FOUR YEAR UNDERGRADUATE PROGRAM(2024 – 28)
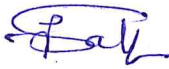## DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM

PART-A: Introduction

Program: Bachelor in Science (Degree/Honors)		Semester -VI	Session: **2024-2025**
1	Course Code	DSC-06T	
2	Course Title	ORGANIC AND PHYSICAL CHEMISTRY- II	
3	Course Type	DSC	
4	Pre-requisite(if,any)	*As per Program*	
5	Course Learning. Outcomes(CLO)	➤ *To understand role of quantum mechanics in chemistry.* ➤ *To know the organic compound in biological system* ➤ *To know the polymers in chemistry their preparation and application of polymer.* ➤ *To learn the techniques for studying the structure of chemical molecule.*	
6	Credit Value	**3 Credits**	*Credit = 15 Hours -learning & Observation*
7	Total Marks	Max.Marks: 100	Min Passing Marks:40

PART -B: Content of the Course

Total No.of Teaching–learning Periods(01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics(Course contents)	No. of Periods
I	**Quantum Chemistry I:-**Black body radiation ,plank's radiation law, photoelectric effect, Compton effect, de-Broglie's idea of matter and waves and its experimental verification. Heisenberg's uncertainty principle, operators: Hamiltonian operator, angular momentum operator, Laplacian operator, postulates of quantum mechanics, Eigen values, Eigen function, Schrodinger time independent wave equation, physical significance of Ψ and Ψ^2. Application of Schrodinger wave equation to Particle in one dimensional box. **Quantum Chemistry II:-**Quantum mechanical approach of molecular orbital theory basic idea, criteria of forming Molecular orbitals, LCAO(Linear combination of atomic orbital) approximation, formation of H_2^+ ion, calculation of energy of energy levels from wave functions, bonding and antibonding wave functions, concept of sigma bonding sigma antibonding, pi bonding and pi anti bonding M.Os. and their characteristics Comparison of M.O. theory and V.B. Model.	12
II	**(A)Carbohydrate:** Introduction and classification of carbohydrate, monosaccharide: open chain and cyclic structure of glucose and fructose, epimer and anomers of glucose. Relative and absolute configuration of carbohydrates, Specific rotation and mutarotation of glucose. Determination of ring size in glucose. Chemical properties of gluose: Osazone formation, oxidation, reduction, Reaction with HIO_4, Interconversion of Glucose and fructose, Chain lengthening and chain shortening. Structure of Disaccharide Sucrose, Lactose and Maltose. Structure of polysaccharide: Starch, Cellulose. **(B) Amino Acid & Protein:** amino acid types of amino acid, isoelectric point, structure of protein primary, secondary and tertiary structure. **(C) Nucleic Acid:** components of nucleic acid, types of nucleic acid, nucleoside, nucleotide, structure of nucleic acid.	11
III	**(A)Organometallic compound:** Preparation, Structure, and chemical reactions of organomagnesium(Grignard Reagent), Organozinc compound, Organolithium compound, Organosulphur compound **(B) Synthesis of organic compound via enolates :** Active methylene compound, Keto-enol tautomerism, Alkylation of diethyl malonate and acetoacetic ester. Claisen ester	11

		condensation and Robinson anealation. Synthesis of monoalkyl and dialkyl derivative, fatty acids, dibasic acid, α, β unsaturated acid, valeric acid, monoketone, diketone, heterocyclic compounds etc.	
IV	Spectroscopy II(Organic) (A) Infra red Spectroscopy: Basic principle and instrumentation, introduction, Modes of vibrations, fundamental band of different bond and functional groups, identification of band for compound and IR spectra of different compounds. Applications of IR spectroscopy. (B)Principle and instrumentation of UV-visible spectroscopy, Introduction, wavelength maxima, Beer Lambert's Law, Shifts in UV-visible spectra, Chromophore –Auxochrome theory, Effect of conjugation on wavelength maxima. Types of electronic transitions. Applications of UV-visible spectroscopy. Woodward Fischer rule for polyene wavelength maxima calculation. (C) NMR (Nuclear Magnetic Resonance): Introduction to NMR, Basic principle and instrumentation, No. of signal in PMR(proton Magnetic Resonance),Chemical shift, Sheilding and deshielding effect, Splitting of signal or spin-spin interaction, Intensity of Signal and peak height and peak ratio. Coupling Constant J. Proton NMR of some compound like ethanol, propanol, toluene, acetaldehyde, ketone,1,2-dibromoethylene etc.	11
Keywords	*Particle in one Dimensional Box, Hydrogen atom, Proton NMR, UV Visible, Vibrational Spectra. Woodward Fischer Rule.*	

SignatureofConvener&Members (CBoS):

PART–C:Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

1. Tandon, M. M. N., & Agarwal, S. C. *(2022). Unified chemistry. Shivalal and Company.*
2. Sharma, B. K. *(2010). Spectroscopy comprehension. Goel Publishing House.*
3. Puri, B. R., Sharma, L. R., & Pathania, M. S. *(2021). Principles of physical chemistry. Vishal Publications.*
4. Gurtu, J. N., & Gurtu, R. *(2015). Advanced physical chemistry. Pragati Prakashan.*

Reference Books Recommended:

5. Atkins, P. W., de Paula, J., & Keeler, J. A. *(2005). Atkins' physical chemistry Oxford University Press.*
6. Pandya, A. J. *(2010). A textbook of biochemistry: Nucleic acids, proteins and carbohydrates.*
7. Korte, F., & Goto, M. *(2009) Nucleic acids, proteins and carbohydrates, John Willy & Sons*

Online Resources:

➢ https://onlinecourses.nptel.ac.in/noc23_cy09/preview
➢ https://www.udemy.com/course/ochemnmr/?couponCode=LEADERSALE24A
➢ https://en.wikipedia.org/wiki/Bioorganic_chemistry#:~:text=Biophysical%20organic%20chemistry%20is%20a,nature%20to%20determine%20their%20properties.
➢ https://onlinecourses.nptel.ac.in/noc21_cy38/preview

PART-D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment(CIA):30 Marks

End Semester Exam(ESE):70 Marks

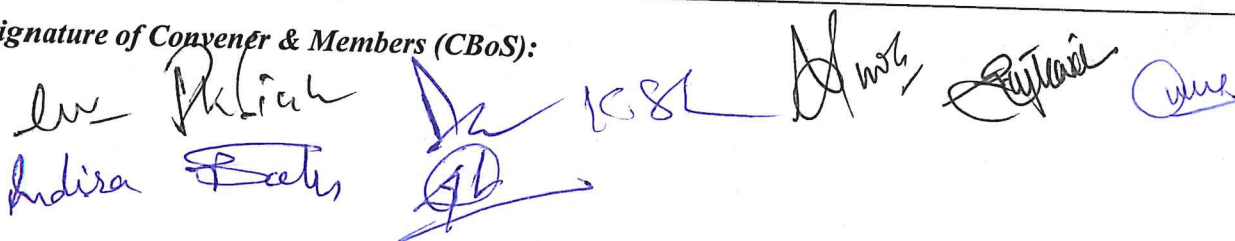| Continuous Internal Assessment(CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 +20 Assignment/Seminar- 10 Total Marks -30	Better marks out of the two Test / Quiz+ obtained marks in Assignment shall be considered against 30 Marks
End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20Marks Section B: Descriptive answer type qts.,1out of 2 from each unit-4x10=40Marks	

Name and Signature of Convener & Members of CBoS:

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FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM

PART-A: Introduction

Program:Bachelor in Science (Diploma / Degree)		Semester VI	Session: 2024-2025
1	CourseCode	CHSC-06P	
2	CourseTitle	CHEMISTRY LAB COURSE-VI	
3	CourseType	DSC	
4	Pre-requisite(if,any)	As per Program	
5	Course Learning. Outcomes(CLO)	➢ To understand the basic principles involved in separation and identification of organic compound. ➢ To apply the knowledge of qualitative and quantitative estimations in real sample analysis. ➢ To learn the synthesis of organic compounds ➢ To learn the use of conductometer and spectrophotometer in analysis.	
6	CreditValue	1 Credits	Credit =30 Hours Laboratory or Field learning/Training
7	TotalMarks	Max.Marks:50	Min Passing Marks:20

PART -B: Content oftheCourse

TotalNo.of learning-Training/performancePeriods:30 Periods (30 Hours)

Module	Topics(Coursecontents)	No.ofPeriod
Lab./Field Training/ Experiment Contents of Course	1)To determine the solubility and solubility product of Sparingly soluble salt using conductometer. 2)To titrate potentiometrically the given ferrous sulphate solution using KMnO4 / $K_2Cr_2O_7$ as titrant and calculate redox potential of Fe^{2+} /Fe^{3+} system on the hydrogen scale. **Organic mixture analysis** Separation and Identification of two solid organic compounds from given binary organic mixture by H_2O,$NaHCO_3$, NaOH for separation and preparation of suitable derivative. **Synthesis of one organic compound :-** (a)synthesis of m-dinitrobenzene from nitrobenzene. (b) synthesis of acetanilide from aniline (c)Preparation of iodoform from ethanol and acetone (d)Preparation of p-bromoacetanilide (e)Preparation of 2,4,6-tribromophenol. (f)Preparation of methyl orange and methyl red. (g)Preparation of benzoic acid from toluene. (h)Preparation of aniline from nitrobenzene.	30
Keywords	Organic mixture analysis, synthesis of organic compound, solubility product, conductometer.	

Signature of Convener & Members (CBoS):

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

1. Tandon, M. M. N., & Shiva Lal Agarwal & Company. (2012). BSc. Practical Chemistry.
2. Pandey, O. P., BajPai, D. N., Giri, S., & S. Chand. (2013). Practical Chemistry.

Reference Books Recommended:

1. Bassett, J., Denney, R. C., Jeffery, G. H., & Mendham, J. (2000). Vogel's Text Book of Qualitative Analysis (revised). ELBS.
2. Das, R. C., & Behra, B. (2002). Experimental Physical Chemistry. Tata McGrawHill.

Online Resources:

- ➤ e-Resources / e-books and e-learning portals
- ➤ https://chem.libretexts.org/Courses/University_of_California_Davis/Chem_4C_Lab%3A_General_Chemistry_for_Majors/Chem_4C%3A_Laboratory_Manual/05%3A_Potentiometric_Titrations_(Experiment)
- ➤ https://vlab.amrita.edu/?sub=2&brch=191
- ➤ https://www.orgsyn.org/

PART-D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment(CIA): 15 Marks

End Semester Exam(ESE): 35Marks

Continuous Internal Assessment(CIA): (By Course Teacher)	Internal Test / Quiz-(2): **10 &10** Assignment/Seminar +Attendance- 05 Total Marks -**15**	Better marks out of the two Test / Quiz **+**obtained marks in Assignment shall be considered against **15** Marks	
End Semester Exam (ESE):	Laboratory / Field Skill Performance: On spot Assessment P. Performed the Task based on lab. work - 20 Marks Q. Spotting based on tools& technology (written) – 10 Marks R. Viva-voce (based on principle/technology) - 05 Marks		Managed by Course teacher as per lab. status

Name and Signature of Convener & Members of CBoS: