A.VEERIYA VANDAYAR MEMORIAL SRI PUSHPAM COLLEGE (AUTONOMOUS), POONDI, THANJAVUR DIST.

Question Pattern for UG and PG Programmes for students to be admitted during 2014 – 2015 and afterwards

Total Marks: 75

QUESTIONS PATTERN

SECTION – A
(Question 1 to 10)

10 x 2 = 20 Marks

1.   Short Answer Questions

2.   Two Questions from each units (All are answerable)

SECTION – B
(Question 11 to 15)

5 x 5 = 25 Marks

1.   5 Paragraph type questions with "either / or" type choice.

2.   One question from each unit of the Syllabus.

3.   Answer all the questions.

SECTION – C
(Question 16 to 20)

3 x 10 = 30 Marks

1.   5 Essay type questions – any three are answerable.

2.   One questions from each unit of the Syllabus.

Semester	Subject Code	Title Of The Paper	Hours Of Teaching / Week	No. of Credits
I	**14U1CHT1**	√ℜ│ꝯ⌠ √⌠ℜ⌡BΔ (χ│↔∑│*f*, E→││>, ∑ꝯ*f*│Δ, √⌠ℜ⌡B κ↔⌠ꝯ→)	**6**	**3**

⟨→: 1   ¬⊗Φ∞⊥

…∑↔Δ: 18

1. √↔ꝯ∴o≡│ ∂│ │⟨ꝯ⌠ □]∫κ∫®℘ꝯ □ │ꝯ®E♥ ¬℘∫τ>Δ

   (]∫κo>ꝯBΔ ξ↵κμΔ)

2. ∑ꝯ∴ℜ│_ │σΘ⌠ □ >τ∝⇑…>[

   (℘│κ⇑ □ >λ[E⊕♥A)

3. ℘ꝯ↔]Bꝯ⌠ □ •>⊆]↔♥ ℘ꝯ*f*_│⊥

   (•>⊆]↔♥ ¬℘∬ ∴, •>⊆]↔♥ ℘λ⌠ •>⊆]↔⇑ >ꝯ│Δ,

   •>⊆]↔ …>σλ[μ])

4. ℘ꝯ↔]>ꝯ⊗[□ T↔⇑>ꝯΦ

5. ℘®│ℜ…│ꝯ®│*f* │_Bꝯ□ •⊆>↔Δ □∑ꝯ│

   (♦≡…│ χ⌡│ ∴ ♦[∑ꝯ…*f*, ♦≡│⊥ ∑ꝯ│ (>τ∝∑ꝯ│, γ⊆]↔ꝯ ∑ꝯ│,

   │[♠*f* ∑ꝯ│, ∴│⌈Bꝯ⟨ ∑ꝯ│))

6. │κ↔ξ⇑μ □ │σ↔ꝯ⇔[││> (│ꝯυ→Δ │σΘ∠Δ ∴⟩♥ ℘]_│⌈)

⟨→: 2 χ│↔∑│*f*

…∑↔Δ: 18

1. …│®│σ □ √↔ꝯ│ ℘ꝯκΔ (1 ξ>_ 15 κ│↔)

2. …│®│σ □ ℘B□≡│⊥ ¬>ꝯ*f*∫Δ

⟨→: 3 E→││>

…∑↔Δ: 18

1. …│®│σ □ ꝯ↔_ ¬│ꝯ│ℜꝯΔ κꝯ♠Δ℘ꝯ│ (1 ξ>_ 10 κ│↔)

2. …│®│σ □ ∴…♠ꝯ↔⇒E>Δ ξ↵κμΔ

⸾→: 4 ∑ς*f*∣Δ

…∑↔Δ: 18

ζ.¬κ. ℘ς⌈•♥÷↔∴⸠B[□ ¬∣⟨>∴ A⇑>⌈

⸾→: 5 √⌈ℜ⌋B κ↔⌈ς→

…∑↔Δ: 18

E→∣∣>, A]♠Δ, ∑ς*f*∣Δ, ∣σ∣>, χ∣↔∑∣ *f*

Semester	Subject Code	Title Of The Paper	Hours Of Teaching/ Week	No. of Credits
I	14U1CHE1	**PART – II ENGLISH PROSE, POETRY AND COMMUNICATION SKILLS**	6	3

Objective

➢ To initiate the Students to understand English through Prose, Poetry and Basic Communicative Grammar

Unit – I

1) The Running Rivulets of Man,   2) Parliament is Marking Time,

3) The Lady in Silver Coat,   4) Mr. Applebaum at Play.

Unit – II

1) The Feigning Brawl of an Impostor,   2) Thy Life Is My Lesson,

3) Solve The Gamble,   4) The Stoic Penalty.

Unit – III

1) Nobility In Reasoning,   2) Malu the Frivolous Freak,

3) Bharath! Gird Up Your Loins!   4) Honesty is the Cream Of Chastity

Unit – IV

John Milton – On His Blindness.

Oliver Goldsmith – The Village Schoolmaster.

William Wordsworth – The Daffodils.

P.B.Shelley – Ozymandias.

Keats – La Belle Dame Sans Merci.

Hopkins – Thou Art Indeed, Just Lord.

Unit – V

Parts of Speech, Nouns, Pronouns, Conjunctions, Adjectives, Articles, Verbs, Adverbs, Interjection – sentence.

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
I	14U1CHC1	**General Chemistry – I**	6	6

Unit - I

Atomic structure and periodic properties: Shapes of atomic orbitals, - principal, azimuthal, magnetic and spin quantum numbers and their significance-Pauli's exclusion principle, Hund's rule, Aufbau Principle, (n+l) rule, stability of half-filled and fully filled orbitals.

Periodic table: Description - classification of elements - variation of atomic volume, atomic & ionic radii, ionisation potential, electron affinity , electronegativity and metallic characters along the periods and in groups -factors influencing the periodic properties. Pauling's and Mulliken's Scales of electro negativity

Unit - II

Basic concepts in organic chemistry: Sigma and pi bonds– Concept of hybridization – Structure of organic molecules based on sp^3, sp^2 and sp hybridization. *Covalent bond properties of organic molecules:* Bond length, bond energy, bond polarity, dipolemoment - inductive, mesomeric, electromeric, resonance and hyperconjugative effects. Naming of alkanes (up to 10 carbon systems) – functional groups - mono functional and bi-functional compounds - Structural isomerism with appropriate examples.

Unit - III

Alkanes: Petroleum source of alkanes – General methods of preparations - chemical properties with mechanism of free radical substitution for halogenation.

Cycloalkanes: Preparation and properties – ring opening reactions - conformational study of ethane ,n-butane and cyclohexane - relative stability of cycloalkanes – Bayer's Strain theory & its limitations.

Unit - IV

Atomic structure and basic quantum mechanics: Electromagnetic radiation - characteristics of wave - Electromagnetic radiation - Black body radiation and Planck's quantum theory - photo electric effect– Compton effect - De Broglie hypothesis and de Broglie equation - Davisson and Germer experiment. Heisenberg's uncertainty principle - . Schrödinger wave equation . Physical significance of Ψ(psi) function. –Nodal planes and nodal points in atomic orbitals.

Unit - V
TITRIMETRIC METHODS OF ANALYSIS

General principle. Types of titrations. Requirements for titrimetric analysis. Concentration systems: Molarity - Normality - problems. Primary and secondary standards, criteria for primary standards, preparation of standard solutions, standardization of solutions. Limitation of volumetric analysis, endpoint and equivalence point.

Acid-base Equilibria pH of strong and weak acid solutions. Buffer solutions. Henderson equations. Preparation of acidic and basic buffers. Relative strength of acids and bases from Ka and Kb values. Neutralisation-titration curve, theory of indicators, choice of indicators. Use of phenolphthalein and methyl orange.

Complexometric titrations

Stability of complexes, titration involving EDTA. Metal ion indicators and characteristics. Problems based on titrimetric analysis.

Books for Reference:

1. Puri B.R. Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry, Milestone Publishers, Delhi (2008)
2. Gopalan R., Inorganic Chemistry for undergraduate students, Universities Press(India) Pvt.ltd.,Hyderabad(2009)
3. Soni P.L.,Mohan Katyal,Text book of Inorganic chemistry,20th edition,Sultan Chand & Son,New Delhi (1992)
4. Lee J.D., Concise Inorganic Chemistry, UK, Black well science (2006).
5. Puri B.R..,Sharma L.R., Pathania M.S., Principles of Physical Chemistry, Vishal Publishing Co., Jalandar, (2004)
6. Soni P.L.,Dharmarah O.P.,Dash U.N.,Text book of physical chemistry,22nd edition, Sultan Chand &Son,New Delhi (2001)
7. Glasstone S., Lewis D. Elements of Physical Chemistry, London, Mac Millan & Co. Ltd.
8. ArunBahl, Bahl .B.S.,Tuli G.D., Essentials of Physical , Multi colour edition,S. Chand & Company Ltd., New Delhi, (2008).
9. Morrison R.T., Boyd R.N. Organic Chemistry (6th edition), New York, Allyn & Bacon Ltd., (2006).
10. Bahl B.S. Arun Bahl, Advanced Organic Chemistry, S. Chand & Company ltd., New Delhi, (2005).
11. Bahl B.S. Arun Bahl, Text book of Organic Chemistry, Multi colour edition,S. Chand & Coy Ltd.,New Delhi, (2006).
12. Soni P.L.,Chawla H.M., Text book of Organic chemistry,29th edition,Sultan Chand & Son,New Delhi (2007)
13. Jain M.K.,Sharma S.C., Modern Organic chemistry,Vishal Publishing Co., Jalandar, (2012)
14. Pillai C.N.,Organic Chemistry for undergraduate students, Universities Press(India) Pvt.ltd.,Hyderabad(2008).
15. Bhupinder Mehta and Manju Mehta "Organic Chemitry", PHI Learning Pvt Ltd, New Delhi – 110001.(2012)

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
I	**14U1CHCP1**	**VOLUMETRIC ANALYSIS PRACTICAL**	**3**	**2**

A. Acidimetry and alkalimetry
1. Estimation of HCl by NaOH using a standard oxalic acid solution
2. Estimation of Na_2CO_3 by HCl using a standard $Na_2 CO_3$ solution

B. Permanganometry
3. Estimation of oxalic acid by $KMnO_4$ using a standard oxalic acid solution
4. Estimation of Iron (II) sulphate by $KMnO_4$ using a standard Mohr's salt solution.

C. Dichrometry
6. Estimation of $KMnO_4$ by thio using a standard $K_2Cr_2O_7$ solution.
7. Estimation of Fe (III) by using $K_2Cr_2O_7$ using a standard Mohr's salt solution using

   internal and external indicators (not for examination).
8. Estimation of copper (II) sulphate by $K_2Cr_2O_7$ solution

D. Applied Experiments (not for examination)
9. Estimation of Total Hardness of water
10. Estimation of available Chlorine in Bleaching Powder
11. Estimation of chloride ion in neutral solution

Reference:

1. Venkateswaran V. Veerasamy R. Kulandaivelu A.R., Basic principles of Practical Chemistry, 2nd edition, Sultan Chand & sons, New Delhi, (1997)
2. Dr.Murugan,Former Head, Department of Chemistry , Micro scale Analysis procedure –Material (2012)

Semester	Subject Code	Title of the Paper	Hours of Teaching/ Week	No. of Credits
I	14U1CHMAA1	**Allied Mathematics-I** **(For Physics and Chemistry)**	5	3

Objectives:
1. To introduce the basis concepts of summation of series and special types of matrices, theory & equation.
2. To introduce Higher-level integral.

UNIT-I

Binomial, exponential and logarithmic (without proof) series–summation using the three series.

UNIT – II

Gayley – Hamilton theorem (No proof)– characteristic equation – Roots and vectors – Symmetric, Orthogonal, Unitary, Hermitian Matrices – Simple examples.

UNIT – III

Radius of curvature (Cartesian and Parametric) - partial derivatives of a function of two functions – Jacobians of 2 and 3 variables.

UNIT – IV

Beta and Gamma Integral (Simple problems only) – Evaluation of double and triple integrals.

UNIT – V

Theory of Equations - relations between roots and co – efficients – symmetric functions of the roots in terms of co-efficients - imaginary roots and irrational roots - transformation of equation – Reciprocal equation.

Text Book:

Algebra volume I & II – Part I Algebra and Calculus Vol. II – T.K.M. Pillai (Relevant portions only)
Unit I   :   Chapter 3 (Vol – I),
Unit II :   Chapter 2 (Vol – II),
Unit III: Chapter 1 (Section 6), chapter 3 (Section 3.2., 3.3.) and Chapter 7.
Unit IV: Chapter 5.
Unit V: Chapter 6 (Vol – I)

General Reference:
1. Algebra (Major) – T.K.M .Pillai.
2. Calculus(Major) – T.K.M. Pillai.
3. Ancillary Mathematics – P.R.Vittal, Margam Publications.

Semester	Subject Code	Title of the Paper	Hours of Teaching /Week	No. of Credits
I	**14U1CHZOA1**	**Allied Zoology – 1**	**5**	**4**

Objectives:

1. To acquire a basic knowledge of animal diversity and organization.
2. To study the general aspects of Invertebrates and Parasites.
3. To study the general aspects of Chordata animals and their anatomy
4. To learn the general principles.

