UPL University of Sustainable Technology

SRICT Institute of Science & Research

B.Sc (Hons) - CHEMISTRY
B.Sc. SEM III
Teaching/Exam Scheme
(As per NEP-2020)

w.e.f.: July-2024

No.	Course Code	Category of course	Course title	Hours Per week			Tot. hrs	Credit	CCE	SEE	Total Marks
				L	T	P					
1	CHM300-2C	Major	Coordination Chemistry	4	-	-	4	4	50	50	100
2	CHM301-2C	Major	Gravimetry and Titrimetric Analysis	4	-	-	4	4	50	50	100
3	CHM302-2C	Major	Practicals in Chemistry-I	-	-	8	8	4	50	50	100
4	MDC300-2C	MDC	Non-Conventional Energy Resources	3	1	-	4	4	50	50	100
	MDC301-2C	MDC	Environmental Sustainability	3	1	-	4	4	50	50	100
5	AEC300-2C	AEC	Introduction to Functional English	2	-	-	2	2	25	25	50
	AEC301-2C	AEC	English and Communication Skills	2	-	-	2	2	25	25	50
	AEC302-2C	AEC	Developing Fluency and Clarity in English	2	-	-	2	2	25	25	50
6	SEC300-2C	SEC	Stress Management	2	-	-	2	2	25	25	50
	SEC301-2C	SEC	Entrepreneurship Skills	2	-	-	2	2	25	25	50
	SEC302-2C	SEC	Team Skills	2	-	-	2	2	25	25	50
7	VAC300-2C	VAC	Indigenous Science and Technology	2	-	-	2	2	25	25	50
			Total	17	2	8	26	22	275	275	550

- CCE - Continuous and Comprehensive Evaluation.
- SEE – Semester End Evaluation.

Multi-Disciplinary Courses	1. MDC300-2C: Non-Conventional Energy Resources 2. MDC301-2C: Environmental Sustainability
Ability Enhance Course (AEC)	1. AEC300-2C : Introduction to Functional English 2. AEC301-2C : English and Communication Skills 3. AEC302-2C : Developing Fluency and Clarity in English
Skill Enhancement Courses (SEC)	1. SEC300-2C: Stress Management 2. SEC301-2C: Entrepreneurship Skills 3. SEC302-2C: Team Skills

UPL University of Sustainable Technology

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As Per National Education Policy 2020 (NEP 2020)

Bachelor of Science
Course Code: CHM300-2C
Course Name: Coordination Chemistry
Semester: III

w.e.f.: July 2024

Type of course: Major Course

Prerequisite: Should have underlying knowledge of coordination transition elements and their applications.

Rationale: At the end of the course, students will have knowledge about coordination chemistry comprising of various theories, stereochemistry, and electronic spectra of various configuration.

Teaching and Examination Scheme:

Credits				Examination Marks		Total Marks
L	T	P	Total	CCE Marks	SSE Marks	
3	1	-	4	50	50	100

Contents:

Sr. No.	Content	Total Hours
	SECTION - A	
1	**Fundamental concept of coordination chemistry** Definition of some terms, classification of ligands, chelate, chelating ligand and chelation, classification of chelates, uses of chelates, coordination number, and nomenclature of co-ordination compounds.	**9**
2.	**Valance bond theory** Main assumption of VBT, octahedral complexes- d^2sp^3 or sp^3d^2:$[Fe(CN)_6]^{4-}$, $[Fe(F)_6]^{3-}$, tetrahedral complexes- sp^3: $[Ni(CO)_4]$, $[Ni(Cl)_4]$, square planar complexes- dsp^2 : $[Ni(CN)_4]^{2-}$, limitation of VBT	**9**
3	**Crystal field theory** Introduction, Werner's coordination theory, CFSE, factors affecting on CFSE, application of CFT (magnetic properties, spectral properties) nomenclature of complexes (nomenclature rules, examples of common monodentate and	**12**

	multidentate ligands).	
SECTION - B		
4	**Stereochemistry of complexes** Stereochemistry of coordination compounds with coordination number- 2, 3, 4, 5, 6, 7, 8, 9, structural isomerism (ionisation isomerism, hydrate isomerism, coordination isomerism, linkage isomerism, coordination position isomerism), stereo isomerism (geometrical isomerism, optical isomerism).	**9**
5	**Term symbol** Russel Saunders coupling and determination of term symbols of the ground state, calculation of number of microstates, pigeon hole diagram of p^2 and d^2 configurations, Hund's rule, hole formulation.	**9**
6	**Electronic spectra of metal complexes** Spectra of transition metal complexes, Laporte orbital and spin selection rules, Orgel energy level diagram of d^5 and combined diagrams of d^1 - d^9, d^2 – d^8, d^3 – d^7, d^4 – d^6 and their spectra, JahnTeller distortion.	**12**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (%)					
R Level	U Level	A Level	N Level	E Level	C Level
25	**30**	**10**	**15**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Text Books:

1. Lee J. D., Concise Inorganic Chemistry, 5th Edition, Oxford University Press, 2008.
2. Puri. Sharma and Kalia, Principles of Inorganic Chemistry, 33rd Edition, Vishal Publishing Co., 2020.
3. P. L. Soni, A textbook of inorganic chemistry, 11th Edition, Sultan Chand & Sons, 1963.
4. Gurudeep Raj, Goel, Advanced Inorganic Chemistry, 2nd Edition, Pub. House, Meerut, 1974.
5. Wahid U. Malik, G. D. Tuli, R. D. Madan, Selected Topics in Inorganic Chemistry, 1st Edition, S. Chand publishing, 1999.
6. R.K.Sharma, Textbook of Coordination Chemistry, 1St Edition, Discovery Publishing House,2014

Reference Books:

1. F.A. Cotton, G Wilkinson, Basics of Inorganic Chemistry, 3rd Edition, Wiley International, 2007.
2. Ajai Kumar, Coordination Chemistry, 7th Edition, Pub. House, Aaryush, 2020.

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Describe basics of coordination complexs.	15%
CO-2	Explain various isomerism for coordination compounds.	15%
CO-3	Discuss modern theory of VBT.	20%
CO-4	Discuss modern theory of CFT.	15%
CO-5	Recites term symbol for p^2 & d^2 configuration.	15%
CO-6	Discuss electronic spectra of various d-configuration.	20%

List of Open Source Software/learning website:

- https://emb-iitk.vlabs.ac.in/exp/tem-analysis/
- https://www.rsc.org/pe
- https://archive.nptel.ac.in/courses/

UPL University of Sustainable Technology

SRICT Institute of Science & Research

Bachelor of Science
Course Code: CHM301-2C
Course Name: Gravimetry and Titrimetric Analysis
Semester: III

w.e.f.: July 2024

Type of Course: Major course

Prerequisite: Should have fundamental knowledge of what is analysis and different analytical terminologies in chemistry.

Rationale: At the end of the course students will have knowledge statistical analysis, Stochiometric calculations, acid-base titration, redox titration, complexometric titration, precipitation titration.

Teaching and Examination Scheme:

Credits				Examination Marks		Total Marks
L	T	P	Total	CCE Marks	SSE Marks	
3	1	-	4	50	50	100

Contents:

Sr. No.	Content	Total Hrs.
	SECTION-A	
1	**Gravimetry** Introduction to gravimetric methods of analysis, Precipitation methods, Colloidal State, Supersaturation and precipitate formation, Co-precipitation, Conditions of precipitations, Precipitations from homogenous solution, Washing the precipitates, Ignition of precipitates.	**9**
2	**Acid-Base Titration:** Strong acid vs strong base, Detection of end point, Indicator, pH, Standard solutions of acid and bases, Standardization process, Titration Curve, Weak acid vs strong base, Titration of Na_2CO_3, Titration of polyprotic acids, Titration of mixture of acids or bases, Equivalence point from derivatives of titration curves,	**12**
3	**Redox Titration:** Redox reactions, Balancing redox reactions, Calculating redox titrations curves, visual detection of end points, Titration involving iodine – Iodimetry and Iodometry, Titration with oxidizing agents, Titration with reducing agents,	**9**

	Applications of redox titrations.	
SECTION-B		
4	**Complexometric Titration:** Complex, Formation constant of complex, Chelates, EDTA Titrations, Metal EDTA titration curves, End point, Indicators, Direct Titration, Back-Titration, Replacement Titration, Analysis of mixed metal by complexometric titrations, Applications of complexometric titrations.	**12**
5	**Precipitation Titration:** Basics of precipitation titrations, estimation of halogen, Argentometric titrations, indicators, Applications of precipitation titration, standardization of solutions, concentration of indicator solution, Limitation of precipitation titration.	**9**
6	**Statistics and Data Handling in Analytical Chemistry:** Accuracy and Precision: There Is a Difference, Types of errors, Significant Figures, Standard Deviation, The Q Test, Statistics for Small Data Set, F-Test, t-Test and their applications in chemistry.	**9**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (%)					
R Level	U Level	A Level	N Level	E Level	C Level
25	**30**	**10**	**15**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate

C: Create and above Levels (Revised Bloom's Taxonomy)

Text Books:

1. Textbook of Analytical Chemistry, Y. Anjaneyulu, K. Chandrasekhar and Valli Manickam, Pharma BS Publications, 2019.
2. Analytical Chemistry – Theory and Practise, 3rd Edn., R. M. Verma, CBS Publishers and Distributors Pvt. Ltd., 2016.
3. Analytical chemistry, 7th Edn., G. D. Christian, P. K. Dasgupta, Kevin, A. Schug, Wiley,2020
4. Modern Analytical Chemistry, David Harvey, McGraw Hill, 1999.
5. Quantitative Analysis, 6th Edn., R. A. Day, Jr., A. L. Underwood, PHI Learning Pvt. Ltd., 1991.
6. Skoog's and West's Fundamentals of Analytical Chemistry, F James Holler, Stanley R. Crouch, 9th Edn. Cengage Learning, 2013.

