B.Sc. Semester–V
DSE-9A: Chemistry (Theory)

Course title- Chemistry -9A
Course Code: C5CHE2T1

Type of Course	Theory / Practical	Credits	Instruction hour per week(hr)	Total hoursof Syllabus /Sem	Duration ofExam(hr)	Formative Assessment Marks	Summative Assessment Marks	Total Marks
DSE-9A	Theory	04	04	64	03	20	80	100

Course Outcomes (COs)

CO1:
Explain the principles of coordination chemistry, including crystal field theory, magnetic properties, stability of metal complexes, and correlate structure with color and magnetic behavior of coordination compounds.

CO2:
Classify and describe organometallic compounds and inorganic polymers, apply the 18-electron rule, determine electron counts in metal carbonyls, and explain the preparation, structures, properties, and applications of silicones and phosphazenes.

CO3:
Interpret the chemistry of heterocyclic compounds and carbohydrates by explaining their classification, nomenclature, synthesis, reactions, stereochemistry, and structural features of mono-, di-, and polysaccharides.

CO4:
Apply the principles of UV-Visible and IR spectroscopy to identify chromophores, predict electronic transitions, calculate absorption maxima using Woodward–Fieser rules, and analyze functional groups and hydrogen bonding in organic molecules.

CO5:
Evaluate colligative properties of solutions, derive relationships between molecular mass and colligative effects, and determine molecular masses using osmotic pressure, boiling point elevation, vapor pressure lowering, and freezing point depression methods.

CO6:
Analyze reaction kinetics and industrial chemical processes by understanding theories of reaction rates, fast reaction techniques, photochemical reactions, and the manufacture, properties,

applications, and corrosion behavior of industrial materials such as cement, ceramics, paints, soaps, detergents, and metals.

DSE-9A:Chemistry(Theory)9A(C5CHE2T1)	64hrs
UNIT-I: COORDINATION CHEMISTRY-II ORGANOMETALLICCOMPOUNDS&INORGANIC POLYMERS	16hrs
Coordination chemistry-II Crystal field theory, crystal field splitting in octahedral, tetrahedral and square planner complexes, calculation of CFSE in octahedral and tetrahedral complexes, crystal field effects in weak and strong field ligands.Factorsaffectingthemagnitudeofcrystalfieldsplitting.Tetragonaldistortionofoctahedralgeometry,JohnTellerdistortion.Explanation of colour and magnetic moments of complexes . Determination of magnetic susceptibility by Gouy's method. Stability of metal complexes (thermodynamic and kinetic), stepwise and overall stability constant and their relationship. Factors affecting the stability of metal complexes. **(8 Hours)** **Organometallic compounds** Definition and classification with examples, concept of hapticity of organic ligands with examples. Metal carbonyls: Types, nomenclature, preparation, andproperties.18-electronrule, electron count in metal carbonyls of Cr, Mn, Fe, Co and Ni. Structure of mononuclear ($Cr(CO)_6$, $Fe(CO)_5$& $Ni(CO)_4$) and binuclear carbonyls ($Mn_2(CO)_{10}$, ($Co_2(CO)_8$&($Fe_2(CO)_9$ using VBT. **(5 Hours)** **Inorganic Polymers** General properties and types of inorganic polymers. Comparison with organic polymers. Silicones: preparation, properties and uses. Types of silicones: structure, properties and uses. Phosphazines: Preparation and structure of phosphonitrilic chloride (trimer). **(3 Hours)**	
UNIT-II:HETEROCYCLICCOMPOUNDS,CARBOHYDRATES ,UV AND IR SPECTROSCOPY	16hrs
HeterocyclicCompounds: Classification, Nomenclature by Hantzsch and Widmann method, aromaticity of 5- and 6-membered rings containing one hetero atom, synthesis of pyrrole, furan (Paal-Knor synthesis), pyridine (Hantzsch synthesis). Electrophilic substitution reactions in furan, pyrrole and pyridine (Nitration, sulphonation, halogenation, Friedel-Craft's reaction). Nucleophilic substitution reactions in pyridine: Chichibabin reaction with organo lithium compounds (butyl and Phenyl lithium). Indole (Fischer's synthesis), quinoline (Skrap'ssynthesis). **(5 Hours)** **Carbohydrates:** Classification and general properties. Glucose and Fructrose (Open chain and cyclic structure), Determination of configuration of monosaccharides.	

