SIES (Nerul) College of Arts, Science and Commerce (Autonomous)

B.Sc (Environmental Sciences)

Sr. No.	Heading	Particulars
1	Title of the course	B.Sc (Environmental Sciences)
2	Eligibility for admission	HSC with PCB or PCM or Equivalent
3	Minimum percentage	40%
4	Semesters	I and II
5	Level	UG
6	Pattern	04 years & 08 semesters CBGS
7	To be implemented from	From Academic year 2023-24 in a progressive manner

SIES (Nerul) College of Arts, Science and Commerce (Autonomous)

(Affiliated to University of Mumbai)
RE-ACCREDITED GRADE "A" BY NAAC (3rd CYCLE)

BOARD OF STUDIES
SYLLABUS FOR
B.Sc. (Environmental Sciences)

(WITH EFFECT FROM THE ACADEMIC YEAR 2023-2024)

PROGRAMME OBJECTIVES:

1. To exploit opportunities in the Environmental Sciences.
2. To create better avenues for improving employability.
3. To provide exposure to new environmental sciences field
4. To enable increased industry academia interaction

PROGRAMME OUTCOMES:

1. At the end of the programme, students are able to expand through understanding in key areas in the subjects presented.
2. At the end of the programme student get trained to cater to the need for ecological citizenship through developing strong foundation on critical linkage between ecology-society-economy. .
3. At the end of the programme, learner will become aware of the importance of working with safety and consciousness in laboratory and actively pursue information about health and environmental safety of chemicals used.
4. At the end of the programme, learner will recognize the need of constant expertized improvement through lifelong lernung

SIES Nerul College of Arts, Science and Commerce (Autonomous)

B.Sc. Environmental Sciences Programme

(To be implemented from Academic Year- 2023-24)

No. of Courses	Course Code	Semester I	Credits
1	***Major***		
1	U23ES1MJ01	Environment and Ecosystem	**4**
2	***Minor***		
2	U23ES1MI01	Basic Chemistry-I	**4**
3	***Open Electives(OE)***		
4	U23ES1E01	Environment and Society	**4**
4	***VSC/SEC***		
6	U23ES1VSC01	Basics of Computers	**2**
7	U23ES1SEC01	Introduction to Good Laboratory Practices	**2**
5	***AEC/VEC/IKS***		
8	U23ES1AEC01	Effective Communication	**2**
9	U23ES1VEC01	Understanding Indian Society and Constitutional Values	**2**
10	U23ES1IKS01	India's Contribution to Mathematics since Ages	**2**
6	***OJT, FP, RP, CEP, CC***		
		Total Credits	**22**

Environment and Ecosystem

COURSE CODE: U23ES1MJ01 COURSE CREDIT: 04 (03 theory+01 practical)

1 credit - 15 lectures

1 lecture is 60 minutes

Course Objective: To explain the students with basic concepts of ecology of ecosystems and biodiversity.

Learning Outcome: The learners will reach systematic and updated knowledge about the different components of the ecosystem along with their functioning and gain insight into the biodiversity of India and the world with respect to the threats faced by it and their conservation Aspects.

Sr. No	Syllabus	No. of lectures
01	**Module-1- Environment** ∉ **Environment** – Definition, Origin of Earth, and components. ∉ **Environmental Science** - Scope, components, importance of environmental sciences, ∉ Interdisciplinary nature of environmental science ∉ Introduction to Ecology: Definition, Scope, Relation to Other Disciplines, Subdivisions, Modern Branches of Ecology, Applications, and Significance to Human Beings. Evolution and succession. ∉ Ecological adaptations: Adaptations in plants- Hydrophytes, Mesophytes, Xerophytes, Epiphytes, Halophytes; Adaptations in Aquatic and Desert Animals, Adaptations in animals for Flying and Burrowing. ∉ Population Interactions and their types.	15
02	**Module II- Ecosystem** ∉ Earth & its Structural Components: Formation of the Earth: Internal Structure of Earth Formation and composition of core, mantle, crust. ∉ Theories of geological evolution: Wagener's Continental Drift Theory, Plate Tectonic Theory, Sea floor spreading. ∉ Types of Rocks Igneous, Sedimentary, Metamorphic, Rock cycle,	15

	∉ Rock-forming minerals – quartz, feldspar, micas, clay minerals, calcite, dolomite etc. ∉ Weathering and Soil: Soil, Soil Profile, Soil Formation, Soil classification, Physical & chemical properties of soil, Macro & micro plant nutrients, Importance and Significance of Soil, Soil erosion Types, causes, and effects. ∉ Components of the ecosystem ∉ Biogeochemical Cycles ∉ Types of ecosystems ∉ Biomes and their types	
03	**Module 3-Fundamentals of Biodiversity and Conservation** ∉ **Biodiversity:** Definition, Types and Levels of Biodiversity, Importance of Biodiversity, Status of Biodiversity (Global and National), Speciation and Extinction, Threats to Biodiversity, IUCN categories of threats to Biodiversity, Endemism; Endemic species and Endangered Species, Exotic species, 'Hotspots' of Biodiversity. ∉ **Biodiversity Conservation:** ***'In-Situ'*** Conservation, ***'Ex- Situ'*** Conservation.	**15**

Practicals

COURSE CODE	TITLE	CREDITS	HOURS
U23ES1MJ01	**Environment and Ecosystem**	**1**	**30**

1. Identification of ecological adaptations in plants and animals across different habitats.
2. Identification of different types of population interactions.
3. Determination of primary productivity of the terrestrial ecosystem by chlorophyll method.
4. Determination of primary productivity of aquatic ecosystems by light and dark bottle method.
5. Present biogeographic regions of India on map.
6. Prepare a map of Maharashtra showing Protected Area Network (PAN).
7. Identification of global environmental problems.
8. To study the Soil Profile for height, Colour and Texture

References:

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
2. Mishra, D. D., 2008. Fundamental Concepts of Environmental Studies, S. Chand Publishers, N. Delhi, 271.
3. Eugene P. Odum and Gary W. Barrett (1953), Fundamentals of Ecology (5th edn), brooks/cole, US
4. Charles Krebs (2013), Ecology: Pearson New International Edition (6th Edin).
5. Krishnan, M. S. 1982. *Geology of India and Burma*. CBS Publishers & Distributors.
6. Singh K.P. and J.S. Singh (1992). Tropical Ecosystems: Ecology and Management. Wiley Eastern Limited, Lucknow, India.
7. Singh, J.S. (ed.) 1993. Restoration of Degraded Land: Concepts and Strategies. Rastogi Publications, Meerut.
8. Smith, R.L. (1996). Ecology and Field Biology, Harper Collins, New York.
9. Botkin, D.B. and Keller, E.A. 2000. Environment Science: Earth as a living planet. Third Edition. John Wiley and Sons Inc.
10. E. P. Odum (1996) Fundamentals of Ecology, Nataraj Publisher, Dehra Dun.
11. K.M.M. Dakshini (1999) Principle and Practices in Plant Ecology, CRC, Boston.
12. M.C. Dash (1994) Fundamentals of Ecology, Tata McGraw Hill, New Delhi.

Basic Chemistry-I

COURSE CODE: U23ES1MI01 COURSE CREDIT: 04 (03 theory+01 practical)

1 credit - 15 lectures

1 lecture is 60 minutes

Course Objectives:
To acquaint the students with basic concepts of chemistry viz., nomenclature chemical bonding and stereochemistry.
Learning Outcome: The students will learn elaborate concepts of nomenclature of solutions, classification and buffers. They will also be able to elaborate the chemical bonding types in different compounds along with gaining insight into stereochemistry.

Sr. No	Syllabus	No. of lectures
01	**Module-1- Nomenclature, Classification and Solutions, Buffers** **Nomenclature and Classification of:** ∉ **Inorganic Compounds:** Oxides, Salts, Acids, Bases, Ionic, Molecular and Coordination Compounds ∉ **Organic Compounds:** Alkanes, Alkenes, Alkynes, Cyclic Hydrocarbons, Aromatic Compounds, Alcohols and Ethers, Aldehydes and Ketones, Carboxylic Acids and its derivatives, Amines, Amides, Alkyl Halides and Heterocyclic Compounds **Solutions:** Normality, Molarity, Mole fraction, ppb, ppm, millimoles, milliequivalents (Numericals expected). ∉ **Buffer:** Concept of Buffers, Types of Buffers, Derivation of Henderson equation for Acidic and Basic buffers, Buffer action, Buffer capacity (Numericals expected) pH of Buffer Solution.	**15**
02	**Module II- Chemical Bonding** ∉ Bond length, Bond order Ionic Bond- Nature of Ionic Bond, Structure of NaCl, KCl and CsCl, Factors influencing the formation of ionic bond.	**15**

	∉ Covalent Bond- Nature of covalent bond, Structure of CH_4, NH_3, H_2O, Shapes of $BeCl_2$, BF_3. ∉ Coordinate Bond- Nature of Coordinate Bond. ∉ Non-Covalent Bonds: Van De Waal's forces: dipole - dipole, dipole – induced dipole, Hydrogen Bond.	
03	**Module 3-Stereochemistry** **Stereochemistry:** Isomerism, Racemic mixtures Cis-Trans, Threo, Erythro and Meso isomers. Conformation: Conformations of Ethane, Difference between Configuration and Conformation. ∉ Configuration: Asymmetric Carbon Atom, Stereogenic/ Chiral Centers, Chirality ∉ Projection formulae – Fischer, Newman and Sawhorse, The Interconversion of the Formulae	**15**

COURSE CODE	**TITLE**	**CREDITS**	**HOURS**
U23ES1MI01	**BASIC CHEMISTRY-I**	**1**	**30**

1. Spot test for compounds belonging to Carboxylic Acid, Phenol, Aldehyde/Ketone, Ester, Alcohol, Amine, Nitro Compounds, Haloalkane, Haloarene.
2. To prepare 0.1 N succinic acid and standardize sodium hydroxide of two different concentrations.
3. Study of neutralization reaction by titration.
4. Estimation of Alcohol by Dichromate method.
5. Preparation of buffers.

References:

- Ahluwalia, V. K., 2010 TEXTBOOK OF ORGANIC CHEMISTRY, VOL.III, S. Chand Publishers, Ane Books Pvt. Ltd.
- Arun Bahl and B. S. Bahl: Advanced Organic Chemistry, S. Chand
- Atkins P.W. and Paula J.de, Atkin’s Physical Chemistry, 10th Ed., Oxford University 12 Press (2014).
- Ball D.W., Physical Chemistry, Thomson Press, India (2007).
- Castellan G.W., Physical Chemistry, 4th Ed., Narosa (2004).
- Mortimer R.G., Physical Chemistry, 3rd Ed., Elsevier: NOIDA, UP (2009).
- Kalsi, P. S. Stereochemistry Conformation and Mechanism, New Age International, 2005
- Garland C. W., Nibler J.W. and Shoemaker D.P., Experiments in Physical Chemistry, 8th Ed., McGraw-Hill, New York (2003).
- Halpern A.M. and McBane G.C., Experimental Physical Chemistry, 3rd Ed., W.H. Freeman and Co., New York (2003).

OE- ENVIRONMENT AND SOCIETY

COURSE CODE: U23ES1E01 **COURSE CREDIT: 04**

1 credit - 15 lectures

1 lecture is 60 minutes

Course Objective: To orient the students with various movements for the environment.
Learning Outcome: The students will be encouraged to participate in activities that promote environmental conservation and are also made aware of the role of society in environmental management.

Sr. No	Syllabus	No. of lectures
01	**Module -1- Introduction to Environment and Society** ∉ Concept of environment, Environment and man relationship ∉ Scope and Multidisciplinary nature of Environmental Studies ∉ Environment education and public awareness ∉ Environmental ethics.	15
02	**Module-2 - Impact of anthropogenic activities on Environment and Society** Impact of the following anthropogenic activities on the environment and society: • Pollution • Industrialization • Urbanization • Deforestation • Mining • Developmental projects • Reclamation • Tourism	15
03	**Module-3 - Man and Environment Management** • Concept and strategies for sustainable development • The Sustainable Development Goals (SDG) 2030 Agenda • Resource utilization and sustainability • Strategies for environmental protection based on	15

	consumerism.	
04	**Module-4- Environmental Movements and Society** • Concept of Social and Environmental Movements • Origin of Environmental movements in India • Case studies of environmental movements (Bishnoi movement, Chipko Movement, Appiko Movement, Narmada Bachao Andolan, Silent Valley movement) • Ideological trends in Environmental Movement	15

References:

- A Textbook of Environmental Studies, D. K. Asthana, S Chand & Co Ltd
- A Textbook of Environmental Chemistry and Pollution Control, S. S. Dara, S Chand & Co Ltd
- Essential Environmental Studies, S P Misra & S N Pandey, Ane Books Pvt. Ltd.
- Understanding Environment, Chokkan, K.B., Pandya, H. & Raghunathan, H. (eds). 2004 Sagar Publication India Pvt. Ltd., New Delhi.
- Pandit, M.K. 2013. Chipko: Failure of a Successful Conservation Movement. In: Sodhi, N.S., Gibson, L. & Raven, P.H. Conservation Biology: Voices from the Tropics. pp. 126- 127. Wiley Blackwell, Oxford, UK.

VSC – Basics of Computers

COURSE CODE: U23ES1VSC01 **COURSE CREDIT: 02**

1 credit - 15 lectures

1 lecture is 60 minutes

Course Objective: To acquaint the students with Microsoft office and its various tools.

Learning outcomes: Students will learn the basics of computers and to use various toolbars in Microsoft Word, Microsoft Excel and Microsoft PowerPoint.

Sr. No	Syllabus	No. of lectures
01	**Module 1- Basics of Computers** ∉ **Microsoft Word** – Creating new documents; Page Layout; Styles and Themes; Columns and Ordering; Working with Text; Format Text; Text boxes; Listing of Text; Use of various shapes; Use of Tables; SmartArt Graphics; Saving documents. **Microsoft Excel –** Starting a workbook; Modifying columns rows and cells; Formatting cells; Creating formulas; Formatting Tables; Aligning Texts; Working with Worksheets; Freezing worksheet panes; Use of Charts; Conditional Formatting. ∉ **Microsoft PowerPoint –** Uses of PowerPoint presentations; Basics of Presentation slides; Text Basics; Themes and Background styles; Pictures and Clip Art; Viewing and Printing slides; Animating Texts and Objects; Use of Slide Transitions; Slide Show options.	**15**
02	**Module 2- Tutorials** • **Tutorials based on Basics of Computers**	**15**

References:

1. Maluth, J. (2016). Basic Computer Knowledge. (n.p.): Amazon Digital Services LLC - Kdp.
2. Wempen, F. (2014). Computing Fundamentals: Introduction to Computers. Germany: Wiley.
3. Thareja, R. (2019). Fundamentals of Computers. India: Oxford University Press.
4. Foulkes, L. (2020). Learn Microsoft Office 2019: A Comprehensive Guide to Getting Started with Word, PowerPoint, Excel, Access, and Outlook. United Kingdom: Packt Publishing.
5. Habraken, J. (2022). Microsoft Office Inside Out (Office 2021 and Microsoft 365). United States: Microsoft Press.

