Jaypee Brother Medical Publishers (P) Ltd., New Delhi 110 002.
2. Medical Laboratory Technology, K.M. Samuel.
3. Clinical Pharmacology (1987), by Dr. Lawrance and P.N. Bennett (Sixth Edition), ELBS, English Language Book Society, Churchil Livingstone, England.
4. District Laboratory Practice in Tropical countries, part I, By Mouica Cheesbrough, Cambridge Las Priced Edition, Cambridge University Press, Cambridge, U.K.
5. Basic Clinical Paraitology (1993), W.Harold Brown and A.Franklin Neva (5th edition), Prntice Hall Internation Edition.
6. Biological Chemistry – Leringer.

7. Human Physiology by Pearse.
8. The Biology of Animal Paraistes (1984), Cheng, T.Toppan C9 Ltd., Japan.
9. Medical Laboratory Technology: A procedure manual for routine diagnostic tests Volume – I-II By Kanai, L.Mukherjee, Tata McGraw – Hill Publishers, New Delhi.
10. Basic Clinical Paraitology 5th Edn, Harrold, W.Harold Brown and A. Franklin Neva-prentice Hall Internation Editions, U.S.A.

Web Links:

https://www.sunydutchess.edu/academics/catalog/current/courses/medical_laboratory_tech/index.pdf(Dutchess Community College, New York).
https://www.sunydutchess.edu/academics/catalog/current/programs/medicalandalliedhealth/mlt.pdf(Dutchess Community College, New York).
https://makautwb.ac.in/syllabus/BSc%20(Medical%20Lab%20Technology)28.02.2018.pdf

Course Outcome

- Pare the way for basic idea of various aseptic technique.
- Understanding the significance of waste disposal.
- Knowledge on Blood grouping and Blood sugar & urine sugar level.
- Gaining knowledge on culture of Bacteria, fungi and expertise on histological slide preparation.
- Operation technique of Diagnostic apparatus.
- Understanding for various immune techniques.

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
III	**20P3BTEDC**	**Extra Disciplinary Course – Trends in Biotechnology**	**4**	**-**

Objectives:

1. To study the concept and scope of Biotechnology.
2. To Understand r-DNA Technology.
3. To aware the programmes of cell culture, preparations of hormones and vaccines, transgenic animals and human genome project.
4. To study the Bioprocess technology and their applications.
5. To study the Environment Biotechnology and aware the biodiversity and their conservation.

Unit I **Hrs12**

Biotechnology – Introduction and Scope of Biotechnology – Gene Cloning, Cell –free protein production – Production of Health care Products, Medical and Forensic application (RFLP, RAPD, DNA finger printing). Applications of PCR and LCR in disease diagnosis.

Unit II **Hrs12**

Nuclear transplantation, Transgenic Animals Development and uses – mice, goat, fish and sheep. Tendered meat production. Transgenic Plant: Insect resistance, fungus resistance, virus resistance, drought, cold resistance, saline resistance, Transgenic plant with vitamin A, Gene Production of therapeutic antibodies and edible vaccine.

Unit III **Hrs12**

Bioprocess technology – Scope – Fermentor –Bioprocess products: Organic acids – Citric acid, Lactic acid, acetic acid. Antibiotics – Wide and Narrow specxtrum antibiotics. Aminoacids – Glutamic acid, Lysine, Isoleucine, Aspartic acid and Proline. Production of SCP. Enzyme Production – Amylase, Pectinase and Cellulase. Dairy products and Biofuel production.

Unit IV **Hrs12**

Biofertilizers – N_2 fixing microbes (Azolla, Azatobacter, Azospirillum) for use in Agriculture – A. tumifasciens for crop improvement – Biopesticides. Biopolymer and its Application – Biosensor and its application – Bioleaching- Biomining – Biotechnology in oil recovery – Bioremediation of Xenobiotics – superbug – its application. Biodegradation.

Unit V **Hrs12**

Regulations of Biosafety: possible dangers of GEO, Biohazards of rDNA technology. National and International biosafety guidelines, Primary and secondary containments and implementation. Web based information of biosafety on GMO.

Reference:

1. Dubey, R.C. – A Text Book of Biotechnology, S. Chand & Co., Ltd, New Delhi, 1996.
2. Gupta, P.K. – Elements of Biotechnology, Rastogi and Co., Meerut, 1994.
3. Kumar, H.F. A text book on Biotechnology, Affiliated East & West Press Pvt., Ltd, N-Delhi.
4. D.Balasubramanian *et. al.,* - Concepts in Biotechnology.
5. Singh, R.S. – Introductory Biotechnology, Central book deport, Allahabad.
6. Primrose, R. – Molecular Biotechnolgoy, ASM Press.
7. Lick, E.R. and Pastenak – J.J. Molecular Biotechnology.
8. Ignachimuthu – Plant biotechnology, Oxford IBH Publishers, New Delhi.
9. Ranga – Fishery Biotechnology.
10. Primrose, R. – Molecular Biotechnology, ASM Press.
11. Purohit – A Text Book of Biotechnology, Agrobions, Jodhpur.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
III	**20P3CSEDC/ 20P3ITEDC**	**Extra Disciplinary Course- E-Learning Technologies**	**4**	**-**

Objective

- To learn the various E-learning approaches and components.
- To understand the types of design models of E-Learning.
- To explore the models for E-learning courseware development.
- To learn about E-learning authoring tools.
- To know about evaluation and management of E-learning solutions.