Absolute configuration of Glucose and Fructose .Mutarotation. Ascending and descending in monosaccharides, Interconversion of aldose to ketose and vice-versa,Osazoneformation.Structure of disaccharides (Sucrose ,Cellobiose , maltose , lactose) and polysaccharides (starch and cellulose) excluding their structure elucidation **(5Hours)** **UltravioletSpectroscopy:** Types of electronic transitions, λ_{max}, chromophores and auxochromes,bathochromic and hypsochromicshifts,intensity of absorption,Woodward–Fieserrules for calculating λ_{max} of α, β-unsaturated aldehydes, ketones, carboxylic acids, esters. **(3Hours)** **Infrared Spectroscopy:** Introduction to infrared spectroscopy, intensity of absorption band, position of absorptions, C-H, >C=O, O-H and N-H absorption bands with explanation for variation in stretching frequencies. Identification of Hydrogen bonding in alcohols,phenols and carboxylic acids using IRspectroscopy. **(3 Hours)**	
UNIT-III:COLLIGATIVE PROPERTIES AND CHEMICAL DYANAMICS	16hrs
Colligative Properties: Definition and examples Osmosis and osmotic Pressure: Semi permeable membrane , natural and artificial semi permeable examples . Osmosis and osmotic pressure- determination of osmotic pressure by Berkeley and Hertley's method .Theory of dilute solutions . laws of osmotic pressure relationship between molecular mass and osmotic pressure ,isotonic solutions . Lowering of vapour pressure; Concept of vapour pressure Rault's law relative lowering of vapour pressure of solvent ,Its determination by dynamic method (Ostwald's and walker).Calculation of molecular mass from relative lowering of vapour pressure. Elevation inboiling point: Definition and its relationship with relative lowering of vapour pressure (to be derived from Clepeyron-Clausius equation). Ebullioscopic constant of solvent, relationship between molar mass and elevation in boiling point. Detrmination of molar mass of solute by Landberger method. Depression in freezing point: Definition and its relationship to the lowering of vapour pressure cryoscopic constant of solute, relatin between depression in freezing point and molecular mass of solute (to be derived from Clepeyron-Clausius equation). Determination of molecular mass of solute by cryoscopic method. **08 Hours**	

Chemical Dyanmics: Macroscopic and microscopic kinetics, Theories of reaction rate-Collision theory and transition state theory, Thermodynamical formulation of reaction rates(Wyne-jonesandeyring treatment),reaction between ions in solution-Influence of ionic strength on reaction rates. **Concept of steady state kinetics:** chain reactios-chain length and chain inhibition,comparison of photochemical and thermal reactions, mechanism ofphotochemical and thermal reactionsof HCl and HBr **Kinetics of fast reactions-** study of relaxationmethod (temperature and pressure jump), flow method (Plug flow mehtod and stopped flow methods), Flash photolysis and shock tube method.. **08 Hours**	
Unit-IV- INDUTRIAL CHEMISTRY	16Hours
Cement & Ceramics: **Cement:** Introduction, definition, raw materials, grades of cement. Manufacture of Portland cement (by dry and wet process) Mechanism of setting of cement. Types of cement and their uses. RCC. **Ceramics**- Introduction, classification- clay definition and feldspar, properties and uses. **03 Hours** **Paints and pigments-:Paints** -Introduction requirement of paint constituents of paint, formulation of paint, failure of paint film (Reason) Emulsion paint, manufacture of white lead using Dutch process and uses **Pigments**-Definition, Red and white pigment. **03Hours** **Oils, Fats, Soaps and Detergents:** Composition of oils and fats, Determination of saponification value and Iodine value of oils and fats, Manufacture of soaps(hydrolyser process),Synthetic detergents (syndets), manufacture of sodium lauryl sulphate and sodium dodecyl benzene sulphonate, cleansing action of soaps. **05 Hours** **Corrosion:** Introduction, Definition, Types of corrosion: Dry corrosion & Wet corrosion , Factors influencing corrosion-Microbiological Corrosion, Atmospheric Corrosion, Mechanism of electrochemical corrosion. Galvanic Corrosion, Concentration Cell Corrosion, Differential aeration Corrosion. Corrosion control –Proper designing-Using pure metal-Using metal alloys. **05 Hours**	

Recommended Books/References

1. ConciseInorganicChemistry-J.D.Lee,5th Edn,New AgeInternational(1996)
2. ModernInorganicChemistrySathyaPrakash'sbyR.D.Madan,S.ChandandCo.Ltd.NewDelhi.
3. InorganicChemistry-PrinciplesofStructureandReactivity,4th Edn-J.E.Huheey,E.A.Keiter,R.L.Keiter and O.K. Medhi. Pearson Education (2009).
4. AdvancedInorganicChemistry-Agarwal&Keemtilal,11th edition,Pragathipublication,2012
5. OrganicChemistryMorrison,R.T. &Boyd,R.N., Pearson, 2010.
6. Advanced OrganicChemistryBahl,A.&Bahl,B.S.,S.Chand,2010.
7. OrganicChemistry-M.K.Jain,Nagin&Co.,1987.
8. OrganicChemistry-Mehtaand Mehta,2005.
9. PhysicalChemistryP.W.Atkins:,2002.
10. FundamentalofmolecularspectroscopybyCNBanwell-2008
11. SpectroscopybyH.Kaur,Apragatiedition-9th edition2014.
12. MolecularstructureandspectroscopybyG.Aruldhas,2nd edition-2014
13. PhysicalChemistryW.J.Moore:1972.
14. TextBookofPhysicalChemistry-P.L.Soni,S.Chand&Co.,1993.
15. PrinciplesofPhysicalChemistry-B.R.Puri,L.R.SharmaandM.S.Patania,S.L.N.Chand&Co.1987.
16. AnalyticalChemistry-SUsharani,MacmillianIndiaLimited,2000
17. Industrial Chemistry,B.K.Sharma,9th Edn.KrishnaPrakashanMedia(P)Ltd.Meerut(1997-98)

B.Sc.Semester–V

DSE-10A:Chemistry(Practical)

Coursetitle:Chemistry-10 A

CourseCode:C5CHE2P1

Typeof Course	Theory/ Practical	Credits	Instruction hour per week(hr)	Total hoursofSyllabus /Sem	Duration ofExam(hr)	Formative Assessment Marks	Summative Assessment Marks	Total Marks
DSE10A	Practical	02	04	64	03	10	40	50

Expt. No.	Title: ORGANIC CHEMISTRY EXPERIMENTS	56hrs
1to6	**Qualitative analysis of solid–solid organic binary mixtures** **Experiments 1 to 6** Identification of nature and separation of binary mixture. Analysis of any one compound through preliminary tests, element test, physical constant, functional group test and preparation of suitable derivative and its physical constant. **Acids:** Salicylic, Cinnamic and Phthalicacid **Phenol:** β–naphthol, α-Naphthol **Base:** m-nitroaniline and p-nitroaniline. **Neutral:** Naphthalene, Acetanilide, Benzamide, m-dinitro benzene & p-bromo acetanilide	
	PHYSICALCHEMISTRYEXPERIMENTS	
1	Conductometric titration of strong acid HCl against weak base NH_4OH	
2.	Conductometric titration of $BaCl_2$ against $MgSO_4$	
3	Determination of solubility and solubility product of sparingly soluble salt BaSO4/PbSO4 conductometrically	
4	Potentiometric titration of HCl against NaOH	
5	Potentiometric titration of Ferrous Ammonium Sulphate(FAS) against Standard potassium permanganate solution	
6	Colorimetric method of estimation of Copper in Copper Sulphate and verification of Beer-Lambert's Law	

Examination

In a batch of twenty students in the practical examination, ten students maybe given organic experiments and other ten students may be given physical chemistry experiments. Selection of experiments may be done by the students based on the lots.

Organic Chemistry

In a batch of ten students, not more than two students should get the same mixture in the practical examination. Viva questions maybe asked on any of the experiments prescribed in the practical syllabus. During practical examination chart is not allowed.

Distribution of marks:

Nature & Separation- 6, Preliminary test and Elemental analysis test:- 6 marks, Physical Constant-3, Functional Group test -5, Confirmative test-5, Preparation of the derivative-3, systematic presentation-2, Journal-5, Viva-voce-5.

Physical chemistry

In a batch of ten students, not more than two students should get the same experiment in the practical examination. Selection of experiments may be done by the students based on the picking up of chits. Viva questions may be asked on any of the experiments prescribed in the practical syllabus.

Distribution of Marks:

Accuracy-18, Technique and Presentation-3 Calculation and graph-9 (5+4), Journal-5, Viva-Voce-5, Total=40.

Deduction of Marks for accuracy:

Error upto 5%-18, 6-10%-15, 11-15%-12, 16-20%-09, above20%-01

Recommended Books/References

1. Advanced Practical Chemistry, agadamba Singh, R.K.P.Singh, Jaya Singh, L.D.S.Yadav, I.R. Siddiqui, Pragatiprakashan, 7th edition, 2017.
2. CollegePracticalChemistry:V.K.Ahluwalia,SunithaDhingraandAdarshGulati.UniversityPress-2011.
3. ComprehensivePracticalOrganicChemistry:V.K.Ahluwalia,andRenuAggarwal,UniversityPress-2000.
4. FundamentalofelectrochemistrybyVladimirS.Bagotsky·2005
5. AnintroductiontoelectrochemistrybySamuelGlasstooen2011
6. PhotochemistrybyGurdeepRaj,5thedition-2008.

B.Sc.Semester–V
DSE-9B:Chemistry(Theory)
Course title- Chemistry-9B
CourseCode:C5CHE2T2

Typeof Course	Theory/ Practical	Credits	Instruction hour per week(hrs)	Total hoursof Syllabus /Sem	Duration ofExam(hrs)	Formative Assessment Marks	Summative Assessment Marks	Total Marks
DSE-9B	Theory	04	04	64	03	20	80	100

CO1: Apply crystal field theory and coordination chemistry concepts to explain the structure, stability, magnetic properties, colour, and bonding behavior of coordination compounds and organometallic complexes.

CO2: Analyze the preparation, structure, bonding, and properties of organometallic compounds and inorganic polymers, including metal carbonyls, silicones, and phosphazenes, and evaluate their industrial significance.

CO3: Interpret the chemistry of alkaloids and dyes by understanding their classification, extraction, synthesis, structural features, applications, and safety aspects.

CO4: Utilize UV and IR spectroscopic techniques to identify functional groups, predict electronic transitions, determine absorption characteristics, and solve structural problems of organic compounds.

CO5: Explain the principles and applications of rotational, vibrational, Raman, and electronic spectroscopy, including molecular energy levels, selection rules, spectral interpretation, and determination of molecular parameters.

CO6: Evaluate industrial chemical processes and synthetic strategies by understanding the manufacture and applications of cement, ceramics, paints, pigments, retrosynthetic analysis, and the mechanisms and uses of important organic reagents.

DSE-9B:Chemistry(Theory)9B(C5CHE2T2)	64hrs
UNIT-I: COORDINATION CHEMISTRY-II: ORGANOMETALLIC COMPOUNDS INORGANIC POLYMERS	16 hrs
Unit-I Coordination chemistry-II	16 Hrs
Crystal field theory, crystal field splitting in octahedral, tetrahedral and square planner complexes, calculation of CFSE in octahedral and tetrahedral complexes, crystal field effects in weak and strong field ligands. Factors affecting the magnitude of crystal field splitting. Tetragonal distortion of octahedral geometry, John-Teller distortion. Explanation of colour and magnetic moments of complexes. Determination of magnetic susceptibility by Gouy'smethod. Stability of metal complexes (thermodynamic and kinetic), stepwise and overall stability constant and	

their relationship. Factors affecting the stability of metal complexes. **(8Hours)** **Organometallic compounds** Definition and classification with examples, concept of hapticity of organic ligands with examples.Metalcarbonyls:Types,nomenclature,preparation,andproperties.18-electronrule, electron count in metal carbonyls of Cr, Mn, Fe, Co and Ni.Structure of mononuclear ($Cr(CO)_6$, $Fe(CO)_5$& $Ni(CO)_4$) and binuclear carbonyls ($Mn_2(CO)_{10}$, $(Co_2(CO)_8$&$(Fe_2(CO)_9$ using VBT. **(5 Hours)** **Inorganic Polymers** General properties and types of inorganic polymers. Comparison with organic polymers. Silicones: preparation, propertiesanduses.Types of silicones: structure, properties and uses. Phosphazines: Preparation and structure of phosphonitrilic chloride (trimer). **(3 Hours)**	
UNIT-II:ALKALODS, DYES UV&IR SPECTROSCOPY	16hrs
Alkaloids: Classification, source, extraction and general properties, Hofmann's exhaustive methylation, constitution and synthesis of hygrine, coniine and nicotine.**(3 Lectures)** **Dyes:** Colour and constitution, synthesis and applications of congo red, malachite green, phenolphthalein and alizarin, dyes used in food and their safety concern, organic pigments with examples. **(3 Lectures)** **Ultraviolet Spectroscopy:** Types of electronic transitions, λmax, chromophores and auxochromes, bathochromic and hypsochromic shifts, intensity of absorption, Woodward rules for calculating λmax of conjugated dienes such as alicyclic, homoannular and heteroannular dienes, α, β-unsaturated aldehydes, ketones, carboxylicacids, esters. Applications of UVspectroscopy. **(5Lectures)** **Infrared Spectroscopy:** Introduction to infrared spectroscopy, intensity of absorption band, position of absorptions, C-H, >C=O, O-Hand N-H absorption bands with explanation for variation in stretching frequencies. Identification of Hydrogen bonding in alcohols, phenolsand carboxylic acids Using IRs pectroscopy.**(5Lectures)**	
UNIT-III:ROTATIONAL,VIBRATIONALANDELECTRONICSPECTROSCOPY:	16hrs
Interaction of electromagnetic radiation with matter, electromagnetic spectrum **a).Rotational Spectroscopy:** Rotation of molecules, diatomic: rigid rotator, selection rule : derivation for expression of energy and bond length (HCl), problems on bond length, polyatomic molecules:	

linear, symmetric top, asymmetric top molecules(qualitative approach). (**3hours**) **(b)VibrationalSpectroscopy:** Vibrating diatomic molecules - energy of diatomic molecules, force constant, vibrational spectra: harmonically vibrating diatomic molecules (HCl) and anharmonicity, Morse potential, dissociation energies, fundamental frequencies, overtones, hot bands, degrees of freedom for polyatomic molecules, modes of vibration, concept of group frequencies, and problemsonforceconstants.Vibration-rotation spectroscopy:diatomicvibrating rotator, P, Q, R branches**(5 Hours)** **(c)Raman Spectroscopy:** Classical theory, Rotational Raman spectroscopy (Linear and symmetric top molecules for S and R branch), Vibration - rotational Raman spectra (Rotational finestructures), complementaryofRamanandIR vibrations.**(4hours)** **(d)ElectronicSpectroscopy:**Diatomic molecules: Born- Oppenheimer approximation, vibrational course structure of electronic transition and intensity, Franck – Condon principle, pre-dissociation, 'g' and 'u' transitions and their applications in organic molecules. **(4 Hours)**	
UNIT-IV INDUSTRIALCHEMISTRY & RETROSYNTHESIS AND REACTIONS AND REAGENTS	16 HRS
Cement: Introduction ,definition ,raw meterials, grades of cement. Manufacture of Portland cement (by dry and wet process) Mechanism of setting of cement. Types of cement and their uses. RCC **Ceramics**- Introduction, classification- **claydefination and feldspar, properties and uses.** **(4 Hours)** **Paints and pigments-:Paints** -Introduction requirement of paint constituents of paint, formulation of paint, failure of paint film (Reason) Emulsion paint, manufacture of white lead using Dutch process and uses **Pigments-Definition, Red and white pigment.** **(4 Hours)** **Retro synthesis:** Introduction to Retro synthetic analysis, synthons, synthetic equivalents and target molecules functional group inter convertion one and two group C-X disconnection (definition and examples) Retro synthesis of benzocaine and 4-methoxyacetophenone, saccharin. **(4 Hours)** **Reaction and Reagents:** Preperation and mechanism and applications.DCC(Amide formation) LiAlH4(Reduction of aldehydes, carboxylic acids and esters)lead tetra acetate(oxidation of 1,2-diols),NBS(allylic bromination),OsO4(hydrolysis of alkenes),PCC(pyridiniumchlorochlorate)in the oxidation primary alcohols. **(4 Hours)**	

Recommended Books/References

1. ConciseInorganicChemistry-J.D.Lee,5th Edn,New AgeInternational(1996)
2. ModernInorganicChemistrySathyaPrakash'sbyR.D.Madan,S.ChandandCo.Ltd,NewDelhi.
3. InorganicChemistry-PrinciplesofStructureandReactivity,4th Edn-J.E.Huheey,E.A.Keiter,R.L.Keiter and O.K. Medhi. Pearson Education (2009).
4. AdvancedInorganicChemistry-Agarwal&Keemtilal,11th edition,Pragathipublication,2012.
5. AGuidebooktoMechanisminOrganicChemistrySykes,P.,OrientLongman,NewDelhi (1988).
6. Organic ChemistryMorrison,R.T. &Boyd,R.N., Pearson, 2010.
7. Advanced OrganicChemistryBahl,A.&Bahl,B.S.,S.Chand,2010.
8. OrganicChemistry-M.K.Jain,Nagin&Co.,1987.
9. OrganicChemistry-Mehtaand Mehta,2005.
10. PhysicalChemistryP.W.Atkins:,2002.

Formative Assessment forTheory		
Sl. No	Assessmenttype	Marks
01	InternalAssessmenttest1	05
02	InternalAssessmenttest2	05
03	Assignment	10
	Total	20
Formative Assessment as per the guidelines		

GENERAL PATTERN OF THEORY QUESTION PAPER FOR DSE

(80 marks for semester end Examination with 3hrs duration)

Part-A Question number 1-10 carries 2 marks each.:20marks
Part-B Questionnumber 11-18 carries 05 Marks each. Answer any 06 questions: 30marks
Part-C Question number 19-22 carries 10 Marks each. Answer any 03questions: 30marks

(Minimum1question from each unit and 10 marks question may have sub questions for 7+3 or 6+4 or 5+5 if necessary) **Total: 80 Marks**

Note:- Proportionate weightage shall be given to each unit based on number of hours prescribed

B.Sc. Semester–V
DSE-10B:Chemistry(Practical)10B
Coursetitle-Chemist10B CourseCode:C5CHE2P2

Type of Course	Theory/ Practical	Credits	Instruction hour per week(hr)	Total hours of Syllabus /Sem	Duration of Exam(hr)	Formative Assessment Marks	Summative Assessment Marks	Total Marks
DSE10B	Practical	02	04	64	03	10	40	50

Course Outcomes(CO)

After completion of course, chemistry(Practical)students will be able to

CO1: Identify nature of solid – solid organic mixtures and analyse any one of the separated compound through preliminary tests, element test, physical constant, functional group test and preparation of suitable derivative and its physical constant.

CO2: Understand the – conductivity cell, cell constant & conductivity measurement. Electrodes & its potential, reference electrodes and measurement of electro motive force. pH cell and measurement of pH of a solution. Beer- Lambert law, optical density & molar extinction coefficient. Developing skills to handling the instruments for the measurement of conductance, emf, pH and optical density.

Expt.No,	Title: ORGAIC CHEMISTRY EXPERIMENTS	64hrs
1to6	**Qualitative analysis of solid–solid organic binary mixtures Experiments 1 to 6** Identification of nature and separationof mixture. Analysis of any one compound through preliminary tests, element test, physical constant, functional group test and preparationofsuitable derivative and its physical constant. **Acids:** Salicylic, Cinnamic acid and Phthalic acid **Phenol:** β–naphthol. **Base:** m-nitroanilineandp-nitroaniline. **Neutral:** Naphthalene, Acetanilide,Benzamide, ,m-dinitrobenzene & Parabromo acetanilide	
	PHYSICALCHEMISTRYEXPERIMENTS	
1	Conductometric titration of strong acid HCl against weak base NH_4OH	
2.	Conductometric titration of $BaCl_2$ against $MgSO_4$	
3	Determination of solubilty and solubility product of sparingly soluble salt BaSO4/PbSO4 conductometrically	

4	Potentiometric titration of HCl against NaOH	
5	Potentiometric titration of Ferrous Ammonium Sulphate(FAS)against Standard potassium dichromate solution	
6	Colorimetric method of estimation of Copper in Copper Sulphate and verification of er-Lambert's LA Law	

B.Sc. V Semester
Elective Course-I
Course Title: Chemistry EC-I
Course code: C5 CHE5T1

Type of Course	Theory/ Practical	Credits	Instruction hours per hour	Total hours of syllabus/sem	Duration of Exam	Formative Assessment	Summative Assessment	Total Marks
EC-I	Theory	03	03	45	03	20	80	100

Course Outcome (CO)

After completion of course, students will be able to:

CO1: Understand the definition, types and examples of carbohydrates structure and elucidation
CO2: Appreciate the importance of Amino acids proteins and peptides
CO3: Understand the definition, types and examples and the Biological impotence of lipids enzymes alkaloids and vitamins
CO4: Appreciate the importance of Synthetic dyes
CO5: Understand the definition, types and examples and the Biological importance of drugs and pharmaceuticals

B.Sc.V Semester
Elective Course

45 Hours

Bio molecules

Unit – I

Carbohydrates Amino Acids, Peptides and Proteins **12 Hrs**

Classification of carbohydrates, reducing and non-reducing sugars, General Projects of Glucose and Fructose, their open chain structure. Epiners, mutauotation and anomers. Determination of configuration of Glucose (Fischer proof).Cycle structure of glucose. Haworth projection. Cyclic structure of fructose, structure of fructose, structure of disaccharides (sucrose, maltose, lactose) and polysaccharides (stretch and cellulose) excluding their structure elucidation.

Classification of Amino Acids, Zwitterion structure and Isoelectric point. Overview of Primary, Secondary, Tertiary and Quaternary, structure of proteins. Determination of primary structure peptides.

Unit –II

Enzymes and correlation with drug action Vitamins 12 Hrs

Mechanism of enzyme action , factors affecting enzyme action Coenzymes and cofactors and their role in biological reactions, Specificity of enzyme action (Including stercospeificity), Enzyme

inhibitors and their importance, phenomenon of inhibition (Competative and Noncompetative inhibition including allosteric inhibition).