SEC-Introduction to Good Laboratory Practices

COURSE CODE: U23ES1SEC01 **COURSE CREDIT: 02**

1 credit - 15 lectures

1 lecture is 60 minutes

Course Objective: to acquaint the students with basic rules, etiquettes, and handling of chemicals in the laboratory.

Learning outcomes: Students will be able to work in the laboratory with the confidence and professional diligence required at the industrial level.

Sr. No	Syllabus	No. of lectures
01	**Module 1- Good Laboratory Practices** ∉ Basic rules and etiquettes to be followed in a laboratory. ∉ Types of glassware used. ∉ Storage and labeling of chemicals. ∉ Handling of chemicals. ∉ Transfer of chemicals; Use of pipettes. ∉ Disposal of chemicals and housekeeping practices. ∉ Measures to follow in case of accidents and injuries. ∉ Laboratory safety ∉ Personal Protective Equipments	**15**
02	**Module 2- Tutorials** • **Tutorials based on Good laboratory practices**	**15**

References:

1. Seiler, J. P. (2012). Good Laboratory Practice: The Why and the How. Germany: Springer Berlin Heidelberg.
2. Good Laboratory Practice Regulations, Revised and Expanded. (2002). United States: CRC Press.
3. Good Laboratory Practice Regulations. (1989). Switzerland: M. Dekker.
4. Anderson, M. A. (2002). GLP Essentials: A Concise Guide to Good Laboratory Practice. United Kingdom: Interpharm Press

AEC: Effective Communication Skills-1

COURSE CODE: U23ES1AEC01 **COURSE CREDIT: 02**

1 credit - 15 lectures

1 lecture is 60 minutes

Course Objectives:

1. To develop an awareness among learners about the complexity of the communication process.
2. To develop effective letter-writing skills among students with reference to prescribed layouts and formats.
3. To demonstrate the effective use of communication skills applicable to the employability in present situation.

Course Outcomes:

1. Learner will be aware about the general nature of the Communication process.
2. Learner will be able to write business letters in prescribed layouts and formats.
3. Learner will be able to use different types of oral and written skills to face employability conditions.

Sr. No	Syllabus	No of Lectures
01	**Module-1 .Theory of Communication** Introduction and Process of Communication, Channels of Communication: Formal /Informal, Vertical, Downward, Upward, Horizontal, Grapevine, Methods of Communication: Verbal/Nonverbal, Barriers in Communication: Physical, Linguistic, Psychological, Sociocultural, Mechanical, Modern Modes of Communication	10
02	**Module-2.Business Correspondence -1** Theory of Business Letter Writing,7 Cs of Writing, Format of Letter Writing, Full Block Format, Modified Block Format, Parts of Letter : Major Parts/Minor Parts, Personnel Correspondence: Job Application Letter, Resume, Job Acceptance Letter, Resignation Letter, Recommendation Letter. Professional E mail Writing: Format, Principles of E-mail writing	10

03	**Module-3. Language and Writing Skills** Paragraph Writing: Developing an idea, Use of appropriate linking devices, Interpretation of Data, Composition on given situation Listening Comprehension, Public Speaking Skills, ICT Enabled Communication, Appropriate use of Non-Verbal Communication, and Multilingual Competency.	**10**

Reference Books:

1. A Handbook of Commercial Correspondence by Ashley, A, Oxford University Press, 1992.
2. Basic Business Communication: Skills for Empowering the Internet Generation by Raymond Lesikar and Marie Flatley,9th Edition, Tata McGraw Hill, New Delhi,2002.
3. Business Communication by D Chaturvedi and Mukesh Chaturvedi, Third Edition, Pearson Publications Ltd,2013.
4. Business Communication by Meenakshi Raman and Prakash Singh ,Oxford University Press,2007.
5. Business Communication Strategies by Monippally, Matthukutty, M,Tata McGraw Hill New Delhi,2001.
6. Effective Business Communication by Herta Murphy, Herbert Hildebrandt,,Jane Thomas,Mc Graw Hill Education,2009.
7. Effective Communication by Balan K.R. and Rayadu C.S., Beacon Publication, New Delhi, 1996.
8. Effective Technical Communication by M.Ashraf, Rizvi,Mc Graw Hill Publications,2006.

VEC: Understanding Indian Society and Constitutional Values

COURSE CODE: U23ES1VEC01 **COURSE CREDIT: 02**

1 credit - 15 lectures **1 lecture is 60 minutes**

Course Objectives:

1. To introduce students to the overview of Indian Society.
2. To help them understand the constitution of India.
3. To acquaint them with the socio-political problems of India.
4. To introduce students to a basic understanding of the Indian Political System.

UNIT	TOPICS	LECTURES
Unit-I **Salient features of Indian Society**	● Understand the multi-cultural diversity of Indian society through its demographic composition: Population distribution according to religion, caste, geographical location and gender and age. (3) ● Co-existence of traditionalism and Modernism in Indian Society (1) ● Values emerging from the diversity in Indian Society (1)	5 Lectures

Unit-II **Challenges of Diversity to Unity**	Disparity Arising out of- ● Regionalism and Linguism-Meaning, causes and Impact (2) ● Casteism and Communalism - Meaning, History, measures to solve these problems. (2) ● Social Inequalities: Meaning, Causes and Effects, (1) ● Gender Inequalities- Treatment and exclusiveness of Women and Other Genders in the society (2) ● Economic/ Wealth Inequalities-Class System and Economic Segregation of the Society (2) ● Measures to improve Equality and Social Justice in the society (1)	10 Lectures
Unit-III **Constitutional Values**	● Philosophy of the Constitution as set out in the Preamble (2) ● Features of the Constitution (2) ● Fundamental Rights (2) ● Fundamental Duties (1) ● Directive Principles of State Policy (1) ● Federal structure (2)	10 Lectures

Unit-IV **Significant Aspects of Political Processes**	● The party system in Indian politics; (2) ● Local self -government in urban and rural areas; the 73rd and 74th Amendments and their implications for inclusive politics (2) ● Role and significance of women in politics (1)	5 Lectures

References-

- Social and Economic Problems in India, Naseem Azad, R Gupta Pub (2011)
- Indian Society and Culture, Vinita Padey, Rawat Pub (2016)
- Urbanisation in India: Challenges, Opportunities & the way forward, I J Ahluwalia, Ravi Kanbur, P K Mohanty, SAGE Pub (2014)
- Regional Inequilities in India Bhat L SSSRD- New Delhi
- The Problems of Linguistic States in India, Krishna Kodesia Sterling Pub
- Problems of Communilism in india, Ravindra Kumar Mittal Pub
- Combating Communalism in India: Key to National Integration, KawalKishor Bhardwaj, Mittal Pub
- Khare, R. S. (1998). Cultural diversity and social discontent: Anthropological studies on contemporary India.
- Ganesh, K., & Thakkar, U. (Eds.). (2005). Culture and the making of identity in contemporary India. SAGE Publications India.
- Das, B., & Khawas, V. (2009). Gender issues in development: concerns for the 21st century. (No Title).
- Mandal, B. P. (2011). Cultural Sociology. Centrum Press.
- Rapport, N. (2014). Social and cultural anthropology: The key concepts. Routle
- Oxford Concise Dictionary of Politics, Iain Mclean / Alistair McMillan, Oxford University Press
- Politics, 2nd Edition, Andrew Heywood, Ane Books.