UNIT I INTRODUCTION

Need for E-Learning – Approaches of E-Learning – Components of E-Learning – Synchronous and Asynchronous Modes of Learning – Quality of E-Learning – Blended Learning: Activities, Team and Technology – Work Flow to Produce and Deliver E-Learning Content – Basics of Design Thinking.

UNIT II DESIGNING E-LEARNING COURSE CONTENT

Design Models of E-Learning – Identifying and Organizing E-Learning Course Content: Needs Analysis – Analyzing the Target Audience – Identifying Course Content – Defining Learning Objectives – Defining the Course Sequence – Defining Instructional Methods – Defining Evaluation and Delivery Strategies – Case Study.

UNIT III CREATING INTERACTIVE CONTENT

Preparing Content: Tips for Content Development and Language Style – Creating Storyboards: Structure of an Interactive E-Lesson – Techniques for Presenting Content – Adding Examples – Integrating Multimedia Elements – Adding Examples – Developing Practice and Assessment Tests – Adding Additional Resources– Courseware Development Authoring Tools – Types of Authoring Tools – Selecting an Authoring Tool

UNIT IV LEARNING PLATFORMS

Types of Learning Platforms – Proprietary Vs. Open – Source LMS – LMS Vs LCMS – Internally Handled and Hosted LMS – LMS Solutions – Functional Areas of LMS.

UNIT V COURSE DELIVERY AND EVALUATION

Components of an Instructor-Led or Facilitated Course – Planning and Documenting Activities – Facilitating Learners Activities – E-Learning Methods and Delivery Formats – Using Communication Tools for E-Learning – Course Evaluation.

REFERENCES:

1. Clark, R. C. and Mayer, R. E, "eLearning and the Science of Instruction", Third Edition, John Wiley, 2016.
2. Means, B., Toyama, Y., and Murphy, R, "Evaluation of Evidence – Based Practices in Online Learning: A Meta – Analysis and Review of Online Learning Studies", Centre for Learning Technologies, 2010.
3. Crews, T. B., Sheth, S. N., and Horne, T. M, "Understanding the Learning Personalities of Successful Online Students", Educause Review, 2014.
4. Johnny Schneider, "Understanding Design Thinking, Lean and Agile", O'Riley Media, 2011.
5. Madhuri Dubey, "Effective E – learning Design, Development and Delivery", University Press, 2011.

Course Outcomes:

On completion of the course, the students will be able to:

- Distinguish the phases of activities in the models of E-learning.
- Identify appropriate instructional methods and delivery strategies.
- Choose appropriate E-learning authoring tools, Create interactive E-Learning courseware, Evaluate the E-learning courseware, Manage the E-learning courseware.

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
III	**20P3LSEDC**	**Extra Disciplinary course Documentation Centers in India**	**4**	**-**

Objectives:

- To promote and support adoption of standards in library operations.
- To coordinate with other regional, national & international network for exchange of information and documents

Unit I

Components of information systems-Libraries, Documentation centers, Information centers.

Unit II

Data banks, Information analysis centers, Referral centers, Clearing Houses, Reprographic and translation centers-Their function and services.

Unit III

National Information systems: DESIDOC, NASSDOC, SENDOC, NISCAIR and INFLIBNET.

Unit IV

Information Aggregators, Databases Proquest, EBscohost, J-gate, POPLINE, Shodhganga, NDL,.

Unit V

Information products and series – Newsletters, House Bulletins in – house Journals, state of art reports, digest and Technical Digest.

Outcome:

The students shall be able to:

- Know the standards in library operations.
- Understand the regional, national & international network for exchange of information and documents

Reference:

1. Date, C.J. An Introduction to Database System, ed.7, Delhi: Pearson Education (Singapore), 2002
2. Desai, Bipin C. An Introduction to Database System, New Delhi, Galgetia, 2001
3. Karts Henry F, DBS Computer, New Delhi, McGraw Hill, 2000.
4. Raghu Ramakrishnan, DBMSS, New Delhi, McGraw Hill, 2000.
5. Gangadharaiah G, Management of Information Products and Services in University Libraries, Common Wealth, New Delhi, 2012.