

DAVANGERE UNIVERSITY, DAVANAGERE

B.Sc. (Hons.) Program

DRAFT SYLLABUS

CHEMISTRY

[Effective from 2021-22]

PROGRAM /COURSE STRUCTURE AND SYLLABUS as per the Choice Based Credit System (CBCS) designed in accordance with

Learning Outcomes-Based Curriculum Framework

(LOCF)

of National Education Policy (NEP) 2020

Bachelor of Science in CHEMISTRY (B.Sc.) (Hons.)

for III and IV Semesters

CHAIRMAN B.O.S.

DOS in Chemistry

Davangere University,

Shivagangotri, Davangere-577007.

PREAMBLE

The higher education system in India is undergoing a substantial change in the last year with implementation of New Education Policy (NEP) leading to both qualitative and quantitative and development of the beneficiaries. Quality higher education involved innovation that can be useful for efficient governance of higher education institutions, systems and society at large. The quality of Chemistry education profoundly impacts not only the academia but also research and innovation of a Country.

The undergraduate programme will prepare the students for both- academia and employability. The curriculum has been prepared with an aim to support a uniform, advanced and effective Chemistry curriculum for undergraduate studies in Chemistry. The concerns, needs and interests of students, teachers as well as societal expectations have been taken into consideration while developing this syllabus. Each course aims to present learning targets and objectives, and thus provide learning and teaching strategies, assessment and resources. The programmes also state the attributes that it offers to inculcate at the graduation level. The graduate attributes encompass values related to well-being, emotional stability, critical thinking, social justice and also skills for employability.

The Chemistry Syllabus for B.Sc. Degree covers fouracademic years consisting of Eight semesters and this curriculum is prepared to give sound knowledge and understanding of Chemistry to undergraduate students. The goal of the syllabus is to make the study of chemistry stimulating, relevant and interesting. The syllabus has been prepared in a participatory manner, after discussions with a number of faculty members in the subject and after referring the existing syllabi, the new syllabi of Pre-University class, UGC model curriculum and the syllabi of other Universities and National level Institutes.

COURSE STRUCTURE

		SECOND YEAR;	SEN	IESTE	R-III					
Categor	Course code	Mark Title of the Paper		Teachi hours/v k			Credi	Duratio n of exams		
g a			I A	SE E	Tota l	L	T	P		(Hrs)
L5	21BSC3L5LK3	Kannada	40	60	100	4	-	_	3	3
1.5	21BSC3L5LFK3	Functional Kannada							3	19
	21BSC3L6EN3	English						= 2		
	21BSC3L6HI3	Hindi			# # ##	4	-	-	3	
L6	21BSC3L6SN3	Sanskrit	40	40 60	100					3
	21BSC3L6TE3	Telugu								
	21BSC3L6UR3	Urdu			* 8			is.	3	
D002	21BSC3C3CHM 3L	CHEMISTRY: CHM T-3	40	60	100	4	-		4	2
DSC3	21BSC3C3CHM 3P	CHEMISTRY LAB: CHM P-3	25	25	50	-	-	4	2	3
2	Another	Another Department	40	60	100	4	-	-	4	3
DSC3	Department Code	Course Title	25	25	50	-	-	4	2	3
SEC2	21BSC3SE2ES2	Artificial Intelligence	25	25	50	1	-	2	2	2
VBC5	21BSC3V5PE3	Physical Education- Sports	25	-	25	-	-	2	1	,
VBC6	21BSC3V6NC2	NCC/NSS/R&R(S&G) / Cultural	25	•	25	-	-	2	1	
OEC3	21BSC3O3CHM 3	3.1 envirana mental chemistry 3.2 Green chemistry and	.	60	100	3	-	=	3	2
		elean Energy Source C	Total Marks 700 Semester 25							

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Catago		Title of the	Marks			Teaching hours/we ek			Cred	Duration
Catego	Course code	Paper	IA	SEE	Total	L	Т	P	it	of exams (Hrs)
L7	21BSC4L7LK4	Kannada	40	60	100	100 4	_	-	3	3
D,	21BSC4L7LFK4	Functional Kannada	5.							8
	21BSC4L8EN4	English				4				
	21BSC4L8HI4	Hindi	40 60	60	100			-	3	
L8	21BSC4L8SN4	Sanskrit	40	60						3
	21BSC4L8TE4	4L8TE4 Telugu							i i	
	21BSC4L8UR4	Urdu								
9*	21BSC4C4CHM4L	CHEMISTRY: CHM T-4	40	60	100	4	-	-	4	2
DSC4	21BSC4C4CHM4P	CHEMISTRY LAB : CHM P-4	25	25	50			4	2	3
Daga	Another	Another	40	60	100	4	-	-	4	3
DSC4	Department Code	Department	25	25	50	-	-	4	2	3
AECC	21BSC4AE1ES2	Constitution of	25	25	50	1	-	2	2	2
VBC7	21BSC4V5PE4	Physical	25	25 - 25		-	-	2	1	-
VBC8	21BSC4V6NC3	NCC/NSS/R	25	-	25	-	-	2	1	-
OEC4	21BSC4O4CHM4	41 ***Effecting	40	60	100	3	-	-	3	2
	Ĭ.;	H. T Majer	Total	Marks	700	1	emes Cred		25) S

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Registrar
Davangere University
Shivagangotri, Davangere

PROGRAM OUTCOMES:

After studying the Chemistry for 04 years, students will be able to:

- PO 1 Demonstrate, solve and an understanding of major concepts in all the disciplines of chemistry.
- PO 2 Provide students with broad and balanced knowledge and understanding of key chemical concepts.
- PO 3 Develop in students a range of practical skills so that they can understand and assess risks and work safely and competently in the laboratory.
- PO 4 Develop in students the ability to apply standard methodology to the solution of problems in chemistry.
- PO 5 Provide students with knowledge and skill towards employment or higher education in chemistry or multi-disciplinary areas involving chemistry.
- PO 6 Employ critical thinking and the scientific knowledge to design, carry out, record and analyze the results of chemical reactions.
- PO 7 To prepare students effectively for professional employment or research degrees in chemical sciences.
- PO 8 To cater to the demands of chemical industries of well-trained graduates.
- PO 9 To build confidence in the candidate to be able to work on his own in industry and institution of higher education.
- PO 10 To develop an independent and responsible work ethics.

SECOND YEAR B.Sc: III- SEMESTER DSC 3 CHEMISTRY: CHMT-3

Course Code: 21BSC3C3CHM3L

Course Title: CHMT-3

Courses	Credits	No. of Classes/We ek	Total No. of Lectures/Ho urs	Duration of Exam in hrs	Internal Assessm ent Marks	Semester End Exam Marks	Total Marks
Theory	04	. 04	56	2.	40	60	100
Practical	02	04	52	3	25	25	50

Course Objectives:

The students are able to learn the following;

- 1. Different types of bonding in molecules/compounds/ions
- 2. The structures of molecules/compounds/ions based on different models/theories
- 3. Properties of compounds based on bonding and structure
- 4. The concept of mechanism and its importance.
- 5. Concept and importance of intermediates in organic chemistry taking proper examples
- 6. The various techniques for identification of reaction mechanism to the student taking proper examples
- 7. The fundamentals of thermodynamics including the laws, the concept of entropy and free energy functions and their applications.
- 8. The concepts of surface chemistry, catalysis and their applications.
- 9. Interrelationship among frequency, wavelength and wave number and importance of validation parameters of an instrumental method.
- 10. Principle, instrumentation and applications of spectrophotometry, nephelometry and turbidometry

Course outcomes:

After the completion of this course, the student would be able to

- 1. Predict the nature of the bond formed between different elements
- 2. Identify the possible type of arrangements of ions in ionic compounds
- 3. Write Born Haber cycle for different ionic compounds
- 4. Relate different energy parameters like, lattice energy, entropy, enthalpy and solvation energy in the dissolution of ionic solids

- 5. Explain covalent nature in ionic compounds
- 6. Explain the mechanism for a given reaction.
- 7. Predict the probable mechanism for an reaction . Explain the importance of reaction intermediates, its role and techniques of generating such intermediates .
- 8. Learn important laws of thermodynamics and their applications to various thermodynamic systems
- 9. Understand adsorption processes and their mechanisms and the function and purpose of a catalyst.

10. Apply adsorption as a versatile method for waste water purification.

11. Understand the importance of fundamental law and validation parameters in chemical analysis

12.Know how different analytes in different matrices (water and real samples) can be determined by spectrophotometric, nephelometric and turbidometric methods.

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UNIT-I: INORGANIC CHEMISTRY

Structure and Bonding -I

The ionic bond :Structures of ionic solids

Radius ratio rules, Calculation of some limiting radius ratio values, Coordination number 3 (planar triangle), Coordination number 4 (tetrahedral and square planar), Coordination number 6 (octahedral), Close packing.

Classification of ionic structures:

Ionic compounds of the type AX (NaCl)

Ionic compounds of the type AX₂ (Rutile structure)

Layer structures CdI2, Cadmium iodide structure

Limitations of radius ratio concept.

Lattice energy and Born-Haber cycle, Derivation of Born-Lande equation and its drawbacks, Kapustinskii equation, solvation energy and solubility of ionic solids, polarizing power and polarizability, Fajan's rules with applications.

5 hrs

Covalent bond: Valence bond theory, The Lewis theory, The octet rule, Exceptions to the octet rule, Sidgwick- Powell theory. Valence shell electron pair repulsion (VSEPR) theory, Effect of lone pairs, electronegativity, isoelectronic principle, Examples using VSEPR theory: BF3 and BF4-, NH3and NH₄+, I₃- and I₃+, SF₆, and IF₇. Limitations of VSEPR Theory.

4 hrs

UNIT-II: ORGANIC CHEIMISTRY

Reaction Intermediates: Generation, Stability and Reactions of,

i) Carbocations: Pinacol-Pinacolone Rearrangement.

- ii) Carbanions: Aldolcondensation, Claisen-Schmith condensation.
- iii) Free Radicals: Sandmeyer Reaction
- iv) Carbenes and Nitrenes: Singlet and Triplet states, their relative stability and reactions
- v) Arynes: Formation, detection etc.

8 hrs

Methods for Identifying Reaction Mechanism:

Product analysis, Isolation and Identification of Intermediates, Stereochemical Evidences, Effect of Catalyst, crossover Experiments, Isotopic studies, Kinetic Studies.

6 hrs

UNIT -III : PHYSICAL CHEMISTRY

First Law of Thermodynamics

Thermodynamic Processes, Reversible and Irreversible Processes, Nature of Heat and Work, Internal Energy, First Law of Thermodynamics-Statement, Enthalpy of a System, Work done in isothermal and adiabatic expansion of an ideal gas, Numerical problems, Joule -Thomson Expansion, Relation between Joule-Thomson coefficient and other thermodynamic parameters.

Second law of Thermodynamics

Concept of entropy, thermodynamic scale of temperature, Statements of the Second Law of Thermodynamics, molecular and statistical interpretation of entropy, Calculation of entropy change for reversible and irreversible processes, Free Energy Functions: Gibbs and Helmholtz energy, Variation of S, G, A with T, V and P, Numerical problems, Free energy change and spontaneity, Gibbs-Helmholtz equation.

Third Lawof Thermodynamics

Statement of third law, concept of residual entropy, calculation of absolute entropy of molecules.

Surface Chemistry

Adsorption

Types of adsorption isotherms. Freundlich adsorption isotherm (only equation), its limitations. Langmuir adsorption isotherm (derivation to be done) and BET equation (derivation not included).

Catalysis

Definition and types with examples.

Heterogeneous catalysis: surface reactions, unimolecular, bimolecular surface reactions. Autocatalysis with examples. Applications: Design process to removal of toxic compounds from industrial wastewater and treatment of portable water requirements.

4Hrs

UNIT-IV: ANALYTICAL CHEMISTRY

Quantitataive analysis-Instrumental methods

Electromagnetic spectrum, absorption of electromagnetic radiation, Definition and units of frequency, wavelength, wave number, Beer's law, Beer-Lambert law derivation, deviations from Beer's law, limitations, construction of calibration graph (Plot of absorbance versus concentration), Evaluation Procedures- standard addition, Internal standard addition, validation parameters-detection limits, sensitivity, dynamic/linearity range, Instrumentation, single beam and double beam spectrophotometers, quantitative applications of colorimetry (determination of Fe, Ti and PO₄³⁻) and numerical problems on application of Beer's law.

10 hrs

Nephelometry and Turbidimetry: Introduction, principle, instrumentations of nephelometry and turbidimetry; effects of concentration, particle size and wavelength on scattering; choice between nephelometry, applications of nephelometry and turbidimetry (determination of SO_4^{2-})

4 hrs

References:

- 1. Fundamental of Analytical Chemistry, D.A. Skoog, D.M. West, Holler and Crouch, 8th edition, Saunders College Publishing, New York (2005).
- 2. Analytical Chemistry, G.D. Christian, 6th edition, Wiley-India (2007).
- 3. Quantitative Analysis, R.A. Day and A.L. Underwood, 6th edition, PHI Learning Pvt Ltd.NewDelhi(2009).
- 4. Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D.Barnes and M.J.K. Thomas, 6th edition, Third Indian Reprint, Pearson Education Pvt.Ltd.(2007).
- 5. Organic Reaction Mechanism by V.K.Ahluwalia and R.K.Parashar (Narosa Publishers)
- 6. Organic Chemistry by S.M.Mukherji, S.P.Sinh and R.K.Kapoor (Narosa Publishers)
- 7. Morrison R.N and Boyd R.N,OrganicChemistry,Darling Kindersley(India)Pvt.Ltd.(Pearson Education)
- 8. Finar I.L,Organic Chemistry(Volume I); Finar I.L (Volume II) Stereochemistry and the Chemistry of Natural Products.,Dorling Kindersley(India)Pvt.Ltd.(Pearson Education)
- 9. Kalsi P.S.Stereochemistry, conformation and Mechanism, New age International
- 10. Eliel E.L and wilenS.H, Stereochemistry of Organic Compounds, Wiley, (London)
- 11. Peter Atkins & Julio De Paula, Physical Chemistry, 9th Ed., Oxford University Press (2010)
- 12. G W Castellan, Physical Chemistry, 4th Ed., Narosa (2004)

13. R G Mortimer, Physical Chemistry 3rd Ed., Elsevier: Noida, UP (2009)

14. B R Puri, L R Sharma and M S Pathania, Principal of Physical Chemistry, Vishal Publishing Co.

15. B S Bahl, G D Tuli and Arun Bahl, Essentials of Physical chemistry, S Chand &

Company Ltd.

16. A S Negi and S C Anand, A textbook of Physical Chemistry, New Age International Publishers.

17. B N Bajpai, Advanced Physical chemistry, S Chand and Company ltd.

- 18. R L Madan, Chemistry for Degree Students, Semester I, II, III and IV, S Chand and Company Ltd.
- 19. P L Soni, O P Dharmarha and U N Dash, Textbook of Physical Chemistry, Sultan Chand and Sons.