- Dictionary of Politics, D. Robertson, Penguin Books India.
- An Introduction to Political Theory, Gauba, O. P., Macmillan
- Political ideas and concepts : An introduction, Heywood Andrew, Macmillan, Houndmills
- Political ideologies : An introduction, Heywood Andrew, Macmillan, Houndmills
- Oxford Companion to Politics of the World, Krieger Joel Joseph William A Kahler Miles Nzongola – Ntalaja Georges Stallings Barbara B. Weir Margaret, Oxford University Press New York.
- Political Theory, Das Hari Hara and Chaudhari B. C., National Publishing House.
- Introduction to the Indian Constitution, Basu D.D., Wadhwa Publications.
- An Introduction to the Constitution of India, Pylee M V,Vikas Publishing House.
- Introduction to the Constitution of India, Sharma, Brij Kishore, Prentice-Hall of India.
- Our Constitution Kashyap Subhash, National Book Trust.
- Indian Policy for Preliminary Examination, Lakshmikant, Tata McGraw Hill.
- Indian Government and Politics, Narang A.S., Gitanjali Publishing House, New Delhi.
- Introduction to Media and Politics, Sarah Oates, Sage publishers.
- Principles of Modern Political Science, J.C. Johari, Sterling publishers

Indian Knowledge System(credit 2)

India's Contribution to Mathematics since Ages

COURSE CODE: U23ES1IKS01 **COURSE CREDIT: 02**

1 credit - 15 lectures

1 lecture is 60 minutes

Course Objectives:

∉ To make students aware about the contribution of India to Mathematics.

∉ To make students aware about the several methods of ancient mathematics that will enhance their speed and accuracy in various competitive and placement exams.

Course Outcome:

- Learners will be able to know about the contribution of Indian mathematicians and they will be able to apply several tricks and techniques of Vedic mathematics.

Unit	Details	Lectures
I	**The Non-zero Indian Contribution to Mathematics** The Indian Number System, The Baudhayana-Pythagoras Theorem, The Mathematics of Language, The Sine Function in Trigonometry, Negative Number, Solution to Quadratic Equations, The Virahanka-Fibonacci Sequence, Binomial Distribution, First Exact Formula for Pie, Geometric Construction with Compass and unmarked Straightedge. **Indian Mathematician and their Contribution** Aryabhata, Brahamagupta, Mahavira, Bhaskara, Ramanujan, Madhava.	**15**

II	**Sutras** Ekadhikena Purvena, Urdhva – tiryagbhyam, Nikhilam navatascaramam Dasatah, Paravartya Yojayet, Sunyam Samya Samuccaye, Anurupye Sunyamanyat, Sankalana Vyavakalanbhyam, Ekanyunena Purvena, Yavadunam Tamadun Kartya Varganca Yojayet. **Vedic Computation** Beejank, Vinculum Numbers, Simultaneous Linear Equations, Magic Squares, Dates and Calendars	**15**

References:

1. Vedic Mathematics Made Easy by *Dhaval Bhatiya*, Jaico Publishing House.rtfgh
2. Vedic Mathematics by *Bharathi Krishna Tripathi*, Motilal Banarsidass Publisher.
3. Cultures and History of Mathematics, by C. S. Seshadri, Hindustan Book Agency.
4. Contributions to the History of Indian Mathematics by *Gerard G. Emch, R. Sridharan and M. D. Srinivas*

Reference Links for preparing Study Material-

- https://lotusarise.com/salient-features-of-indian-society-upsc/
- https://iasscore.in/upsc-syllabus/indian-society/indian-society-mains
- https://lotusarise.com/upsc-notes/indian-society-upsc-notes/
- https://asiasociety.org/education/indian-society-and-ways-living
- https://www.drishtiias.com/to-the-points/Paper2/inequality-in-india

SIES (Nerul) College of Arts, Science and Commerce (Autonomous)
Syllabus for Approval

B.Sc (Environmental Science)

Sr. No.	Heading	Particulars
1	Title of the course	B.Sc (Environmental Science)
2	Eligibility for admission	HSC with PCB or PCM or Equivalent
3	Minimum percentage	40%
4	Semester	II
5	Level	UG
6	Pattern	3-4 years & 6-8 semesters Choice Based Garding System
7	To be implemented from	From Academic year 2023-24 in a progressive manner

Date: 22.12.23

Signature:

Dr. Koel Roychoudhury
AC Chairperson

Dr.Jyoti G. Koliyar(Jatinder Das)
Head of the Department

SIES (Nerul) College of Arts, Science and Commerce (Autonomous)
(Affiliated to University of Mumbai)
RE-ACCREDITED GRADE "A" BY NAAC (3rd CYCLE)

BOARD OF STUDIES

SYLLABUS FOR
B.Sc in Environmental Science
(AC. Item No.2.3)

(WITH EFFECT FROM THE ACADEMIC YEAR 2023-2024)

PROGRAMME OBJECTIVES:

1. To exploit opportunities in the Environmental Sciences.
2. To create better avenues for improving employability.
3. To provide exposure to new environmental sciences field
4. To enable increased industry academia interaction

PROGRAMME OUTCOMES:

1. At the end of the programme, students are able to expand through understanding in key areas in the subjects presented.
2. At the end of the programme student get trained to cater to the need for ecological citizenship through developing strong foundation on critical linkage between ecology-society-economy. .
3. At the end of the programme, learner will become aware of the importance of working with safety and consciousness in laboratory and actively pursue information about health and environmental safety of chemicals used.
4. At the end of the programme, learner will recognize the need of constant expertized improvement through lifelong learning.

SIES (Nerul) College of Arts, Science and Commerce (Autonomous)

B.Sc. Environmental Science Programme

(To be implemented from Academic Year- 2023-24)

No. of Courses	Course Code	Semester II	Credits
1	***Major***		
1	U23ES2MJ01	Environmental Physics, Meteorolgy and Atmosphere	**03**
	U23ES2MJP01	Practical's in Environmental Physics, Meteorolgy and Atmosphere	**01**
2	***Minor***		
2	U23ES2MI01	Basic Chemistry-II	**03**
	U23ES2MIP01	Practical's in Basic Chemistry-II	**01**
3	***Open Electives(OE)***		
4	U23ES2E01 U23ES2E02	Introduction to Entrepreneurship Personality Development	**02** **02**
4	***VSC/SEC***		
6	U23ES2VSC01	Web Designing	**01**
	U23ES2VSCP01	Web Designing	**01**
7	U23ES2SEC01	INSTRUMENTATION AND ANALYTICAL TECHNIQUES IN ENVIRONMENTAL SCIENCE	**01**
	U23ES2SECP01	INSTRUMENTATION AND ANALYTICAL TECHNIQUES IN ENVIRONMENTAL SCIENCE	**01**
5	***AEC/VEC/IKS***		
8	U23ES2AEC01	Effective Communication-II	**2**
9	U23ES2VEC01	Sustainability and Green Business Practices	**2**
6	***OJT, FP, RP, CEP, CC***		
	U23ES2CC01	CC in Cultural Activities/NSS	**2**
		Total Credits	**22**

Environmental Physics, Meteorology and Atmosphere

COURSE CODE : U23ES2MJ01 COURSE CREDIT: 04 (03 theory+01 practical)

1 credit - 15 lectures

1 lecture is 60 minutes

Course Objectives:
This paper aims to build conceptual understanding of students by exposing them to the basic biophysical principles behind various environmental processes.
Course Outcome:

1. The students learn the concepts of physics associated with particle movement and pollution dispersion in different mediums.
2. To understand the concept of Meteorology
3. To learn about the Evolution of the atmosphere.

