Department of Chemistry

Board of Studies Meeting

The minutes of the 15th meeting of Board of Studies held on 06.04.2024 at 9.30 am at the IQAC Board Discussion Room.

Members Present:

S. No.	Name	Category
1	Dr. M. Suganthi, Associate Professor & Head	Chairman
2	Dr. R. Prabhakaran, Associate Professor, Bharathiar University, Coimbatore	University Nominee
3	Prof. R. Nandhakumar, Professor, Karunya Institute of Technology and Sciences (Deemed to be University), Coimbatore	Subject Expert
4	Mr. E. Muthusamy, Priyadarshini Chemicals. Pvt. Ltd. Nava India, Coimbatore	Industrial Expert
5	Dr. R. Ravikumar	Member
6	Dr. M.R. Ezhilarasi	Member
7	Dr. M. Dineshkumar	Member
8	Mrs. P. Kavitha	Member
9	Dr. R. Menaka	Member
10	Dr. M. Mohanraj	Member
11	Dr. R. Rajkumar	Member
12	Dr. P. Amaravathy	Member

13	Dr. S. Shyamsivappan	Member
14	Dr. N. Kuppuchamy	Co-opted Member
15	Dr. A. Hazel Verbina	Co-opted Member
16	Dr. V. Gopalakrishnan	Co-opted Member
17	Dr. R. Sowrirajan	Co-opted Member
18	Dr. D. Sridevi	Co-opted Member
19	Dr. P. Chidambara Rajan	Co-opted Member
20	Dr. S. Gowri	Co-opted Member
21	Ms. R. Aishwarya	Student Representative- UG
22	Mr. P. Perumal	Student Representative- PG

The HoD and Chairman of the department of chemistry welcomed and introduced all the members and appreciated them for their continuous support and contribution for the development of academic standard and enrichment of the syllabus.

Further Chairman informed the inability of the following member/s to attend the meeting and requested to grant leave of absence.

1. Dr. Shubhashini K Sripathi - Subject Expert
   Professor, Avinashilingam University, Coimbatore
2. Mr. S. Munishkumar - Meritorious Alumni
   Supervisor, PSG Hospitals

After brief discussion the items of the agenda were taken one by one for discussion and the following resolutions were passed.

Item 15.1: *To review and approve the minutes of the previous meeting held on* ***17.10.2023.***

The Chairman of the board presented the minutes of the previous meeting held on **17.10.2023** and requested the members to approve. After brief discussion the following resolution was passed.

Resolution:

Resolved to approve the minutes of the previous meeting held on 17.10.2023.

Item 15.2: *To consider and approve the scheme and syllabi for I semester for the students admitted during the academic year 2024-25.*

The chairman presented the detailed Scheme and Regulation for the students admitted during the academic year 2024-25 and syllabi for the I semester. The members deliberated in detail about

the modification required. After discussion, it is unanimously decided to adopt the following changes.

Changes Made:

Course Code	Course	Change and Reason
24CEU1CA	General Chemistry-I	Dr. R. Prabhakaran and Dr. R. Nandakumar suggested change was made Unit II - namely weaker bonding was included as it's one of the important types of basic bonding.

New Courses Introduced:

Course Code	Course	Reason
-	-	-

Courses Removed

Course Code	Course	Reason
-	-	-

After discussion the following resolution was passed.

Resolution:

Resolved to approve the above modification and adopt the revised syllabi for the students admitted during the academic year 2024-2025.

Item 15.3: *To consider and approve the syllabi for III semester for the students admitted during the academic year 2023-24.*

The chairman presented the detailed syllabi for III Semester to the students admitted for the academic year 2023-24. The members deliberated in detail about the modification required. After discussion it is unanimously decided to adopt the following changes.

Changes Made:

Course Code	Course	Change and Reason
232CE1A3CB	Analytical Chemistry	Dr. R. Prabhakaran and Dr. R. Nandakumar suggested change was made Unit III - To enhance practical knowledge in solution preparation mole percentage was added.

New Courses Introduced:

Course Code	Course	Reason
-	-	-

Courses Removed

Course Code	Course	Reason
-	-	-

After discussion the following resolution was passed.

Resolution:

Resolved to approve the above modification and adopt the revised syllabi for the students admitted during the academic year 2022-2023.

Item 15.4: *To consider and approve the syllabi for V semester for the students admitted during the academic year 2022-23.*

The chairman presented the detailed syllabi for V Semester to the students admitted for the academic year 2022-23. The members deliberated in detail about the modification required. After discussion it is unanimously decided to adopt the following changes.