20. Modern Inorganic Chemistry 3rd Edition, R. D. Madan.

21. Principal Of Inorganic Chemistry By B.R. Puri, L.R. Sharma, K.C. Kalia., Vishal publishing Co, 2020, 55th Edition.

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PRACTICALS

Credit Points: 2

Teaching Hours:4 hrs

Evaluation: Continuous Internal Assessment - 25 marks

Semester End Examination: 25 marks

Course Objectives

- 1) To impart skills related to preparation of stock and working solutions and handling of instrumental methods
- 2) To know the principle of colorimetric analysis and construction of calibration plot
- 3) To understand the chemistry involved in colorimetric determination of metal ions and anions
- 4) To determine Rf values of different metal ions present in a mixture
- 5) To impart knowledge on the importance of functional groups in organic compounds.
- 6) Techniques to identify the functional groups in an compound by performing physical and chemical tests
- 7) To record its melting point/boiling point.
- 8) To prepare suitable derivative for that compound and to characterize it.

Course Specific outcomes

After the completion of this course, the student would be able to

- 1) Understand the importance of instrumental methods for quantitative applications .
- 2) Apply colorimetric methods for accurate determination of metal ions and anions in water or real samples
- 3) Understand how functional groups in an compound is responsible for its characteristic property
- 4) Learn the importance of qualitative tests in identifying functional groups.
- 5)Learn how to prepare a derivative for particular functional groups and how to purify it'

PART-A (Analytical Chemistry)

- 1) Colorimetric determination of copper using ammonia solution
- 2) Colorimetric determination of iron using thiocyanate solution
- 3) Colorimetric determination of nickel using DMG solution
- 4) Colorimetric determination of titanium using hydrogen peroxide
- 5) Colorimetric determination of nitrite in a water sample (diazo coupling Reaction/Griess reagent.
- 6) Colorimetric determination of phosphate as ammonium phosphomolybdate
- 7) Determination of Rf values of two or three component systems by TLC
- 8) Separation of different metal ions by paper chromatography/ Solvent extraction of iron using oxine solution (demonstration)

Note: Minium FIVE experiments shall be carried out.

PART-B (Organic Chemistry)

Qualitative analysis of bifunctional Organic compounds such as 1)Salycilic acid, p-Nitro benzoic acid, Antranilicacid, p-Chloro benzoic acid 2) o-Cresol,p-Cresol,Resorcinol,oaniline,p-Nitroaniline,p-Toluidine,p-Chloroaniline,p-Nitrophenol, p-nitophenol 3)o-Nitro Bromoaniline, 4)Ethyl Salicylate, Salicylaldehyde, Actophenone,p-Dichlorobenzene,p-Nitro toluene, Benzamide etc.

Note: Atleast FIVE compounds to be analyzed in a semester.

References

1) Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D.Barnes and M.J.K. Thomas, 6th edition, Third Indian Reprint, Pearson Education Pvt.Ltd.(2007) 2) Vogels Text Book of Qualitative Chemical Analysis, ELBS.

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SECOND YEAR B.Sc: IV- SEMESTER DSC 3 CHEMISTRY: CHMT-4

Course Title: CHMT-4

Course Code:21BSC4C4CHM4L

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Courses	Credits	No. of Classes/We ek	Total No. of Lectures/Ho urs	Duratio n of Exam in hrs	Internal Assessme nt Marks	Semeste r End Exam Marks	Total Mark s
Theory	.04	04	56	2	40	60	100
Practical	02	04	52	3	25	25	50

COURSE OBJECTIVES

Students learn about:

- 1. Types of hybridization with examples.
- 2. Molecular orbital theory
- 3. Metallic bonding
- 4. Properties of compounds based on bonding and structure
- 5. Concept of stereochemistry and its importance .
- 6. The various projection formulae and the techniques of designating the molecules into R, S, D,
- L taking proper examples
- 7. The theory and concept of Cis-, Trans- isomerism and its importance and the techniques to differentiate between them taking examples.
- 8. The theoretical and experimental aspects of chemical kinetics including basic theories of reaction rates and methods of determining order.
- 9. Electrochemistry dealing with electrolytes in solution. Conductance measurements and applications. Concept of ionic mobility and their determination.
- 10. Fundamentals of separation methods and principles of paper, thin layer and column chromatography
- 11. Principle, types and applications of solvent extraction
- 12. Principle and mechanism of ion-exchange, types of resins and domestic and industrial applications of ion-exchange chromatography

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Course outcomes: After the completion of this course, the student would be able to

- 1. Write the M.O. energy diagrams for simple molecules
- 2. Differentiate bonding in metals from their compounds
- 3, Explain the importance of Stereochemistry in predicting the structure and property of organic molecules.
- 4. Predict the configuration of an organic molecule and able to designate it.
- 5. Identify the chiral molecules and predict its actual configuration
- 6. Understand the concept of rate of a chemical reaction, integrated rate equations, energy of activation and determination of order of a reaction based on experimental data
- 7. Know different types of electrolytes, usefulness of conductance and ionic mobility measurements
- 8. Determine the transport numbers.
- 9.Understand the requirement for chemical analysis by paper, thin layer and column chromatography.
- 10. Apply solvent extraction method for quantitative determination of metal ions in different samples
- 11. Utilize the ion-exchange chromatography for domestic and industrial applications

Unit - I: INORGANIC CHEMISTRY

Structure and Bonding -II

Concept of resonance, resonance energy, hybridisation, types of hybridization, $sp(BeCl_2)$, $sp^2(BF_3)$, $sp^3(SiCl_4)$, $sp^3d(PCl_5)$, $sp^3d^2(SF_6)$ and energetics of hybridization.

Bent's rule, Limitations of Valence Bond Theory.

3 hrs

Molecular Orbital theory(MOT):

LCAO concept: Rules for linear combination of atomic orbitals.

s-s, s-p, p-p, p-d and d-dcombinations of orbitals, bonding, nonbonding and antibonding molecular orbitals, non-bonding combinations of orbitals.

Examples of molecular orbital treatment for homonuclear diatomic molecules;

H₂ and H₂⁺, C₂ molecule, O₂. O₂ and O₂².

M.O. energy diagrams of heteronuclear diatomic molecules with examples (NO, NO⁺ CO and HCl). Calculation of bond order, relationship between bond order, bond energy and bond length, magnetic properties based on MOT.

7 hrs

Metallic Bonding:

General properties of metals: Conductivity, Lustre, Malleability and cohesive force Crystal structures of metals and Bond lengths.

Theories of bonding in metals:

Free electron theory, Valence bond theory, Molecular orbital or band theory of solids. Prediction of conducting properties of conductors, insulators and semiconductors, extrinsic and intrinsic semiconductors using M.O. theory.

4 hrs

UNIT-II: ORGANIC CHEMISTRY

Stereochemistry of Organic Compounds:

Fischer projection, Newmann and Sawhorse projection formulae and thei interconversions. Geometrical isomerism: Cis-trans and syn-anti isomerism, E/Z notations with C.I.P rules. Optical Isomerism: Optical activity, Specific rotation, Chirality/Asymmetry, Enantiomers, Molecules with two or more chiral centres, Diasteroisomers, meso structures, Racemic mixtures and Resolution, Relative and absolute configuration, D/L and R/S designations.

14 hrs

UNIT -III: Physical Chemistry

Chemical Kinetics

Differential and integrated form of rate expressions up to second order reactions, Derivation of expression of rate constant of second order reaction (a=b and a \neq b), Problems on rate constant (a=b), Methods of determination of order of a reaction, temperature dependence of reaction rates; Arrhenius equation, activation energy, Numerical problems on Arrhenius equation in calculating energy of activation and rate constants. Collision theory of reaction rates, Lindemann's mechanism, qualitative treatment of the theory of absolute reaction rates.

Experimental determination of kinetics of inversion of cane sugar by polarimetric method.

7 Hrs

Electrochemistry - I

Arrhenius theory of electrolytic dissociation. Merits and Demerits, Conductance, Specific conductance, equivalent and molar conductivity and their variation with dilution. Molar conductivity at infinite dilution. Numerical problems.

Kohlrausch's law of independent migration of ions and its applications, Debye-Hückel-Onsager(DHO) equation(No derivation). Ionic mobilities and their determinations, transference numbers and their relation to ionic mobility's, determination of transference numbers using Hittorf and Moving Boundary methods.

Applications of conductance measurement: (i) degree of dissociation of weak electrolytes (ii) ionic product of water (iii) solubility and solubility product of sparingly soluble salts (iv) conductometric titrations (acid base titrations only) and (v) Hydrolysis constants of salts. Numerical problems.

7 Hrs

UNIT-IV: ANALYTICAL CHEMISTRY

Separation methods

Fundamentals of chromatography: General description, definition, terms and parameters used in chromatography, classification of chromatographic methods, criteria for selection of stationary and mobile phase and nature of adsorbents. Principles of paper, thin layer, column chromatography. Column efficiency, factors affecting the column efficiency, van Deemter's equation and its modern version.

3hrs

Paper chromatography: Theory and applications

Thin layer chromatography (TLC): Mechanism, Rf value, efficiency of TLC plates, methodology-selection of stationary and mobile phases, development, spray reagents, identification and detection, qualitative applications.

Solvent Extraction: Types- batch, continous, efficiency, selectivity, distribution coefficient, Nernst distribution law, derivation, factors affecting the partition, relationship between % extraction and volume fraction, Numerical problems on solvent extraction. Solvent extraction of iron and copper.

4hrs

Ion exchange chromatography: resins, types with examples- cation exchange and anion exchange resins, mechanism of cation and anion exchange process and applications of ion-exchange chromatography (softening of hard water, separation of lanthanides, industrial applications).

03Hrs

References:

- 1. Fundamental of Analytical Chemistry, D.A. Skoog, D.M. West, Holler and Crouch, 8th edition, Saunders College Publishing, New York (2005).
- 2. Analytical Chemistry, G.D. Christian, 6th edition, Wiley-India (2007).
- 3. Quantitative Analysis, R.A. Day and A.L. Underwood, 6th edition, PHI Learning Pvt Ltd.NewDelhi(2009).
- 4. Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D.Barnes and M.J.K. Thomas, 6th edition, Third Indian Reprint, Pearson Education Pvt.Ltd.(2007).
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- 6. Organic Chemistry by S.M.Mukherji, S.P.Sinh and R.K.Kapoor (Narosa Publishers)
- 7. Morrison R.N and Boyd R.N,OrganicChemistry,Darling Kindersley(India)Pvt.Ltd.(Pearson Education)
- 8. Finar I.L,Organic Chemistry(Volume I); Finar I.L (Volume II) Stereochemistry and the Chemistry of Natural Products.,Dorling Kindersley(India)Pvt.Ltd.(Pearson Education)
- 9. Kalsi P.S.Stereochemistry, conformation and Mechanism, New age International
- 10. Eliel E.L and wilenS.H, Stereochemistry of Organic Compounds, Wiley, (London)
- 11. Peter Atkins & Julio De Paula, Physical Chemistry, 9th Ed., Oxford University Press (2010)
- 12. G W Castellan, Physical Chemistry, 4th Ed., Narosa (2004)
- 13. R G Mortimer, Physical Chemistry 3rd Ed., Elsevier: Noida, UP (2009)
- 14. B R Puri, L R Sharma and M S Pathania, Principal of Physical Chemistry, Vishal Publishing Co.
- 15. B S Bahl, G D Tuli and Arun Bahl, Essentials of Physical chemistry, S Chand & Company Ltd.
- 16. A S Negi and S C Anand, A textbook of Physical Chemistry, New Age International Publishers.
- 17. B N Bajpai, Advanced Physical chemistry, S Chand and Company ltd.
- 18. R L Madan, Chemistry for Degree Students, Semester I, II, III and IV, S Chand and Company Ltd.
- 19. P L Soni, O P Dharmarha and U N Dash, Textbook of Physical Chemistry, Sultan Chand and Sons.
- 20. Modern Inorganic Chemistry 3rd Edition, R. D. Madan.
- 21. Principal Of Inorganic Chemistry By B.R. Puri, L.R. Sharma, K.C. Kalia., Vishal publishing Co, 2020, 55th Edition.

PRACTICALS

Credit Points: 2

Teaching Hours:4Hrs

Evaluation: Continuous Internal Assessment-25 marks
Semester End Examination: 25 marks

Course objective:

To attain practical knowledge about:

- 1. Analytical skills in detecting the constituents present in unknown samples by systematically carrying out the qualitative analysis.
- 2. The methods of determining rates of chemical reactions.
- 3. Designing electrochemical cells and making measurements related to it.
- 4. Determination of physical characteristics of electrolytes using conductivity measurements in solution.
- 5. Adsorption phenomenon, mechanism and basic models to explain adsorption.
- 6. Simple techniques like conductometry to obtain physicochemical parameters of electrolytes.

Course outcomes: At the end of the course student would be able to

- 1. Understand the chemical reactions involved in the detection of cations and anions.
- 2. Explain basic principles involved in classification of ions into groups in semi-micro qualitative analysis of salt mixture
- 3. Carryout the separation of cations into groups and understand the concept of common ion effect.
- 4. Understand the choice of group reagents used in the analysis.
- 5. Analyse a simple inorganic salt mixture containing two anions and cations
- 6. Use instruments like conductivity meter to obtain various physicochemical parameters
- 7. Apply the theory about chemical kinetics and determine the velocity constants of various reactions.
- 8. Learn about the reaction mechanisms.
- 9. Interpret the behaviour of interfaces, the phenomena of physisorption and chemisorptions and their applications in chemical and industrial processes.
- 10. Learn to fit experimental data with theoretical models and interpret the data

PRACTICALS

Part A- Inorganic Chemistry Practicals

Qualitative semi-micro analysis of mixtures containing 2 anions and 2 cations. Emphasis should be given to the understanding of different reactions.

The following cations and anions are suggested.

Cations: NH_4^+ , Pb^{2+} , Bi^{3+} , Cu^{2+} , Al^{3+} , Fe^{3+} , Co^{2+} , Cr^{3+} , Ni^{2+} , Zn^{2+} , Mn^{2+} , Ba^{2+} , Ca^{2+} , Sr^{2+} , Mg^{2+} , Na^+ , K^+ and Li^+ .

Anions: CO₃²⁻, CH₃COO⁻, Cl⁻, Br⁻, I⁻, NO₃⁻, BO₃³⁻, SO₄²⁻, C₂O₄²⁻ and PO₄³⁻

Spot tests and flame tests to be carried out wherever possible.

Note: Minimum FIVE mixtures shall be carried out.

Part B- Physical Chemistry Practicals

- 1. Determination of the enthalpy of neutralization of a strong acid with strong base.
- 2. Verification of Freundlich and Langmuir isotherms for adsorption of acetic acid on activated charcoal.
- 3. The study of kinetics of potassium persulphate and potassium iodide volumetrically.
- 4. Determination of velocity constant for acid catalyzed hydrolysis of methyl acetate.
- 5. Determination of velocity constant for the saponification of ethyl acetate (a = b) volumetrically.
- 6. Determination of equivalent conductivity of strong electrolyte and verification of DHO equation.
- 7. Determination of dissociation constant of weak acid by conductivity method.
- 8. Conductometric titration of strong acid and strong base.
- 9. Conductometric titration of weak acid and strong base.
- 10. Determination of the hydrolysis constant of aniline hydrochloride conductometrically.
- 11. Determination of solubility product of sparingly soluble salt conductometrically.

Note: Minimum FIVE experiments shall be carried out.

References:

- 1. J B Yadav, Advanced Physical Chemistry, Krishna Prakashan Media (P) Ltd, Meerut
- 2. Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi (2011).
- 3. Garland, C. W.; Nibler, J. W. & Shoemaker, D. P. Experiments in Physical Chemistry 8th Ed.; McGraw-Hill: New York (2003). Halpern, A. M. &McBane, G. C. Experimental Physical Chemistry 3rd Ed.; W.H. Freeman & Co.: New York (2003).
- Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D.Barnes and M.J.K. Thomas, 6th edition, Third Indian Reprint, Pearson Education Pvt.Ltd.(2007)
 Vogels Text Book of Qualitative Chemical Analysis, ELBS

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DOS in Chemistry

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OPEN ELECTIVE

Non-Science Students: III Semester

21BSC303CHM31

Title of the course open Elective: 3.1 Environmental Chemistry

Courses	Credits	No. of Classes/We ek	Total No. of Lectures/Ho urs	Duratio n of Exam	Internal Assessme nt Marks	Semeste r End Exam	Total Mark s
				in hrs		Marks	
Theory	03	03	42	03	40	60	100

Unit I

Environmental Chemistry

Vertical temperature and vertical structure of atmosphere, Heat/ radiation budget of the earth: Energy balance of earth, Bio Geo Chemical Cycles in environment: Oxygen, Carbon, Nitrogen, Phosphorous, Sulphur Cycle, Bio distribution of elements

Ozone laver

Ozone layer- Earth's protective umbrella: Formation & depletion, Ozone hole over Antarctica, harmful effects of Chlorofluoro Carbons (CFC),

Acid rain: Introduction, Theories of acid rain, adverse effects of acid rain, control of acid rain

21 Hours

Unit II

Environmental Pollution

Air pollution dealing with Particles, ions and radicals.Important photochemical reactions in atmosphere, Major sources of Air pollution, Aerosols and their effects, Effects of particulate matter, indoor and occupational pollutants, Air Quality standards

Vehicular pollution

Automobile emissions, Fuels: Diesel vs CNG, biofuels, prevention and control of vehicular pollution, gobal efforts in reducing vehicular pollution

Smog: Definition, mechanism of smog formation, examples of London Smog, Los Angeles Smog.

21 Hours

References

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- 1. Environmental Chemistry, Dr H Kaur, PragathiPrakashan, 2016
- 2. Environmental Chemistryby Colin Baird and Michael Cann | 2012
- 3. A Textbook Of Environmental Chemistry 2020by V. Subramanian

OR

Non Science Students: III Semester

21BSC303CHM3 2

21BSC303CHH32

Title of the course open Elective: 3.2 Green Chemistry and Clean energy sources

Courses	Credits	No. of Classes/We ek	Total No. of Lectures/Ho urs	Duratio n of Exam in hrs	Internal Assessme nt Marks	Semeste r End Exam Marks	Total Mark s
Theory	03	03	42	03	40	60	100

Unit I

Principles and goals of Green Chemistry, Green chemicals, Green reagents, Green catalysts, Green solvents.

Emerging Green technologies, Microwave chemistry, Sono chemistry, Photo chemistry and Electro chemistry.

Use of pesticides synthesized by Green chemistry route

21 Hours

Unit II

Growing energy demands, Resources of energy, Conventional sources of energy with example of hydroelectric power/ thermal power plants, nonconventional sources of energy: solar, wind, geothermal energy, ocean energy and tidal power

Fossil fuel based energy: coal, methanol, petroleum, natural gas, biomass energy, biogas Hydrogen as an alternate source of energy. Energy consumption and conservation. Environmental impact assessment and environmental laws in India.

21 Hour

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Non Science Students: IVSemester

21BSC404CHM41

Title of the course open Elective: 4.1 Effects of Radioactivity

Courses	Credits	No. of Classes/We ek	Total No. of Lectures/Ho urs	Duratio n of Exam in hrs	Internal Assessme nt Marks	Semeste r End Exam Marks	Total Mark s
Theory	03	03	42	03	40	60	100

Unit I

Introduction, Radiation, Natural and manmade sources of radioactive pollution, effects of radioactive pollution, biological effects of radiation, radiation effects on plants

Precautions to be taken in the event of nuclear war, preventive measures and control of radiation from nuclear power plants, atom bomb disaster in Hiroshima, three mile island disaster,

Chernobyl: world's worst nuclear disaster

21 Hours

Unit II

Disposal of hazardous radioactive waste

Radioactive waste, environmental problems and management of nuclear waste, disposal methods of radioactive waste, recent methods to dispose critically dangerous radioactive waste Classification of hazardous waste, management of hazardous waste, treatment and disposal of hazardous chemicals

21 Hours

References:

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OR

Non-Science Students: IV Semester

21BSC404CHM4 と

Title of the course open Elective: 4.2 Water

Courses	Credits	No. of Classes/We ek	Total No. of Lectures/Ho urs	Duratio n of Exam in hrs	Internal Assessme nt Marks	Semeste r End Exam Marks	Total Mark s
Theory	03	03	42	03	40	60	100

Unit I

Introduction: Water quality parameters, standards and laws, Hard and Soft water, softening of water, demineralisation of waste water, purification of water for municipal purposes, chlorination and dechlorination, fluoridation and deflouridation, potability of water

Control of water pollution-minimisation, functions of central and state pollution control boards, recycling of waste water

21 Hours

Unit II

Analysis of water pollutants, objectives of water analysis, chemical substances affecting water quality: colour, odour, turbidity, conductivity, pH, acidity, alkalinity, etc, chemicals substances in water affecting health.

Definitions of following terms: Dissolved oxygen, COD(Chemical Oxygen Demand), BOD(Biological Oxygen Demand), and Total organic carbon content.

21 Hours

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Semester 4

B Sc / B Sc (Honors)

Title of the Course: Open Elective:	Number of lecture	
Electrochemistry, Corrosion and	hours/semester	
Metallurgy Number of Theory		
Credits		
3	42	

Evaluation Scheme for Theory:

Continuous Internal Assessment (CIA) – 40 Marks Semester End Examination (SEE) – 60 marks

This course provides a broad introduction to the fundamental principles of Electrochemistry, Corrosion and Metallurgy. The student will gain an understanding of basic and practical applications in various fields of Electrochemistry, Corrosion and Metals and Alloy behaviour and manufacturing processes. This course is a valuable prerequisite for taking more technically challenging courses that will be required for career development.

Course Objectives

The students are able to learn the following;

- 1. Types of conductance, concept of electrolytes, electrolysis, redox reactions and EMF
- 2. Concept of different types of electrochemical cells, Types of electrodes and electrode potential. Application of electrochemical series.
- 3. Basic principles and applications of conductometric, potentiometric and pH titrations.
- 4. Different types of Batteries their principle construction and working lead-acid storage and lithium ion battery. Study of Fuels cells.
- 5. Concept of corrosion, types of corrosion and its prevention by different methods. Introduction to electroplating.
- 6. Introduction to ores and minerals, extraction of metals from their ores, and purification. Eg., Manganese, Titanium and Uranium.
- 7. Study of alloys, classification, production and uses of alloys.

Expected Course Outcomes

Upon completion of the course students will be able to

1. Understand the concept of conductance in electrolytic solutions, electrolysis and redox reactions involved in electrode reactions.

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- 2. Learn the different types of electrochemical cells, their symbolical representation and application of electrochemical series.
- 3. Apply conductometric, potentiometric and pH titrations
- 4. Know the principle, construction and working of batteries
- 5. Understand different types of corrosion and its prevention by different methods
- 6. Learn the methods of extraction of metals from their ores and purification

UNIT I

Electrochemistry

Conductance, specific and molar conductance Types of Electrolytes, Conductivity in electrolytic solution, Electrolysis, Kohlrausch's law and its application, Equivalent Conductance of Weak electrolyte at Infinite dilution.

Oxidation -reduction reactions, electrode potential, EMFof an electrochemical cell, cell reaction, Daniel cell, dry Cells - electrolytic and Galvanic cell, Representation of a cell. Standard electrode potential, Nernst equation (No derivation) and its application to chemical cell, Electrochemical series and its importance. Types of Electrodes.

Basic Principles of (i) Conductometric titrations- HCl Vs NaOH, CH3COOH Vs NaOH

(ii) Potentiometric titrations: Acid-base titration HCl Vs NaOH, Redox titration (FAS Vs K₂Cr₂O₇)

Determination of pH using glass electrode.

12 hrs

Batteries- Primary and Secondary batteries, Battery components and their role. Working of the following Batteries- Lead acid, Lithium Storage, Batteries, Fuel cells.

2 hrs

UNIT II

Corrosion: Introduction, definition, Types of Corrosion, Corrosion rate, Factors affecting corrosion rate, Metallic factor-purity, electrode potential of metal, hydrogen over voltage, nature of corrosion product. Environmental Factors-Temperature, pH of the medium, humidity, presence of impurities, electrical conductivity of the medium, velocity of the medium, concentration of the medium.

Prevention of Corrosion: Material selection - Metals and alloys, metal purification, non-metallic, Alteration of environment - Changing media, inhibitors, Design-wall thickness, design rules, Coating-Metallic and other inorganic coatings, organic coating.

Electroplating: Introduction, Electroplating of chromium (hard and decorative). Electro less plating: Introduction, distinction between electroplating and electroless plating processes. Electroless plating of copper.

14 hrs

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UNIT III

Metallurgy

Introduction: Ore, minerals, important ores of some common elements in India, General Principles of pyrometallurgy, roasting, Calcination, Gangue, Smelting, Flux, Gravity separation, Froth flotation process, leaching. Techniques employed for Purification of metal (Distillation process, Bessemerization, Electro-refining, Van Arkel and De Boer's Filament.

6 hrs

Extraction of metals: Extraction of Manganese (Pyrolusite), Titanium (Ilmanite) and Uranium.

4 hrs

Alloys: Introduction, Classification of alloys, commercially important alloys, gold karats, Production of Ferro alloys; Ferrochrome, Ferro Manganese, Uses of alloys.

4 hrs

Reference Books

- 1. Barrow. G.M, Physical Chemistry, Tata McGraw□Hill, (2007)
- 2. An introduction to electrochemistry, Samuel Glasstone, East-West edition New Delhi, (1942)
- 3. Text book of physical chemistry, Samuel Glasstone, 2ndEdition, Mac Millan India Ltd, (1991)
- 4. Principles and applications of Electrochemistry, D. R. Crow, 3rd edition, Chapmanhall London, (1988)
- 5. Fundamentals of electrochemical deposition, Milan Paunovic and Mordechay Schlesinger, Wiley Interscience Publications, New York, (1998)
- 6. Engineering Chemistry, V R Kulkarni and K Ramakrishna Reddy, New Age International, (2015)
- 7. Electrochemistry and Corrosion Science, Nestor Perez, Springer (india) Pvt. Ltd., (2004)
- 8. Principles and Prevention of Corrosion, D. A. Jones, Macmillan Publ. Co., (1996)
- 9. Essential of Materials Science and Engineering, Donald R. Askeland, Thomson Learning, 5th Edition, (2006)
- 10. Introduction to Engineering Materials, B. K. Agarwal, Tata McGraw Hill, 1st Edition
- 11. Material Science and Engineering, V. Raghavan, PHI Learning, 5th Edition
- 12. Engineering Materials and Metallurgy, R. K. Rajput, S. Chand 1st Edition, (2011)

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Open Elective

Semester 4

B Sc / B Sc (Honors)

Course Code: 21BSC303CHM3

Title of the Course: Open Elective: *Electrochemistry, Corrosion and Metallurgy Number of Theory Credits	Number of lecture hours/semester
3	42

Evaluation Scheme for Theory:

Continuous Internal Assessment (CIA) – 40 Marks Semester End Examination (SEE) – 60 marks

This course provides a broad introduction to the fundamental principles of Electrochemistry, Corrosion and Metallurgy. The student will gain an understanding of basic and practical applications in various fields of Electrochemistry, Corrosion and Metals and Alloy behaviour and manufacturing processes. This course is a valuable prerequisite for taking more technically challenging courses that will be required for career development.

Course Objectives

The students are able to learn the following;

- 1. Types of conductance, concept of electrolytes, electrolysis, redox reactions and EMF
- 2. Concept of different types of electrochemical cells, Types of electrodes and electrode potential. Application of electrochemical series.
- 3. Basic principles and applications of conductometric, potentiometric and pH titrations.
- 4. Different types of Batteries their principle construction and working lead-acid storage and lithium ion battery. Study of Fuels cells.
- 5. Concept of corrosion, types of corrosion and its prevention by different methods. Introduction to electroplating.
- 6. Introduction to ores and minerals, extraction of metals from their ores, and purification. Eg., Manganese, Titanium and Uranium.
- 7. Study of alloys, classification, production and uses of alloys.

Expected Course Outcomes

Upon completion of the course students will be able to

1. Understand the concept of conductance in electrolytic solutions, electrolysis and redox reactions involved in electrode reactions.

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- 2. Learn the different types of electrochemical cells, their symbolical representation and application of electrochemical series.
- 3. Apply conductometric, potentiometric and pH titrations
- 4. Know the principle, construction and working of batteries
- 5. Understand different types of corrosion and its prevention by different methods
- 6. Learn the methods of extraction of metals from their ores and purification

UNIT I

Electrochemistry

Conductance, specific and molar conductance Types of Electrolytes, Conductivity in electrolytic solution, Electrolysis, Kohlrausch's law and its application, Equivalent Conductance of Weak electrolyte at Infinite dilution.

Oxidation -reduction reactions, electrode potential, EMFof an electrochemical cell, cell reaction, Daniel cell, dry Cells - electrolytic and Galvanic cell, Representation of a cell. Standard electrode potential, Nernst equation (No derivation) and its application to chemical cell, Electrochemical series and its importance. Types of Electrodes.

Basic Principles of (i) Conductometric titrations- HCl Vs NaOH, CH3COOH Vs NaOH

(ii) Potentiometric titrations: Acid-base titration HCl Vs NaOH, Redox titration (FAS Vs K₂Cr₂O₇)

Determination of pH using glass electrode.

12 hrs

Batteries- Primary and Secondary batteries, Battery components and their role. Working of the following Batteries- Lead acid, Lithium Storage, Batteries, Fuel cells.

2 hrs

UNIT II

Corrosion: Introduction, definition, Types of Corrosion, Corrosion rate, Factors affecting corrosion rate, Metallic factor-purity, electrode potential of metal, hydrogen over voltage, nature of corrosion product. Environmental Factors-Temperature, pH of the medium, humidity, presence of impurities, electrical conductivity of the medium, velocity of the medium, concentration of the medium.

Prevention of Corrosion: Material selection - Metals and alloys, metal purification, non-metallic, Alteration of environment - Changing media, inhibitors, Design-wall thickness, design rules, Coating-Metallic and other inorganic coatings, organic coating.

Electroplating: Introduction, Electroplating of chromium (hard and decorative). Electro less plating: Introduction, distinction between electroplating and electroless plating processes. Electroless plating of copper.

14 hrs

UNIT III

Metallurgy

Introduction: Ore, minerals, important ores of some common elements in India, General Principles of pyrometallurgy, roasting, Calcination, Gangue, Smelting, Flux, Gravity separation, Froth flotation process, leaching. Techniques employed for Purification of metal (Distillation process, Bessemerization, Electro-refining, Van Arkel and De Boer's Filament.

6 hrs

Extraction of metals: Extraction of Manganese (Pyrolusite), Titanium (Ilmanite) and Uranium.

4 hrs

Alloys: Introduction, Classification of alloys, commercially important alloys, gold karats, Production of Ferro alloys; Ferrochrome, Ferro Manganese, Uses of alloys.

4 hrs

Reference Books

- 1. Barrow. G.M, Physical Chemistry, Tata McGraw-Hill, (2007)
- 2. An introduction to electrochemistry, Samuel Glasstone, East-West edition New Delhi, (1942)
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- 4. Principles and applications of Electrochemistry, D. R. Crow, 3rd edition, Chapmanhall London, (1988)
- 5. Fundamentals of electrochemical deposition, Milan Paunovic and Mordechay Schlesinger, Wiley Interscience Publications, New York, (1998)
- 6. Engineering Chemistry, V R Kulkarni and K Ramakrishna Reddy, New Age International, (2015)
- 7. Electrochemistry and Corrosion Science, Nestor Perez, Springer (india) Pvt. Ltd., (2004)
- 8. Principles and Prevention of Corrosion, D. A. Jones, Macmillan Publ. Co., (1996)
- 9. Essential of Materials Science and Engineering, Donald R. Askeland, Thomson Learning, 5th Edition, (2006)
- 10. Introduction to Engineering Materials, B. K. Agarwal, Tata McGraw Hill, 1st Edition
- 11. Material Science and Engineering, V. Raghavan, PHI Learning, 5th Edition
- 12. Engineering Materials and Metallurgy, R. K. Rajput, S. Chand 1st Edition, (2011)

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BScQuestionPaper Pattern all Papers including OPEN E	LECTIVE
Time: 3 Hrs <u>PART-A</u> Max Marks. 60	
Answer any Five questions.	5X2=10
1. a	
b	e
c	
d	
e	
${f f}$	
g	
h	
Note:Twoquestionsfromeachunit.	
PART-B	
Answerany Five of the following questions.	5X4=20
2	
3	
4	
5	
6	
7	4
8	
9	
Note: Twoquestionsfromeachunit.	
PART-C	
Answerany Three of the following questions.	3X10=30M
10	(5+5) M
11	(5+5) M
n.s	(5+5) M
Registrar Davangere Univer	(5+5) M
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Concept Note:

- 1. **CBCS** is a mode of learning in higher education which facilitates a student to have some freedom in selecting his/her own choices, across various disciplines for completing a UG/PG program.
- 2. A credit is a unit of study of a fixed duration. For the purpose of computation of workload as per UGC norms the following is mechanism be adopted in the University:
 - One credit (01) = One Theory Lecture (L) period of one (1) hour.
 - One credit (01) = One Tutorial (T) period of one (1) hour.
 - One credit (01) = One practical (P) period of two (2) hours.
- 3. Course: paper/subject associated with AECC, DSC, DSEC, SEC, VBC, OEC, VC, IC and MIL
- 4. In case of B.Sc. Once a candidate chose two courses/subjects of a particular two department in the beginning, he/she shall continue the same till the end of the degree, then there is no provision to change the course(s) and Department(s).
- 5. A candidate shall choose one of the Department's courses as major and other Department course as minor in fifth and sixth semester and major course will get continued in higher semester.
- 6. Wherever there is a practical there will be no tutorial and vice-versa
- 7. A major subject is the subject that's the main focus of Core degree/concerned.
- 8. A minor is a secondary choice of subject that complements core major/concerned.
- 9. Vocational course is a course that enables individual to acquire skills set that are required for a particular job.
- 10. Internship is a designated activity that carries some credits involving more than 25 days of working in an organization (either in same organization or outside) under the guidance of an identified mentor. Internship shall be an integral part of the curriculum.
- 11. OEC: For non- computer science students. Computer Science students have to opt for OEC from departments other than major and minor disciplines.

Abbreviation Explanations:

- 1. AECC: Ability Enhancement Compulsory Course.
- 2. DSC: Discipline Specific Core Course.
- 3. DSEC: Discipline Specific Elective Course.
- 4. SEC: Skill Enhancement Course.
- 5. VBC: Value Based Course.
- 6. OEC: Open/Generic Elective Course.
- 7. VC: Vocational Course.
- 8. IC: Internship Course.
- 9. L1: Language One.
- 10. L2: MIL.
- 11. L= Lecture; T= Tutorial; P=Practical.
- 12. MIL= Modern Indian Language; English or Hindi or Telugu or Sanskrit or Urdu.

Program Coding:

- 1. Code 21: Year of Implementation.
- 2. Code BSC: BSC Program under the faculty of Applied Science of the University.
- 3. Code 1: First Semester of the Program, (2 to 6 represent higher semesters).
- 4. Code AE: AECC, (C for DSC, S for SEC, V for VBC and O for OEC).
- 5. Code 1: First "AECC" Course in semester, similarly in remaining semester for such other courses.
- 6. Code LK: Language Kannada, similarly Language English, Language Hindi, Language Telugu, Language Sanskrit, &Language Urdu.
- 7. Code 1: Course in that semester.
- 8. CHM: Chemistry.

DOS in Chemistry
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AIRMAN B.O.S.

Proceedings of UG BoS Meeting in Chemistry

Proceedings of the meeting of Board of Studies in Chemistry (UG) held on 29-08-2022 at 11.00am in the Department of Chemistry, Davangere University, Shivagangothri, Davangere, The following members were present.

MEMBERS:

1. Prof. Mamatha G P Department of Chemistry, Davangere University Davangere.

-- Chairperson BoS

-- External Member

2. Dr..I. Mallikarjuna

Assistant Professor

Smt.VHD Central Institute of Home Sciene

(Maharani Cluster University)

Sheshadri Road

Benagaluru-560001

3. Dr..K C Ramesh Associate Professor. SJM College Chitradurga

-- Member

4. G Umesh

Associate Professor, ADB first Grade College

Harapanahalli

5. S. Nagaraja Associate Professor Govt Science College Chitradurga -- Member

-- Special Invitee

Member Absent:

1. Dr. K V Basavarajappa Associate Professor GFGC College Davangere .

The chairperson welcomed the members of the Board to the meeting and placed the agenda before them for discussion.

Agenda:

1. Curriculum Structure of NEP 2020 For III and IV Semester of B.Sc Honors in Chemistry.

The BoS Resolved the following

The Board approved to implement the curriculum structure of NEP-2020 for III and IV Semester of B.Sc. Honors in chemistry.

1. The Board decided to introduce one unit from all the four branches of Chemistry for both III and IV Sem.

Inorganic Chemistry

Organic Chemistry

Physical Chemistry

Analytical Chemistry

2. Distribution of IA Marks for Theory DSC

[40M]

3. Distribution of IA Marks for practical's DSC [25M]
Minimum EIGHT Experiments Should be Performed for each III & IV Semester

4. Sem End Exam Theory DSC

[60M]

5. Sem End Practical Exam DSC

[25M]

6. Sem End Exam Open Elective Course (OEC) for

60M

7. Distribution of IA Marks for OEC

[40M]

8. Question Paper Pattern for DSC, OEC, SEC, for Both III & IV Semester.

The Committee followed the guidelines given by the HEC State level and decided the distribution of marks, Question paper pattern for Sem end exam for both theory and practical's also IA for DSC and OEC

The Meeting ended with vote of thanks to all the Members by Chairman BoS.

Signature of the Committee Members:

- 1. Prof. Mamatha G P, Chairman BoS
- 2. Dr. I Mallikarjuna., External Member
- 3. Dr. K C Ramesh., Member
- 4. G Umesh., Member
- 5. S. Nagaraja, (Special Invitee)

ep29/3/22

Prof. Mamatha G P
Chairperson BoS
Department of Chemistry,
Davangere University.Davangere.

CHAIRMAN B.O.S.

DOS in Chemistry Davangere University,

Shivagangotri, Davangere-577007.

ದಾವಣಗೆರ ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

ವಿಶ್ವವಿದ್ಯಾನಿಲಯ ಕಾರ್ಯಾಲಯ, ಶಿವಗಂಗೋತ್ರಿ, ದಾವಣಗೆರೆ-577007 ದೂರವಾಣಿ ಸಂಖೈ:08192-208029, ಫ್ಯಾಕ್ಸ್:08192-208008

ವಿದ್ಯಾದಾನೇನ ವರ್ಧತೆ, ವಿದ್ಯಾ ಏನಯೀನ ಶೋಭತೆ, ಏದ್ಯಯಾ ಏಂಧತೆ ಅಮೃತಂ :

ಸಂ:ದಾವಿವಿ/ಪ್ರಾಧಿಕಾರ/ಅಮಂ/2022-23 1714

ದಿನಾಂಕ:11/08/2022

್ಷಪರಿಷ್ಕೃತ ಜಾತ್ರೋಲೆ

ವಿಷಯ: ನೂತನ ರಾಷ್ಟ್ರೀಯ ಶಿಕ್ಷಣ ನೀತಿ–2020 (NEP)ರನ್ವಯ ಸ್ನಾತಕ ಪದವಿಯ 3 ಮತ್ತು 4ನೇ ಸೆಮಿಸ್ಟರ್ಗಳ ಪಠ್ಯಕ್ರಮವನ್ನು ರಚಿಸುವ ಕುರಿತು.

ಉಲ್ಲೇಖ: 1. ಮಾನ್ಯ ಕುಲಪತಿಗಳ ಅನುಮೋದನೆ ದಿನಾಂಕ:01/08/2022

2. ಸಂ:ದಾವಿವಿ/ಪ್ರಾಧಿಕಾರ/ಅಮಂ/2022-23/1604 ದಿನಾಂಕ:02/08/2022

ವಿಶ್ವವಿದ್ಯಾನಿಲಯದ ಎಲ್ಲಾ ಸ್ನಾತಕ ಅಧ್ಯಯನ ಮಂಡಳಿಯ ಅಧ್ಯಕ್ಷರುಗಳಿಗೆ – ಈ ಮೂಲಕ ತಿಳಿಯಪಡಿಸುವುದೇನೆಂದರೆ, ಕರ್ನಾಟಕ ರಾಜ್ಯ ಉನ್ನತ ಶಿಕ್ಷಣ ಪರಿಷತ್ತು, ಬೆಂಗಳೂರು – ಇವರ ಅಧಿಕೃತ ಜಾಲತಾಣದಲ್ಲಿ ನೂತನ ರಾಷ್ಟ್ರೀಯ ಶಿಕ್ಷಣ ನೀತಿ–2020 ಮಾರ್ಗಸೂಚಿಗಳನ್ವಯ ವಿವಿಧ ಸ್ನಾತಕ ಪದವಿಗೆ ಸಂಬಂಧಿಸಿದಂತೆ 3 ಮತ್ತು 4ನೇ ಸಮಿಸ್ಟರ್ಗಳ ಪಠ್ಯಕ್ರಮಗಳನ್ನು ಪ್ರಕಟಿಸಿರುತ್ತಾರೆ. ಆದುದರಿಂದ, ನಮ್ಮ ವಿಶ್ವವಿದ್ಯಾನಿಲಯಕ್ಕೆ ಸಂಬಂಧಿಸಿದ ವಿಷಯವಾರು ಪಠ್ಯಕ್ರಮವನ್ನು ಉಲ್ಲೇಖ (02)ರ ಪತ್ರದೊಂದಿಗೆ ಲಗತ್ತಿಸಿ ಈಗಾಗಲೇ ಕಳುಹಿಸಲಾಗಿದ್ದು, ಸದರಿ ಪಠ್ಯಕ್ರಮವನ್ನು NEP-2020ರ ನಿಯಗಳನುಸಾರ ಜಾರಿಗೊಳಿಸುವ ಬಗ್ಗೆ ಅಧ್ಯಯನ ಮಂಡಳಿಯಲ್ಲಿ ಪರಿಶೀಲಿಸಿ ಸೂಕ್ತ ಶಿಫಾರಸ್ಸುಗಳೊಂದಿಗೆ ದಿನಾಂಕ:26/08/2022ರೊಳಗೆ ಸಾಫ್ಟ್ ಮತ್ತು ಹಾರ್ಡ್ ಪ್ರತಿಗಳನ್ನು ವಿಶ್ವವಿದ್ಯಾನಿಲಯಕ್ಕೆ ದ್ವಿಪ್ರತಿಯಲ್ಲಿ 'ಮುದ್ದಾಂ' ಸಲ್ಲಿಸಲು ಈ ಮೂಲಕ ತಿಳಿಸಲಾಗಿದೆ.

ವಿ.ಸೂಚನೆ: ಸದರಿ ವಿಷಯವನ್ನು ಅಧ್ಯಯನ ಮಂಡಳಿ ಅಧ್ಯಕ್ಷರುಗಳು ತಮ್ಮ ವಿಭಾಗದ ಅಧ್ಯಕ್ಷರು & ಅಧ್ಯಾಪಕರುಗಳ ಗಮನಕ್ಕೆ ತರಲು ಸೂಚಿಸಲಾಗಿದೆ.

ಆದೇಶಾನುಸಾರ

ಕಾಲಸಚಿವರು ದಾವಣಗರ ವಿಶ್ವವಿದ್ಯಾನಿಲಯ ಸಿಪಗಂಗೋತ್ರಿ, ದಾಪಭಗರ-577007

ಗಿ, ವಿಶ್ವವಿದ್ಯಾನಿಲಯದ ವ್ಯಾಪ್ತಿಗೊಳಪಡುವ ಅಧ್ಯಯನ ಮಂಡಳಿಯ ಅಧ್ಯಕ್ಷರುಗಳಿಗೆ.

ಪ್ರತಿ:

1. ಕುಲಸಚಿವರು (ಪರೀಕ್ಷಾಂಗ ವಿಭಾಗ), ದಾವಣಗೆರೆ ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಶಿವಗಂಗೋತ್ರಿ, ದಾವಣಗೆರೆ.

2. ಡೀನರು, ಕಲಾ, ವಾಣಿಜ್ಯ, ಶಿಕ್ಷಣ, ವಿಜ್ಞಾನ ಮತ್ತು ತಂತ್ರಜ್ಞಾನ, ದಾವಣಗೆರೆ ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಶಿವಗಂಗೋತ್ರಿ, ದಾವಣಗೆರೆ.

3. ಕಛೇರಿ ಪತ್ರಿ.