Sr. No	Syllabus	No. of lectures
01	**Module I-Fundamentals of Environmental Physics** Basic concepts of light and matter. Introduction to the concept of absorption and transmission of light, Beer– Lambert law, Photovoltaic and solar cells; scattering of light, Rayleigh and Mia scattering. • Basic concepts of force, work and energy; types of forces and their relation (Viscous, Coriolis, gravitational, centripetal, and centrifugal force). • Radiation – phenomenon, sources, types; radioactive decay – principle and effects; half-life; interaction of different types of radiation with matter; Radiation protection - principles and techniques.	**15**
02	**Module II- Meteorology** Basic knowledge of climatological parameters for environmental study; • Weather and climate; • Classification of Climate; • Concept of heat transfer - conduction, convection; • Fundamentals of temperature, pressure, relative humidity, rainfall and wind speed; • Concept of atmospheric stability; • Environmental lapse rate, Temperature inversion, Mixing height	**15**
03	**Module III-** **Atmosphere**: Evolution of the atmosphere – Principle components – Permanent and variable gases. Structure of the atmosphere on the basis of temperature and composition. Ozone chemistry - Depletion and recovery of stratospheric ozone – monitoring, effects and control measures. Climatology: Differences between weather and climate; Insolation - Factors affecting the distribution. Solar (short-wave) and terrestrial (long-wave) radiations. Earth's Albedo and Heat budget of the earth. Tropical monsoon climate – Tropical cyclones and their impacts. Weather forecasting and modification. El-Nino and La-Nina effect. Global warming, effects and control measures; Global dimming - Definition, causes and implications; Urban Heat Islands	15

Practicals

COURSE CODE	TITLE	CREDITS	HOURS
U23ES2MJP01	**Environmental Physics, Meteorologyand Atmosphere**	**1**	**30**

Minor Experiments:

1. Angle of prism.
2. Determination of relative humidity of air by whirling psychrometer.
3. Measurement of light intensity using lux meter.
4. Identification of meteorological instruments.

Major Experiments:

1. To prepare the station based wind rose for an area.
2. To study about Meteorological instruments study
3. Rain Gauge making

References:

1. Radiation detection and measurement, G.F. Knoll (John Wiley & Sons, 2000).
2. Theoretical Nuclear Physics, J.M. Blatt & V.F.Weisskopf (Dover Pub.Inc., 1991).
3. Boeker, E. & Grondelle, R. 2011. Environmental Physics: Sustainable Energy and Climate Change. Wiley.
4. Pita, G., Sardinha, R. A., Rodrigues, A. (2021).
5. Fundamental Principles of Environmental Physics. Germany: Springer International Publishing.
6. Forinash, K. (2017). Physics and the Environment. United Kingdom: Morgan & Claypool Publishers.
7. Environmental Physics. (2018). Canada: Arcler Education Incorporated.
8. Allaby, M. (2002). Basics of Environmental Science.
9. Routledge. Barry, G. R. and Chorley, J. R. (2003). Atmosphere, Weather and Climate. Routledge, London.
10. Critchfield, H. J. (1995). General Climatology. Printice Hall of India. Horne, A. J., & Goldman,
11. C. R. (1994). Limnology (Vol. 2). New York: McGrawHill. Lutgens, F. K. and Tarbuck,
12. E. J. (1982). Atmosphere – Introduction to Meteorology. Prentice Hall Inc. Manahan,
13. S. E. (2011). Fundamentals of environmental chemistry. CRC press. Miller, G. T., & Spoolman,
14. S. (2015). Environmental Science. Cengage Learning.
15. Miller, Jr. G. T. (1994). Living in the Environment: Principles, Connections and Solutions.
16. Wadsworth Publishing Co. Miller, R. W. and Donahue, R. L. (1992). Soils – Introduction to Soils and Plant Growth. Prentice Hall of India.

Basic Chemistry-II

COURSE CODE : U23ES2MI01 COURSE CREDIT: 02 (02 theory)

1 credit - 15 lectures

1 lecture is 60 minutes

Course Objective: To acquaint the students with the concept of titrimetric and volumetric estimation.
Course Outcome: 1. To learn the concept of Thermodynamics.
2. The students will acquire in-depth skills in titrimetric and gravimetricanalysis.
3. To understand the applications of redox reactions.

Sr. No	Syllabus	No. of lectures
01	**1. Thermodynamics** Thermodynamics:System, Surrounding, Boundaries Sign Conventions,State Functions, Internal Energy and Enthalpy:Significance, examples,(Numericals expected), Standard free energy change and Equilibrium constant, Laws of thermodynamics and their application in sciences	15
02	. **1. Titrimetry and Gravimetry** Titration, Titrant, Titrand, End Point, Equivalence Point, Titration Error, Indicator, Primary and Secondary Standards, Characteristics and examples 2. Types of Titrations: Acid –Base, Redox, Precipitation, Complexometric Titration 3. Acid-base titration- Strong Acid Vs Strong Base, Theoretical aspects of Titration Curve and End Point Evaluation. Theory of Acid –Base Indicators, Choice and Suitability of Indicators. **2. Gravimetric Analysis:** Introduction, principle, Solubility and Precipitation, Factors affecting Solubility, Nucleation, Particle Size, Crystal Growth, Colloidal State, Steps involved. (Numericals Expected).	**15**
03	**1. Reaction kinetics and redox reaction** Rate of Reaction, Rate Constant, Measurement of Reaction Rates Order Molecularity of Reaction, Integrated Rate Equation of First and Second Order, determination of order of reaction, Principles of Oxidation and Reduction Reactions: Oxidising and Reducing Agents, Oxidation number, Rules to assign Oxidation Numbers with examples Ions like Oxalate, Permanganate and Dichromate. Balancing Redox Reactions by Ion Electron Method Oxidation, Reduction, Addition and Substitution & Elimination Reactions	**15**

	2. Principles of Oxidation and Reduction Principles of Oxidation & Reduction Reactions: Oxidizing and Reducing Agents, Oxidation Number, Rules to assign Oxidation Numbers with examples Ions like Oxalate, Permanganate and Dichromate. Balancing Redox Reactions by Ion Electron Method Oxidation, Reduction, Addition and Substitution & Elimination Reactions. • Application of redox chemistry: extraction of elements, redox reagents in volumetric analysis.	

COURSE CODE	TITLE	CREDITS	HOURS
U23ES2MIP01	**Practical's in Basic Chemistry-II**	**1**	**30**

Major

1. Colorimetric Determination of Copper ions in given Solution by using calibration curve method and calculation of % error.
2. Gravimetric estimation of Nickel (II) as Ni-DMG and calculation of % error.
3. Estimation of the amount of ferrous and ferric ions in the given sample.

Minor

1. To study hydrolysis of methyl acetate.
2. To determine enthalpy of dissolution of salt (KNO3).
3. Commercial Analysis of a) Mineral Acid b) Organic Acid.
4. To determine the percentage purity of a sample of BaSO4 containing NH4Cl.

- Ahluwalia, V. K., 2010 TEXTBOOK OF ORGANIC CHEMISTRY, VOL.I, S. Chand Publishers, Ane Books Pvt. Ltd.
- McQuarrie D.A. and Simon J.D., Molecular Thermodynamics, Viva Books Pvt. Ltd., New Delhi (2004).
- Morrison, R. T. and Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt Ltd. (Pearson Education).2012.
- Arun Bahl and B. S. Bahl: Advanced Organic Chemistry, S. Chand
- Khosla B.D., Garg V.C. and Gulati A., Senior Practical Physical Chemistry, R. Chand and Co., New Delhi (2011)

OPEN ELECTIVES

Introduction to Entrepreneurship

COURSE CODE:U23ES2E01 **COURSE CREDIT: 02**

1 credit - 15 lectures

1 lecture is 60 minutes

Course Objectives:

- Entrepreneurship is one of the major focus areas of the discipline of Management. This course introduces Entrepreneurship to budding managers.
- To develop entrepreneurs & to prepare students to take the responsibility of the full line of management function of a company.

Course Outcome: After completion of this course students will be able to:-

- To identify the importance of Entrepreneurship
- To identify the mechanisms available to evaluate and analyze the external environment which affects entrepreneurship.
- The learners will be able to understand venture capital, its sources and problems faced during raising funds.