Unit I   **Hrs15**

1. Phylum Protozoa : Plasmodium, Protozoan Parasites
2. Phylum Coelenterata : Obelia –. external characters only.
3. Phylum Platyhelminthes : Taenia solium - Organisation and life history.

Unit II   **Hrs15**

4. Phylum Mollusca : Fresh water Mussel – external characters only.
5. Phylum Arthropoda :External characters of Prawn
6. Phylum Echinodermata : Type study : Star Fish

Unit III   **Hrs15**

General characters and outline classification of Chordata –
A detailed study of Rat.

UnitIV   **Hrs15**

Cell biology: Structure and functions of eukaryotic cells,
Plasma membrane, Mitochondria and Nucleus.
Genetics: Mendelian Principles
Evolution: Lamarckism and Darwinism

Unit V   **Hrs15**

Embryology: Types of vertebrate eggs and cleavage
Physiology: Excretion in Man and Osmoionic regulation in fishes
Ecology: Abiotic factors – Temperature and Light.

References

1. Ekambaranatha Iyer, M and Anatha Krishnan, T.N – Outlines of Zoology
   Verma and Agarwal- Animal Physiology and Ecology
2. Verma and Agarwal – Cytology and Genetics

Semester	Subject Code	Title of the Paper	Hours of Teaching/ Week	No. of Credits
I & II	14U2PHMAA2	**Allied Mathematics-II (NS) (For Physics and Chemistry)**	3+3	-

Objectives:
- To introduce concepts of Hyperbolic function and correlation.
- To introduce the concepts of numerical solution of ordinary differential equation and 3 dimensional analytical geometry.

UNIT –I : Trigonometry

Expansion of $\sin n\theta$, $\cos n\theta$, $\tan n\theta$, $\sin^n \theta$, $\cos n\theta$, $\tan n\theta$- Hyperbolic function – Relation between circular and hyperbolic functions – separation of real and imaginary parts of hyperbolic functions.

UNIT – II

Inverse hyperbolic functions – separation of real and imaginary parts of inverse hyperbolic function.

UNIT – III

Correlation (including rank correlation) – Regression - analysis of variation (one way classification)

UNIT – IV

Numerical solution of ordinary differential equation Taylor series methods Euler and Eluler modified method – R.K.4th order method.

UNIT – V

Standard equation of plane, straight line S.D. between two skew lines, spheres (up to intersection of plane).

Text Book:
1. Trigonometry & Analytical Geometry 3D – T.K.M.Pillai (Relevant portions only)
2. Statistical Methods – S.P.Glupta Sultan & Chand (Relevant Portions)
3. Numerical methods is science & Engineering M.K.Venkataraman (Relevant Portions).
Unit I :   Chapter 3, 4
Unit II :   Chapter 4, 5
Unit III :   Chapter 10, 11 and Chapter 5
Unit IV :   Chapter 10
Unit V :   Chapter 2, 3 & 4.

General References:
1. Trigonometry   - S.Arumugam
2. Statistics   - M.Sivathanupillai
3. Ancillary Maths -   P.R.,Vittal, Margam Publications.

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
I & II	**14U2BOZOAPL**	**Practical – I – Allied Zoology (NS)**	**3+3**	**-**

Objectives:

1. To know the Digestive system, Nervous system of Earthworm and Cockroach.
2. To dissect and study the circulatory of Calotes.

Dissection

Earth worm-Nervous system.

Cockroach – Digestive and Nervous system.

Freshwater – Mussel – Digestive system.

Calotes - Arterial and Venous system.

Mounting:

Earthworm - body setae and penial setae.

Freshwater mussel Pedal ganglion.

Cockroach and Honey bee - Mouth parts

Shark - Placoid scales

Spotters:

Paramecium, Trypanosoma, Sponge gemmules, Obelia colony, Obelia medusa, Ephyra larva, Physalia, Fasciola hepatica, T.S. of liver fluke, micracidium larva, Redia larva, Cercaria larva, Taenia solium entire, Scolex, Nereis entire, T.S. of Nereis, Parapodium, Leech entire, T.S of leech, Glochium larva, Starfish entire, Bipinnaria larva. Amphioxus entire, Shark, Salamander, Calotes, Pigeon and Rat.

Reference

1. Ekambaranatha Iyer, M and Ananthakrishna, T.N. Outlines of Zoology.

Semester	Subject Code	Title Of The Paper	Hours Of Teaching / Week	No. of Credits
II	**14U2CHT2**	√∣ ƒℜ∣ς⌠ √⌈ℜ⌡BΔ – ℘B[ξ∣ ⊕⇑ >τ∝ –√⌈ ℜ∣□ κ↔⌈ς→	**6**	**3**

⟨→: 1

…Σ↔Δ: 18

1.]∫⌈Θς♠⊗Δ ℘⊆>⌈ □ …>κς↔Δ □ …∣ς⟨→]∫♥ ℘]∣Δ
2.]∫Σςϒℜ∣↔⊗⌈ □…>κς↔Δ □6□γΔ]∫ξ∣ ⊕ □]∫⇑>ς⌡ ƒ∣Δ □
    ]∫ℜ∣∫∣ς∅⌈ ℘]∣Δ
3. •⊆>↔⌈ □…>κς↔Δ □]∫κς™⌈ ℘]∣Δ (√∣ ⊕∣…⟨ς ∣∣ ⊗⊆> √[℘Δ …)
 4. ∴ς\ℜ∣κς⊗∣⌈ □]∫κς⊗∣Δ □ ∂∫® ℘⇑μ

⟨→: 2   …Σ↔Δ: 18

1. ¬ ℘⟩Bς∝κς⌈ □]∫¬∴ςα □ 4. ∴ς\ℜ∣≡∣®∣
2. ΣΔ∴ς∝κς⌈ □]∫κςΦ ¬∴ςα □
    (χB⌈κ⊕ ϒB⌈Σ⌈Δ … ξ>_ 10 ℘ςƒ_∣⊥)
3. γ⌡ ƒς⊥ □]∫♥ ℘ς∣κ
    (∴ς⌈∣α⇑]≡∣⊥ …. ξ>_ 10 ℘ςƒ_∣⊥)
 4.]∫∴≡∣ ∣Bς∝κς⌈ □¬ ℘⟩B]∫¬∴ςα (ξ>_ 10 ℘ςƒ_∣⊥)

⟨→: 3

…Σ↔Δ: 18

1.]∫ϑ⌈⌈ □]∫∴⊆]↔Δ □ (ξ>_ >⊆]↔Δ □ ∣_σ: 10 ℘ςƒ_∣⊥)
2. ζ∴↔ζ⌡ ℘↔⌈ □ *♠ς®EBΔ∣ ∴ ÷⊥∣⟨⇑ >τ∝ (ξ⌐κμΔ)
3.]⟨ƒ↔ς⊗♥ ℘ℜ ∣σ↔ςB⌈ □ ζυ⊕ς⌈ ℜ ζ⊕κ⇒E □ Σς®∣ κ⟨Δ
4. T↔∴ςξMκ⌈ □]∫ℜ∣ςκ∧⌈ ∣⌈Δ℘∣Δ □ AB κς♥A
5. ζ□≡ς∣ ∴∣>ς[⊗ς⌡A □ ξ∣ ∣ψ[⊗>∣Δ (1 ξ>_ 4 ℘ςƒ_∣⊥)

⟨→: 4 ℘B[ξ∣ ⊕⇑ >τ∝

…Σ↔Δ: 18

κς℘ℜ⌡B ∂∣ ∴ ♥A □ A□⌈⇓E κ∣ ∣∣⊥ □ κοτζΔ, κο τ∣ς √ƒ≡∣⊥ □ ♦⌐⇑μ♥÷∣ ω ℵℜ∣ Δ⌈∣↔, ⟨∣↔, ω∣↔ …κ→℘ς∣∣⊥ □¬⊗ςυ∣∣⟨♥ ÷�⌈⇑μ♥ ¬℘ς⌡⊥ ∣ςβΔ ξ∣ ⊕ □ Ω→⇑>υ ζΞ∣∣⊥ □ ⊗⟩Bς♠ >τ∝ κ∣κΔ ∂∣>_.
    ¬⊗ς_οB_□¬⊗ς_κ∣∣ □ √⌈ℜ∣□κ∣∣ □ √⌈ℜ⌡B κ∣∣ □¬ ℘B⌈⇓¬⊗ς_□ √∣ζ∣□∣ ς↔□Δ □ ∂→¬ ℘ς⌡® ¬ ℘B⌈ (¬ ℘ς⌡⊥, √ƒΔ, ∣ς⌡Δ, E∣♠, ζ□Δ, ¬>ςα_) □ σ∣♠⇓¬⊗ς_□

√‖ ƒ⇓ ¬⊗ς_ ▢ χ)⇓¬⊗ς_ ▢ ξυ→ ▢ ♦⇓⊗Δ ▢ σζ]∣⊥ ▢ √‖ ƒΩ∣⌈ ▢ >[σ∣ ♠ ▢ ÷⊕σ∣ ♠ ▢ ¬ >\Ω∣⌈ σ∣ ♠ ▢ ζ⁄♥A σ∣ ♠ ▢ κ⌐κ∣ ∴].

⦃→: 5   √⌈ℜ∣▢ κ↔⌈ς→

…∑↔Δ: 18

√⌈ℜ∣▢ κ↔⌈ς→ ▢ >τ∝⇑ μ∣ ⊕ ¬κ≠Ξ∣.

Semester	Subject Code	Title Of The Paper	Hours Of Teaching/ Week	No. of Credits
II	**14U2CHE2**	**PART – II ENGLISH EXTENSIVE READERS AND COMMUNICATIVE SKILLS**	**6**	**3**

Objective

➢ To impart language and communicative skills through short stories, one act plays and communicative grammar

Unit – I

K.A.Abbas – The Sparrows

O'Henry – The Cop and the Anthem.

Guy de Maupassant – The Necklace.

R.K.Narayan – Engine Trouble.

Unit – II

Anton Chekov – The Proposal

O'Henry – While the Auto Watts

Unit - III

Saki – The Death Trap

Mahesh Dattani –The Girl who touched the stars

Claudia I.Haas – The Cellphone Epidemic

Unit – IV

Tense, Question Tag, Dialogue Writing, Paragraph Writing, Adjectives, Adverb

Unit – V

Voices, Degress of Comparison, Direct and Indirect

Book Prescribed:

Unit IV & V – Communicative grammar by the Department of English

semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
II	**14U2CHC2**	**GENERAL CHEMISTRY – II**	**6**	**6**

Unit - I

Chemical Bonding: Formation of ionic bond in NaF & $CaCl_2$. - lattice Energy – Born Haber Cycle - polarizing power and polarisability –formation of covalent bond in H_2 & Cl_2 - partial ionic character from electro negativity – transitions from ionic to covalent character and vice versa – Fajan's rule –inter and intra molecular hydrogen bonds – inter molecular forces.

VSEPR theory :Shapes of simple of $BeCl_2$, BF_3, NH_3 , H_2O ,PCl_5, SF_6,IF_7, XeF_6, molecules - **VB Theory** - **MO theory** : Bonding and antibonding orbitals – application of MO theory to H_2,He_2,N_2,O_2,HF and CO – comparison of VB and MO Theories.

Unit - II

Hydrogen: Position in the periodic table, atomic, nascent and occluded hydrogens - uses of hydrogen.

Elements of Group IA : General characteristics – diagonal relationship between Li and Mg – extraction and uses of Lithium - extraction, physical & chemical properties and uses of Sodium – preparation (Laboratory and Industrial methods) , properties and uses of NaOH and Na_2CO_3 .

Elements of Group II A: General characteristics – uses - diagonal relationship between Be and Al – Chemistry of $MgCO_3$ and $MgSO_4$.$7H_2O$– property and uses of Plaster of paris.

Noble gases: Position in the periodic table – isolation from atmosphere – general characteristics – uses.

Unit - III

Alkenes: Nomenclature – geometrical isomerism – E Z nomenclature –methods to distinguish geometrical isomers - general methods of preparation of alkenes –chemical properties – Markonikov's rule and peroxide effect - preparation and uses of polythene (using Ziegler – Natta Catalyst) , PVC. Polypropylene, Teflon.

Alkynes: Nomenclature - general methods of preparation – physical properties – Acidity of acetylene, addition of H_2, HX, X_2, ozonolysis, hydroboration and polymerisatin.

Alkadienes: Types - mechanisms of electrophilic and free radical addition reactions - thermodynamic and kinetic controlled reactions- natural rubber-chemistry of vulcanization -neoprene, and Buna S rubber.

Unit - IV

Aromatic Hydrocarbons: Structure of benzene - resonance in benzene – delocalized cloud in benzene and its consequences – aromaticity – Huckel's rule (4n+2) and its simple applications. **Aromatic electrophilic substitution**: Mechanisms of nitration, sulphonation, halogenations. Friedal Craft's alkylation and acylation in benzene – *Orientation in benezene* :activating and deactivating groups , ortho/para ratio – Nuclear and side chain halogenations of Toluene.

Polynuclear hydrocarbons : Isolation, properties, synthesis and uses of Naphthalene and Anthracene

Unit - V

Real gases : VanderWaals equation of states–derivation–significance of critical constants– Critical equations of state–law of corresponding states– compressibility factor. Inversion temperature and Joule Thomson effect. *Liquefaction of gases:* Linde , claud methods and demagneitisation methods

Molecular velocities: Maxwell's distribution (derivation not required) – mean, most probable and root mean square velocities – collision diameter, mean free path and collision number – **Transport properties** : Viscosity ,thermal conductivity and diffusion (concept only) – degrees of freedom - molecular basis of heat capacity

Books for Reference:

1.	Puri B.R. Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry, Milestone Publishers, Delhi (2008)
2.	Gopalan R., Inorganic Chemistry for undergraduate students, Universities Press(India) Pvt.ltd.,Hyderabad(2009)
3.	Soni P.L.,Mohan Katyal,Text book of Inorganic chemistry,20th edition,Sultan Chand & Son,New Delhi (1992)
4.	Lee J.D., Concise Inorganic Chemistry, UK, Black well science (2006).
5.	Puri B.R..,Sharma L.R., Pathania M.S., Principles of Physical Chemistry, Vishal Publishing Co., Jalandar, (2004)
6.	Soni P.L.,Dharmarah O.P.,Dash U.N.,Text book of physical chemistry,22nd edition, Sultan Chand &Son,New Delhi (2001)
7.	Glasstone S., Lewis D. Elements of Physical Chemistry, London, Mac Millan & Co. Ltd.
8.	ArunBahl, Bahl .B.S.,Tuli G.D., Essentials of Physical , Multi colour edition,S. Chand & Company Ltd., New Delhi, (2008).
9.	Morrison R.T., Boyd R.N. Organic Chemistry (6th edition), New York, Allyn & Bacon Ltd., (2006).
10.	Bahl B.S. Arun Bahl, Advanced Organic Chemistry, S. Chand & Company ltd., New Delhi, (2005).
11.	Bahl B.S. Arun Bahl, Text book of Organic Chemistry, Multi colour edition,S. Chand & Coy Ltd.,New Delhi, (2006).
12.	Soni P.L.,Chawla H.M., Text book of Organic chemistry,29th edition,Sultan Chand & Son,New Delhi (2007)
13.	Jain M.K.,Sharma S.C., Modern Organic chemistry,Vishal Publishing Co., Jalandar, (2012)
14.	Pillai C.N.,Organic Chemistry for undergraduate students, Universities Press(India) Pvt.ltd.,Hyderabad(2008).
15.	Bhupinder Mehta and Manju Mehta "Organic Chemitry", PHI Learning Pvt Ltd, New Delhi – 110001.(2012)

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
II	**14U2CHCP2**	**Core Practical – ORGANIC QUALITATIVE ANALYSIS AND PHYSICAL CONSTANTS**	**3**	**2**

A. Organic qualitative analysis

Systematic analysis of an organic compound - Preliminary tests, detection of element present, Aromatic or aliphatic, Saturated or unsaturated, nature of the functional group and exhibiting confirmatory tests and derivatives for the given organic compounds.

B. Physical constants:

Determination of physical constants (boiling point and melting point) of the given organic compound.

Reference:

1. Venkateswaran V. Veerasamy R. Kulandaivelu A.R., Basic principles of Practical Chemistry, 2nd edition, Sultan Chand & sons, New Delhi, (1997)

2. Dr. S.Murugan ,Former Head, Department of Chemistry **A Laboratory Manual of ORGANIC CHEMISTRY with MICROSCALE EXPERIMENTS in Organic Chemistry** (2006) Printed at Bharathi Press,Rajakkamangalam Road, Chettikulam Junction, Nagercoil - 629 002 ☎   : 04652-226907

Semester	Subject Code	Title of the Paper	Hours of Teaching/ Week	No. of Credits
I & II	**14U2PHMAA2**	**Allied Mathematics-II (NS) (For Physics and Chemistry)**	**3+3**	**4**

Objectives:
- To introduce concepts of Hyperbolic function and correlation.
- To introduce the concepts of numerical solution of ordinary differential equation and 3 dimensional analytical geometry.

UNIT –I : Trigonometry

Expansion of $\sin n\theta$, $\cos n\theta$, $\tan n\theta$, $\sin^n \theta$, $\cos n\theta$, $\tan n\theta$- Hyperbolic function – Relation between circular and hyperbolic functions – separation of real and imaginary parts of hyperbolic functions.

UNIT – II

Inverse hyperbolic functions – separation of real and imaginary parts of inverse hyperbolic function.

UNIT – III

Correlation (including rank correlation) – Regression - analysis of variation (one way classification)

UNIT – IV

Numerical solution of ordinary differential equation Taylor series methods Euler and Eluler modified method – R.K.4th order method.

UNIT – V

Standard equation of plane, straight line S.D. between two skew lines, spheres (up to intersection of plane).

Text Book:
1. Trigonometry & Analytical Geometry 3D – T.K.M.Pillai (Relevant portions only)
2. Statistical Methods – S.P.Glupta Sultan & Chand (Relevant Portions)
3. Numerical methods is science & Engineering M.K.Venkataraman (Relevant Portions).
Unit I :   Chapter 3, 4
Unit II :   Chapter 4, 5
Unit III :   Chapter 10, 11 and Chapter 5
Unit IV :   Chapter 10
Unit V :   Chapter 2, 3 & 4.

General References:
1. Trigonometry   - S.Arumugam
2. Statistics   - M.Sivathanupillai
3. Ancillary Maths -   P.R.,Vittal, Margam Publications.

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
I & II	**14U2CHZOAPL**	**Practical – I – Allied Zoology (NS)**	**3+3**	**2**

Objectives:

1. To know the Digestive system, Nervous system of Earthworm and Cockroach.
2. To dissect and study the circulatory of Calotes.

Dissection

Earth worm-Nervous system.

Cockroach – Digestive and Nervous system.

Freshwater – Mussel – Digestive system.

Calotes - Arterial and Venous system.

Mounting:

Earthworm - body setae and penial setae.

Freshwater mussel Pedal ganglion.

Cockroach and Honey bee - Mouth parts

Shark - Placoid scales

Spotters:

Paramecium, Trypanosoma, Sponge gemmules, Obelia colony, Obelia medusa, Ephyra larva, Physalia, Fasciola hepatica, T.S. of liver fluke, micracidium larva, Redia larva, Cercaria larva, Taenia solium entire, Scolex, Nereis entire, T.S. of Nereis, Parapodium, Leech entire, T.S of leech, Glochium larva, Starfish entire, Bipinnaria larva. Amphioxus entire, Shark, Salamander, Calotes, Pigeon and Rat.

Reference

1. Ekambaranatha Iyer, M and Ananthakrishna, T.N. Outlines of Zoology.

Semester	Subject Code	Title of the Paper	Hours of Teaching/ Week	No. of Credits
II	**14U2CHMAA3**	**Allied Mathematics- III (For Physics and Chemistry)**	**5**	**3**

Objectives:
➢ To study vector differentiation and vector integration with application.
➢ To study ordinary Differential equation and partial differential equation
➢ To study Fourier series and Laplace transforms.

Unit-I : Differential Equation:
Second order differential elation with constant coefficient of the types $ay'' + by' + cy = e^{ax}$, $g(x)$, x^n , $\sin ax$, & $\cos ax$ only – solution of partial differentials of the form $f(p, q) = o$; $f(z, p, q) = 0$; $f(x, p, q) = 0$; $f(Y, p, q) = 0$; $f(x, p) = g(Y, q)$; $z = p\,x + qy + f(p, q)$: Lagrange's method for solving $P_p + Q_q = R$.

Unit – II: Laplace Transforms:
Definition – Laplace Transform of function e^{at}, $\cos at$, $\sin$ at and t^n where 'n' is positive integer-First Shifting theorem – Laplace transforms of $e^{at} \cos bt$, $e^{at} \sin bt$, $e^{at} \sin hbt$, $e^{at} \cos hbt$, $e^{at} t^n$. Transforms of $f'(t)$ and $f''(t)$ – Inverse transforms relating to the above standard forms. Application of solution of ordinary differential equation with constant coefficients (involving the above transforms)

Unit –III Fourier Series:
Definition – finding Fourier coefficients for a d given periodic function with period 2π-odd, even functions – Half range series.

Unit – IV Vector differentiation:
Velocity and acceleration – scalar and vector fields – Divergence and curl- application – Laplalce operator.

Unit – V Vector integration:
Application of Gauss and Stoke's theorems (no proof of the theorem).

Text Book:
Unit I   :   Chapter2 & 4   Differential Equations – TKM Pillai
Unit II   :   Chapter5   Calculus Volume III – TKM Pillai
Unit III   :   Chapter6 Section 1 to 5   Calculus Volume III – TKM Pillai
Unit IV   :   Chapter IV   Vector Algebra & Analysis – TKM Pillai
Unit V   :   Chapter VI

General References:
1. Engineering Mathematics – A Singaravelu(Volume I & II)
2. Vector Calculus – K.Viswanbathan and S.Selvaraj.
3. Ancillary Mathematics – P.R.Vittal, Morgam Publications.

Semester	Subject Code	Title of the Paper	Hours of Teaching /Week	No. of Credits
II	14U2CHZOA2	**Allied Zoology –II**	6	4

Objectives:
1. To acquire basic knowledge about the beneficial role of animals.
2. To study the various types cultures.

Unit I   **Hrs15**

Vermiculture and composting–types of earthworm–rearing technology Types of Vermicomposting: Small scale and Large scale method– economic importances.

Unit II   **Hrs15**

Sericulture –Types of silkworm; Biology and Life cycle of silkworm (*Bombyx mori*) – economic importance of silkworm.

Unit III

Apiculture – species of honeybee – Types of bee hive – nutritive and medicinal value of honey and Bee wax.

Unit IV   **Hrs15**

Aquaculture–construction of pond – Management of a pond – Freshwater cultivable fishes – fish feed– Economic importance.

Unit V   **Hrs15**

Poultry farming–types of poultry–Poultry nutrition–diseases and their prevention–Economics of poultry production.

References
1. Agarwal, W.C. – Economic Zoology
2. Pradip V. Jabde – Applied Zoology.

Semester	Subject Code	Title Of The Paper	Hours Of Teaching / Week	No. of Credits
III	**14U3CHT3**	⎮ς♥÷B≡⎮⊥, ⎮®‖↔⎮⊥, √⎾ℜ⏌B κ↔⎾ς→	**6**	**3**

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2. ∴⎰…∴‖⎾ ☐ ∴⎾⎾κ♠Δ Aℜ⎮ ⎮ς⎮>

3. ⎾κ⎮ E⊆>ς∴⎰ ☐ σ∴⎮⎾B⎾ √⎾Δ℘⎮Δ

4. ⎮Δ℘↔ς∴ςB☐Δ ☐ ●⊆>↔ ⎮ς⏌ fΔ ☐ ⎾fς∴⎰♥ ℘f⎾Δ (84 ℘ςf_⎮⊥)

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1. ¬℘⟩B A↔ς☐Δ ☐ √⟨Bς[ζ⎮ ∴ς⊕ ∑ςB♠ς⎾ A↔ς☐Δ (27 ℘ςf_⎮⊥)

2. ∑⟨¬κ⏌ ℘ς ☐●BΔκ↔ ⎮ς⏌ fΔ (ξ>_ 20 ℘ςf_⎮⊥)

3. …>Δ℘ςκ⎰ ☐ ∑ς®⎮♥ ℘f⎾Δ (ξ>_ 10 ℘ςf_⎮⊥)

4. ⎾⊕ς♥A↔ς☐Δ ☐σ⎾ς>⇑μℜ ⎮ς⏌ fΔ ☐ ∑÷ ∂κ>ς↔♥ ℘f⎾Δ (ξ>_ 10 ℘ςf_⎮⊥)

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⎮®‖↔♥ ℘λυE ☐ 10 ∴]♥¬℘⏌

¬∴ςα¬℘B⌈♥A♥ ℘λυE □ 5 ∴]♥¬℘⌡

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Semester	Subject Code	Title Of The Paper	Hours Of Teaching/ Week	No. of Credits
III	**14U3CHE3**	**PART – II ENGLISH SHAKESPEARE, EXTENSIVE READERS AND COMMUNICATIVE SKILLS**	**6**	**3**

Objective

➢ To introduce the language of the world renowned dramatist and novelist to enhance the vocabulary and communicative skills of the learners.

Unit – I

Funeral Oration – Julius Caesar

Trial for a Pound of Flesh – The Merchant of Venice

Unit – II

He Kills Sleep – Macbeth

A Real Love at First Sight – Twelfth Night

Unit – III

When the Moor Kills, "So Good a wife" – Othello

In Love is a "Midsummer Madness" – Tempest

Unit – IV

The Mayor of Casterbridge (Abridged) – Thomas Hardy

Unit – V

Note making, Hints Developing, Expansion of Ideas and Proverbs, Sequence of Sentences Synonyms, Antonyms.

Book Prescribed:

Unit–I : II & III: Selected scenes from Shakespeare.

Unit IV: The Mayor of Casterbridge Abridged by E.F.Dodd

Unit V : Communicative Grammar.

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
III	**14U3CHC3**	**GENERAL CHEMISTRY – III**	**6**	**6**

Unit - I

Group III A: General characteristics of elements - diagonal relationship between B and Si - extraction, physical & chemical properties and uses of Aluminium – chemistry of Al_2O_3, – alloys of aluminum.

Group IVA: General characteristics of elements – anomalous behaviour of carbon and silicon from the rest of the family- allotropic forms of carbon – chemistry of charcoal – chemistry of CO & CO_2 – use of CO_2 in fire extinguishers – dry ice - preparation , properties and uses of silicon. **Group V A:** General characteristics of elements – unique features of nitrogen from the rest of the family – preparation of nitrogen – physical & chemical properties and uses of N_2.

Unit - II

Oxygen Family: Anomalous behaviour of oxygen – paramagnetic nature of oxygen - classification of oxides based on their chemical behaviour (acidic, amphoteric and neutral) and oxygen content (normal, per, super, di, sub and mixed oxides). Chemistry and structure of H_2O_2 - structure of sulphurous, sulphuric and pyrosulphuric acid - preparation, properties, structure and uses of peracids of sulphur – role of Selenium in Xerography.

Oxidation and Reduction Reactions: Definition (electronic theory) of oxidizing agents, reducing agents, equivalent weights of oxidizing and reducing agents - Oxidation number concept – Balancing redox equations by Oxidation number method and ion - electron method.

Halogen family: General characteristics of halogen with reference of electro negativity, electron affinity, oxidation states and oxidizing power - peculiarities of fluorine. *Inter halogen compounds:* Types – preparation and properties of $ICl.BrF_3,ClF_5$ and IF_7. *Pseudo halogens:* General characteristics – basic nature of iodine.

Unit - III

Organohalogen compound: Synthetic uses of alkyl halides & Grignard reagents – *Aliphatic nucleophilic substitutions*: Mechanisms of SN^1, SN^2, and SN^i mechanisms– effect of solvents, leaving groups, nucleophiles and structure of substrate (Reactivity of methyl, ethyl, isopropyl, t-butyl, vinyl, allyl, benzyl halides). *Elimination reaction*: mechanism of E_1 and E_2 reactions – elimination versus Substitution - Hoffmann and Saytzeff elimination. *Aromatic nucleophilic substitutions:* Benzyne mechanism and intermediate complex mechanism.

Unit - IV

Stereochemistry: projection formulae (Fisher,Sawhorse,Newmann) - stereoisomerism – types – optical isomerism - chirality – idea of asymmetry and dissymmetry - R,S notations of simple aliphatic compounds - D, L notations– erythro, thero conventions – optical activity – measurement of optical activity - Optical isomerism exhibited by lactic and tartaric acid – resolution of racemic mixture – stereoselectivity (bromination of cyclo hexene) and stereospecificity (bromination of 2- butane) in organic reactions - Walden inversion. Optical activity of substituted Biphenyl allenes and spiranes – atrop isomerism.

Unit - V
Qualitative Inorganic Analysis: Dry test, flame test, Cobalt nitrate test - Wet confirmatory tests for acid radicals - Interfering acid radicals- Theory of Interference - Elimination of Interfering acid radicals. Solubility Product – common ion effect - principle involved in the elimination of interfering anions – principles involved in the group separation - reactions involved in the confirmatory tests of sulphate, nitrate, carbonate, chloride, fluoride borate, phosphates anions and Pb^{+2}, Cu^{+2}, Cd^{+2}, Bi^{+2}, Fe^{+2}, Fe^{+3}, Al^{+3}, Cr^{+3}, Co^{+2}, Ba^{+2}, Ca^{+2}, Sr^{+2}, Mn^{+2}, Ni^{+2}, Zn^{+2}, Mg^{+2} cations.

Books for Reference:

1.   Puri B.R. Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry, Milestone Publishers, Delhi (2008)
2.   Gopalan R., Inorganic Chemistry for undergraduate students, Universities Press(India) Pvt.ltd.,Hyderabad(2009)
3.   Soni P.L.,Mohan Katyal,Text book of Inorganic chemistry,20th edition,Sultan Chand & Son,New Delhi (1992)
4.   Lee J.D., Concise Inorganic Chemistry, UK, Black well science (2006).
5.   Puri B.R..,Sharma L.R., Pathania M.S., Principles of Physical Chemistry, Vishal Publishing Co., Jalandar, (2004)
6.   Soni P.L.,Dharmarah O.P.,Dash U.N.,Text book of physical chemistry,22nd edition, Sultan Chand &Son,New Delhi (2001)
7.   Glasstone S., Lewis D. Elements of Physical Chemistry, London, Mac Millan & Co. Ltd.
8.   ArunBahl, Bahl .B.S.,Tuli G.D., Essentials of Physical , Multi colour edition,S. Chand & Company Ltd., New Delhi, (2008).
9.   Morrison R.T., Boyd R.N. Organic Chemistry (6th edition), New York, Allyn & Bacon Ltd., (2006).
10. Bahl B.S. Arun Bahl, Advanced Organic Chemistry, S. Chand & Company ltd., New Delhi, (2005).
11. Bahl B.S. Arun Bahl, Text book of Organic Chemistry, Multi colour edition,S. Chand & Coy Ltd.,New Delhi, (2006).
12. Soni P.L.,Chawla H.M., Text book of Organic chemistry,29th edition,Sultan Chand & Son,New Delhi (2007)
13. Jain M.K.,Sharma S.C., Modern Organic chemistry,Vishal Publishing Co., Jalandar, (2012)
14. Pillai C.N.,Organic Chemistry for undergraduate students, Universities Press(India), Pvt.ltd.,Hyderabad(2008).
15. Frank J. Welcher and Richard B. Hahn, Semi micro Qualitative Analysis, New Delhi, Affiliated East- west Press pvt.Ltd. (1969).
16. Venkateswaran V. Veerasamy R. Kulandaivelu A.R., Basic principles of Practical Chemistry, 2nd edition, Sultan Chand & sons, New Delhi, (1997).
17. Bhupinder Mehta and Manju Mehta "Organic Chemitry", PHI Learning Pvt Ltd, New Delhi – 110001.(2012)

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
III & IV	**14U4CHCP3**	**Inorganic Qualitative Analysis Practical (Non - Semester)**	**3+3**	**-**

Semimicro inorganic qualitative analysis

Analysis of a mixture containing two cations and two anions of which one will be an interfering ion using semimicro methods and conventional scheme with hydrogen sulphide.

1. **Cations to be Studied:** lead, copper, bismuth, cadmium, iron, aluminium, zinc, manganese, cobalt, nickel, barium, calcium, strontium, magnesium and ammonium

2. **Anions to be studied:** Carbonate, Sulphate, nitrate, chloride, bromide, fluoride, borate, oxalate, and phosphate

Reference:

I. Venkateswaran V. Veerasamy R. Kulandaivelu A.R., Basic principles of Practical Chemistry, 2nd edition, New Delhi, Sultan Chand & sons (1997)

Semester	Subject Code	Title of the Paper	Hours of Teaching/ Week	No. of Credits
III	**14U3CHPHA1**	**Allied Physics – I**	**5**	**4**

Unit – Gravitation

Newtons law of gravitation – determination "G"- Boys method – density of earth – gravitational potential and field intensity due to a solid sphere at a point inside the sphere – outside the sphere.

Elasticity :Twisting couple on a cylinder – determination of coefficient of Rigidity modulus –Static Torsion method –Bending of beams – Bending moment –Uniform bending-experimental method for the determination of Young's modulus – I section of girders.

Unit – II Sound

Composition of two simple harmonic motions (1) along a straight line and (2) at right angles – Lissajous figures and applications. Acoustic of buildings –Reverberation-intensity measurement by hotwire microphone method.

Unit – III Thermal Physics

Low temperature Physics – Production of low temperature – liquefaction of gases – liquefaction of helium – adiabatic demagnetization (qualitative)only – super conductivity –.Newton's law of cooling –verification-specific heat capacity of a liquid by cooling – Bomb calorimeter.

Conduction: Coefficient of thermal conductivity-good and bad conductors-Searle's method for good conductors –Lees disc method for bad conductors. Stefan's law Of radiation-solar constant – Angstroms pyroheliometer.

Unit – IV Optics

Interference - thin film – reflection air wedge - Diffraction –fresnel's and fraunhofer diffraction- Transmission grating -theory.

Polarization- Elliptically and circularly polarized light - quarter wave plate – half wave plate-Babinet compensator -optical activity – Laurent's half shade polarimeter.

Unit – V Relativity

Frames of reference - Galilean transformation – inertial and non - inertial frames-Michelson-Morley Experiment –negative result – postulates of special theory of relativity-Lorentz transformation equatons-time dilation-length contraction. Wave mechanics - De Broglie's concept of matter waves – Davisson and Gemmer experiment- G.P.Thomson experiment - Uncertainty principle.

Reference:
1. Allied physics – A. Sundaravelusamy, Priya publications, Karur-2.
2. Allied physics - R. Sabesan and others, Popular Book Depot, Madras-15.

Semester	Subject Code	Title of the Paper	Hours of Teaching/ Week	No. of Credits
III & IV	**14U4CHPHAP**	**Allied -PL-Physics (NS)**	**3+3**	**-**

Any Sixteen Experiment:

1. Young's modulus – non uniform bending.

2. Rigidity modulus –Static Torsion

3. Coefficient of viscosity – Graduated burette method.

4. Specific heat capacity of liquid - Newton's law of cooling

5. Newton's rings-Radius of curvature.

6. Air wedge – Thickness of wire

7. Spectrometer prism – A and D

8. Spectrometer grating – normal incidence

9. Field along the axis of the coil

10. Carey Fosters Bridge – specific resistance

11. P.O Box-Specific Resistance

12. Potentiometer – ammeter calibration

13. Figure of merit of a galvanometer –Half deflection method – B.G

14. Diode – characteristics

15. S.T and interfacial – drop weight method

16. Logic gates – using Discrete Components.

Semester	Subject Code	Title Of The Paper	Hours Of Teaching / Week	No. of Credits
IV	**14U4CHT4**	⊗≡∣ √⌈ℜ⌋BΔ – ∂⊕ √⌈ℜ⌋BΔ – ¬⊗Δ¬∴ςα – √⌈ℜ⌋B κ↔⌈ς→	**6**	**3**

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℘]υ→♥ ℘⇑μ

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Semester	Subject Code	Title of The Paper	Hours of Teaching/ Week	No. of Credits
IV	**14U4CHE4**	**PART – II ENGLISH ENGLISH FOR COMPETITIVE EXAMINATIONS**	**6**	**3**

Objective

➢ To prepare the learners for competitive examinations and to know the fundamentals of practical communication.

Unit – I

Grammar– Number, Subject, Verb, Agreement, Articles, Sequence of Tenses, Common Errors.

Unit – II

Word Power - Idioms & Phrases, one word substitutes, Synonyms, Antonyms, Words we often confuse, foreign words & phrases, spelling.

Unit – III

Reading & Reasoning – Comprehension, Jumbled Sentences.

Unit - IV

Writing Skills – Paragraph, Precis Writing, Expansion of an idea, Report Writing, Essay, Letters, Reviews (Film & Book)

Unit – V

Speaking- Public speaking, Group Discussion, Interview, Spoken English.

Prescribed Text:

1. V.Saraswathi, English for Competitive Examinations, Chennai, Emerald Publishers, 2000.

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
IV	**14U4CHC4**	**GENERAL CHEMISTRY – IV**	**6**	**6**

Unit - I

Metallurgy: Occurrence of metals – minerals & ores – mineral wealth of India .*concentration of ores*: Froth floatation, magnetic separation, liquation, leaching. *Production of the metal:* calcinations, roasting, smelting, aluminothermic process and amalgamation. *purification of metals* : Poling, electrolysis, zone refining , cupellations, Van Arkel de Boer methods – Microbial metallurgy.
Chemistry of transition elements: Electronic configuration – general periodic trend – group study of chromium, iron, copper and zinc – galvanization.

Unit - II

Iron: Commercial forms - manufacture of cast iron. **Steel**: Classification and heat treatment -alloys of steel (composition and uses).
 f - Block Elements: Electronic configuration**.** *Lanthanides and actinides*: Occurrence, oxidation states, magnetic properties, colour (not for actinides) and spectra – lanthanide and actinide contraction - differences between lanthanides and actinides - separation of lanthanides by ion exchange and solvent extraction methods – uses of lanthanides and actinides - extraction and properties of thorium and uranium - preparation, properties and uses of uranylacetate and thoria.

Unit - III

Alcohols: Classification and nomenclature – General methods of preparation, physical & chemical properties aliphatic alcohols - industrial preparation of ethanol – ascending and descending series - preparation , properties and uses of glycerol.
Ethers: Classification and nomenclature: Preparation, physical & chemical properties of Diethyl ether and Anisole – estimation of methoxy group by zeisel's method.
Crown ethers: Introduction – structures – applications.

Unit - IV

Chemical Kinetics: Rate of a reaction, rate equation, order and molecularity of reaction. Factors influencing the reaction rate–zero, first, second and third order reactions and their characteristics- pseudo uni molecular reaction - derivation of rate constants for first and second order reactions (equal initial concentration) – derivation of time for half change with examples. Methods of determination of order of reactions - effect of temperature on reaction rate – concept of activation energy, energy barrier - Arrhenius equation. *Theories of reaction rates*: collision theory – absolute reaction rate theory (ARRT) for a bimolecular reaction– Lindemann's theory of unimolecular reaction.