Reference Books:

1. Vogel's Qualitative Inorganic Analysis, 7th Edn., Revised by G Svehla, Pearson, 2008
2. Vogel's Textbook of Quantitative Chemical Analysis, 5th Edn. G. Jeffery, J. Bassett, J

Mendham, R Denney, Longman Scientific and Technical, 1989.

List of Open-Source Software/learning website:

1. https://epgp.inflibnet.ac.in

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Understand estimation of ion with the help of gravimetry.	15%
CO-2	To find strength of acid and base by the help of neutralization titration.	20%
CO-3	Determine strength of redox active species using redox titration	15%
CO-4	Determine concentration and amount of metal ion present in unknown sample by use of complexometric titration.	20%
CO-5	Find out concentration of halogen by using precipitation titration.	15%
CO-6	Understand statistical analysis in analytical chemistry.	15%

UPL University of Sustainable Technology

SRICT Institute of Science & Research

As Per National Education Policy 2020 (NEP 2020)

Bachelor of Science

Course Code: CHM302-2C

Course Name: Practicals in Chemistry-I

Semester: III

w.e.f.: July 2024

Type of Course: Major course

Prerequisite: Should have fundamental knowledge glassware's and apparatus used in chemistry lab.

Rationale: At the end of the course students will have knowledge of semi micro qualitative analysis of four radical inorganic mixture and estimation of metal by complexometric titration.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks		Total Marks
L	T	P	C	CCE Marks	SEE Marks	
	-	8	4	50	50	100

Contents:

Sr. No.	Content	Total Hrs. 120
	SECTION-A: Inorganic Practicals	
	❖ **Inorganic Qualitative Analysis:** No. of Practicals (Min.:07) ❖ Inorganic Mixture: Four radicals. It may include two positive Radicals and two negative radicals. ❖ **Cations:** Cd^{+2}, Cu^{+2}, Bi^{+3}, Fe^{+2}, Zn^{+2}, Al^{+3}, Ni^{+2}, Mn^{+2}, Ba^{+2}, Sr^{+2}, Ca^{+2}, Mg^{+2}, NH_4^+, K^+ ❖ **Anoins:** Cl^-, Br^-, I^-, NO_3^-, CO_3^{-2}, S^{-2}, PO_4^{-3}, BO_3^{-3}, SO_4^{-2}, CrO_4^{-2}, $Cr_2O_7^{-2}$ ❖ To estimate the amount of barium in the whole of the given solution of barium chloride. https://www.vlab.co.in/broad-area-chemical-sciences ❖ To estimate the amount of nickel as nickel dimethyl glyoxime. https://www.vlab.co.in/broad-area-chemical-sciences ❖ To determine the crystal field stabilization energy (CFSE) of metal complexes. https://www.vlab.co.in/broad-area-chemical-sciences	**60**

SECTION-B: Analytical Practicals		
	1. Determination of Fe content in iron ore by gravimetry. 2. Determination of Cu content in Brass alloy by gravimetry. 3. Estimation of Glucose by iodometry. 4. Estimation of polyhydric alcohol by iodometric titration. 5. Estimation of Cl^- Content in water by precipitation titration. 6. Estimation of Ca^{+2} & Mg^{+2} by complexometric titration. 7. Estimation of Cu^{+2} by complexometric titration. 8. Soil Analysis-Determination of Available Organic Carbon content in the Soil https://vlab.amrita.edu/?sub=2&brch=294&sim=1552&cnt=1 9. Soil Analysis-Determination of Available Nitrogen content in the Soil by Kjeldahl method https://vlab.amrita.edu/?sub=2&brch=294&sim=1551&cnt=1 10. Soil Analysis-Determination of Available Phosphorus content in the Soil by Bray's method https://vlab.amrita.edu/?sub=2&brch=294&sim=1550&cnt=1	**60**

Reference Books:

1. Vogel's Qualitative Inorganic Analysis, 7th Edn., Revised by G Svehla, Pearson, 2008
2. Vogel's Textbook of Quantitative Chemical Analysis, 5th Edn. G. Jeffery, J. Bassett, J Mendham, R Denney, Longman Scientific and Technical, 1989.
3. Practical physical chemistry –J.B.Yadav.
4. Experimental physical chemistry – R.C.Das, B.Behera.

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Understand what is qualitative analysis,	10%
CO-2	Understand semimicro qualitative analysis, Inorganic qualitative analysis, Group separation,	20%
CO-3	Understand Group test, confirmatory test for cations and anions.	20%
CO-4	Understand significance of gravimetric analysis in determination of metal ions.	20%
CO-5	Know what are different types of titration,	10%
CO-6	Estimation of various ions by different types of titrations.	20%

Distribution of Practical Marks

A Level	B Level	C Level	D Level
10	**15**	**15**	**10**

Legends:

A= Conduction of Practical

B= Regular Record Writing

C= Viva –Voce

D= Understanding of Experiments

UPL University of Sustainable Technology

SRICT Institute of Science & Research

As Per National Education Policy 2020 (NEP 2020)
Bachelor of Science
Course Code: MDC300-2C
Course Name: Non-Conventional Energy Resources
Semester: III/IV

w.e.f July 2024

Type of course: MDC

Prerequisite: Should have underlying knowledge of various forms of energy and source.

Rationale: At the end of the course, students will have a fundamental knowledge regarding various renewable energy sources. They will also learn various challenges faced by various technologies for harnessing energy from various renewable energy sources. It also makes them aware regarding current and future role of energy sources emphasizing on methodologies to derive maximum energy out of these energy sources.

Teaching and Examination Scheme:

Credits				Examination Marks		Total Marks
L	T	P	Total	CCE Marks	SSE Marks	
3	1	-	4	50	50	100

Contents:

Sr. No.	Content	Total Hours
	SECTION - A	
1	**Introduction to Renewable Energy systems** Principles of renewable energy; energy and sustainable development, social implications. Renewable energy availability in India and worldwide, Examples of renewable energy sources.	**9**
2.	**Solar Energy** Solar Radiation, Measurements of Solar Radiation, Flat Plate And Concentrating Collectors, Solar Direct Thermal Applications, Solar Thermal Power Generation, Fundamentals of Solar Photo Voltaic Conversion, Solar Cells, Solar PV Power Generation, Solar PV Applications.	**12**

3	**Wind Energy** Wind Energy Estimation, Types of Wind Energy Systems, Performance, Site Selection, Details of Wind Turbine Generators.	**9**
	SECTION - B	
4	**Ocean Energy & Geothermal Energy** Ocean Thermal Energy Conversion (OTEC), Principle of operation, development of OTEC plants, Tidal and wave energy, Potential and conversion techniques, mini-hydel power plants. Introduction to Geothermal energy resources, types of wells, methods for harnessing energy, advantages and disadvantages, Applications.	**12**
5	**Energy from Biomass** Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Biogas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking.	**9**
6	**Energy Conservation** Principles of energy conservation, the different energy conservation appliances, cooking stoves, Benefits of improved cooking stoves over the traditional cooking stoves, Energy Management & Audit, Waste heat recovery system, hydrogen cell, E-Vehicles.	**9**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (%)					
R Level	U Level	A Level	N Level	E Level	C Level
25	**30**	**10**	**15**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate

C: Create and above Levels (Revised Bloom's Taxonomy)

Text Books:

1. G. D. Rai, Non-Conventional Energy Sources, 6th Edition, Khanna Publisher, ISBN- 978-81-7409-073-8, 2017.
2. B. H. Khan, Non-Conventional Energy Sources, 3rd Edition, McGrow Hill Education India Pvt. Ltd., ISBN- 978-93-5260-188-2, 2009.

Reference Books:

1. S. Rao, B.B. Parulekar, "Energy Technology", Khanna Publishers, 3rd Edition, 2018.
2. S. C. Bhatia, R. K. Gupta,"Textbook of Renewable Energy",Woodhead Pub. Ind. Pvt Ltd.
3. V. T. Patil , A.T. Patil, " Renewable Energy Technologies", Nirali Prakashan, 1st Edition, 2020

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Describe the need, importance, and scope of non-conventional and alternate energy resources.	15%
CO-2	Explain the various techniques used in power generation through solar energy.	20%
CO-3	Demonstrate the different types of Wind energy systems and factors affecting power generation through Wind turbine generators.	15%
CO-4	Analyze the principle of operation for ocean thermal energy & geothermal energy with relevant applications.	20%
CO-5	Summarize the various methodologies available for utilization of energy from Biomass.	15%
CO-6	Summarize principles of energy conservation through Energy management principles and audit.	15%

List of Open Source Software/learning website:

- Students can refer to video lectures available on the websites including NPTEL
- https://www.rsc.org/pe
- https://archive.nptel.ac.in/courses/
- https://byjus.com/physics/conventional-and-nonconventional-sources-of-energy/
- https://www.geeksforgeeks.org/non-conventional-sources-of-energy/
- https://beeindia.gov.in/sites/default/files/4Ch12.pdf

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As Per National Education Policy 2020 (NEP 2020)
Bachelor of Science
Course Code: MDC301-2C
Course Name: Environmental Sustainability
Semester: III/IV

w.e.f.: July 2024

Type of Course: MDC

Prerequisite: Should have basic knowledge of Sustainable Development.

Rationale: At the end of the course students will have knowledge an increased awareness among students on issues in areas of sustainability. To understand the role of engineering and technology within sustainable development.