Changes Made:

Course Code	Course	Changes and Reason
222CE1A5CA	Inorganic Chemistry - II	Dr. R. Prabhakaran suggested the following changes were made Unit I - Magnetic shift reagent was added due to it's applications in the NMR characterization technique of organic molecule. Unit II- Fluorine compound HF was added because it is one of important inorganic acid.

222CE1A5DC	Forensic Chemistry	Dr. R. Nandakumar suggested changes were included Unit II – Types of finger prints, silver nitrate, iodine fuming method were added being important identification methods in forensic science Unit III - Types of explosives added to impart more about functioning of explosives Unit IV - Types of drugs to elaborate knowledge and application of drugs Unit V - NMR application in forensic science as a case study for the better understanding of spectroscopy applications
222CE1A5GA	Chemistry in Daily life	Dr. R. Prabhakaran and Dr. R. Nandakumar suggested change was included Unit IV - Toxicity due to Lead, Chromium and Tin play vital role in many disorders

After discussion the following resolution was passed.

Resolution:

Resolved to approve the above modification and adopt the revised syllabus for the students admitted for the academic year 2022-23.

Item 15.5: *To consider and approve the scheme and syllabi for I semester for the M. Sc students admitted during the academic year 2024-25.*

The Chairman presented the detailed scheme and syllabi for the I semester for the students admitted for the academic year 2024-25 and syllabi for the I semester. The members deliberated in detail and approve the existing syllabus of 2023-24.

Changes Made:

Course Code	Course	Reason
-	-	-

New Courses Introduced:

Course Code	Course	Reason
-	-	-

Courses Removed

Course Code	Course	Reason
-	-	-

After discussion the following resolution was passed.

Resolution:

Resolved to retain the existing syllabus of 2023-24 batch without any modification for the students admitted for the academic year 2024-25.

Item 15.6: *To consider and approve the syllabi for III semester for the M.Sc. students admitted during the academic year 2023-24.*

The chairman presented the detailed syllabi for III Semester to the students admitted for the academic year 2023-24. The members deliberated in detail about the modification required. After discussion it is unanimously decided to adopt the following changes.

Course Code	Course	Changes and Reason
232CE2A3CA	Chemistry of Natural Products	Dr. R. Prabhakaran and Dr. R. Nandakumar suggested change were made Unit V - The important heterocyclic moieties like Isooxazoles, Pyrazole, Carbazole and Naphthyridines have been included due to the precursor for many drug molecules
232CE2A3CB	Inorganic Chemistry	Dr. R. Prabhakaran and Dr. R. Nandakumar suggested change was included Unit III - Since derivation is required to explain term symbols suggested to remove derivation not required.
232CE2A3CC	Quantum Chemistry and Group theory	Dr. R. Prabhakaran and Dr. R. Nandakumar suggested change was added Unit IV- The few contents in the Unit V are deleted and added in the unit IV, since the contents will be relevant in the unit IV so as to explain the terms.

After discussion the following resolution was passed.

Resolution:

Resolved to approve the above modification and adopt the revised syllabus for students admitted for the academic year 2023-24.

Item 15.7: *To review and approve the skill oriented VACC course on Industrial product for III semester students admitted during the academic year 2023-24. To be offered during the academic year 2024-25.*

The chairman presented the Industrial product syllabus for students admitted during the academic year 2023-24. The members unanimously decided to retain the existing syllabus

without any modification.

Resolution:

Resolved to retain the existing syllabus without any modification for the students admitted for the academic year 2023-24.

Item 15.8: *To approve the panel of examiners for question paper setting, question paper scrutiny and conduct of practical and theory examinations for the odd semester of the academic year 2024-25.*

The Chairman presented the panel of examiners for question paper setting, question paper scrutiny and conduct of practical and theory examinations for the odd semester of the academic year 2024-25.

Resolution:

Resolved to approve the panel of examiners for question paper setting, question paper scrutiny and conduct of practical and theory examinations for the odd semester of the academic year 2024-2025.

Item 15.9: *To consider and approve any other item brought forward by the Chairman and the members of the board.*

No other item was brought forward

Finally, the Chairman thanked all the members for their cooperation and contribution in enriching the syllabi with active participation in the meeting and sought the same spirit in the future also. The meeting was closed with formal vote of thanks proposed by Dr. M. Suganthi, Head and Chairman- Chemistry BoS.