UNIT - V

Catalysis: General characteristics of a catalyst .*Types*: Homogeneous and heterogeneous catalysis, positive and negative catalysts, acid – base, induced, auto and enzyme catalysis – promoter – catalytic poisoning (anti catalyst) - intermediate compound theory and adsorption theory catalysis. Factors increasing and decreasing the catalytic activity - mechanism and characteristics of enzyme catalysis – Michaelis-Menton equation

Adsorption: Types – characteristics of adsorption - comparison of chemisorption and physisorption - *Isotherms*: Freundlich and Langmuir adsorption isotherms (no derivation) – applications of adsorption.

Colloids: Definition - types - stability - gold number - kinetic, optical and electrical properties. *Emulsion and Gels*: Types of emulsions, preparation, properties and application.

Books for Reference:

1. Puri B.R. Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry, Milestone Publishers, Delhi (2008)
2. Gopalan R., Inorganic Chemistry for undergraduate students, Universities Press(India) Pvt.ltd.,Hyderabad(2009)
3. Soni P.L.,Mohan Katyal,Text book of Inorganic chemistry,20th edition,Sultan Chand & Son,New Delhi (1992)
4. Lee J.D., Concise Inorganic Chemistry, UK, Black well science (2006).
5. Puri B.R..,Sharma L.R., Pathania M.S., Principles of Physical Chemistry, Vishal Publishing Co., Jalandar, (2004)
6. Soni P.L.,Dharmarah O.P.,Dash U.N.,Text book of physical chemistry,22nd edition, Sultan Chand &Son,New Delhi (2001)
7. Glasstone S., Lewis D. Elements of Physical Chemistry, London, Mac Millan & Co. Ltd.
8. ArunBahl, Bahl .B.S.,Tuli G.D., Essentials of Physical , Multi colour edition, S. Chand & Company Ltd., New Delhi, (2008).
9. Morrison R.T., Boyd R.N. Organic Chemistry (6th edition), New York, Allyn & Bacon Ltd., (2006).
10. Bahl B.S. Arun Bahl, Advanced Organic Chemistry, S. Chand & Company ltd., New Delhi, (2005).
11. Bahl B.S. Arun Bahl, Text book of Organic Chemistry, Multi colour edition, S. Chand & Coy Ltd.,New Delhi, (2006).
12. Soni P.L.,Chawla H.M., Text book of Organic chemistry,29th edition, Sultan Chand & Son,New Delhi (2007)
13. Jain M.K.,Sharma S.C., Modern Organic chemistry, Vishal Publishing Co., Jalandar, (2012)
14. Pillai C.N.,Organic Chemistry for undergraduate students, Universities Press(India) Pvt.ltd.,Hyderabad(2008).
15. Bhupinder Mehta and Manju Mehta "Organic Chemitry", PHI Learning Pvt Ltd, New Delhi – 110001.(2012)

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
III & IV	**14U4CHCP3**	**INORGANIC QUALITATIVE ANALYSIS PRACTICAL (NS)**	**3+3**	**6**

Semimicro inorganic qualitative analysis

Analysis of a mixture containing two cations and two anions of which one will be an interfering ion using semimicro methods and conventional scheme with hydrogen sulphide.

3. **Cations to be Studied:** lead, copper, bismuth, cadmium, tin, iron, aluminium, zinc, manganese, cobalt, nickel, barium, calcium, strontium, magnesium and ammonium

4. **Anions to be studied:** Carbonate, Sulphate, nitrate, chloride, bromide, fluoride, borate, oxalate, and phosphate

Reference:

Venkateswaran V. Veerasamy R. Kulandaivelu A.R., Basic principles of Practical Chemistry, 2nd edition, New Delhi, Sultan Chand & sons (1997)

Semester	Subject Code	Title of the Paper	Hours of Teaching/ Week	No. of Credits
IV	**14U4CHPHA2**	**Allied Physics – II**	**5**	**4**

Unit – I Magnetism

Poles and dipoles - Gauss's law for Magnetism – Para magnetism – dia Magnetism- Ferromagnetism. Electromagnetism: Biot- Savart's law –Magnetic field due to a straight conductor – circular conductor - field along the axis of a coil-solenoid-ampere's theorem.

Unit – II Electricity

Kirchhoff's law and their applications - Kirchhoff's law –Whetstone's Bridge-Carey Foster's Bridge. Electromagnetic induction: Laws of electromagnetic induction – expression for induced e.m.f-self inductance of a solenoid – Rayleigh's method- Mutual inductance of solenoid - Determination of coefficient of coupling –Eddy currents and its applications.

Unit - III Atomic Physics

Vector atom model-quantum numbers in vector atom model-Pauli's exclusion principle- Periodic classification of elements – Photoelectric effect – Einstein's photo electric equation –experimental verification – Photomultiplier tube.

X – rays: continuous and characteristic X – rays –Mosley's law and its importance –Bragg's Law – Bragg 's spectrometer-crystal structure.

Unit – IV Nuclear Physics

Nuclear size –mass – charge – spin magnetic moment – packing fraction – stability and binding energy .Liquid drop model - shell model – nuclear fission-multiplication factor – critical size - chain reaction – nuclear fusion –stellar energy Thermonuclear reaction - controlled thermonuclear reaction – nuclear reactor.

Unit – V: Electronics

Necessity of modulation – Different types of modulation –junction Diode Detector - Ionosphere and propagation of radio waves – AND,OR,NOT,NOR,NAND GATES-Laws of Boolean algebra Demorgan's theorems – Universal building block.

Reference:

1. Allied physics – A. Sundaravelusamy, Priya publications, Karur-2.
2. Allied physics - R. Sabesan and others, Popular Book Depot, Madras-15.

Semester	Subject Code	Title of the Paper	Hours of Teaching/ Week	No. of Credits
III & IV	**14U4CHPHAP**	**Allied -PL-Physics (NS)**	**3+3**	**2**

Any Sixteen Experiment:

1. Young's modulus – non uniform bending.

2. Rigidity modulus –Static Torsion

3. Coefficient of viscosity – Graduated burette method.

4. Specific heat capacity of liquid - Newton's law of cooling

5. Newton's rings-Radius of curvature.

6. Air wedge – Thickness of wire

7. Spectrometer prism – A and D

8. Spectrometer grating – normal incidence

9. Field along the axis of the coil

10. Carey Fosters Bridge – specific resistance

11. P.O Box-Specific Resistance

12. Potentiometer – ammeter calibration

13. Figure of merit of a galvanometer –Half deflection method – B.G

14. Diode – characteristics

15. S.T and interfacial – drop weight method

16. Logic gates – using Discrete Components.

Semester	Subject Code	Title of the Paper	Hours of Teaching/ Week	No. of Credits
V	**14U5CHC5**	**ORGANIC CHEMISTRY – I**	**5**	**5**

UNIT - I

Carbonyl Compounds: Introduction – nomenclature of carbonyl compounds. - reactivity of carbonyl group – activity of alpha hydrogen - mechanisms of Aldol, Perkin, Knoevenagel, Benzoin condensations and Claisen , Reformatsky, Witting, Cannizaro, haloform reactions - reduction mechanisms of sodium borohydride, lithium aluminum hydride - WolfKishner, Clemenson and MPV reductions - Oppenauer oxidation - Michael addition reaction.

UNIT - II

Mono carboxylic acids: Nomenclature – acidity – influence of substituents on acidity (aliphatic and aromatic acids) – ortho effect – reactions. *Dicarboxylic acids* :Nomenclature, - acidity - preparation and properties of oxalic, malonic, succinic, glutaric and adipic acids. *Characteristics of reactive methylene group***:** Synthetic uses of malonic and acetoacetic esters. **Tautomerism:** definition – Keto – Enol tautomerism (identification, acid and base catalysed mechanisms)
Esters : Nomenclature – general methods of preparation- chemical properties and uses.

UNIT - III

Nitrogen compounds : Nomenclature - nitro alkanes - alkyl nitrites - differences – nitro aci nitro tautomerism. *Aromatic nitro compounds*: Reduction of nitro benzene under different conditions. *Amines* :Gabrial phthalimide synthesis, Hoffmann degradation- separation of mixture of amines by Hoffmann method and Hinsberg method - effect of substituent's on basicity and comparison of aliphatic and aromatic amines - mechanism of carbylamines reaction and diazotization. *Diazomethane, benzene diazonium chloride and diazo acetic ester*: Preparation and synthetic importance.

UNIT - IV

Heterocyclic compounds:Nomenclature. *Furan, pyrrole, thiophene* : preparation and properties. *Pyridine* : synthesis and reactions - comparison of the basicities of pyrrole, pyridine and piperidine with amines.*quinoline, isoquinoline and indole* : Synthesis with special reference to Skraup, Fischer Napieraloki and Ficher - indole syntheses and properties

UNIT - V

Dyes: Theory of color - chromophore, auxochrome, classification according to application and structure - preparation and uses of Malachite green, Indigo, Alizarin dyes.
Benzenesulphonic acid - saccharin, chloramines– T, sulphonamides, **sulphanilic aci**d **Sulphanilamide:** Preparation, properties and uses.
Polymers: Definition – classification of polymers-mechanism of cationic, anionic and free radical polymerization –thermo setting polymers – preparation of Nylon 66, polyester, bakelite.
Oils and fats - fatty acids – Introduction- manufacture of soap - mechanism of cleaning action of soap-detergents-merits and demerits of soap and detergent.

Books for Reference:

1. Finar I.L, Organic Chemistry, Vol 1&2, (6th edition) England, Addison Wesley. Longman Ltd. (1996)
2. Morrison R.T., Boyd R.N., Organic Chemistry, (6th edition) New York, Allyn & Bacon Ltd., (2006)
3. Bahl B.S, Arun Bahl, Advanced Organic Chemistry , (12th edition) New Delhi, Sultan Ch and Co., (1997).
4. Pines S.H., Organic Chemistry, (4th edition) New Delhi, Mc Graw - Hill International Book company (1986)
5. Seyhan N. Ege., Organic Chemistry, New York, Houthton Mifflin Co., (2004)
6. Soni P.L.,Chawla H.M., Text book of Organic chemistry,29th edition,Sultan Chand & Son, New Delhi (2007)
7. Jain M.K.,Sharma S.C., Modern Organic chemistry,Vishal Publishing Co., Jalandar, (2012)
8. Pillai C.N.,Organic Chemistry for undergraduate students, Universities Press(India) Pvt.ltd.,Hyderabad(2008).
9. Bahl B.S. Arun Bahl, Text book of Organic Chemistry, Multi colour edition,S. Chand & Coy Ltd., NewDelhi,(2006).
10. Bhupinder Mehta and Manju Mehta "Organic Chemitry", PHI Learning Pvt Ltd, New Delhi – 110001.(2012)

Semester	Subject Code	Title of the Paper	Hours of Teaching/ Week	No. of Credits
V	**14U5CHC6**	**PHYSICAL CHEMISTRY – I**	**5**	**5**

UNIT - I

Thermodynamics: Definitions of System, surrounding, isolated, closed and open systems, state of the system, Intensive and extensive variables. *Thermodynamic processes*: Reversible and irreversible, isothermal and adiabatic processes - state and path functions - exact and inexact differentials.

First law of thermodynamics: Statement - definition of internal energy (E), enthalpy (H) and heat capacity. Relation between Cp and Cv. calculation of w, q, dE and dH for expansion of ideal and real gases under isothermal and adiabatic conditions of reversible and irreversible processes. Definition of joule - thomson coefficient ($\mu_{J.T}$) - calculation of ($\mu_{J.T}$) for ideal and real gases .

Thermochemistry: Relation between enthalpy of reaction at constant volume (q_v) and at constant pressure (q_p) - temperature dependence of heat of reaction - Kirchoffs equation - bond energy and its calculation from thermochemical data - Hess's law of heat summation (statement and applications)

UNIT - II

Second law of thermo dynamics : Need for the law - different statements of the law - Carnot's cycle and efficiency of heat engine - Carnot's theorem - thermodynamic scale of temperature.

Entropy : Definition and physical significance of entropy - entropy as a function of P, V and T - entropy changes during phase changes - entropy of mixing - entropy criterion for spontaneous and equilibrium processes in isolated system .

Gibb's free energy (G) and Helmholtz free energy (A) :Variation of A and G with P, V and T- Gibb's - Helmholtz equation and its applications - thermodynamic equation of state - Maxwell's relations - ΔA and ΔG as criteria for spontaneity and equilibrium - advantage of ΔG over entropy change.

UNIT - III

Third law of thermodynamics : Nernst heat theorem - Statement and concept of residual entropy - evaluation of absolute entropy from heat capacity data.

Equilibrium constant and free energy change: Thermodynamic derivation of law of mass action - equilibrium constants in terms of pressure and concentration - thermodynamic interpretation of Lechatelier's principle - Van't Hoff's reaction isotherm - Van't Hoff's isochore - Clapeyron equation and Clausius – Clapeyron equation- applications

Systems variable composition : Partial molar quantities - chemical potential - variation of chemical potential with T, P and X (mole fraction) - Gibb's Duhem equation.