Teaching and Examination Scheme:

Credits				Examination Marks		Total Marks
L	T	P	Total	CCE Marks	SSE Marks	
3	1	-	4	50	50	100

Contents:

Sr. No.	Content	Total Hrs.
	SECTION-A	
1	**Concept of sustainable development** Sustainable development Goals, Indian & Global Scenario, Elements of sustainable development, Sustainable habitat, Sustainable Urbanization, Economy of Natural resources.	9
2	**Industrial ecology and Green Productivity** GP methodology, Green building, Conventional and renewable sources, Zero waste concept, Need for renewable energy and Growth of renewable energy in India	12
3	**Climate change & circular economy** Climate change and Global warming, Acid Rain, Ozone layer depletion, Climate Change and India's Effort to Tackle Climate Change, Circular economy and waste valorization.	12

SECTION-B		
4	**Cleaner Production Methodology** Six steps methodology for CP, Analyze process steps, generating cleaner production opportunities, selecting cleaner production solutions, Implementation, maintaining cleaner production, Benefits of CP.	**9**
5	**Need for Cleaner Production** Barriers and drivers to Cleaner Production, Introduction and implementation of good housekeeping, Check lists for good housekeeping and need to implement good housekeeping.	**9**
6	**Case studies of CP** Co-processing of Hazardous and Non Hazardous Wastes as Alternate Fuel in Cement Kiln, Creation of Wealth from High TDS Waste Stream through "Waste Recovery Plant".	**9**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (%)					
R Level	U Level	A Level	N Level	E Level	C Level
25	**30**	**10**	**15**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate

C: Create and above Levels (Revised Bloom's Taxonomy)

Text Books:

1. M. Gresens, Environmental Sustainability, ISBN- 9780985569853, 3rd Edition, New Academia Publishing, 2012.
2. J. Blewitt, Understanding Sustainable Development, 2nd Edition, ISBN-978-0-415-70782-4, Routledge Publishing , 2014.
3. R. Goodland, The concept of Environmental Sustainability, An/IUaI Reviews, 1995.
4. Carol Sze Ki Lin, Guneet Kaur, Chong Li and Xiaofeng Yang, Waste valorization: Waste streams in Circular Economy, Wiley publishing, ISBN: 9781119502753, 2020.

Reference Books:

1. D.T. Allen, D.R Shonnard, Sustainability Engineering: Concepts, Design and case studies, Prentice Hall.
2. R.N. Bhattacharya, Environmental Economics. Oxford University Press, 2002.
3. S.C. Bhattacharya, Energy Economics, Springer, London, 2011.
4. A. N. Agrawal, Indian Economy: Problems of development and planning. pune: Vishwa Prakashan, 1995.
5. A. S, Bradely, A.O. Adebayo, P. Maria, Engineering applications in sustainable design and development, Cengage learning.

6. Environment impact assessment guidelines, Notification of government of India, 2006.

List of Open-Source Software/learning website:

1. NPTEL
2. Coursera.org
3. https://portals.iucn.org/library/sites/library/files/documents/Hlth-022.pdf
4. https://ncert.nic.in/textbook/pdf/keec109.pdf
5. https://open.umn.edu/opentextbooks/textbooks/96
6. https://ncert.nic.in/textbook/pdf/jesc116.pdf

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Understand the relevance and the concept of sustainability and the global initiatives in this direction	15 %
CO-2	Explain the different types of environmental pollution problems and their sustainable solutions	20 %
CO-3	Discuss the environmental regulations and standard	20 %
CO-4	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles	15 %
CO-5	Outline the concepts related to conventional and non-conventional energy	15 %
CO-6	Identify the role of engineering and technology within sustainable development	15 %

UPL University of Sustainable Technology

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As Per National Education Policy 2020 (NEP 2020)
Bachelor of Science
Course Code: AEC300-2C
Course Name: Introduction to Functional English
Semester: III/IV

w.e.f- July 2024

Type of Course: Ability Enhance Course

Prerequisite: Zeal to learn the subject

Rationale: At the end of the course, students will have knowledge of English language. It also targets the understanding of grammar, focusing on comprehension, and reading, speaking and writing skills.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks		Total Marks
L	T	P	C	CCE Marks	SSE Marks	
1	1	-	2	25	25	50

Contents:

Sr. No.	Content	Total Hrs.
	SECTION-A	
1	**Listening** To enable students to listen and understand • Conversations based on familiar situations • Specific information • Short lectures, descriptions, and narrations, rapid talks, passages read aloud • Listening to pre-recorded Interviews and conversations	**7**
2	**Speaking** To enable the students to • Introduce themselves, Introducing others • Greeting and formulae of everyday conversation • Describe person, place or situation	**8**

	• Ask for Requests, Offering help, Congratulating, Enquiries and Seeking permission.	
SECTION-B		
3	**Reading** To enable the students to • Read for information news features, articles, newspapers and texts • Read to get the overall idea, and comprehend the passage • Brochure, Advertisements and Picture reading	**8**
4	**Writing** To enable the students to… • Write leave application, apology and request letters • Write paragraphs, developing points /ideas • Dialogue writing. • Writing a speech.	**7**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (%)					
R Level	U Level	A Level	N Level	E Level	C Level
25	**30**	**10**	**15**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate

C: Create and above Levels (Revised Bloom's Taxonomy)

Reference Books:

1. Living English Structure, Standard Allen, Longman
2. A Comprehensive English Language Course, Chandak Chattarji, Orient Longman
3. Developing Communication Skills, K. Mohan and M. Banerji, McMillan, Chennai
4. Grant Taylor. English Conversation Practice. (Tata McGraw Hill, New Delhi)
5. R P Bhatnagar and R T Bell (1999) Communication in English, (Orient Longman, Hyderabad)

Course Outcomes:

After completing this course, student will be able to

Sr. No.	**CO statement**	**Marks % weightage**
CO-1	Use language functions for basic conversation, descriptions and Introduce themselves	20%
CO-2	Understand basic spoken conversations and longer discourse	10%
CO-3	Read and understand simple texts	10%
CO-4	Write formal letters to seek permission, leave and apology and write simple paragraphs	20%

CO-5	Write various formal and informal documents of day to day life	20%
CO-6	Use grammar effectively to make themselves competent Listener, Speaker, Reader and Writer by exposing to various set of situations	20%

List of Open Source Software: Books / Audio Visual Course Recommended

- Learn English Teens – (20 episodesBritish Council)
- Spoken English— D Sasikumar and PV Dhamija. (With Audio Cassette) (Tata Mcgraw Hill Publication Ltd, New Delhi) (Units 1-13)

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SRICT Institute of Science & Research

As Per National Education Policy 2020 (NEP 2020)
Bachelor of Science
Course Code: AEC301-2C
Course Name: English and Communication Skills
Semester: III/IV

w.e.f. July 2024

Type of course: Ability Enhance Course

Prerequisite: Zeal to learn the subject

Rationale: At the end of the course, students will have knowledge of English language. It also targets the understanding of grammar, focusing on comprehension, and reading, speaking and writing skills. This would be developed through balanced and integrated tasks.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks		Total Marks
L	T	P	C	CCE Marks	SSE Marks	
1	1	-	2	25	25	50

Contents:

Sr. No.	Content	Total Hrs.
	SECTION-A	
1	**Basics of Communication** • Definitions Communication, • The Process of Communication • Flow of Communication- Downward, Upward, Horizontal and Diagonal. • Barriers in Communication: Language Barrier, Cultural Barrier, Gender Barrier, Attitudinal Barrier and Psychological Barrier. • Some Remedies to overcome Barriers • Difference between General and Scientific Communication	**8**
2	**Non-Verbal Communication** • Kinesics • Proxemics • Paralinguistic features • Chronemics and Haptics	**7**

SECTION-B		
3	**Basic of Listening Skills** • Introduction • Listening v/s Hearing • Poor Listening v/s Effective Listening • Advantages of Effective Listening • Techniques/tips for Effective Listening • Listening Practice	**8**
4	**Basics of Reading Skills** • Introduction to Reading • Reading Speed • Benefits of Effective Reading • Four Basic Steps to Effective Reading • Types of Reading: Skimming, Scanning, Extensive Reading, Intensive Reading • Reading Comprehension Practice (Different type of passages- Science/Business/Literary)	**7**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (%)					
R Level	U Level	A Level	N Level	E Level	C Level
25	**30**	**10**	**15**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate

C: Create and above Levels (Revised Bloom's Taxonomy)

Text Book:

Communication Skills By Sanjay Kumar, Pushpalata 1st Edition, 2011 (OUP)

Reference Books:

1. Basic Communication Skills for Technology, Andreja. J. Ruther Ford, Pearson Education, 2nd Edition, 2011.
2. Developing Soft Skills, Sherfield, Montegomery and Moody, Pearson, 4th Edition, 2015.
3. Remedial English Grammar, F.T. Wood, Macmillan, 4th Edition, 2007.

Course Outcomes:

After completing this course, students will be able to;

Sr. No.	CO statement	Marks % weightage
CO-1	The students will be able to form correct sentences in English by acquiring basic competence in grammar	20%
CO-2	Analyze grammar effectively to make themselves competent Listener,	20%

	Speaker, Reader and Writer by exposing to variousset of situations	
CO-3	The students will feel confident enough to listen to and read English for everyday communication needs.	10%
CO-4	Apply the dynamics of various rules of grammar and check its validation while they speak and write language correctly.	20%
CO-5	List ideas using various forms of vocabulary in variedsituations in oral and written communication	20%
CO-6	The students will be able to access information in English necessary for academic, personal and professional development.	10%

List of Open Source Software/learning website:

- Website: English GUETA
- Android App/iPhone App of English GUETA
- YouTube Channel of English GUETA

UPL University of Sustainable Technology

SRICT Institute of Science & Research

As Per National Education Policy 2020 (NEP 2020)

Bachelor of Science
Course Code: AEC302-2C
Course Name: Developing Fluency and Clarity in English
Semester: III/IV

w.e.f.: July 2024

Type of course: Ability Enhance Course

Prerequisite: Zeal to learn the subject

Rationale: At the end of the course, this paper teaches students the skills in the front desk Management. It introduces them to business English.

Teaching and Examination Scheme:

Credits				Examination Marks		Total Marks
L	T	P	C	CCE Marks	SSE Marks	
1	1	-	2	25	25	50

Contents:

Sr. No.	Content	Total Hrs.
	SECTION-A	
1	**UNIT: 1 English for Front Desk Management** 1. Greeting, Welcoming 2. Dealing with complaints, giving instructions or directions 3. Giving information: About Various Facilities, Distance, Area, Local Specialties, 4. Consultation and Solution of Problems 5. Accepting Praises and Criticism, Apologizing.	**8**
2	**UNIT: 2 Fluency and Etiquette** 1. Polite sentences and Words 2. Use of Persuading words 3. Intonation and Voice Modulation 4. Developing Vocabulary.	**7**
	SECTION-B	
3	**UNIT: 3 Business Speeches** 1. Principles of Effective Speech and Presentations 2. Speeches: Introduction, Vote of Thanks, Occasional Speech, Theme Speech 3. Use of Audio- Visual Aids in Presentations	**7**
4	**UNIT: 4 Cross-Cultural Communication** 1. Dealing with Language Differences 2. Probing Questions to get information 3. Etiquette in Cross-cultural Communication	**8**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (%)					
R Level	U Level	A Level	N Level	E Level	C Level
25	**30**	**10**	**15**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate

C: Create and above Levels (Revised Bloom's Taxonomy)

Text Book:

1. Urmila *Rai* and S.M.*Rai, Effective Documentation & Presentation,* Himalaya Publishing house, Mumbai, 2009.

Reference Books:

1. J. V. Vilanilam. More Effective Communication: A Manual for Professionals, New Delhi, Sage Publications, 2000.
2. R S N Pillai & Bagavathi, Modern Commercial Correspondence,, S Chand & Co, 2008.
3. Reuben Ray, Communication Today, Himalaya Publishing House, Mumbai, 2015.
4. Raymond Lesikar, Business Communication: Making Connections in a Digital World, 11th Edition, AITBS – Publishers Delhi, 2017.
5. Sushil Bahl, Business Communication Today, New Delhi: Response Books, 1996.
6. Ron Ludlow, Fergus Panton, The Essence of Effective Communication, Prentice Hall, New York, 1992.
7. Pradhan, Bhende & Thakur, Business Communication, 5th Edition, Himalaya Publishing House, 2008.
8. N Krishnaswamy, Lalitha Krishnaswamy and others, Mastering Communication Skills and Soft Skills, Bloomsbury, New Delhi, 2015.
9. Krishna Mohan, Meera Banerji, Developing Communication Skills, Macmillan India Limited, 2000

Course Outcomes:

After completing this course, students will be able to;

Sr. No.	CO statement	Marks % weightage
CO-1	Recollect day to day communication at different places.	20%
CO-2	Express your thoughts and views to others.	15%
CO-3	Develop public speaking skills.	15%
CO-4	Distinguish between general communication and corporate communication.	20%
CO-5	Organize speech so one can easily understand.	10%
CO-6	Convince other to work together in corporate world.	20%

List of Open Source Software/learning website:

- **http://www.english-online.org.uk/**

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SRICT Institute of Science & Research

As Per National Education Policy 2020 (NEP 2020)
Bachelor of Science
Course Code: SEC300-2C
Course Name: Stress Management
Semester: III/IV

w.e.f.- July 2024

Type of Course: SEC Course

Prerequisite: Should be well aware of importance of mental health.

Rationale:

Students will have a better understanding of the effects and ramifications of stress on their work after completing this course. Through stress reduction, students can learn how to manage work-life balance and get ready for a better future.

Teaching and Examination Scheme:

Credits				Examination Marks		Total Marks
L	T	P	Total	CCE Marks	SSE Marks	
1	1	-	2	25	25	50

Contents

Sr. No.	Content	Total Hrs.
	SECTION-A	
1	**Meaning and nature of stress:** Difference between eustress and distress; Frustration, conflict and pressure; Meaning of stressors; common stressors at work place: Stressors unique to age and gender.	**7**
2	**Cognitive appraisal of stress:** General adaptation to stress; Consequences of stress; Physiological and psychological changes associated with the stress response. Stress and Memory; Stress and Other Cognitive Variables; Stressful environmental conditions on performance.	**8**
	SECTION-B	
3	**Strategies of Stress Management:** Prevention of Stress Challenging Stressful Thinking; Problem Solving; Emotional and cognitive coping styles; Strategies of Synthesis and Prevention; Resilience and Stress; Optimal functioning; Making changes last; Small changes and large rewards	**7**
4	**Preparing for the Future:** Care of the Self: Nutrition and Other Lifestyle Issues: Stress reduction practices: Time management; Exercise; Relaxation techniques; yoga; meditation.	**8**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (%)					
R Level	U Level	A Level	N Level	E Level	C Level
25	**30**	**10**	**15**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

References:

1. Clayton,M, Brilliant stressmanagement How to manage stress in any situation's 1st edition, Greart Britain Pearson Education
2. Cooper C.,& Palmer.S Conquer Your Stress, London: Institute of personal development Universities Press
3. Dutta P.K. Stress management Himalaya, Himalaya Publishing House
4. Lee K. ; Reset: Make the Most of Your Stress: Your 24-7 Plan for Well-being. Universe Publishing
5. Ogden.J, Health Psychology 2nd edition Philadelphia, Open University press
6. Olpin, M. & Hesson M. Stress Management for Life: A Research-Based Experiential Approach. 4th edition. Wadsworth Publishing.

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	To understand the nature and consequences of stress	20%
CO-2	To understand the impact of stress on work	15%
CO-3	understand the cognitive variables of stress	15%
CO-4	To recognize the stressors, adaptive and maladaptive behaviour	20%
CO-5	To learn managing work-life balance	10%
CO-6	Prepare themselves for better future by reducing the stress.	20%

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SRICT Institute of Science & Research

As Per National Education Policy 2020 (NEP 2020)

Bachelor of Science

Course Code: SEC301-2C

Course Name: Entrepreneurship Skills

Semester: III/IV

w.e.f.- July 2024

Type of Course: SEC Course

Prerequisite: Understanding of skills as major contributors to self-development.

Rationale:

After studying this course, students will be able to identify their entrepreneurial potential Students will be able to understand the process of setting up entrepreneurial ventures and learn general management skills that are important for the successful launch of a new venture.

Teaching and Examination Scheme:

Credits				Examination Marks		Total Marks
L	T	P	Total	CCE Marks	SSE Marks	
1	1	-	2	25	25	50

Contents:

Sr. No.	Content	Total Hrs.
	SECTION-A	
1	**Introduction** Concept, knowledge and skills requirement; characteristics of successful entrepreneurs; role of entrepreneurship in economic development; entrepreneurship process; factors impacting emergence of entrepreneurship	**7**
2	**Starting the venture** Generating business idea – sources of new ideas, methods of generating ideas, opportunity recognition; environmental scanning, competitor and industry analysis; feasibility study – market feasibility, technical/operational feasibility, financial feasibility: drawing business plan, start ups.	**8**
	SECTION-B	
3	**Functional plans** Marketing plan – marketing research for the new venture, steps in preparing marketing plan, contingency planning; organizational plan – form of ownership, designing organization structure; financial plan – cash budget, working capital	**7**
4	**Sources of finance** Debt or equity financing, commercial banks, venture capital; financial institutions supporting entrepreneurs; legal issues – intellectual property rights patents,	**8**

	trademarks, copyrights, trade secrets, licensing.	

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (%)					
R Level	U Level	A Level	N Level	E Level	C Level
25	**30**	**10**	**15**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate

C: Create and above Levels (Revised Bloom's Taxonomy)

References:

1. Entrepreneurship, Hisrich, Robert D., Michael Peters and Dean Shephered, Tata McGraw Hill, New Delhi
2. Entrepreneurship, Barringer, Brace R., and R. Duane Ireland, Pearson Prentice Hall, New Jersy
3. Entrepreneurship, Lall, Madhurima, and Shikha Sahai, Excel Books, New Delhi
4. Entrepreneurship Development and Small Business - Charantimath, Poornima, Pearson Education, New Delhi
5. Entrepreneurship, Kuratko, Donand and Richard Hodgetts, Cengage Learning India Pvt. Ltd., New Delhi.

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	To introduce the students to the entrepreneurship as a mindset.	20%
CO-2	Develop entrepreneurial skills by giving an overview of the capabilities that are needed to become an entrepreneur.	15%
CO-3	Understand the process of setting up entrepreneurial ventures	15%
CO-4	Learn general management skills	20%
CO-5	To develop a keen insight in the students for identifying viable disruptive business opportunities	10%
CO-6	Effectively manage ventures.	20%

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SRICT Institute of Science & Research

As Per National Education Policy 2020 (NEP 2020)

Bachelor of Science

Course Code: SEC302-2C

Course Name: Team Skills

Semester: III/IV

w.e.f.- July 2024

Type of Course: SEC Course

Prerequisite: Knowing of team work to be the source of consolidated and completed task.

Rationale:

After studying this course, students will be understand the significance of team skills. They can design, develop and adapt to situations as an individual and as a team too.