Date: 06.04.2024

(Dr. M. Suganthi)
BoS Chairman/HoD
Department of Chemistry
Dr. N. G. P Arts and Science College
Coimbatore -- 641 048

B.Sc- SYLLABUS REVISION

Name of the faculty: BAS **Board:** Chemistry

Semester: I **Course Code/Name:** 24CEU1CA–GENERAL CHEMISTRY-I

Unit	Existing	Changes
I	**Atomic Structure** Rutherford atomic model – Bohr theory of hydrogen atom – Sommerfeld theory – Particle and wave character of electrons – De Broglie's equation – Davisson- Germer experiment - Heisenberg's uncertainty principle - Compton effect – Schrödinger wave equation – Eigen values and Eigen functions – Quantum numbers – Pauli's exclusion principle – Hund's rule and Aufbau principle	
II	**Chemical Bonding** Types of bonds – ionic, covalent, coordinate and metallic bonds - Hybridization involving s, p and d orbitals – Properties of ionic, covalent and coordinate compounds – VSEPR theory - Valence bond theory. Molecular orbital theory – Molecular orbital configurations of simple homo nuclear and hetero nuclear diatomic molecules – Comparison between VBT and MOT	Weaker bonding
III	**Gaseous State** Kinetic molecular theory of gases – Maxwell's distribution of molecular velocities (derivation not needed) – Collision diameter – Collision number, collision frequency – Mean free path – Real and ideal gases – Deviation of real gases from ideal behavior-Equations of state -	

Cont…

	Derivation of Van der Waal's equation. Various methods for expressing concentrations of solutions – Vapour pressure of liquids – ideal and non-ideal solutions – Raoult's law – Vapour pressure of non-ideal solutions – Vapour pressure composition and boiling point composition curves	
IV	**Thermodynamics** System-Isolated system - Open system - Closed system. Surroundings - Extensive and intensive properties - Types of process. First law of thermodynamics - Internal energy. State function and path function - Exact and inexact differentials - Enthalpy of system, enthalpy of vaporization, enthalpy of fusion - Heat capacity of a system Relation between Cp and Cv in gaseous system. Joule Thomson effect, Joule Thomson coefficient and inversion temperature. Heat of neutralization - Heat of solution, heat of combustion, Kirchoff's equation - Flame and explosion temperature - Bomb calorimeter - Measuring enthalpy of combustion, Hess's law- Bond energy - Calculations of bond energy	
V	**Basic Organic Chemistry** Electronic displacements: Inductive effect, electromeric effect, resonance hyperconjugation and steric effect. Strength of organic acids and bases - Factors affecting pK values. Cleavage of bonds: homolysis and heterolysis. Reactive intermediates: Structure and stability of carbocations, carbanions and free radicals	

Cont…

Percentage of Syllabus revised: 1%

Course Focuses on:

☑	Skill Development	☐	Entrepreneurial Development
☑	Employability	☐	Innovations
☐	Intellectual Property Rights	☐	Gender Sensitization
☐	Social Awareness/ Environment	☐	Constitutional Rights/ Human Values/ Ethics

Name of the faculty: BAS **Board:** Chemistry

Semester: III **Course Code/Name:** 232CE1A3CB – ANALYTICAL CHEMISTRY

Unit	Existing	Changes
I	**Laboratory Practices** Storage and handling of corrosive, toxic and poisonous chemicals - Simple first aid procedure for acid and alkali in eye, acid and alkali burns, heat burns and cut by glasses. Principle of titrimetric methods - Acidimetry - Alkalimetry - Permanganometry - Dichrometry - Iodometry - Argentometry - Complexometric titrations	
II	**Qualitative analysis** Introduction - Dry reactions – Heating and flame tests - Wet reactions – Test tubes - Centrifuge tubes - Stirring rods - Droppers - Reagent bottles - Centrifugation - Transferring of precipitates - Washing the precipitates through Buchner funnel - Sintered crucible - Wash bottles - Heating of solutions - Evaporation - Dissolving of precipitates - Precipitation with hydrogen sulphide - Cleaning	