UNIT - IV

Solutions: Ideal and Non-ideal solutions – Raoult's law – Henry's law, concept of activity and activity coefficients – Gibbs - Duhem - Margules equation .*Completely miscible liquid systems :* benzene and toluene - deviation from Raoult's law. Theory of fractional distillation **-** azeotropes - HCl - water and ethanol - water systems . *Partially miscible liquid systems* : phenol - water, triethylamine - water and nicotine - water systems. lower and upper CSTs - effect of impunities on CST. *Completely immiscible liquids* : Principle and applications of steam distillation - Nernst distribution law – derivation - applications.

Dilute solutions: Colligative properties, lowering of vapour pressure, elevation of boiling point , depression of freezing point , osmotic pressure -   determination of molecular masses using the above properties - abnormal molecular masses – (molecular dissociation & association).

UNIT - V
Phase rule: Definition of terms - derivation of Phase rule, *One component systems*: water and sulphur. *Two component systems*: solid liquid equilibria. *Simple eutectic systems***:** (lead-silver, Bi-Cd) - desilverisation of lead - compound formation with congruent melting point. (Mg-Zn) and incongruent melting point (Na-K).
Solid solutions: (Ag-Au) - fractional crystallisation.- *Freezing mixtures* : $FeCl_3$ - H_2O systems and $CuSO_4$-H_2O system.

Book for Reference:

1.   Puri B.R., Sharma L.R., Pathania M.S., Principles Of Physical Chemistry, (23rd edition), New Delhi,   Shoban Lal, Nagin Chand & Co., (1993)
2.   Maron and Prutton, Physical Chemistry, Mac Millan, London.
3.   Atkins P.W., Physical Chemistry, (5th edition) Oxford Uiversity Press. (1994)
4.   Castellan G.V., Physical Chemistry, Orient Longmans, New Delhi.
5.   Soni P.L.,Dharmarah O.P.,Dash U.N.,Text book of physical chemistry,22nd edition, Sultan Chand & Son,New Delhi (2001)
6.   Glasstone S., Lewis D. Elements of Physical Chemistry, London, Mac Millan & Co. Ltd.
7.   Arun Bahl, Bahl .B.S., Tuli G.D., Essentials of Physical , Multi colour edition, S. Chand & Company Ltd., New Delhi, (2008).

Semester	Subject Code	Title of the Paper	Hours of Teaching /Week	No. of Credits
V	**14U5CHC7**	**INORGANIC CHEMISTRY**	**5**	**5**

UNIT - I
Coordination compounds: Central metal ion – ligands-types of ligands– coordination number, oxidation numbers, and coordination sphere – Nomenclature - isomerism (structural and stereo) - Werner's theory of complexes. EAN rule VB theory- applications and limitations.

UNIT - II
Crystal Field theory: Crystal field splitting in octahedral, tetrahedral and square planar fields – factors influencing the magnitude of crystal field splitting – magnetic properties and colour. Labile and inert complexes- stepwise and overall stability constants- Factors affecting stability of complexes - Reaction mechanism – substitution reactions in octahedral complexes – SN1 and SN2 mechanisms – Acid hydrolysis: Complementary and non- complementary reactions- Trans effect.

UNIT - III
Biologically important coordination compounds: Structure and application Chlorophyll, hemoglobin, vitamin B_{12}– role of alkali and alkaline earth metals in biological systems.
Metal carbonyls - synthesis and structure of mono nuclear carbonyls of Ni, Fe, Cr, and bi nuclear carbonyls of Co, Mn - synthesis and structure. **Nitrosyl compounds**: Classification, preparation and properties - structure and uses of sodium nitroprusside.
Biological functions and toxicity of some elements : Cr, Mn, Co, Ni, Cu, Se, Mo, Cd, I, Hg Pb, Fe and Zn. Estimation of nickel using DMG and aluminium using oxine - estimation of hardness of water using EDTA

UNIT - IV
Solid state: Isotropic and anisotropic solids – Interfacial angle – symmetry elements in crystal systems – Bravais lattices - Unit cell – law of rational indices (Weiss indices), Miller indices – unit cell dimension – density – number of atoms per unit cell – X-ray diffraction by crystals – derivation of Bragg's equation – Experimental methods of X-ray study- rotating crystal method – X-ray pattern by powder method – crystal structure of KCl, NaCl, ZnS, CsCl – Radius ratio and packing in crystal.

UNIT - V
Organo metallic compounds: Introduction - *Ferrocene*: preparation, property, structure and stability – *Zeigler natta catalyst. Binary compounds*: hydrides, borides (structure, properties and uses), Boranes (structure of Diborane only) carbides (classification and applications only) and Boron nitride and Borozole (structure only) – Clathrates (examples, applications, formation in quinol). *Silicones*: composition, manufacture, structure, properties and uses.
Silicates: Different types with examples and structures.

Books for Reference:
1.   Soni P.L., Text Book of Inorganic Chemistry, S, Chand & Co, New Delhi (2006).
2.   Madan R.D.,Juli G.D and Malik S.M.,Selected Topics in Inorganic Chemistry, S.Chand & Co,NewDelhi (2006) 4.Lee J.D.,Concise Inorganic Chemistry, ELBS Edition.
3.   Puri B.R. Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry, Milestone Publishers, Delhi (2008)
4.   Gopalan R., Inorganic Chemistry for undergraduate students, Universities Press(India) Pvt.ltd.,Hyderabad(2009)
5.   Lee J.D., Concise Inorganic Chemistry, UK, Black well science (2006).

B.Sc. Chemistry

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
V	**14U5CHCP4**	**PHYSICAL CHEMISTRY PRACTICAL**	**3**	**3**

1. Determination of Partition coefficient of iodine between Carbon tetrachloride

2. Determination of rate constant of acid catalyzed hydrolysis of an ester (Methyl acetate or ethyl acetate).

3. Determination of molecular weight by Rast's method using naphthalene, di phenyl, m- di nitro benzene as solvents and benzamide, naphthalene, acetanilide, di phenyl as solutes.;

4. Determination of CST of Phenol

5. Effect of impurity on CST of Phenol

6. Determination of transition temperature of crystal hydrates such as sodium thio sulphate, sodium acetate, strontium chloride, manganese chloride.

7. Phase diagram of Naphthalene – Di phenyl amine system, Naphthalene – Di phenyl , Naphthalene – m –di nitro benzene, Naphthalene – p- nitro toluene.

8. Determination of strength of NaOH solution by Conductometric titrations using standard HCl acid.

9. Determination of strength of KMnO4 solution by Potentiometric titrations using standard FAS solution.

10. Determination of cell constant

Reference:

1. Venkateswaran V. Veerasamy R. Kulandaivelu A.R., Basic principles of Practical

Chemistry, 2nd edition, Sultan Chand & sons, New Delhi, (1997)

Semester	Subject Code	Title of the Paper	Hours of Teaching/ Week	No. of Credits
V	**14U5CHEL1A**	**Major elective - I** **PHARMACEUTICAL CHEMISTRY**	**4**	**3**

Unit - I

Terminology: Drugs, pharmacy, pharmacology, pharmacognosy , therauptics, toxicology, chemotherapy, pharmacopoeia - first aid for bleeding for blood, maintain breathing, Cuts, Abrasions and Bruises, Fractures, Burns and Fainting. First aid box for aceident, plaster of paris. Important compound Aluminum, phosphorus, Arsenic, Mercury, Iron, Milk of maganesia, Aluminum Hydroxide gel.

Unit - II

Analyesic and Antipyretics: Analgestic - Norcotic analgesics, synthetic analegises pethidine and methadone, Narcotic antagonist, Morphine, Non-narcotic - antipyretic analgsesics. Pyrazole, salicylic acid, P-amino phenol derivative asprin and Ibu profen, Ketoprofen, Naproxen.

Unit - III

Anasthetics: Definition, classification of anesthetics, Ethers, Halohydro carbons, chloroform Halo ethane, Ferqusen principle- Intravenous anesthetics. Structure of thiopental sodium – Local anesthetics – cocaine- source and structure – preparation and uses of procaine. Amethocanie and Benzocaine.

Unit - IV

Antiseptics and Disinfectants – phenol co-efficient. Phenolic component transquilizers –definition and example. Pschodelic drugs. LSD and Marijuna, AIDS HIV, propagation prevention and treatment.

Unit - V

Poisons: Poison Investigation - Definition kinds of poison – Aceidental suicidal andomicidal death – action of poison – general condition that control - action of poison – general condition that control action of poison Hints of Investigation. Industrial gases and volatile poison, synthetic gases – carbon di sulphide – petroleum distillate, aromatic compounds, chlorinated hydro carbons.

References:

1. Lakshmi S, pharmaceutical chemistry.

2. Jaya Shree Ghosh, A text book of pharmaceutical chemistry, 3rd ed., S.Chand &Company Ltd., NewDelhi (2008)

Semester	Subject Code	Title of the Paper	Hours of Teaching/ Week	No. of Credits
V	**14U5CHEL1B**	**Major elective - I BIOCHEMISTRY**	**4**	**3**

Objectives:

1. To enable the student to develop a sound knowledge of fundamental concepts in biochemistry.
2. To enumerate the molecular motif of a living cell, structural and functional hierarchy of biomolecules.
3. To emphasis on the various aspects of metabolism and interrelationship of metabolic events.

UNIT 1: **Amino acids and Proteins**

Living Cell – Plant and Animal cell. Cell membrane – organelles – functions of major subcellular components – Anabolism and catabolism and their relation to metabolism. **Amino acids** – classification –Synthesis of _-amino acids and their identification. Peptide bond- stereochemistry, synthesis of peptides by solution and solid phase techniques. **Proteins** – classification – properties-3D structure-determination of amino acid sequence – denaturation and renaturation of protein molecules. Separation and purification of proteins – dialysis – gel filtration - electrophoresis. Catabolism of amino acids: Transamination, oxidative deamination, decarboxylation. The urea cycle and other possibilities of detoxification of ammonia.

UNIT 2 : **Enzymes**

Nomenclature, classification and properties-specificity, factors influencing enzyme action. Mechanism of enzyme action – Lock and Key model and induced fit models. Coenzymes – cofactors – prosthetic groups of enzymes (TPP, NAD, NADP, FAD, ATP). Their importance in enzyme action. Mechanism of inhibition (competitive, non- and uncompetitive and allosteric). Immobilization of enzymes. Enzyme specificity,

UNIT 3: **Lipids**

Classification - neutral lipids, Phospho lipids (lecithines, cephalins, plasmalogens) and glycolipids – importance, synthesis and degradation. Fatty acids – saturated, unsaturated fatty acids, EFA. Properties – Hydrolysis-acid number, saponification number. Auto-oxidation (Rancidity), addition reactions-Iodine value, Polenske number, Reichert-Meissl number, acetyl number. Hydrogenation Cholesterol – biosynthesis. Bile salts derived from cholesterol. Metabolism: Oxidation of glycerol – _-oxidation of fatty acids; biosynthesis of lipids – synthesis of fatty acids and synthesis of triglycerides.

UNIT 4: **Carbohydrates**

Classification – reducing and non-reducing sugars. Glucose: structure-conformation – stability Carbohydrates of the cell membrane – starch, cellulose and glycogen. (Structure and utility) Metabolism: Glycolysis and its reversal; TCA cycle. Relation between glycolysis and respiration. Principles of bioenergetics, electron transport chain and oxidative phosphorylation.

Unit 5 Nucleic Acids

Nucleosides and nucleotides – purine and pyrimidine bases. Nucleic acids Difference between DNA and RNA. Classification of RNA. Biosynthesis of DNA: Replication. Biosynthesis of mRNA: Transcription. Genetic code – mutations and mutants. DNA repair. Biosynthesis of proteins. DNA sequencing and PCR, recombinant DNA technology, DNA polymorphism.

Text books

1. Lehninger, Principles of Biochemistry, Fourth Edition, by David L. Nelson and Michael M. Cox, Worth Publishers, New York, 2005.
2. L. Veerakumari, Biochemistry, MJP publishers, Chennai, 2004.
3. Lubert Stryer, Biochemistry, W. H. Freeman and company, New York, 1975.

Reference books

4. Robert L.Caret, Katherine J. Denniston, Joseph J. Topping, Principles and Applications of organic and biological chemistry, WBB publishers, USA, 1993.
5. J. L. Jain, Biochemistry, Sultan Chand and Co.1999
6. A. Mazur and B. Harrow, Text book of biochemistry, 10th Edition, W.B. Saunders Co., Philadelphia, 1971.
7. Paula Yurkanis Bruice, Organic chemistry, 3rd Edition, Pearson Education, Inc. (Singapore), New Delhi, reprint, 2002.
8. P. W. Kuchel and G. B. Ralston, Shaum Series, Theory and Problems of Biochemistry, McGraw-Hill Book Company, New York, 1988.

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
V	**14U5CHEL2A**	**Major Elective - II ANALYTICAL CHEMISTRY**	**4**	**4**

UNIT - I

Laboratory Hygiene and safety: Storage and handling of corrosive, flammable, explosive, toxic, carcinogenic and poisonous chemicals - simple first aid procedures for accidents involving acids, alkalies, bromine, burns and cut by glass - threshold vapour concentration and safe limits.

Error analysis: Types of errors-minimizing errors - significant figures - accuracy - methods of expressing accuracy - precision - methods of expressing precision - mean, median, mean deviation, standard deviation and confidence limits – Q test.

UNIT - II

Estimations of commercial samples: Determination of percentage purity in Pyrolusite, Iron ore, washing soda and Bleaching power - estimation of glucose and phenol.

Gravimetric analysis: Principle - theories of precipitation - solubility product and precipitation – conditions of precipitations - specific and selective precipitants, organic and inorganic precipitants - purity of precipitates – co precipitation & post precipitation - precipitation from homogeneous solution - use of sequestering agents

UNIT - III

Thermo analytical methods: Principles of TGA and DTA - Characteristics of TGA ($CaC_2O_4.H_2O$, $CuSO_4.5H_2O$) and DTA ($CaC_2O_4.H_2O$) curves - factors affecting TGA and DTA curves - applications of TGA and DTA.

Electro analytical techniques: Theory of electro gravimetric analysis - determination of copper (by constant current procedure). *Electrolytic separation of metals*: Principle - separation of copper and nickel,

Coulometry: principle - Coulometry at controlled potential - apparatus and technique - separation of nickel and cobalt.

UNIT - IV

Colorimetry and spectrophotometry: principle of colorimetric analysis - colorimetric estimation of Ni^{+2} and Fe^{+3} - spectrophotometric determination of chromium.

Separation Purification techniques: principle involved in separation by precipitation and Solvent extraction - principles of crystallization, fractional crystallization - Principles and techniques of sublimation and solvent extraction (soxhlet extraction), simple, fractional and steam distillation, distillation under reduced pressure - *Desicants.*

UNIT - V

Chromatography: Adsorption and partition principle - *Column chromatography*: Preparation of the column, elution, recovery of substances and applications. *Thin layer chromatography*: Choice of adsorbent - experimental methods - R_f-values and factors affecting the R_f values – applications of TLC. *Paper chromatography*: Principle,

development of chromatogram, ascending, descending and radial techniques – superiority of TLC over paper chromatography – *Gas chromatography*: Principles and technique. *Ion - exchange chromatography*: Principle - requirements of a good resin - experimental techniques - separation of Na-K. *High Pressure Liquid Chromatography (HPLC)*: Principle and advantages.

Book for Reference:

1.   Douglas A. Skoog and Donald M. West, F.J. Holler, Fundamentals of Analytical Chemistry, 7th edition, Harcourt College Publishers.
2.   Mendham J., Denney R.C., Barnes J.D., Thomas M., Vogel's Text book of Quantitative Chemical analysis, 6th edition, Pearson education.
3.   Sharma, B.K., Instrumental Methods of Chemical Analysis, Koyel Publishing House, Merrut, (1997)
4.   Gopalan. R., Subramaniam P.S. and Rengarajan K., Elements of Analytical Chemistry, Sultan Chand and Sons, NewDelhi(2000).
5.   Usharani S., Analytical Chemistry, Macmillian India Ltd., NewDelhi(2000)

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
V	**14U5CHEL2B**	**Major Elective - II POLYMER CHEMISTRY**	**4**	**4**

UNIT – I
Classification and Molecular weight Determination: Basic concepts of polymer science – molecular forces and chemical bonding in polymers – classification of polymer – addition polymers, condensation. Major mass and size of polymers – Number average and weight average molecular weight – methods of molecular weight determination. Osmometry viscosity, light scattering, sedimentation, Ulteracentrifuge; Molecular weight distribution curve.

UNIT – II
Synthesis and Kinetics: Kinetics of polymerization – free radical chain polymerization, cationic polymerization, anionic polymerization, copolymerization, Degree of polymerization, chain length, chain transfer, chain termination, stereo regular polymerization, zeigler Nata catgalysts.

UNIT – III
Characteriation: Crystalline Nature – X-ray diffraction, study of polymers, degree of crystallinity, Differential scanning Calorimetry, Thermogravimetric analysis of polymers. Glass Transition Temperature – factors affecting Glass Transition Temperature, properties associated with Glass Transition Temperature, Crystallinity and Melting point – Relations to structure.

UNIT – IV
Chemical Reaction Cyclikzation: Hydrolysis, Acidolysis, Hydrogenation, Addition and substitution reaction cross linking – Vulcanization, graft and Block Copolymers. Type of degradation – Thermal Mechanical, Oxidatived, Hydrolytic and photo degradation.

UNIT – V
Physical Properties and applications Polymers: Mechanical – Strees – strain measurements Electrical – conducting – polyacetylene, polyaniline. Industrially important polymers–Natural and syhnthetic rubber– polyesters, polytetrafluoroethylene, (TEFLON), Polystrenelon exchange Resins, nation, polyacrylonitrile – carbon fibres, polyvinyl chloride and polyacrylates.

References:
1. V.R. Gopwrikar – polymer science, wiley Eastern, 1986.
2. K.J. Saunders, Organic Polymer Chemistry – Chapman and Hall, 1976.
3. Raymound, B. Seymour, Polymer Chemistry – An introduction, Marcel Dekker Inc. NY 1981.
4. Fred W. Billmeyer – Text book of polymer science, john – Wiley.
5. K. Gupta, fundamentals of polymer science and Engineering, Tata, MgGraw Hill.
6. Stepak, polymer characterization of processing technology, Academic press, Indian.

Semester	Subject Code	Title of the Paper	Hours of Teaching/ Week	No. of Credits
VI	**14U6CHC8**	**ORGANIC CHEMISTRY – II**	**6**	**6**

UNIT - I

Carbohydrates: Classification - properties , structure and configurations of mono saccharides (glucose and fructose) - interconversion - ascending and descending series - mutarotation, epimerisation - determination of ring size of glucose - cyclic forms of other mono saccharides - structural elucidation of sucrose, maltose – structures of starch and cellulose – properties of starch – glycogen, innulin, cellulose nitrate, cellulose acetate and mercerized cotton (simple treatment).

UNIT - II

Amino acids: Classification, general methods of preparation and reactions of amino acids, zwitter ion - isoelectric points, action of heat on ȧ, β and γ amino acids.
Peptides and proteins: Peptide linkage - polypeptide - end group analysis - synthesis of peptides - Merrifield synthesis.
Proteins: Classification - denaturation - colour reactions – primary, secondary and tertiary structures
Vitamins: Classification, biological importance of vitamins A, B_1, B_2, B_6, B_{12} and C.

UNIT - III

Alkaloids: isolation, physiological activities -classification, general methods of elucidating structure - structural elucidation and synthesis of coniine, nicotine and piperine
Terpenes: classification - isoprene rule, general methods of structural elucidation - citral, geraniol, nerol, α – terpeniol and menthol.

UNIT - IV

Molecular rearrangements: Types of rearrangements (nucleophilic and electrophilic). *Mechanism with evidence for the following re-arrangements*: pinacol - pinacolone, benzil- benzilic acid, benzidine, Claisen, Fries, Hofmann, Curtius, Lossen, Beckman, dienone – phenol.
Photochemical reactions: Norrish type I and II.

UNIT - V

Phenols: Classification and nomenclature – esterification , halogenation, coupling with diazonium salt, Kolbe, Reimer Teimann, Gattermann, Houben Hoesch, Lederer Manasse reactions(mechanism not needed) and uses **.** *Cresol (o,m and p), Nitrophenol and Amino phenol* : preparation and properties.
Nucleic acids: Structure purine and pyrimidine bases – nucleosides, nucleotides – DNA and RNA – structure and functions.
Enzymes: Introduction, classification – Mechanism of enzyme action, Factors affecting enzyme activity.

Books for Reference:

1.   Finar I.L, Organic Chemistry, Vol 1&2, 6th edition, Addison Wesley. Longman Ltd., England (1996).
2.   Morrison R.T., Boyd R.N., Organic Chemistry, 6th edition, Allyn & Bacon Ltd., New York (2006).
3.   Bahl B.S, Arun Bahl, Advanced Organic Chemistry , 12th edition, Sultan Chand and Co., New Delhi (1997).
4.   Pines S.H., Organic Chemistry, 4th edition, McGraw - Hill International Book company, New Delhi (1986).
5.   Seyhan N. Ege., Organic Chemistry, Houhton Mifflin Co., New York, (2004)
6.   Soni P.L.,Chawla H.M., Text book of Organic chemistry,29th edition,Sultan Chand & Son, New Delhi (2007)
7.   Jain M.K.,Sharma S.C., Modern Organic chemistry,Vishal Publishing Co., Jalandar, (2012)
8.   Pillai C.N.,Organic Chemistry for undergraduate students, Universities Press(India)Pvt.ltd., Hyderabad(2008).
9.   Bahl B.S. Arun Bahl, Text book of Organic Chemistry, Multi colour edition,S. Chand & Coy Ltd., NewDelhi,(2006).
10.   Bhupinder Mehta and Manju Mehta "Organic Chemitry", PHI Learning Pvt Ltd, New Delhi – 110001.(2012)

Semester	Subject Code	Title of the Paper	Hours of Teaching /Week	No. of Credits
VI	**14U6CHC9**	**PHYSICAL CHEMISTRY – II**	**6**	**6**

UNIT - I

Electrical Conductance: Conductance in metal and in electrolytic solution.- specific conductance and equivalent conductance - Arrhenius theory of electrolytic dissociation and its limitation - weak and strong electrolytes - variation of specific and equivalent conductance with concentration of solution - Ostwald's dilution law - applications and limitation of Ostwald's dilution law.

Ionic mobility: Transport number - Hittorfs rule - determination by Hittorf's method and moving boundary method - Kohlrausch's law and its applications (Determination of equivalent conductance of weak electrolytes, determination of transport number) - application of conductance measurements (determination of solubility product of a sparingly soluble salt and conductometric titrations) - elementary treatment of the Debye – Huckel- Onsager equation for strong electrolytes (no derivation) - evidence for ionic atmosphere - conductance at high frequencies (Debye - Falkenhagen effect) and at high fields (Wein effect).

UNIT - II

Electrochemical Cells: Galvanic cell **-** Daniel cell **-**half cell - Nernst equation of electrode potential – cell diagram and terminology - single electrode potential - sign convention - reversible and irreversible cells – types of electrodes (metal/metal ion, Gas, metal/insoluble salt and redox electrodes) – standard electrode potentials - standard hydrogen electrode–calomel electrode - electrochemical series and its significance - EMF of a galvanic cell and feasibility of cell reaction - calculation of thermodynamic quantities of cell reactions (ΔG, ΔH, ΔS and equilibrium constant).

Concentration cell: With and without transport- liquid junction potential. *Application of EMF measurements:* Valency of doubtfulion, solubility products, pH using hydrogen and quinhydrone electrodes, Potentiometric titrations (acid – base, redox and precipitation)

UNIT - III

Photo Chemistry : Consequences of light absorption - Jablonski diagram- radioactive and non - radioactive transitions (fluorescence, phosphorescence) - Lambert – Beer, Grothus - Draper and Stark – Einstein law - quantum efficiency - photo chemical reactions - kinetics of H_2-Cl_2 and H_2-Br_2 reactions - comparison between thermal and photochemical reactions - photo sensitization and quenching - chemiluminescence - lasers (simple treatment) and its application.

Macromolecules: Molecular weight of macro molecules – determination of molecular weight by osmotic pressure and light scattering methods.

UNIT - IV

Electromagnetic spectrum :The regions of various types of spectra.

Microwave spectroscopy: Rotational spectra of diatomic molecules treated as rigid rotator, condition for a molecule to be active in microwave region, rotational constants (B), and selection rules for rotational transition - frequency of spectral lines, calculation of inter - nuclear distance in diatomic molecules.

Infrared spectroscopy : Vibrations of diatomic molecules - harmonic and unharmonic oscillators, zero point energy, dissociation energy and force constant, condition for molecule to be active in the IR region, selection rules for vibrational

transition, fundamental bands, overtones and hot bands, diatomic vibrating rotator - P,Q,R branches - determination of force constant.

UV visible spectroscopy: conditions Franck - Condon principle – pre dissociation.

UNIT - V

Raman spectroscopy: Rayleigh scattering and Raman scattering. Stokes and antistokes lines in Raman spectra, Raman frequency, quantum theory of Raman effect, condition for a molecule to be Raman active - comparison of Raman and IR spectra- structural determination from Raman and IR spectroscopy, rule of mutual exclusion.

NMR spectroscopy : Nuclear spin and conditions for a molecule to give rise to NMR spectrum- theory of NMR spectra, number of NMR signals, equivalent and non - equivalent protons, position of NMR signals, shielding, de-shielding, chemical shift δ and τ scales. Peak area and number of protons - splitting of NMR signals - spin - spin coupling.

Books for Reference:

1. Maron S.H. and Lando J.B., Fundamentals of Physical Chemistry, Mac Millan & Co. Ltd., London
2. Glasstone S. and Lewis D., Elements of physical Chemistry ,Mac Millan & Co. Ltd., London
3. Khterpal S.C. Pradeeps, Physical Chemistry, Volume I & II, Pradeep publications Jalandhur, (2004).
4. Jain D.V.S and Jainhar S.P., Physical chemistry, Principles and problems, Tata Mc Graw Hill, New Delhi, (1988).
5. Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry, 23rd edition, Shoban Lal, Nagin Chand & Co., New Delhi, (1993)
6. Atkins P.W., Physical Chemistry, (5th edition) Oxford Uiversity Press. (1994)
7. Castellan G.V., Physical Chemistry, Orient Longmans. New Delhi.
8. Soni P.L.,Dharmarah O.P.,Dash U.N.,Text book of physical chemistry,22nd edition, Sultan Chand & Son,New Delhi (2001).
9. ArunBahl, Bahl .B.S.,Tuli G.D., Essentials of Physical , Multi colour edition, S.Chand & Company Ltd., New Delhi, (2008).

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
VI	**14U6CHCP5**	**GRAVIMETRIC AND ORGANIC PREPARATION PRACTICAL**	**6**	**6**

A. Gravimetric Estimation:

1. Estimation of Barium as Barium chromate

2. Estimation of Barium as sulphate.

3. Lead as chromate.

4. Lead as sulphate.

5. Estimation of Calcium as oxalate mono hydrate

6. Nickel as Di Methyl Glyoxime complex

7. Magnesium as magnesium or oxinate.

8. Copper as cuprous thiocynanate.

9. Estimation of chloride as silver chloride.

B. Organic preparation:

1. Oxidation: Benzoic acid frombenzaldehyde
2. Hydrolysis:Salicylic acid from salysilaldehyde
3. Nitration : m-Dinitro benzene from nitro benzene
4. Nitration: Picric acid from phenol
5. Bromination:Tri bromo aniline from aniline
      a. Tri bromo phenol from phenol
      b. p- Bromo acetanilide from acetanilide
6. Osazone from glucose

Reference:

1. Venkateswaran V. Veerasamy R. Kulandaivelu A.R., Basic principles of Practical Chemistry, 2nd edition, Sultan Chand & sons, New Delhi, (1997)

Semester	Subject Code	Title of the Paper	Hours of Teaching/ Week	No. of Credits
VI	**14U6CHEL3A**	**Major Elective – III** **APPLIED INORGANIC CHEMISTRY**	**4**	**4**

UNIT I

Nuclear Chemistry – I : Nuclear particles **-** composition of nucleus - nuclear forces - packing fraction - mass defect - binding energy - nuclear stability - shell and liquid drop nuclear models – magic numbers. *Isotopes*: Detection and separation - deviation of atomic weights from whole numbers – isobars, isotones and mirror nucli.

UNIT II

Radioactivity :Discovery - α, β, γ rays –detection (by Wilson cloud chamber) and measurements (Geiger – Muller counter) of radiation - group displacement law - rate of disintegration - half life and average life, - radioactive series - nuclear transmutation – types of nuclear transmutations - particle accelerators (cyclotron only) - nuclear fission-nuclear reactors – fast breeder reactor (FBTR) – atom bomb – nuclear fusion – hydrogen bomb - applications of nuclear science in agriculture and medicine- carbon dating - rock dating.

UNIT III

Structure of alloys: Substitutional and interstitial solid solutions - Hume Rothery ratio.
Semi conductors: Extrinsic and intrinsic, n-type and p-type, transistors – uses.
Solvents for inorganic reactions: Definition and examples of protic, aprotic, polar, non-polar, non-aqueous solvents.
Acid Base - Theories of acids-bases- Arrhenius, Bronsted – Lowry, Lewis, Solvent system (levelling and differentiating effect), Lux - Flood and Usanovich definition – HSAB principle

UNIT IV

Fossil fuels : Varieties of coal and petroleum - petroleum refineries in India. *Fuel gases*: Calorific value – units of heat - composition and preparation of water gas, semi water gas, carbureted water gas, producer gas, natural gas, LPG and biogas.
Fertilizers: Essential nutrients for plants –functions N,P,K nutrients- manufacture of urea, calcium superphosphate, potassium sulphate and mixed fertilizers - micronutrients and their role in plant life.
Pesticides: Insecticides (stomach & contact poison and fumigant), fungicides, herbicides, rodenticides and their adverse effect – alternative methods for pest control.
Safety matches, **fireworks**: Manufacturing details

UNIT V

Cement: Classification – functions of ingredients of Portland cement - manufacture – Chemistry of setting of cement
Glass: Manufacture-different types of glasses – uses.
Paints and varnishes: Constituent's oil paint –paint pigments –mechanism of drying - **Special paints**: Heat resistant, fire retardant, chemical resistant, temperature

indication, luminous, water repellent, anti fouling paints.-oil and spirit varnishes-enamels and lacquers.

Water pollution: Various water pollutants (sewage, infectious agents, plant nutrients, exotic organic chemicals, inorganic minerals and chemical compounds) and their adverse effect.

Books for Reference:

1.	Soni P.L., Text book of Inorganic Chemistry, S.Chand & Co, New Delhi (2006).

2.	Lee J.D., Concise Inorganic Chemistry, Black well science, UK (2006).

3.	Puri B.R. and Sharma L.R., Principles of Inorganic Chemistry, Soban Lal Nagin Chand & Co. New Delhi.

4.	Satyaprakash, Tuli, G.D., Basu, S.K., and Madan, R.D,] Advanced Inorganic Chemistry (vol I & II), S. Chand, New Delhi (2006).

5.	Gopalan R., Inorganic Chemistry for undergraduate students, Universities Press (India) Pvt.ltd., Hyderabad(2009).

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
VI	**14U6CHEL3B**	**Major Elective – III AGRICULTURAL CHEMISTRY**	**4**	**4**

Unit - I
Soil Science : Physical properties of soil – structure, retention of water by solid, soil moisture content, soil air, soil temperature – chemical properties of soil – chemical composition – soil colloids and it properties – ion charge reaction – soil colloid as source of plant nutrients – Theories of plant nutrients – soil organic mater – transformation of organic mater Soil reaction – Soil pH –reserve and active acidity – buffer action – effect of soil reaction on nutrients – Acid soil, alkaline soil, saline soil, salinealkaline soil – tolerance by plants.

Unit -II
Fertilizer : Definition – Classification – Nitrogenouos , phosphate and potassium fertilizers – importance, classification , examples with concerned nutrients – complex and mixed fertilizers – liming materials – micro materials – micro nutrients and their functions in plants – sources – Bio fertilizer

Unit - III
Manures: Difference between fertilizer and manures–bulky organic manures – handling and storage practice–compost methods–manuring–concentrated organic manures.

Unit - IV
Insecticides: Difinition of pesticide – classification of - safety measures – Insecticides – definition – plant product – Inorganic pesticides - organic pesticides – mode of action of DDT, BHC, methoxy chloro, chlordane-Endosulfan organo phosphorous compounds. Compatibility of pesticides and agro chemicals.

Unit - V
Fungicides and Herbicides: Inorganic and organic fungicides and herbicides acaricides, rodenticide, attractants, repellents, fumigants. Act and laws of insects and insecticides.

References:
1.   N.C.Brady, the Nature and properties of soils Eurasia publishing house, (p) Ltd. 9th Ed. (1984).
2.   Biswas, T.D. and Mukeherjee S.K. Text book of soil science (1987).
3.   A.J.Daji A Text book of soil science –Asia publishing house, Madras (1970).
4.   Donahue, R.L.Miller, R.W.and shickluna, J.C. Soil – An introduction to soil and plant Growth – Prentice Hall of India (P) Ltd., New Delhi(1987).
5.   Colling, G.H. Commercial Fertilizers – McGraw Hill Publishing Coo., New York(1955)
6.   Tisdale, S.L.Nelson, W.L. and Beaton, J.D. Soil fertility and fertilizers. Macmillan publishing company, New York (1990).
7.   Hesse, P.R..A text book of soil chemical analysis John Muray, New York (1971).
8.   Jackon, M.L., soil chemical analysis. Prentic Hall of India, New Delhi (1958).
9.   Buchell, K.H.. Chemical of pesticides – John wiley &Sons, NewYork (1983).
10. Mcinikov, N.N. Chemistry of pesticides Vol.36 of Residue Review-springer verlac, New York (1971).
11. Sree Ramula I, U.S. chemistry of Insecticides and Fungicides – Oxford and IBH publishing (1979).

Semester	Subject Code	Title of the Paper	Hours of Teaching/ Week	No. of Credits
VI	**14U6CHEL4A**	**Major Elective – IV** **DYE CHEMISTRY**	**4**	**3**

Unit - I

Basic concepts of colour chemistry: Colour and sensation - theories of colour and chemical constitution – Witt's theory - chromophore - auxochrome – chromogen – batho chromic and hypsochromic shifts – resonance and valence bond theories – requirements of a dye - classification of dyes based on their their structures and use.
Synthesis of few dyes: Bismark brown, Congo red, Malachite green, Crystal violet, Magenda (Rosaniline), Alizarin, Indigo dyes and fluorescein.

Unit - II

General properties of dye stuff: Linearity, co-planarity -Washing, light, rubbing and sweating, gas fading and sublimation fastness,
Fiber Science : classification fibres –– properties such as count, denier , tex, staple length, spinning properties, strength, elasticity and creep - general characteristics of cotton, silk and wool - chemical natures of cellulosic and proteneous fibers - preparation and properties of nylon 6,6, polyester, viscose.

Unit - III

Pretreatment of fibers : Singing – Singing techniques - sizing & desizing - hydrolytic and enzymatic desizing methods -   scouring - Kier boiling method - bleaching methods (with hypochlorite, peroxide, and bleaching powder) – mercerization .
Technical terms in dyeing: M.L.ratio – % of shade – % of exhaustion – equilibrium absorption. **Dye bath assistants**: Exhaust agents and their mechanism - wetting agents (TR oil) and leveling agents (anionic, cationic and non-ionic) with their mechanisms.

Unit - IV

Dyeing processes -I: *Vat dyeing*: Vatting, dyeing, oxidation and after treatment steps. *Reactive dyeing*: Hot and cold brand reactive dyes – principles involved in the dyeing process. *Dyeing of polyester:* principle – carrier dyeing – functions of carrier – functions of dispersing agents - high temperature dyeing. *Ingrain dyes*: azoic colours with one example.

Unit – V

Dyeing processes - II: *Acid dyeing***:** Mechanism of acid dyeing – role of electrolytes . *Mordant dyes*: chrome mordant process. *Oxidation colours*: Aniline black and dyeing of mineral khakhi and   *Combination shades*.
Textile finishing: Water proofing, moth proofing proofing , mildew and fire proofing
Dyeing machineries: Padding mangle, Jigger, Winch and soft flow machines.
Non textile uses of dyes: Leather dyeing, paper dyeing, solvent dyes ,food colours, hair colours and fluorescent brightening agents

REFERENCE:

1. V.A.Shenai, An introduction to dyes stuff and intermediate–Sevak publication, Mumbai.
2. V.A.Shenai, vol. IV, Technology of textile processing, Sevak publication, Mumbai.
3. V.A.Shenai, vol. I, Textile fibres, Sevak publication, Mumbai.
4. V.A.Shenai, vol.III, Techniques of bleaching, Sevak publication, Mumbai.
5. V.A.Shenai , vol.II, Principle of dyeing , Sevak publication, Mumbai.
6. Soni P.L.,Chawla H.M., Text book of Organic chemistry,29th edition,Sultan Chand & Son, NewDelhi (2007)
7. Jain M.K.,Sharma S.C., Modern Organic chemistry,Vishal Publishing Co., Jalandar, (2012)
8. Bahl B.S. Arun Bahl, Text book of Organic Chemistry, Multi colour edition, S.Chand & Coy   Ltd., NewDelhi,(2006).
9. Abraha. E.N.Dyes and their intermediates-, Bergamon Press, 1969.
10. Lubs. H.A, The chemistry of synthetic dyes and pigments-,ACS Publication, Halner, 1970.
11. Venkataraman . K. The chemistry of synthetic dyes Vol, I, II, III & IV-, Academic Press N.Y., 1949.
12. http://en.wikipedia.org/wiki/Hair_coloring
13. http://www.pbm.com/~lindahl/articles/food_coloring_agents.html
14. http://en.wikipedia.org/wiki/Food_coloring

Semester	Subject code	Title of the paper	Hours of Teaching/ Week	No. of Credits
VI	**14U6CHEL4B**	**Major Elective – IV** **INDUSTRIAL CHEMISTRY**	**4**	**3**

Unit - I

Basic ideas about unit operation – Flow chart- Chemical conversion- Batch versus contion processing – chemical process selection- Design – Chemical process control – chemical process economics – Market evaluation – Plant location- Management for productivity creativity- Research & Development and its role in chemical industries.

Unit - II

Water conditioning for chemical factories – rease – methods of conditioning – demineralisation – Precipitation- Desalting – Industrial and sewage water - water treatment.

Unit - III

Pulp and paper industries – Sulphite, sulphate, soda, ground wood pulp for paper = Manul of paper – specialty paper – paper – paper stock – structural Boards,] Plastics – Manufacture – resin – Manufacturing process – Condensation Polymerization Manufacture of laminates and other derivatives – Hexamethylene tetramine plastics – esters.

Unit - IV

Rubber industries – natural – synthetic rubber – Monomer production – Synthetic polymerization – Butadiene – Styrene copolymers – Butadiene acrylonitrile copol Neoprene – Thiokol – Silicon rubber – Butyl rubber – Urethane rubber – Rubber pre chemicals – Rubber compounding – Rubber fabriation – Latex compound – reclaimed Rubber – derivatives.

Unit - V

Sugar – manufacture – starch and related products – miscellaneous starch. Manufacture of industrial alcohol – Butanol – Acetone – Vinegar – Acetic acid – Citric and Lactic acid all by fermentation.

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.