Teaching and Examination Scheme:

Credits				Examination Marks		Total Marks
L	T	P	Total	CCE Marks	SSE Marks	
1	1	-	2	25	25	50

Contents:

Sr. No.	Content	Total Hrs.
	SECTION-A	
1	**Team Building:** Developing team and team work, roles of leader and team members, skill development and application, traits and essential skills for teambuilding, common pitfalls in teams, advantages of teamwork	**7**
2	**Listening as team skill:** Advantages of effective listening, listening as team member and team leader, use of active listening strategies to encourage sharing of ideas, use empathy, listen to tone and voice modulation, recapitulate points etc.	**8**
	SECTION-B	
3	**Social and Cultural Etiquette:** Need for etiquette like impression, image, earn respect, appreciation etc. Aspects of social and cultural/corporate etiquette in promoting teamwork, importance of time, place, propriety and adaptability to diverse cultures.	**7**
4	**Trust and collaboration:** Explain the importance of trust in creating collaborative team, agree to disagree and disagree to agree- spirit of team work, understanding fear of being judged and	**8**

	strategies to overcome fear.	

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (%)					
R Level	U Level	A Level	N Level	E Level	C Level
25	**30**	**10**	**15**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate

C: Create and above Levels (Revised Bloom's Taxonomy)

References:

1. The 17 Indisputable Laws of Teamwork: Embrace Them and Empower Your Team by John C Maxwell.
2. The Five Dysfunctions of a Team: A Leadership Fable by Patrick Lencioni.
3. Crucial Conversations: Tools for Talking When Stakes are high by Kerry Patterson, Joseph Grenny, et al.
4. Talking to Strangers: What We Should Know about the People We Don't Know by Malcolm Gladwell.
5. Team of Teams: New Rules of Engagement for a Complex World by Stanley McChrystal, Tantum Collins, et al.

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % Weightage
CO-1	Appreciate team skills as leader	20%
CO-2	Engage effective communication by respecting diversity learn to build team	15%
CO-3	Embracing good listening skills	15%
CO-4	Project a good personal image and social etiquette	20%
CO-5	Share new ideas in team and overcome fear	10%
CO-6	How to create collaborative team and work effectively	20%

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SRICT Institute of Science & Research

As Per National Education Policy 2020 (NEP 2020)
Bachelor of Science
Course Code: VAC300-2C
Course Name: Indigenous Science and Technology (IKS-II)
Semester: III

w.e.f.- July 2024

Type of Course: Value added course

Prerequisite: Should have fundamental knowledge of ancient Indian practices developed by Indians over the centuries.

Rationale:

At the end of the course, students are expected understand the concepts of the ancient Indian practices in science developed by Indians over the centuries. Students can able to understand the contributions of ancient and medieval Indians in the area of chemistry and metallurgy, ecology and environment.

Teaching and Examination Scheme:

Credits				Examination Marks		Total Marks
L	T	P	Total	CCE Marks	SSE Marks	
2	-	-	2	25	25	50

Contents:

Sr. No.	Content	Total Hrs.
	SECTION-A	
1	**Fundamentals of technological innovations & Astronomy** An overview of Indian contributions to technology, technological Innovations. Weaving Mathematics into Beautiful Poetry- *Bhaskaracarya*. The Evolution of Sine Function in India, Vedanga Jyotish & Measuring Time & Calendar	**7**
2	**Metallurgy, Textile Chemistry & Pyro Technology** Copper/Bronze/Zinc: Important Mines (*Zawar*, *Khetri* mines), Iron and Wootz Steel Technology Textile and Dyeing - Indian Specialities (Kutchi Embroidery, Cotton Textile etc.), Ceramic Technology, Stone (Lapidary), Shell, Ivory, Faience & Glass Technology	**8**
	SECTION-B	
3	**Water Management & Transportation**	**7**

	Harappan and traditional water management system of Gujarat, historical sites-Sringeverpur, South Indian Water Management System, Western Ghats Cave-Kanheri, etc., Modes of Transportations and Reforms, Grand Trunk Road, (*Uttarapath & Dakshinapath*), Boat & Ship Building	
4	**Ecology, Environment & India's Contribution to the World** *Nakshatrara Gyaan* and Agriculture, Forest Management and Urban Planning, agroforestry, tank, lakes, and stepwells. Zinc smelting, idea of zero, binary number, medicine, rocket, shampoo etc.	**8**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (%)					
R Level	U Level	A Level	N Level	E Level	C Level
25	**30**	**10**	**15**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate

C: Create and above Levels (Revised Bloom's Taxonomy)

References:

1. R.M. Pujari, Pradeep Kolhe, N. R. Kumar, 'Pride of India: A Glimpse into India's Scientific Heritage', Samskrita Bharati Publication.
2. 'Indian Contribution to science', compiled by Vijnana Bharati. 'Knowledge traditions and practices of India', Kapil Kapoor, Michel Danino, CBSE, India.
3. Bibhuti bhushan Datta, Ancient Hindu Geometry: The Science of the Śulba, 1932, repr. Cosmo Publications, New Delhi, 1993
4. Bibhuti bhushan Datta & Avadhesh Narayan Singh, History of Hindu Mathematics, 1935, repr. Bharatiya Kala Prakashan, Delhi, 2004
5. R. Balasubramaniam, Marvels of Indian Iron through the Ages, Rupa & Infinity Foundation, New Delhi, 2008
6. Anil Agarwal & Sunita Narain, (eds), Dying Wisdom: Rise, Fall and Potential of India's Traditional Water-Harvesting Systems, Centre for Science and Environment, New Delhi, 1997

After completing this course, student will be able to

Sr. No.	**CO statement**	**Marks % weightage**
CO-1	Describe the concepts of Indian Science and Technology and astronomy	20%
CO-2	Summarize various developments in Metallurgy, Textile Chemistry	15%
CO-3		15%
CO-4	Discuss development In Water Management	20%
CO-5	Discuss the developments in the Transportation	10%
CO-6	Demonstrate the ecology and environments with India's contribution to world	20%

List of Open-Source Software/learning website:

1. https://iksindia.org/
2.
3. https://margheritacollege.in/admin_portal/all_mrgclg_files/department_studymat/History%20of%20science%20and%20technology%20in%20India9577.pdf
4. https://avadicrpf.kvs.ac.in/sites/default/files/582171867vvm.pdf

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SRICT Institute of Science & Research

B.Sc (Hons) - CHEMISTRY
B.Sc. SEM IV
Teaching/Exam Scheme
(As per NEP-2020)

w.e.f.: July-2024

No.	Course Code	Category of course	Course title	Hours Per week			Tot. hrs	Cr edit	CCE	SEE	Total Marks
				L	T	P					
1	CHM303-2C	Major	Chemistry of Oxygen & Nitrogen containing compounds	4	-	-	4	4	50	50	100
2	CHM304-2C	Major	Thermodynamics and Chemical Kinetics	4	-	-	4	4	50	50	100
3	CHM305-2C	Major	Practicals in Chemistry-II	-	-	8	8	4	50	50	100
4	CHE300-2C	Minor	Solid State Physics and Basic Electronics	3	-	2	5	4	50	50	100
5	AEC300-2C	AEC	Introduction to Functional English	2	-	-	2	2	25	25	50
	AEC301-2C	AEC	English and Communications	2	-	-	2	2	25	25	50
	AEC302-2C	AEC	Developing Fluency and Clarity in English	2	-	-	2	2	25	25	50
6	SEC300-2C	SEC	Stress Management	2	-	-	2	2	25	25	50
	SEC301-C	SEC	Entrepreneurship Skills	2	-	-	2	2	25	25	50
	SEC302-2C	SEC	Team Skills	2	-	-	2	2	25	25	50
7	VAC301-2C	VAC	Swachh Bharat	1	-	2	2	2	25	25	50
	VAC302-2C	VAC	National Cadet Crops	-	-	4	4	2	25	25	50
	VAC303-2C	VAC	National Social Service	-	-	4	4	2	25	25	50
			Total	16	-	12/14					

- CCE - Continuous and Comprehensive Evaluation.
- SEE – Semester End Evaluation.

Ability Enhance Course (AEC)	1. AEC300-2C : Introduction to Functional English 2. AEC301-2C : English and Communications 3. AEC302-2C : Developing Fluency and Clarity in English
Skill Enhancement Courses (SEC)	1. SEC300-2C: Stress Management 2. SEC301-2C: Entrepreneurship Skills 3. SEC302-2C: Team Skills
Value Added Courses (VAC)	1. VAC301-2C : Swachh Bharat 2. VAC302-2C : National Cadet Crops 3. VAC303-2C : National Social Service

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SRICT Institute of Science & Research

As Per National Education Policy 2020 (NEP 2020)
Bachelor of Science
Course Code: CHM303-2C
Course Name: Chemistry of Oxygen & Nitrogen containing compounds
Semester: IV

w.e.f.: July 2024

Type of Course: Major Course

Prerequisite:

Should have fundamental knowledge of organic chemistry and its related concepts.

Rationale: At the end of the course, students will have knowledge about chemistry of alcohol, phenol, ether and epoxides. They will be able to acquire concepts of various name reactions involving carbonyl compounds and carboxylic acid derivatives.

Teaching and Examination Scheme:

Credits				Examination Marks		Total Marks
L	T	P	Total	CCE Marks	SSE Marks	
3	1	-	4	50	50	100

Sr. No.	Content	Total Hrs.
	SECTION-A	
1	**Alcohols** Alcohols: Preparation, properties and relative reactivity of 1°, 2° and 3° alcohols, Bouvaelt-Blanc Reduction, Preparation and properties of glycols, oxidation by periodic acid and lead tetraacetate, Pinacol-Pinacolone rearrangement.	**9**
2	**Phenols, Ethers and Epoxides** Phenols: Preparation and properties, acidity and factors effecting it, ring substitution reactions, Reimer-Tiemann and Kolbe's–Schmidt reactions, Fries and Claisen rearrangements with mechanism. Ethers and Epoxides: Preparation and reactions with acids. reactions of epoxides with alcohols, ammonia derivatives and $LiAlH_4$.	**12**
3	**Carbonyl compounds** Structure, reactivity and preparation, mechanisms of Aldol and Benzoin condensation, Knoevenagel condensation, Claisan-Schmidt, Perkin, Cannizzaro	**12**

	reactions, Beckmann and Benzil-Benzilic acid rearrangements, Baeyer Villiger oxidation. Substitution reactions, oxidations and reductions (Clemmensen, Wolff-Kishner, $LiAlH_4$, $NaBH_4$), addition reactions of unsaturated carbonyl compounds.	
	SECTION-B	
4	**Carboxylic acids and their derivatives** Preparation, physical properties and reactions of monocarboxylic acids, dicarboxylic acids, hydroxy acids and unsaturated acids: Preparation and reactions of acid chlorides, anhydrides, esters and amides, Mechanism of acidic and alkaline hydrolysis of esters, Claisen condensation, Dieckmann and Reformatsky reactions and Curtius rearrangement.	**9**
5	**Nitroalkanes, Diazoalkanes and Azides** Nomenclature, Isomerism, Structure, Preparation, physical properties and chemical reactions of nitroalkanes, Application of Nitroalkanes, Distinguish Nitroalkane and alkyl nitrites, Introduction to Diazoalkanes, Structure of Diazomethane, Physical properties of Diazomethane, Synthesis of Diazomethane, Azide, Structure of Azide, Physical properties of Azide, Synthesis of Azide.	**9**
6	**Amines** Aliphatic and aromatic amines: Classification, Nomenclature, Isomerism, Structure, Methods of preparation of primary, secondary and tertiary amines, how to separate mixtures of amines, Physical and chemical properties of amine. Physical and chemical properties of amine, Reactions involving the benzene ring (Bromination, Nitration, Sulphonation).	**9**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
25	**30**	**10**	**15**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E:Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Text Books:

1. Greeves, N.; Clayden, J.; Warren, S., Organic Chemistry, 2nd edition, Oxford University Press India (2014).
2. Ghosh, S. K., Advanced General Organic Chemistry, Part-I & Part-II, 3rd edition, New Central Book Agency (2010).
3. Bahl, B. S.; Bahl, A., A Textbook of Organic Chemistry, 22nd edition, S. Chand and Company (2016).
4. Sengupta, S., Basic Stereochemistry of Organic Molecules, 2nd edition, Oxford University Press India (2018).

5. Morrison, R. T. & Boyd, R. N. Organic Chemistry, 7th edition, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education) (2010).
6. Finar, I. L. Organic Chemistry (Volume 1), 4th edition, Dorling Kindersley (India) Pvt. Ltd., Pearson Education (1964).

Reference Books:

1. Graham Solomons, T.W. Organic Chemistry, 12th edition John Wiley & Sons, Inc., (2017).
2. Sykes, P., A Guidebook to Mechanism in Organic Chemistry, 6th edition, Pearson Education India (2003).

Course Outcomes:

After completing this course, students will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Describe various phenomenon and aspects of alcohols	15%
CO-2	Discuss the concepts and chemistry of phenols, ethers and epoxides	20%
CO-3	Define and understand the basic concepts of carbonyl compounds	20%
CO-4	Define and understand various named organic reactions associated with carboxylic acid group.	15%
CO-5	Define and understand concepts of Nitroalkanes, Diazoalkanes and Azides	15%
CO-6	Outline the chemistry of Amines	15%

List of Open Source Software/learning website:

- https://uou.ac.in/sites/default/files/slm/BSCCH-202.pdf
- https://www.vedantu.com/jee-main/chemistry-organic-compounds-containing-oxygen revision-notes
- https://ncert.nic.in/ncerts/l/lech203.pdf
- https://learn.careers360.com/chemistry/organic-compounds-containing-oxygen-chapter/
- https://wou.edu/chemistry/courses/online-chemistry-textbooks/ch105-consumer-chemistry/ch105-chapter-9-organic-compounds-oxygen/
- https://unacademy.com/content/jee/study-material/chemistry/organic-compounds-containing-oxygen/

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As Per National Education Policy 2020 (NEP 2020)
Bachelor of Science
Course Code: CHM304-2C
Course Name: Thermodynamics and Chemical Kinetics
Semester: IV

w.e.f.: July 2024

Type of Course: Major course

Prerequisite: Should have fundamental knowledge of general chemistry.

Rationale: At the end of the course students will have knowledge various laws of Thermodynamics, different states of matter, solid state, physical constitution, solutions.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks		Total Marks
L	T	P	C	CCE Marks	SEE Marks	
3	1	-	4	50	50	100

Contents:

Sr. No.	Content	Total Hrs.
	SECTION-A	
1	**Thermodynamics-I** Thermodynamic Terms : System, Boundary, Surroundings, Homogeneous and Heterogeneous Systems, Types of Thermodynamic Systems, Intensive and Extensive Properties, State of a System, Equilibrium and Nonequilibrium States, Thermodynamic Processes, Reversible and Irreversible Processes, Nature of Heat and Work, Internal Energy, Units of Internal Energy, Zeroth Law and First law of thermodynamics	**12**
2	**Thermochemistry:** Enthalpy of a Reaction, Exothermic and Endothermic Reactions, Thermochemical Equations, Heat of Reaction or Enthalpy of Reaction, Heat of Combustion, Heat of Solution, Heat of Neutralisation, Energy Changes During Transitions or Phase Changes, Heat of Fusion, Heat of Vaporisation, Heat of Sublimation, Heat of Transition.	**09**
3	**Thermodynamics-II:** Spontaneous Processes, Entropy, Third Law of Thermodynamics, Numerical Definition of Entropy, Units of Entropy, Standard Entropy, Standard Entropy of	**12**

	Formation, Carnot Cycle, Derivation of Entropy from Carnot Cycle, Physical Significance of Entropy, Entropy Change for an Ideal Gas, Entropy Change	
	SECTION-B	
4	**Third Law of Thermodynamics:** Nernst heat theorem, Third law of thermodynamics, Determination of absolute entropies, Experimental verification of the third law, Entropies of real gases, Entropy changes in chemical reactions.	**09**
5	**Chemical Kinetics-I** Experimental methods for studying kinetics of reactions, Rate of reactions, Rate law and the rate constant, Order of a reaction, Units of rate constant, Integration of rate expressions, first order reactions, second order reactions, third order reactions, zero order reactions, Half life time of a reactions.	**09**
6	**Chemical Kinetics-II** Methods of determining order of a reaction, Order and Molecularity of reactions, mechanisms of complex reactions, collisions, Effect of temperature on reaction rates, Effect of a catalyst, Arrhenius equation, Theories of reaction rates, Collision theory of bimolecular gaseous reactions, activated complex theory of bimolecular gaseous reactions.	**09**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
25	**30**	**10**	**15**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E:Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Text Books:

1. Textbook of Physical Chemistry, P. L. Soni, O. P. Dharmarha, U. N. Dash, Sultan Chand & Sons, 2023.
2. Principles of Physical Chemistry, Puri, Sharma, Pathania, Vishal Publishing House, 2008.
3. Essentials of Physical Chemistry, Arun Bahl, B S Bahl, G D Tuli, S. Chand 2000.
4. Atkin's Physical Chemistry, 8th Edn., Peter Atkins, Julio de Paula, Oxford University Press, 2006.

Reference Books:

1. Physical Chemistry, 3rd Edn. Gilbert W. Castellan, 1983
2. Principles of Physical Chemistry, Samuel H. Maron & Carl F. Prutton, 4th Edn. Macmillan,1965.
3. Physical Chemistry – A Molecular Approacch, Donald A . McQuarrie, John D. Simon, Viva Books,1997.

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Recognize different terminologies of thermodynamics, Students will be aware of heat, work, energy.	20%
CO-2	Students will know about heat of reaction, heat of solution, energy of systems, endothermic reaction, and exothermic reactions.	15%
CO-3	Students will recognize entropy of reactions and 2nd Law of Thermodynamics.	20%
CO-4	Students will be able to understand 3rd law of thermodynamics and its applications.	15%
CO-5	Students will be able to write reactions rate equation and understand different rate law and integrated rate law equation, order of reactions.	15%
CO-6	Students will be able to understand unimolecular, bimolecular reactions, kinetics of opposing reaction, parallel reaction and consecutive reactions.	15%

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As Per National Education Policy 2020 (NEP 2020)
Bachelor of Science
Course Code: CHM305-2C
Course Name: Practicals in Chemistry-II
Semester: IV

w.e.f.: July 2024

Type of Course: Major course

Prerequisite: Should have fundamental knowledge glassware's and apparatus used in chemistry lab and organic compounds.