Cont…

	of apparatus - Interfering anions and its elimination - Classification of cations into analytical groups (group separation only)	
III	**Quantitative Analysis** The mole concept – Atomic, molecular and molar masses – Equivalent mass of an acid, base, oxidizing and reducing agents. Concentration terms – Normality - Molarity - Molality- Mole fraction –Percentage solution – Weight composition - Volume composition. Principles of volumetric analysis – Standard solution (primary and secondary standards) - Titration – Types (acid, base, oxidation and reduction) - Equivalent point - End point - Choice of indicators – Internal and external indicators - Theory of indicators – Precautions to avoid errors in titrimetric analysis	Mole percentage
IV	**Gravimetric Analysis** Precipitation methods - Super saturation and precipitate formation – Post precipitation - Co-precipitation - Conditions of precipitation - Precipitation from homogeneous solution - Ignition of the precipitate - Quantitative separations based on precipitation methods - Fractional precipitation - Organic precipitants - Types- Advantages and disadvantages - Sequestering agents - Solubility products and precipitation	
V	**Crystal Growth** Introduction to crystal growth - Nucleation – Gibbs - Thomson equation - Kinetic theory of nucleation – Limitations of classical nucleation	

Cont…

	theory - Homogeneous and heterogeneous nucleation – Different shapes of nuclei – Spherical, cylindrical and orthorhombic – Temkins model – Physical modeling of BCF theory (Burton-Cabrera-Frank) - Crystal Growth Techniques - Bridgman technique - Czochralski method - Verneuil technique - Zone melting – Gel growth and solution growth methods	

Percentage of Syllabus revised: 1%

Course Focuses on:

☑	Skill Development	☐	Entrepreneurial Development
☑	Employability	☐	Innovations
☐	Intellectual Property Rights	☐	Gender Sensitization
☐	Social Awareness/ Environment	☐	Constitutional Rights/ Human Values/ Ethics

Name of the faculty: BAS **Board:** Chemistry

Semester: V **Course Code/Name:** 222CE1A5CA – INORGANIC CHEMISTRY - II

Unit	Existing	Changes
I	**f-Block elements** General characteristics - Electronic configuration - Oxidation states - Color and magnetic properties. Lanthanide and actinide contraction and their consequences. Separation methods of lanthanide- fractional crystallization - ion - exchange. Comparison between d-and f -blocks elements - Uses of lanthanide compounds	Magnetic Shift reagent

Cont…

II	**Compounds of Halogens** Preparation, properties and uses of hypochlorous acid, sodium hypochlorite - Process of bleaching, constitution of bleaching powder, break point chlorination, adverse of effect of bleaching powder. Preparation, properties and structure of perchloric acid, polyhalides – KI_3, $CsBr_5$, pseudohalogens - Cyanogens $(CN)_2$, thiocyanogen $(SCN)_2$- Preparation, properties and uses of iodine – Analysis of iodine	Fluorine compounds, HF
III	**Semiconductors** Synthesis and crystal structures of TiO_2, ZnO, SnO_2. Types ~~of semiconductors - Properties of semiconductors -~~ Valence band - Conduction band -Band-gap calculation - Photon absorption by semiconductor - Applications of semiconductors.	
IV	**Nuclear Chemistry – I** Radioactivity - Types of radioactivity - Nuclear stability - n/p ratio - Magic numbers - Nuclear binding energy - Mass defect - Nuclear shell model - Groups displacement law - Decay constant - Half life period - Radioactive equilibrium - Artificial transmutation - Application of artificial transmutation - Radioactive series.	
V	**Nuclear Chemistry – II** Nuclear reactions - Fission and fusion reactions - Principle and working of nuclear reactors - Isotopes, isobars, isotones and isomers. Separation of isotopes -	

Cont…

	Identification of isotopes - Isotope effect - Application of isotopes in chemistry and medicine - Detection and measurement of radioactivity –Dosimeter- Wilson cloud chamber-Geiger – Muller counter	

Percentage of Syllabus revised: 3%

Course Focuses on:

☑	Skill Development	☐	Entrepreneurial Development
☑	Employability	☐	Innovations
☐	Intellectual Property Rights	☐	Gender Sensitization
☐	Social Awareness/ Environment	☐	Constitutional Rights/ Human Values/ Ethics

Name of the faculty: BAS **Board:** Chemistry

Semester: V **Course Code/Name:** 222CE1A5DC – FORENSIC CHEMISTRY

Unit	Existing	Changes
I	**General Forensic Science** Forensic significance of physical evidences in crime scene investigation - Types of evidence - Physical, testimonial or personal, miscellaneous, corpus delicti. Non -Living physical evidences - Glass pieces, soils and natural resources, paint, questioned documents, firearms and ammunition, powder residue, explosives, tool, Foot marks and tire marks, drugs. Living physical evidences - Human Body materials blood, organs, physiological	