Vitamins

Introduction, Classification with examples, Synthesis of Vitamin c Biological importance of vitamin A, B1,B2,B6, C&D

Unit –III

Lipids and Alkaloids **11 Hrs**

Introduction to lipids, classification, oils and fats: Common fatty acids present in oils andfats, Omega fatty acids, Trans fats, Hydrogenation, Saponification value, Iodine number,. Biological importance of triglycerides, phospholipids, glycolipids and steroids (Cholesterole).

Introduction to alkaloids, Classification with examples, general methods of structural elucidation, synthesis and elucidation of structure of nicotine, structural formula and uses of Quinine and atropine.

Unit IV: Drugs, Pharmaceuticals and Synthetic Dyes

Drugs and Pharmaceuticals **10 Hrs**

Types of drugs, Definition with examples (Analgestic, Narcotics, Narcoties, Diuretics, sedatives, cardiovascular, Antimalarial, Anthelmintic, Anticounvulsant, Antisepticm, Anticeptics) Synthesis and Aspirin, Paracetsmol, sulphanilamide sulphaziole and chloramines – T4

Synthetic Dyes: Introduction to dyes: Definition, characteristics, and applications of dyes. Difference between dyes and pigments. Classification based on structure Source (natural and synthetic), Method of application and Chemical constitution. Chromosphere theory of colour and constitution, synthesis of Congo red, Bismarck brown, malachite green and alizarin. Environmental impact of dye manufacturing and dye effluents, eco-friendly approaches to dye production.

Recommended Books/References

1. Lee, J.D.ConciseInorganicChemistryELBS,1991.
2. Cotton,F.A.,Wilkinson,G.&Gaus,P.L.BasicInorganicChemistry,3rdEd.,Wiley.
3. Huheey,J.E.,Keiter,E.A.,Keiter,R.L.&Medhi,O.K.InorganicChemistry:Principleso fStructureand Reactivity, Pearson Education India, 2006.
4. Rodgers,G.E.Inorganic&SolidStateChemistry,CengageLearningIndia Ltd.,2008.
5. OrganicChemistry-P.Y.Bruice,7thEdition,PearsonEducationPvt.Ltd.,NewDelhi(2013).
6. HeterocyclicChemistry-R.K.Bansal,3rd Edition, New-AgeInternational,NewDelhi,2004.
7. McMurry,J.E.FundamentalsofOrganicChemistry,7thEd.CengageLearningIndiaEdition, 2013.
8. Morrison,R.T.&Boyd,R.N.OrganicChemistry,Pearson, 2010.
9. Bahl,A.&Bahl,B.S.AdvancedOrganicChemistry,S.Chand,2010.
10. OrganicChemistryVolume-I,II-I.L. Finar,6thEdition, ELBSLondon(2004).
11. P.W.Atkins:PhysicalChemistry,2002.

12. TextBookofPhysicalChemistry-P.L.Soni,S.Chand&Co.,1993.
13. PrinciplesofPhysicalChemistry-
B.R.Puri,L.R.SharmaandM.S.Patania,S.L.N.Chand&Co.1987.
14. AtextbookofPhysicalChemistry-A.S.Negi&SCAnand,3rd edition2022

Formative Assessment forTheory		
Sl.No	Assessmenttype	Marks
01	InternalAssessmenttest1	05
02	InternalAssessmenttest2	05
03	Assignment	10
	Total	20
Formative Assessment as per the guidelines		

GENERAL PATTERN OF THEORY QUESTION PAPER FOR OPEN ELECTIVE

(80 marks for semester end Examination with 3hrs duration)

Part-A Question number 1-10 carries 2 marks each.:20marks
Part-B Question number11-18 carries05 Marks each. Answer any 06 questions: 30marks
Part-C Question number 19-22 carries 10 Marks each. Answer any 03 questions: 30marks

(Minimum1question from each unit and 10 marks question may have sub questions for7+3 or 6+4 or 5+5 if necessary) **Total: 80 Marks**
Note: Proportionate weightage shall be given to each unit based on number of hours prescribed.