Rationale: At the end of the course students will have knowledge of separation of organic compounds as acid, base, phenol and neutral, functional group test and identification of organic compounds. Students will gain knowledge regarding experimental determination of order of reaction, measurement of rate constant, equilibrium constant and decomposition study.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks		Total Marks
L	T	P	C	CCE Marks	SEE Marks	
	-	8	4	50	50	100

Contents:

Sr. No.	Content	Total Hrs. 120
	SECTION-A: Organic Practicals	
	1. Qualitative analysis of organic binary mixtures bearing different functional groups as shown below. 1. Acid + Phenol 2. Acid + Phenol 3. Acid + Phenol 4. Acid + Phenol 5. Neutral + Acid 6. Base + Neutral 7. Alcohol + Neutral 8. Alcohol + Neutral	**60**

	2. Organic preparations: 9. Reduction of p-nitrobenzaldehyde/ m-nitrobenzaldehyde by sodium borohydride. 10. Benzil-Benzilic acid rearrangement. 11. Organic preparation - Allylation of Isatin. https://vlab.amrita.edu/?sub=2&brch=191&sim=607&cnt=2 12. Purification of compounds by crystallization https://vlab.amrita.edu/?sub=2&brch=191&sim=1547&cnt=2 13. Detection of elements: Lassaigne's Test https://vlab.amrita.edu/?sub=2&brch=191&sim=344&cnt=1	
SECTION-B: Physical Practicals		
	1. Investigate the reaction of hydrogen peroxide with potassium iodide and calculate its energy of activation. 2. Determine the equilibrium constant of the reaction of KI with Iodine by distribution method. 3. Determine the dissociation constant and strength of borax solution by pH metry. 4. To determine the rate constant of the saponification of ethyl acetate at different temperatures conductometrically and calculate the energy of activation of the reaction. 5. To determine the dissociation constant (Ka_1 and Ka_2) for a dibasic acid. 6. To study kinetics of decomposition of benzene diazonium chloride in the temperature range 60-90 ^oC. 7. To study kinetics of bromination of phenol by bromide-bromate mixture in an acid medium as a clock reaction. 8. **Determination of Viscosity of Organic Solvents** https://vlab.amrita.edu/?sub=2&brch=190&sim=339&cnt=1 9. **EMF measurement** https://vlab.amrita.edu/?sub=2&brch=190&sim=361&cnt=1 10. **Adsorption Isotherm** https://vlab.amrita.edu/?sub=2&brch=190&sim=606&cnt=1	**60**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
25	**30**	**10**	**15**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E:Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Reference Books:

1. Furniss, B. S.,Hannafold, A. J.,Smith, P. W. G., Tatchell, A. R., Vogel's Textbook of Practical Organic Chemistry, 5th Ed., Pearson Education India
2. Comprehensive Practical Organic Chemistry: Preparations and Quantitative Analysis,V K Ahluwalia & R. Aggarwal Universities Press.
3. An Advance Course in practical Chemistry, A K. Nad, B. Mahapatra and A. Ghoshal.Agarwal, O. P., Advanced Practical Organic Chemistry, Krishna Prakashan, Meerut (2014).
4. Ahluwalia, V. K.; Aggarwal, R., Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis, Universities Press (2000).
5. Clarke, H. T., A Handbook of Organic Analysis: Qualitative and Quantitative, 4th Ed., CBS Publishers India (2007).
6. Practical physical chemistry, Dr. M. Satish Kumar
7. Practical physical chemistry –J.B.Yadav.
8. Practicals in physical chemistry – P.S.Sindhu.
9. Experimental physical chemistry – R.C.Das, B.Behera.
10. Practical organic Chemistry – Mann and Saunders.

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Understand what organic qualitative analysis, preparation is.	10%
CO-2	Separate organic molecule on the basis of its type – acid, base, phenol and netural,	20%
CO-3	Find functional group in organic molecule, confirmatory test for organic molecule, melting point measurement and derivative	10%
CO-4	Know how to evaluate different thermodynamic parameter, reactions.	20%
CO-5	Determine dissociation constant of any reaction,	20%
CO-6	Evaluate rate constant of any reaction, study of kinetics of any decomposition	20%

Distribution of Practical Marks:

A Level	B Level	C Level	D Level
10	**15**	**15**	**10**

Legends: A= Conduction of Practical, B= Regular Record Writing, C= Viva –Voce, D= Understanding of Experiments

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As Per National Education Policy 2020 (NEP 2020)

Bachelor of Science

Course Code: CHE300-2C

Course Name: Solid State Physics and Basic Electronics

Semester: IV

w.e.f.: July 2024

Type of Course: Minor course

Prerequisite:

Should have fundamental knowledge of solids and electronics of elementary level

Rationale: This subject gives the knowledge of fundamental concepts and principles of crystal physics and basic electronics and aims at providing the students with basic understanding of crystallography, superconductivity and various types of diodes, transistors and amplifiers.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks		Total Marks
L	T	P	C	CCE Marks	SEE Marks	
3	-	1	4	50	50	100

Contents:

Sr. No.	Content	Total Hrs.
	SECTION-A	
1	**Crystal Physics:** Crystal lattice, The crystalline State: Crystalline, polycrystalline and glassy materials; Properties of solids, Crystallographic terms: space lattice, crystal lattice, basis, unit cell, primitive unit cell, Bravais lattice, Space lattices of cubic systems, Calculation of lattice constant, Miller indices, Distance of separation between successive hkl planes.	**12**
2	**X ray diffraction and defects:** X ray diffraction, Bragg's law, Experimental methods: Laue method, Powder crystal method and Rotating crystal method. Defects in solids, Point defects - Frenkel and Schottky defects, Line defects, Edge dislocation and Screw dislocation, Surface defects, Effects of Crystal imperfections.	**9**
3	**Superconductivity:** Introduction, General features of superconductors, Meissner effect, Types of superconductors, Penetration depth, Mechanism of superconductivity: BCS theory, Josephson junction and its applications, Applications of superconductor: cyclotron, SQUID, Superconducting magnets, Maglev etc	**9**

SECTION-B		
4	**Diodes:** P-N junction diode, Characteristics and Parameters, Diode approximations, DC load line analysis, Half-wave rectifier, Two-diode Full-wave rectifier, Bridge rectifier, Zener diode voltage regulators: Regulator circuit with no load, Loaded Regulator.	**9**
5	**Transistors:** Bipolar junction Transistor (BJTs): Physical Structures & Modes of Operation, Transistor Characteristics, DC analysis, Introduction to Small Signal Analysis, Transistor as an amplifier, The RC coupled amplifier, Introduction to Power Amplifiers, Transistor as switch. Field Effect Transistors (FETs).	**12**
6	**Amplifiers:** Classification of amplifiers based on Mode of operation (Class A, B, AB, and C & D), Stages (single & multi stage, cascade & cascade connections), and Coupling methods, Nature of amplification and Frequency capabilities. Theory & working of RC coupled voltage amplifier and transformer coupled power amplifier.	**9**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
25	**30**	**10**	**15**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E:Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Text Books:

1. Introduction to Solid State Physics, Kittel, Willey Eastern Ltd (2003).
2. Solid state Physics, Rita John, 1st edition, TataMcGraw Hill publishers (2014).
3. Solid State Physics, R L Singhal, Kedarnath Ram Nath& Co., Meerut (2003).
4. Principles of Electronics-V. K. Mehta & Rohit Mehta, S.Chand Publication, (2002).

Reference Books:

1. Solid State Physics, S.O.Pillai, New Age International (P) Ltd., (2002).
2. Solid State Physics, A. J. Dekker, Macmillan India (1985).
3. Solid State Physics, HC Gupta, Vikas Publishing House Pvt. Ltd., New Delhi (2001).
4. Basic Electronics, B. L. Thareja, S.Chand Publication, (2005)
5. Electronics Fundamentals and Applications, D Chattopadhyay and P.C. Rakshit, New Age International Publications. (2020)

List of Practicals:

1. To study and draw the characteristics of P-N junction diode.
2. To study and draw the characteristics of zener diode.

3. Measurement of inductance by Maxwell's Bridge.
4. To determine the inductance by Anderson's Bridge.
5. To determine the self-inductance of a coil by Owen's bridge.
6. To determine the dielectric constant of a given liquid by Schering bridge.
7. To Study half wave and full wave rectifier.
8. https://vlab.amrita.edu/?sub=1&brch=282&sim=370&cnt=1
9. https://vlab.amrita.edu/?sub=1&brch=282&sim=879&cnt=1
10. https://vlab.amrita.edu/?sub=1&brch=282&sim=1512&cnt=1

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Understand the fundamental concepts of crystallography	20%
CO-2	Comprehend the x ray diffraction methods and difference between various defects	15%
CO-3	Explain phenomenon based on superconductivity and its applications	15%
CO-4	Analyze the different type of diodes and rectifiers	15%
CO-5	Discuss the types of transistors	20%
CO-6	Understand the fundamentals of amplifiers and its classification	15%

List of Open-Source Software/learning website:

- NPTEL
- MIT Open Learning - Massachusetts Institute of Technology, https://openlearning.mit.edu
- National Programme on Technology Enhanced Learning www.youtube.com/user/nptelhrd
- Hyper Physics; http://hyperphysics.phy-astr.gsu.edu/hbase/index.html

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As Per National Education Policy 2020 (NEP 2020)

Bachelor of Science (Hons) - Chemistry

Course Code: VAC301-2C

Course Name: Swachh Bharat

Semester: IV

w.e.f.: July 2024

Type of course: Value Added Course

Prerequisite: Should have fundamental knowledge of importance of cleanliness and hygiene both at the personal level and in our surroundings.

Rationale: At the end of the course, students are expected understand the concepts of the developmental challenges with reference to sanitation infrastructure and practices to build values of cleanliness, hygiene and waste management in diverse socioeconomic contexts. Students are expected understand the concepts of planning of social policy and programmes to use waste management techniques at community level and instil a sense of service towards society and the Nation.

Teaching and Examination Scheme:

Credits				Examination Marks		Total Marks
L	T	P	C	CCE Marks	SSE Marks	
1	-	2	2	25	25	50

Contents:

Sr. No.	Content	Total Hours
	SECTION - A	
1	**Introduction to Swachh Bharat Abhiyan** Gandhian philosophy of Cleanliness, Swachh Bharat Abhiyan (SBA), Hygiene, Sanitation & Sustainable Waste Management, Agencies and nodal Ministries for SBA, Different phases of the SBA and its evaluation, Citizens' Responsibilities: Role of Swacchagrahi.	**8**
2	**Swachh Bharat: Rural Facets** Indicators for Swachh Bharat, i. Sanitation coverage across households (2014 vs. 2022), ii. Open Defecation Free (ODF) Villages: Parameters, iii. ODF plus model: Key indicators	**7**
	SECTION - B	

3	**Swachh Bharat: Urban Facets** i. Sustainable sanitation, ii. Waste/water and solid waste management, iii. Garbage Free Cities	**8**
4	**Prospects and Challenges** Attitudes and Perceptions, Operational and Financial issues, Monitoring & Supervision, Community Mobilization	**7**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (%)					
R Level	U Level	A Level	N Level	E Level	C Level
20	**25**	**25**	**10**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate

C: Create and above Levels (Revised Bloom's Taxonomy)

Reference Books:

1. E book on rural sanitation and drinking water, Ministry of drinking water and sanitation, GoI, 1st Edition, 2014.
2. Ch. Srinivasa Rao, S.K. Soam, R.V.S. Rao, V. Murali, M.A. Basith, P. Vijender Reddy, Laxman M. Ahir, Swachh Bharat Abhiyan at ICAR-NAARM, ISBN: 978-81-933781-3-7, 2018.
3. Clean India: Clean Schools- A Handbook- A National Mission, MHRD, Gov of India, 2016.

Text Books:

1. Rudresh kumar Sugam, Sonali Mittra, Arunabha Ghosh, Kachra Mukt, Shouchalaya Yukt Bharat, Council on Energy, Environment and Water, 2014.
2. L. C. De, Swachh Bharat, Aavishkakr Publishers Distributors, ISBN: 978-81-944464-8-6, 2019.

Course Outcomes:

After completing this course, student will be able to

Sr. No.	**CO statement**	**Marks % weightage**
CO-1	Understanding the significance of the Swachh Bharat Abhiyan.	20%
CO-2	Ability to analyse and predict the sanitation challenges of India	15%
CO-3	Sanitation and Hygeine	15%
CO-4	Determine the link between sanitation and development.	20%
CO-5	Contribute to the Swachh Bharat Abhiyan through real time projects/	10%
CO-6	Contribute to the Swachh Bharat Abhiyan through fieldwork.	20%

List of Open-Source Software/learning website:

1. "Swachh Bharat Mission - Gramin, Department of Drinking Water and Sanitation,
2. Ministry of Jal Shakti"
3. India 2021, Ministry of Information & Broadcasting
4. http://swachhbharatmission.gov.in/SBMCMS/swachhta-pakhwada.htm
5. https ://swachhbharatm ission.gov. in/SBMCMS/a bout-us. Htm
6. https://swachhbharatmission.gov.in/sbmcms/writereaddata/Portal/Images/pdf/3yearsbook.pdf
7. https://swachhbharatmission.gov.in/SBMCMS/writereaddata/Portal/Images/pdf/Swachhata-Sanskriti-Draft-G2-Small-Review-Copy.pdf

List of practicals:

Suggested Activities: List of activities to be undertaken:

1. Identify plastic and e-waste in and around the institution and suggest innovative technologies to minimize wastage.
2. Identify events/fests that generate maximum waste and ways to minimize it.
3. Visit canteen/shops and track the lifecycle of wet/dry waste in and around the institution and document the findings in the form of a Project Report.
4. Conduct interviews of stakeholders to understand the level of awareness.
5. Conduct a Clean Audit of the Institution and identify areas for action.
6. Conduct cleanliness drives.
7. Organise Swachhata Pakhwada meetings, rallies, and mobilization camps within the identified communities.
8. Students may participate in the Swachh Bharat Internship programme.
9. If required students can share their experiences in the form of a Project Report.
10. Any other Practical/Practice as decided from time to time.

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As Per National Education Policy 2020 (NEP 2020)

Bachelor of Science

Course Code: VAC302-2C

Course Name: National Cadet Corps

Semester: IV

w.e.f.: July 2024

Type of Course: Value Added Course

Prerequisite: Student must be an NCC cadet.

Rationale: This course is designed to inculcate unity and discipline in the students and orient student towards Army life.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks		Total Marks
L	T	P	C	CCE Marks	SEE Marks	
1	-	2	2	25	25	50

Contents:

Sr. No.	Content	Total Hrs.
	SECTION-A	
1	**NCC and National Integration & Awareness:** Aims and Objectives of NCC, Organization &Training, National Integration: Importance and Necessity, Freedom Struggle and Nationalist Movement in India, National Interests, Objectives, Threats and Opportunities, Unity in Diversity	**05**
2	**Drill:** Foot drill, Drill with arms, Ceremonial drill	**15**
	SECTION-B	
3	**Personality Development and Leadership:** Introduction to Personality Development, Self-Awareness - Know yourself/ Insight, Change your mind set, Interpersonal relationship and communication, Communication Skills, Types of Leadership, Time Management, Stress Management Skills, Sociability: Social Skills, Values / Code of Ethics	**05**
4	**Map reading:** Introduction to types of Maps and Conventional Signs, Scales & Grid System, Topographical forms and technical terms, Relief, Contours and Gradients, Cardinal points and Types of North, Types of bearings and use of Service Protractor, Prismatic compass and its use & GPS, Setting a Map, finding North and own position, Map to	**05**

	Ground, Ground to Map	

Text Books:

1. National Cadet Corps by R. Gupta, Ramesh Publishing House, New Delhi

Reference Books:

1. Cadet Hand Book (Army) by NCC, New Delhi

List of Practicals:

1. To instill a sense of national integration and awareness among NCC cadets
2. To develop discipline, coordination, and teamwork among NCC cadets through drill exercises
3. To enhance the overall personality and leadership qualities of NCC cadets
4. To impart skills in map reading and navigation to NCC cadets

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Analyze the role of NCC in fostering national unity and promoting a sense of patriotism among youth.	5%
CO-2	Develop a comprehensive understanding of the principles and significance of national integration.	15%
CO-3	Acquire proficiency in various drill commands and movements used in NCC training	30%
CO-4	Enhance self-awareness and self-confidence through structured personality development exercises	10%
CO-5	Apply leadership principles in practical scenarios, including organizing events, leading teams, and managing resources efficiently	10%
CO-6	Demonstrate practical skills in map reading through field exercises, orienteering activities, and navigation challenges	30%

List of Open-Source Software/learning website:

https://indiancc.nic.in/

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As Per National Education Policy 2020 (NEP 2020)

Bachelor of Science

Course Code: VAC303-2C

Course Name: National Service Scheme

Semester: IV

w.e.f.: July 2024

Type of Course: Value Added Course

Prerequisite: Students must be an NSS Volunteer

Rationale: This course aims primarily to inculcate the personal development and character of students and young individuals through voluntary community service.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks		Total Marks
L	T	P	C	CCE Marks	SEE Marks	
1	-	2	2	25	25	50

Contents:

Sr. No.	Content	Total Hrs.
	SECTION-A	
1	**Fundamental of NSS:** Introduction of NSS, Origin of NSS, AIMS & Objective of NSS,NSS MOTTO, NSS Emblem, NSS Day NSS Anthem & Motivational song • Uhte Samaj k Liye Uthe Uthe • Ham sab Mil kar Desh ko Apni • Hum Honge Kamyab Hum honge Kamyab	**8**
2	**Youth population in India and its characteristics** Introduction to India: Physical, socio-economic and demographic background, study of Indian population composition (Age composition), youth composition, youth policy importance of youth policy youth policy in India, NSS as youth organization.	**7**
	SECTION-B	
3	**Activity Based Program:** Shramdaan: Tree plantation, cleaning, Watering, Weeding, Any other activities, Swatchatha Programme, Visit and Conserving Ancient monuments and heritage site, Socio Economic Survey of Village/slum, Nature Camp, Environmental Education etc.	**7**

4	**Awareness Program:** Seminar, Workshop, celebration of national and international day, Personality development program, group activities, Women Empowerment Programme, Health Camps, Blood grouping awareness, Water Conservation Programme	**8**

Reference Books:

1. Prof. B.K. Shivanna, "National Service Scheme" Printing Press KSOU, Mysore 201 1
2. MadhuAhuja, Students Leaders in the National Service Scheme (NSSS) in Delhi : A case study 1986 (New·Delhi : Dept. of Management and Extension , Lady Irwin College, University of pelhi, 1986)
3. Chattarjee, B., Social serice opportu n ities for students in Slum Areas (reprint : Delhi
4. Delhi School of Social Work, U n iversity of Delhi 1973)
5. NSS Manual 2006, Ministry of youth Services and Sports, Govt. of Ind ia, New Delhi.

List of Practical:

1. To know the fundamental AIMS & Objective of NSS
2. To develop discipline, coordination, and teamwork among NSS volunteers during social activities.
3. To enhance the overall personality and leadership qualities of NSS Volunteers.
4. To impart the various awareness program, seminar and camps.

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	To understand the concept of National Service Scheme	5%
CO-2	To introduce the concept and importance of values and Ethics in youths	15%
CO-3	To motivate the NSS volunteers actively participate in community activities.	30%
CO-4	Know the organizational structure and its functions at national to Institutional level.	10%
CO-5	Learn the skills of critical thinking and Decision making	10%
CO-6	Appreciate the culture of Shramdaan and its benefits through working as a team or group.	30%

List of Open-Source Software/learning website:

https://nss.gov.in/mission-objectives