Sr. No	Syllabus	No. of lectures
1	**Foundations of Entrepreneurship Development:** Concept and Need of Entrepreneurship Development Definition of Entrepreneur, Entrepreneurship, Importance and significance of growth of entrepreneurial activities Characteristics and qualities of entrepreneur • Theories of Entrepreneurship: Innovation Theory by Schumpeter & Imitating Theory of High Achievement by McClelland X-Efficiency Theory by Leibenstein Theory of Profit by Knight Theory of Social change by Everett Hagen • External Influences on Entrepreneurship Development: Socio-Cultural, Political, Economical, Personal. Role of Entrepreneurial culture in Entrepreneurship Development.	**10**
2	**Entrepreneur Project Development** Innovation, Invention, Creativity, Business Idea, Opportunities through change. • Idea generation– Sources-Development of product /idea, • Environmental scanning and SWOT analysis • Creating Entrepreneurial Venture-Entrepreneurship Development Cycle •	**10**
3	.**Venture Development** Steps involved in starting of Venture • Institutional support to an Entrepreneur • Venture funding, requirements of Capital (Fixed and working) Sources of finance, problem of Venture set-up and prospects	**10**

References:

1. Dynamics of Entrepreneurial Development Management - Vasant Desai, Himalaya Publishing House.
2. Entrepreneurial Development - S.S. Khanna
3. Entrepreneurship & Small Business Management - CL Bansal, Haranand Publication
4. Entrepreneurial Development in India - Sami Uddin, Mittal Publication
5. Entrepreneur Vs Entrepreneurship- Human Diagno

SCHEME OF EXAMINATION

The scheme of examination shall be divided into two parts:

- **Internal assessment 40% i.e. 20 marks**
- **Semester end examination 60% i.e. 30marks**

(A) Internal Assessment 20 marks

Description	Marks
Internal tests of 10 marks each Q.1 Multiple choice Questions/True or False - 5 Marks Q.2. Attempt 1 Question out of 2 Questions 5 Marks	**10**
One Project and Viva voce/Presentation/Case studies/Assignments	**10**
Total	**20**

B) Semester end examination 30 marks

PAPER PATTERN

Duration : 1 Hour	
Total Marks: 30	
Q.1 10 Marks OR 10 Marks	**10**
Q.2 10 Marks OR 10 Marks	**10**
Q.3 10 Marks OR 10 Marks	**10**
Total	**30**
Note: 10 marks question may be divided into sub questions of 5 Marks each if required.	

Passing criteria:

Minimum 40% in Internal (8 out of 20) and 40% (12 out of 30) in semester end examination.

PERSONALITY DEVELOPMENT – ACHIEVING PERSONAL AND PROFESSIONAL SUCCESS

COURSE CODE: **U23ES2E02** COURSE CREDIT: 02

1 credit - 15 lectures

1 lecture is 60 minutes

Course Objectives:

- The course aims to train students on the importance of self-awareness, personal growth, soft skills, and life skills.
- The course facilitates the participants to understand the skill of influencing, being an effective team member and understanding self-motivation.
- The course aims to foster talent and facilitate employability, empowering the participant to thrive in the fiercely competitive corporate world.
-

Sr. No	Syllabus	No. of lectures
01	Concept of Self Introduction to Personality Development: Personality traits and theories, MBTI, Self-Image and Self-Concept, Locus of Control, Managing Oneself. Concept, Emotional Intelligence , Importance of Emotional Intelligence and Role of Emotional Intelligence in developing effective personality , Positive Attitude, Self-esteem, Self- confidence	**15**
02	Understanding Self in Relation with others Concept of Influencing , Art of Influencing , Johari Window , FIRO – B , Interpersonal Relations, Communication in organizations, Personal Branding, Leadership Skills, Presentation Skills, Personal skills- Stress Management, Negotiation skills, Conflict Management, Time Management and Anger Management.	**15**

References:

- Organizational Behavior by Fred Luthans
- Organization Behavior by Neharika Vohra Stephen P. Robbins, Timothy A. Judge
- The 7 Habits of Highly Effective People by Stephen Covey
- The Art and Science of Personality Development Dan P. McAdams

SCHEME OF EXAMINATION

The scheme of examination shall be divided as follows:

- Comprehensive Internal assessment 100% i.e. 50 marks

Description	Marks
Case Study/ Case-let/ Situation Analysis – (Group Activity or Individual Activity)/ Group Discussion/ Role Play/ Story Telling/ Presentation/ Practical Assignment/ Written Home Assignment/ Industry Analysis – (Group Activity or Individual Activity)/ Literature Review/ Book Review/ In-depth Viva/ Student Driven Activities/ Newspaper reading/ Report Writing/Precis Writing. (Any one of these)	15
Project	20
Class Test/ Open Book Test/ Quiz	10
Class Participation	5
Total	50

Passing criteria: Minimum 40% (20 out of 50) in Comprehensive Internal Assessment.

Web Designing

COURSE CODE: U23ES2VSC01 **COURSE CREDIT: 01**

1 credit - 15 lectures
1 lecture - 60 minutes
Course Objectives:

- The course has been designed to provide the basic knowledge for developing of the web pages using HTML.

Course Outcomes:

- To design valid, well-formed, scalable, and meaningful pages using emerging technologies.

Sr. No	Syllabus	No. of lectures
01	**HTML5:** Fundamental Elements of HTML, Formatting Text in HTML, Organizing Text in HTML, Links and URLs in HTML, Tables in HTML, Images on a Web Page, Image Formats, Image Maps, Colors, FORMs in HTML, Interactive Elements, Working with Multimedia - Audio and Video File Formats, HTML elements for inserting Audio / Video on a web page . **CSS:** Understanding the Syntax of CSS, CSS Selectors, Inserting CSS in an HTML Document, CSS properties to work with background of a Page, CSS properties to work with Fonts and Text Styles, CSS properties for positioning an element	**15**

Text Book(s):

1) HTML 5 Black Book, Covers CSS 3, JavaScript, XML, XHTML, AJAX, PHP and jQuery, 2ed, Dreamtech Press

2) Web Programming and Interactive Technologies, scriptDemics, StarEdu Solutions India.

3) PHP: A Beginners Guide, Vikram Vaswani, TMH

Additional Reference(s):

1) HTML, XHTML, and CSS Bible Fifth Edition, Steven M. Schafer, WILEY

2) Learn to Master HTML 5, scriptDemics, StarEdu Solutions Pvt Ltd

Web Designing Practical

COURSE CODE: U23ES2VSCP01 **COURSE CREDIT: 01**

1 credit - 2 lectures

1 lecture - 60 minutes

Sr.No.	List of Practicals
1	sign a webpage that makes use of a. Document Structure Tags b. Various Text Formatting Tags c. List Tags d. Image and Image Maps
2.	reate an HTML page using tags to accomplish the following: a. A paragraph containing text "All that glitters is not gold". Bold face and italic size this text b. Create equation: $x = 1/3(y1^2 + z1^2)$ c. Put a background image to a page and demonstrate all attributes of background image
3	esign a web page which displays the map of India. Create a clickable region using an image map on the same image so that when we click on Maharashtra it opens another tab with information about Maharashtra. Create two more clickable regions for states of your choice.
4	Design a web page which contains three hyperlinks (audio,video, and gif image). I. When a user clicks on an audio link web page should open in the same tab with some audio content. II. When a user clicks on a video web page should open in the same tab with some video content. III. When a user clicks on a gif image web-page should open in the same tab with some gif content.
5	esign a web page to display following output by using list tags **HTML List Example** • Coffee • Tea • Milk 1. Coffee 2. Tea 3. Milk
6	esign a webpage to display nested ordered and unordered lists.
7	Design a webpage to display the time table of your class.

<table>
<tr><td>8</td><td>Create the following table using HTML tags. Properly align cells, give suitable cell padding and cell spacing, and apply background color, bold and emphasis necessary
<table>
<tr><th colspan="2">Activities</th></tr>
<tr><td rowspan="3">Sr School</td><td>Maths Club</td></tr>
<tr><td>Robotics Club</td></tr>
<tr><td>Photography</td></tr>
<tr><td rowspan="3">Middle School</td><td>Gymnastic</td></tr>
<tr><td>Yoga</td></tr>
<tr><td>Computer Club</td></tr>
<tr><td rowspan="3">Primary School</td><td>Dance</td></tr>
<tr><td>Vocal Music</td></tr>
<tr><td>Swimming</td></tr>
</table></td></tr>
<tr><td>9</td><td>esign a webpage to display following form
Send e-mail to someone@example.com:

Name:
your name
E-mail:
your email
Comment:
your comment

Send Reset</td></tr>
<tr><td>10</td><td>esign a webpage to display student registration forms.</td></tr>
<tr><td>11</td><td>esign a webpage that makes use of Cascading Style Sheets with (Background, fonts, Text styles).</td></tr>
<tr><td>12</td><td>sing CSS
Create a class called income, and make it a background color of #0ff.
Create a class called expenses, and make it a background color of #f0f.
Create a class called profit, and make it a background color of #f00.
Throughout the document, any text that mentions income, expenses, or profit, attach the ppropriate class to that piece of text.
Further create following line of text in the same document: The current price is 50₹ and new price is 40₹</td></tr>
</table>

A) Semester end examination 30 marks
PAPER PATTERN

Duration: 1 hours	
Total Marks: 30	
Description	**Marks**
Q.1 10 marks OR 10 marks	10
Q.2 10 marks OR 10 marks	10
Q.3 10 marks OR 10 marks	10
Total	30
Note: 1. Q.1, 2, 3 may be divided into sub questions if required. 2. Q.3 May include theory (short notes) /Case Study in one of the options.	

Passing criteria: Minimum 40% (12 out of 30) in semester end examination.

SCHEME OF PRACTICAL EXAMINATION

(B) Practical Assessment 20 marks

Description	**Marks**
One question of 10 marks practical	10
Journal	5
Viva	5
Total	20

Passing criteria: Minimum 40% (8 out of 20) in practical examination

SEC-INSTRUMENTATION AND ANALYTICAL TECHNIQUES IN ENVIRONMENTAL SCIENCE

COURSE CODE : U23ES2SEC01 COURSE CREDIT: 02 (01 theory+ 01 practical)

1 credit - 15 lectures

1 lecture is 60 minutes

Course Objective: To acquaint the students with the concept of titrimetric and volumetric estimation.
Course Outcome: The students will acquire in-depth skills in titrimetric and gravimetric analysis besides understanding the applications of redox.

Sr. No	Syllabus	No. of lectures
01	Unit-I: : Introduction to Ecological Instruments Principle, Construction, Working and Applications of: - Audio dosimeter, Wet-bulb globe temperature, Piston pump or bellows pump with an attached detector, Glass tube containing a solid adsorbent, High-flow vacuum air sampler & two-stage cascade impactor, Rain Gauge, Lux meter, High-flow or multi-flow air sampling pumps, pocket ionization chamber, Geiger–Müller meter, Swinging-vane anemometer, Thermal or hot wire velometer, Electrostatic precipitator, Cyclone separator	**15**

COURSE CODE	TITLE	CREDITS	HOURS
U23ES2SECP01	Practical's in INSTRUMENTATION AND ANALYTICAL TECHNIQUES IN ENVIRONMENTAL SCIENCE	**1**	**30**

Experiments:

1. Identification of ecological instruments
2. Determination of particulate matter from the industrial area by High Volume Sampler/Settling method.
3. Estimation of nitrate in water sample by UV spectrophotometer.
4. Visit to Lakes, rivers, estuary and marine, nature parks, water/ sewage/ Industrial effluent treatment plant, Solid waste dump, meteorological centre, mangrove vegetation, industries – food, pharmaceutical, petrochemical, fertilizer, paper, sugar, distillery etc
5. Report on Seminars/Conferences/Workshops related to environmental issues.

- Ahluwalia, V. K., 2010 TEXTBOOK OF ORGANIC CHEMISTRY, VOL.I, S. Chand Publishers, Ane Books Pvt. Ltd.
- McQuarrie D.A. and Simon J.D., Molecular Thermodynamics, Viva Books Pvt. Ltd., New Delhi (2004).
- Morrison, R. T. and Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt Ltd. (Pearson Education).2012.
- Arun Bahl and B. S. Bahl: Advanced Organic Chemistry, S. Chand
- Khosla B.D., Garg V.C. and Gulati A., Senior Practical Physical Chemistry, R. Chand and Co., New Delhi (2011)

Effective Communication-II

COURSE CODE : U23ES2AEC01 **COURSE CREDIT: 02**

1 credit - 15 lectures

1 lecture is 60 minutes

Course Objectives:

1. To develop effective interpersonal skills among learners for corporate employability.
2. To develop effective business letter writing skills among students applicable in corporate world.
3. To develop professional skills among learners for better personality development.

Course Outcomes:

1. Learner will be able to apply interpersonal skills for better employability.
2. Learner will be able to utilize effective business letter writing skills required in corporate world.
3. Learner will be able to use specified oral and written skills for the professional development.

Sr. No	Syllabus	No. of lectures
01	**Module-1.Group Communication** Interview Skills: Preparing for Interview, Types of Interviews, Group Discussion: Nature and Ingredients, Process and Preparation, Corporate Meetings: Theory, Group Dynamics, Process of Conducting Meeting, Notice, Agenda and Minutes of Meeting, Conference: Types, Organization, Advanced Methods of conducting conferences	**10**
02	**Module-2.Business Correspondence -2** Trade Letters: Inquiry Letter, Complaint Letter, Adjustment Letter, Sales Letter, RTI and Consumer Grievance Letter ,Report Writing: Types of Report, Format of Report, Investigative Report, Feasibility Report	**10**
03	**Module-3. Language and Writing Skills** Presentation Skills: Principles of Effective Presentation, Effective use of OHP, Use of PPT, Summarization: Identification of main points and sub points, Presenting in cohesive manner, Paraphrasing and summarizing,	**10**

Reference Books:

1. A Handbook of Commercial Correspondence by Ashley, A, Oxford University Press, 1992.
2. Basic Business Communication: Skills for Empowering the Internet Generation by Raymond Lesikar and Marie Flatley,9th Edition, Tata McGraw Hill, New Delhi,2002.
3. Business Communication by D Chaturvedi and Mukesh Chaturvedi, Third Edition, Pearson Publications Ltd,2013.
4. Business Communication by Meenakshi Raman and Prakash Singh ,Oxford University Press,2007.
5. Business Communication Strategies by Monippally, Matthukutty, M,Tata McGraw Hill New Delhi,2001.
6. Effective Business Communication by Herta Murphy, Herbert Hildebrandt,,Jane Thomas,Mc Graw Hill Education,2009.
7. Effective Communication by Balan K.R. and Rayadu C.S., Beacon Publication, New Delhi, 1996.
8. Effective Technical Communication by M.Ashraf, Rizvi,Mc Graw Hill Publications,2006.

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SCHEME OF EXAMINATION

The scheme of examination shall be divided into two parts:

- **Internal assessment 40% i.e. 20 marks**
- **Semester end examination 60% i.e. 30 marks**

(A) Internal Assessment 20 marks

Description	Marks
Internal tests of 10 marks each Q.1 Multiple choice Questions - 05 Marks Q.2. Attempt 01 questions out of 3 questions (5 marks each)- 05 Marks	10
Role Plays /Group Discussion/Mock Interviews/Presentation/Case studies/Assignments	5
Attendance and Class behavior	5
Total	20

B) Semester end examination 30 marks

Question no.1	A) Descriptive Question OR B) Short Notes -2 out of 3 (5 Marks each) Module no.1	10 Marks
Question no.2	A) Descriptive Question OR B) Short Notes-2 out of 3 (5 Marks each) Module no.2	10 Marks
Question no.3	A) Descriptive Question OR B) Short Notes-2 out of 3 (5 Marks each) Module no.3	10 Marks

Passing criteria: Minimum 40% in Internal (8 out of 20) and 40% (12 out of 30) insemester end examination.

SUSTAINABILITY and GREEN BUSINESS PRACTICES

COURSE CODE: **U23ES2VEC01** COURSE CREDIT: 02

1 credit - 15 lectures

1 lecture is 60 minutes

Objectives

- This program is intended to provide students with the tools needed to help their organization create effective programs, increase efficiency, cut costs, and improve their overall sustainability.
- Students will learn the core principles behind environmental sustainability, explore the "business case" for sustainability, and learn strategies for measuring sustainable practices.

Sr. No	Syllabus	No. of lectures
01	**Module -1- Natural Resources:** **Their Sustainable Management & Conservation, Sustainable Development** ➢ Natural Resources: Meaning, Classification and types of natural resources - Water, Land, Forest, Energy, Minerals, Food; Threats to Natural Resources; Approach for Resource Conservation and Management: Air, Water, Soil and Energy ➢ Sustainable Development: Definition and Meaning, 3 Pillars of sustainable development; Sustainable Development - Yesterday, Today and Tomorrow development; Global challenges of sustainable development : Our common future report, Agenda 21 and Millenium Development Goal, etc.; National sustainable development strategies in India; Important current Issues related to sustainable development (Global warming, climate change, etc.)	15

02	**Module-2 - Business Strategies and Sustainability and Designing Sustainable Futures** ➢ Business and sustainability: Concept of responsible business, CERES (coalition for environmentally responsible economics) principles and blended value; Sustainable development in planning and management: Principles and Approaches - Triple botton line, ESG, etc.; Sustainability reporting(CSR); Life Cycle Analysis; Circular Economy; Indicators of sustanability: Introduction to Nature's Living Planet Index (WWF), Happy Planet Index (New Economics Foundation), Gross Domestic Prouct, Human Development Index, Dow Jones Sustanability Index, etc. ➢ Innovation in Business Practices: Waste as a resource, Renewable Energy Resources (sun, wind, bioenergy, etc.) - Case Studies; Green Marketing and Green Consumerism; Green Business Practices: Ecofriendly Packaging, Organic Farming, Ecotourism, Smart Agriculture,etc.	**15**

References:

- Green Marketing and Management: A global Perspective by John F. Whaik, Qbase Technologies.
- Green Project Management by Richard Maltzman And David Shiden, CRC Press Books.
- Green and World by Andrew S. Winston, Yale Press B

Co –Curricular Course in Cultural Activities

Course Code: U23ES2CC01 **Course Credit: 02**

Course Type: Co-curricular

Course Objectives:

The syllabus is aimed to achieve the following objectives:

1. To train students in skills to plan, manage and implement various types of events and to enable them to effectively undertake any activity in the real world.
2. To develop a sense of discipline and commitment as an educated individual towards the society.
3. To develop social values respecting differences among individuals, respecting diverse value and cultures.

Learning Outcome:

The learners will be able to:

1. Learner will be able to solve problems utilizing various concepts, solutions etc.
2. Learner will be able to understand the power of expressions listening to others, public speaking.
3. Learner will be able to take initiatives and responsibilities, influencing others in working for a good purpose, taking accountability.

Unit No.	Topic	No. of Lectures required
Unit-I	Lectures: 1. Event Communication & Presentation Skills. 2. Special Events, Research & Planning 3. Advance Event Accounting & Costing 4. Event Marketing, Advertising & PR 5. Event Production & Logistics	5
Unit-II	Practical Sessions: 1. Event Communication & Presentation Skills. 2. Special Events, Research & Planning 3. Advance Event Accounting & Costing 4. Event Marketing, Advertising & PR 5. Event Production & Logistics	5
	Department level Cultural activities/Performances	15
	Report Writing / Operations and Marketing	05
	TOTAL (HOURS)	**30**

	Semester – II
Course Name: CC in Cultural Activities	**Course Code:** U23ES2CC01
Course Type	**Co-curricular**
Focuses on	**Skill Development**
Caters to	**Local**
Total Lectures per week (1 Period is 60 minutes)	**1**
Credits	**2**

The scheme of Examination shall be divided as follows.

- **Continuous Evaluation Pattern**

Description	**Marks**
Activity related work such as • Attending lectures • Practical sessions • Seminars, Conference	10 10 10
Maintenance of work records and submission of activity report	10
Test/ Discussion/ Presentations /Viva-voce by faculty in charge	10
Total	**50**

References:

1. S.N. Maheshwari, Cost Accounting
2. B.M. Lal, Cost Accounting
3. Senge, Peter : The Learning Organization
4. Successful Event Management By Anton Shone & Bryn Parry
5. Event management, a professional approach By Ashutosh Chaturvedi

The scheme of examination shall be divided into two parts:

- **Internal assessment 40% i.e. 40 marks**
- **Semester end examination 60% i.e. 60 marks**

(A) Internal Assessment 40 marks

Description	Marks
Internal tests of 20 marks each Q.1 Multiple choice Questions/True or False - 10 Marks Q.2. Attempt 2 questions out of 3 questions (5 marks each)- 10 Marks	20
One Project and Viva voce/Presentation/Case studies/Assignments	15
Attendance and Class behavior	5
Total	40

B.Sc. ENVIRONMENTAL SCIENCES

Maximum Marks: 60
Duration: 2hr
Question 1: Unit I
Question 2: Unit II
Question 3: Unit III
Question 4: Unit IV
Question 5: Unit I to Unit IV (Mixed questions)

Instructions: i. All Questions are compulsory
ii. All questions carry equal marks
iii. Draw neat and labeled diagrams wherever necessary

Q.1. Answer any two questions from the following (Based on Unit I)
a. 06
b. 06
c. 06

Q.2. Answer any two questions from the following (Based on Unit II)
a. 06
b. 06
c. 06

Q.3. Answer any two questions from the following (Based on Unit III)
a. 06
b. 06
c. 06

Q.4. Answer any two questions from the following (MIXED LONG QUESTION UNIT I, II, III) – (Major and Minor Paper)
a. 06
b. 06
c. 06

Q.5. Answer any two questions from the following (Short Notes -Mixed Questions)
a. 03
b. 03
c. 03
d. 03
e. 03
f. 03

Passing criteria: Minimum 40% in Internal (16 out of 40) and 40% (24 out of 60) in semester end examination.

PRACTICAL EXAMINATION: Total Marks: 50

1. Major Experiment: 25 Marks
2. Minor Experiment: 15 Marks

VIVA: 05 Marks
Journal: 05 Marks

NOTE: 1. Practical examination to be conducted as per the practical Syllabus enlisted.
2. Candidates are required to present certified journal on the day of practical examination.

Theory & PRACTICAL EXAMINATION
SEC: INSTRUMENTATION AND ANALYTICAL TECHNIQUES IN ENVIRONMENTAL SCIENCE: Total Marks: 50 (Theory: 30 Marks and Practical: 20 Marks)-(Continuous Evaluation)

Practical:
1. Major Experiment: 15 Marks
VIVA & Journal: 05 Marks

NOTE: 1. Practical examination to be conducted as per the practical Syllabus enlisted.
2. Candidates are required to present certified journal on the day of practical examination

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