Cont…

	fluids, fingerprints, hair and fibers	
II	**Chemical analysis of fingerprints** Source of latent fingermark residue - Aqueous and lipid components, Chemical processing of latent fingermarks - Amino acid sensitive reagents - Ninhydrin, 1,2-indanedione, Lipid-sensitive reagents- Oil red O (ORO), nile red, ~~other techniques~~-powder techniques, cyanoacrylate fuming vacuum metal deposition	Types of finger prints Silver nitrate, iodine fuming method
III	**Chemical analysis of explosives** Explosives - Inorganic and organic high and low explosives, chemical analysis of explosives - Ignition susceptibility test, Colorimetric tests - diphenylamine test, anthrone spot test, barium chloride and silver nitrate spot tests. Microcrystalline tests for explosives - Cropen microcrystalline test	Types of
IV	**Examination of Drugs and Alcohols** Natural and synthetic drugs - Forensic identification of ~~natural and synthetic~~ drugs- Chemical tests - Chen's Test- Mecke's Test- Marqui's Test- nitric acid test- primary, secondary, tertiary amine test. Alcohol intoxication, effects of alcohol on body - Examination of alcohol in liquor - test for ethyl alcohol - Iodoform test, Dichromate test - Test for methanol- Chromotropic acid test, Schiff's reagent test	Types of Drugs
V	**Application of Instrumentation in Forensic Science** Role of Spectroscopic techniques in Forensic Science – UV Visible - Fluorescence and	

Cont…

	Phosphorescence - Atomic (Absorption and Emission)- IR- Electrochemical techniques- Potentiometry- Conductometry - Chromatographic Techniques in Forensic Science	NMR Case Study

Percentage of Syllabus revised: 7%

Course Focuses on:

☑	Skill Development	☐	Entrepreneurial Development
☑	Employability	☐	Innovations
☐	Intellectual Property Rights	☐	Gender Sensitization
☐	Social Awareness/ Environment	☐	Constitutional Rights/ Human Values/ Ethics

Name of the faculty: BAS **Board:** Chemistry

Semester: V **Course Code/Name:** 222CE1A5GA – CHEMISTRY IN DAILY LIFE

Unit	Existing	Changes
I	**Polymers** Introduction – Classification - Difference between thermosetting and thermoplastics – Properties and uses of nylon, polyester, synthetic rubber, polyurethane rubber, sponge, foam, and thermocol	
II	**Hair care and Skin care Products** Shampoo – Thickener and foam stabilizer – Perfume – Preservative – Conditioning agent – Antidandruff shampoo - Hair cream – Hair dye – Constituents of dye remover	
III	**Soap, Detergent and Wax** Soap and detergent - Definition - Ingredients - Cleansing action	

Cont…

	Wax - Classification – Spermaceti - Bayberry - Bees - Chinese insect - Candelilla - Carnauba wax - Montan - Ozocerite - Paraffin and synthetic wax- Hydrocarbon in candles – Manufacture of candles – Safety match sticks	
IV	**Food adulteration** Definition of adulteration of food – Common adulterants in different food – Toxic effects of metals and chemicals – Contamination of food with harmful microorganisms – Food additives and preservatives	lead , chromium, tin
V	**Chemistry in housing and household products** Portland cement - Paints and coatings - Varnishes and polishes - Glass cleaners - Household pesticides - Stain removers - Fire extinguishers	

Percentage of Syllabus revised: 1%

Course Focuses on:

☑	Skill Development	☐	Entrepreneurial Development
☑	Employability	☐	Innovations
☐	Intellectual Property Rights	☐	Gender Sensitization
☐	Social Awareness/ Environment	☐	Constitutional Rights/ Human Values/ Ethics

M.Sc- SYLLABUS REVISION

Name of the faculty: BAS **Board:** Chemistry

Semester: III **Course Code/Name:** 232CE2A3CA - CHEMISTRY OF NATURAL PRODUCTS

Unit	Existing	Changes
I	**Terpenoids** Isolation and classification of terpenoids - Structural elucidation and synthesis of zingiberene, eudesmol, juvenile hormone, abeitic acid and caryophyllene	
II	**Steroids** Introduction - Structural elucidation and synthesis of cholesterol, ergosterol, equilenin, estrone, testosterone and progesterone	
III	**Alkaloids** Introduction – Isolation of alkaloids - Structural elucidation and synthesis of morphine, reserpine, quinine, atropine and glaucine	
IV	**Proteins and Nucleic acids** Proteins – Classification and properties (denaturation, isoelectric point and electrophoresis), primary, secondary, tertiary and quaternary structures of proteins – Synthesis of peptides and polypeptides - N-terminal and C-terminal residue analysis Nucleic acids - Structure and synthesis of nucleosides and nucleotides - Genetic code - Structure of RNA and DNA and their biological importance	
V	**Heterocyclic compounds** Heterocyclic compounds – Synthesis and Structure of natural oxygenated heterocyclics - Flavones, isoflavones - Purines (adenine and guanine) - Anthocyanins (cyanin and pelargonin) and Uric acid. Synthesis of nitrogen heterocycles - Oxazoles – Imidazoles – Thiazoles - Aziridines - Oxiranes - Azetidines - Pyrazines -	Isooxazoles,

Cont…

	Pyridazines - 1,2,3-triazoles - 1,2,4-triazoles.	Pyrazole, Carbazole- Naphthyridines

Percentage of Syllabus revised: 3%

Course Focuses on:

☑	Skill Development	☑	Entrepreneurial Development
☑	Employability	☑	Innovations
☐	Intellectual Property Rights	☐	Gender Sensitization
☐	Social Awareness/ Environment	☐	Constitutional Rights/ Human Values/ Ethics

Name of the faculty: BAS **Board:** Chemistry

Semester: III **Course Code/Name:** 232CE2A3CB - INORGANIC CHEMISTRY

Unit	Existing	Changes
I	**Solid State Chemistry I** Cells and description of crystal structure - Close packing of spheres - Packing efficiency - Hexagonal close packed (hcp) and cubic close packed structures (ccp) - Coordination number - Relative density of packing in simple cubic - Tetrahedral and octahedral holes - Limiting radius ratio rule. Radius ratio for trigonal, tetrahedral, octahedral and cubic sites	
II	**Solid State Chemistry II** Structure of spinels - Stoichiometric defects - Schottky and Frenkel defects - Non-stoichiometric defects - - Metal excess and metal deficiency defects - Extended defects - Line and plane defects. Band theory - Semiconductors - Intrinsic and extrinsic type - Fermi level - Flow of current in semiconductors - Hopping mechanism -	

Cont…

	Band structure - p and n type semiconductors - p-n junction - Superconductivity - 1,2,3-superconductor - Photovoltaic effect	
III	**Lanthanides** General characteristics of lanthanides - Electronic configuration - Oxidation state Lanthanide contraction - Term symbols for Lanthanide ions ~~(Derivation not required)~~ - Factors that mitigate against the formation of lanthanide complexes -Electronic spectra and magnetic properties of lanthanide complexes - Lanthanide complexes as shift reagents - Difference between 4f and 5f orbital elements	
IV	**Nuclear Chemistry I** Nuclear structure - Stability of nuclei - Packing fraction - Even and Odd nature of nucleons - n/p ratio - Nuclear potential - Binding energy and exchange forces - Shell model and Liquid drop model. Decay of radio nuclei - Rate of decay - Determination of half-life period. Modes of decay -Nuclear reactions- Alpha, beta, gamma and orbital electron capture - Nuclear isomerism - Internal conversions - Q value - Nuclear cross section - Threshold energy and excitation functions. Particle acceleration and counting techniques - Linear accelerator - Cyclotron - Synchrotron - Betatron – Bevatron	
V	**Nuclear Chemistry II** Applications of isotopes – Esterification – Friedal Craft's reaction – Structural determination of PCl_5 - Solubility of sparingly soluble substance – Isotope dilution analysis – Carbon dating – Thyroiditis - Assessing the volume of blood in a patient - Brain tumor location and bone fracture healing - Control of predatory insects	

Percentage of Syllabus revised: 1%

Course Focuses on:

☑	Skill Development	☑	Entrepreneurial Development
☑	Employability	☑	Innovations
☐	Intellectual Property Rights	☐	Gender Sensitization
☐	Social Awareness/ Environment	☐	Constitutional Rights/ Human Values/ Ethics

Name of the faculty: BAS **Board:** Chemistry

Semester: III **Course Code/Name:** 232CE2A3CC - QUANTUM CHEMISTRY AND GROUP THEORY

Unit	Existing	Changes
I	**Quantum Chemistry I** Failure of classical mechanics and the success of quantum theory in explaining black body radiation - Photoelectric effect and the H-atom spectrum - De Broglie's matter waves - Heisenberg's uncertainty principle - Schrodinger equation - Born's interpretation of the wave function - Requirements of acceptable wave function. Algebra of operators - Sums and products of operators - Commutator - Linear operators - Eigen functions and Eigen values - Correspondence between physical quantities in classical mechanics and Operators in quantum mechanics - Hamiltonian operator - Quantisation of angular momentum and its spatial orientation - Average (expectation) values - Postulates of quantum mechanics	
II	**Quantum Chemistry II** Particle in a one-dimensional box - Quantization of energy - Normalisation of wave function - Orthogonality of the particle in a one-dimensional box wave functions - Average position and	

Cont…

	average momentum of a particle in a one-dimensional box - Illustration of the uncertainty principle and correspondence principle with reference to the particle in a one-dimensional box - Particle in a three-dimensional box - Separation of variables – Degeneracy Schrodinger equation for simple harmonic oscillator of a diatomic molecule - Illustration of the uncertainty principle and correspondence principle with reference to harmonic oscillator. Schrodinger equation for a rigid rotor of a diatomic molecule. Schrodinger equation for the H-atom (or H - like species) - Separation of variables - Energy levels - Radial factors of the H-atom wave functions	
III	**Quantum Chemistry - III** Need for approximation methods - The perturbation theory (first order only) application of the perturbation method to He-atom - The variation method - Applications of variation method to He-atom - Electron spin and the Pauli's principles – Symmetric and anti-symmetric nature of the wave functions - Slater determinants - Approximate wave function of many electron atoms - Stirling's approximation- Maxwell-Boltzman, Bose-Einestin, Fermi-Dirac, Born Oppenheiner approximation.	
IV	**Group Theory I** Symmetry elements and symmetry operations. Inverse operations - Definition of a group - Properties of a group, definition of abelian group, cyclic group, finite group, infinite group, sub-group and isomorphic group - Group multiplication tables - Symmetry classification of molecules into point groups (Schoenflies symbols only) - Matrices - Definition of matrix - Diagonal matrix - Null matrix - Unit matrix - Symmetric matrix - Skew matrix - Conjugate matrix - Matrix multiplication - Determination of inverse matrix - Block multiplication of matrices. Matrix notations of symmetry	

Cont…

	operations of C_{2v} and C_{3v} point groups.	Definition of reducible and irreducible representations – Irreducible representation as orthogonal vectors – Direct product rule – The Great Orthogonality Theorem and its consequences (statement only, proof not needed)
V	**Group Theory II** ~~Definition of reducible and irreducible representations – Irreducible representation as orthogonal vectors – Direct product rule – The Great Orthogonality Theorem and its consequences (statement only, proof not needed)~~ Construction of character table of C_{2v} and C_{3v} point groups - Calculation of binary co-ordinates in the character tables for C_{2v} and C_{3v} point groups – Calculation of character values of reducible representations per unshifted atom for each type of symmetry operation - Determination of total Cartesian representation – Determination of direct sum from total Cartesian representation. Type of hybridization of atomic orbitals in acetylene, CH_4 and $[PtCl_4]_2$ - Group theory and Vibrational spectroscopy – Vibrational modes as basis for group representation – Symmetry selection rules for IR and Raman spectra - Mutual Exclusion Principle – Classification of vibrational modes.	

Percentage of Syllabus revised: Nil

Course Focuses on:

☑	Skill Development	☑	Entrepreneurial Development
☑	Employability	☑	Innovations
☐	Intellectual Property Rights	☐	Gender Sensitization
☐	Social Awareness/ Environment	☐	Constitutional Rights/ Human Values/ Ethics

ATTENDANCE OF THE FOURTEENTH BOARD OF STUDIES MEETING

Faculty: Basic and Applied Science **Board: Chemistry**

S. No	Name	Designation	Signature
1.	**Dr. M. SUGANTHI** Associate Professor, Department of Chemistry, Dr. N.G.P Arts & Science College,Coimbatore-48	Chairman	06.04.2024
2.	**Dr. R. PRABHAKARAN** Associate Professor, Department of Chemistry, Bharathiar University, Coimbatore-46	Vice Chancellor Nominee	06/04/2024
3.	**Prof. R. NANDHAKUMAR** Professor of Applied Chemistry, School of Sciences Karunya Institute of Technology and Sciences, Coimbatore-114	Subject Expert	06/04/2024
4.	**Dr.SHUBHASHINI K SRIPATHI** Professor of Chemistry, School of Physical Sciences and Computational Sciences, Avinashilingham University, Coimbatore-43	Subject Expert	ABSENT
6.	**Mr.E. MUTHUSAMY** Priyadharshini Chemicals Pvt.Ltd Nava India,Coimbature-06	Industry Expert	06/04/2024
7.	**Mr.S. MUNISHKUMAR** Supervisor, PSG Hospitals, Coimbatore -641004	Alumni	ABSENT
8.	**Dr. R. RAVIKUMAR** Assistant Professor,Department of Chemistry, Dr. N.G.P Arts & Science College,Coimbatore-48	Internal Member	06/4/24
9.	**Dr. M. R. EZHILARASI** Associate Professor, Department of Chemistry, Dr. N.G.P Arts & Science College,Coimbatore-48	Internal Member	6/4/2024
10.	**Dr. M. DINESHKUMAR** Assistant Professor,Department of Chemistry, Dr. N.G.P Arts & Science College,Coimbatore-48.	Internal Member	

11.	**Mrs. P.KAVITHA** Assistant Professor,Department of Chemistry, Dr. N.G.P Arts & Science College,Coimbatore-48.	Internal Member	6/4/24
12.	**Dr. R. MENAKA** Assistant Professor,Department of Chemistry, Dr. N.G.P Arts & Science College,Coimbatore-48.	Internal Member	06/04/24
13.	**Dr. M. MOHANRAJ** Assistant Professor,Department of Chemistry, Dr. N.G.P Arts & Science College,Coimbatore-48.	Internal Member	6/4/24
14.	**Dr. R.RAJKUMAR** Assistant Professor,Department of Chemistry, Dr. N.G.P Arts & Science College,Coimbatore-48.	Internal Member	6/4/24
15.	**Dr.P.AMARAVATHY** Assistant Professor,Department of Chemistry, Dr. N.G.P Arts & Science College,Coimbatore-48.	Internal Member	6/4/24
16.	**Dr. S. SHYAM SHIVAPPAN** Assistant Professor,Department of Chemistry, Dr. N.G.P Arts & Science College,Coimbatore-48.	Internal Member	
17.	**Dr. N. KUPPUCHAMY** Professor &Head,Department of Tamil, Dr. N.G.P Arts & Science College,Coimbatore-48.	Co-opted member	06/04/24
18.	**Dr. A.HAZEL VERBINA** Professor & Head,Department of English, Dr. N.G.P Arts & Science College,Coimbatore-48.	Co-opted member	
19.	**Dr. V.GOPALAKRISHNAN** Assistant Professor & Head,Department of Physics, Dr. N.G.P Arts & Science College,Coimbatore-48.	Co-opted member	
20.	**Dr. R. SOWRIRAJAN** Assistant Professor & Head,Department of Maths, Dr. N.G.P Arts & Science College,Coimbatore-48.	Co-opted member	6/4/24
21.	**Dr. S.GOWRI** Professor & Head, Department of Biochemistry, Dr. N.G.P Arts & Science College,Coimbatore-48.	Co-opted member	6/4/24
22.	**Dr. P.CHIDAMBA RAJAN** Professor & Head, Department of BioTECHNOLOGY, Dr. N.G.P Arts & Science College,Coimbatore-48.	Co-opted member	6/4/24
23.	**Dr. D. SRIDEVI** Professor &Head, Department of Food Science & Nutrition, Dr. N.G.P Arts & Science College,Coimbatore-48.	Co-opted member	6/4/24
24.	**Ms. R.AISHWARYA** III B.Sc. Chemistry, Department of Chemistry, Dr. N.G.P Arts & Science College,Coimbatore-48.	Student Representative	Aishwarya
25.	**Mr.P.PERUMAL** II M.Sc. Chemistry, Department of Chemistry, Dr. N.G.P Arts & Science College,Coimbatore-48.	Student Representative	P. Perumal

Date: 06/04/2024

Academic Council CHAIRMAN Dr.N.G.P. Arts and Science College 2024

(Dr. M. SUGANTHI)
BoS Chairman/HoD
Department of Chemistry
Dr. N. G. P Arts and Science College
Coimbatore -- 641 048