SIES (Nerul) College of Arts, Science and Commerce (Autonomous)
Syllabus for Approval 2026-27

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	45% (Open Category) and 40%(Reserved Category)
4	Semester	III
5	Level	UG
6	Pattern	3-4 years & 6-8 semesters Choice Based Grading System
7	To be implemented from	From Academic year 2026-27 in a progressive manner

Date: 21.02.2026

Signature:

Dr. Koel Roychoudhury
AC Chairperson

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

SIES (Nerul) College of Arts, Science & Commerce (Autonomous)
RISE WITH EDUCATION

CELEBRATING 25 YEARS 1998-2023

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 (Semester III)

(WITH EFFECT FROM THE ACADEMIC YEAR (2026-2027)

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 a 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- 2026-27)

No. of Course s	Course Code	Semester III	Credits
1	***Major***		
1	U25ES3MJ01	Environmental Pollution	**03**
	U25ES3MJP01	Practical's in Environmental Pollution	**01**
2	U25ES3MJ02	Basic Life science-I	**03**
	U25ES3MJP02	Practical's in Basic Life science-I	**01**
2	***Minor***		
1	U25ES3MIP01	Environmental Policies and Regulations	**02**
2	U24ES3MIP02	Sustainable Tourism	**02**
3	***Open Electives(OE)***		
1	U24MS3E01	Personality Development-II (Department of Management Studies)	**02**
4	***VSC/SEC***		
1	U26ES3VSC01	Applied Biodiversity and Wildlife Conservation	**02**
5	***AEC/VEC/IKS***		
1	U24ENG3AEC01(REV.25)	Understanding Basic Forms of English Literature-1	**2**
6	***OJT, FP, RP, CEP, CC***		
1	U24CC3NSS01 U24CC3DLLE01	National Service Scheme (NSS) Studies Paper-II Introduction to DLLE NGO Collaboration-(2)	**4**
		Total Credits	**22**

Environmental Pollution

COURSE CODE : U24ES3MJ01 COURSE CREDIT: 04 (03 theory+01 practical)

1 credit - 15 lectures

1 lecture is 60 minutes

Course Objective:

1. To understand the concept Air and Noise Pollution.
2. To know about the concept of Water Pollution.
3. To gain knowledge about Soil and Radioactive Pollution.

Course Outcome:

1. To acquire the knowledge of the basic concept of Air and Noise pollution.
2. To understand the concept of Water pollution.
3. To relate the cause and effect of Soil and Radioactive Pollution.

Sr. No	Syllabus	No. of lectures
01	**Module I: Air Pollution and Noise Pollution** • Sources of air pollution, Classification of air pollutants, Effects of air pollution - on plants, animals, human health, environment and material. Case studies, Indoor air pollution - causes and effects, Acid rain and its effects, Global Warming, Case studies, Concept of air quality standards, Ambient air quality standards, NAAQS, AQI, Vehicular emission norms. • Noise pollution – Definition, Concept of noise, sound measuring unit; Sources of noise pollution; Effect of noise pollution - on plants, animals, human health and material; Urban cases of noise pollution; Noise standards, WHO prescribed levels of noise, CPCB sound level standards.	15
02	**Module II: Water Pollution** • Sources of water pollution, Classification of water pollutants. Types of water pollution - Groundwater pollution, Surface water pollution, Marine pollution, Impacts of water pollution - on flora, fauna, human health. Case studies, Oil spills, thermal pollution and its effects, Water quality standards, Water quality criteria, Water quality index in India	15

03	**Module III: Soil and Radioactive Pollution** • Soil pollution- natural and anthropogenic causes; classification of soil pollutants, Soil pollution by industrial wastes, urban wastes, radioactive pollutants, agricultural practices, chemical and metallic pollutants, biological agents, mining, resistant objects, soil sediments, Detrimental effects of soil pollutants, industrial pollutants, sewage and domestic wastes, heavy metals and radioactive pollutants, Effects of modern agro-technology, Diseases caused by soil pollution, Impact of Soil Pollution on Air Quality, Case studies. • Definition - Radioactivity, radionuclide, radiation emission; Radioactive pollution – definition, sources of radioactive pollution, Natural Sources of Radiation, Solar rays, Radionuclides in earth's crust, Internal Radiation, Anthropogenic sources of radiation, Medical X-rays, Radioisotopes, Nuclear tests, Nuclear reactors, Radiations from nuclear power plants, Effect of radioactive pollution – on plants, animals, human and environment; Radioactive fallouts and its effect, Industrial, Medical and research use of Radioactive materials.	15

Practicals

COURSE CODE	TITLE	CREDITS	HOURS
U24ES3MJP01	Environmental Pollution	1	30

Minor Experiments:

1. Estimation of particulate matter in ambient air by personal air sampler.
2. Estimation of Dissolved Oxygen and Biochemical Oxygen Demand in water samples.
3. Estimation of pH and Conductivity of Soil Sample.
4. Study of radiations in different objects and environments.

Major Experiments:

1. Estimation of Available Phosphorus in soil samples.
2. Estimation of Iron in Water samples.
3. Estimation of Salinity in Soil samples.
4. Determination of foliar dust capturing capacity of leaves of different plant species.

References:

1. Sharma B.K :(2001), Environmental Chemistry, GOEL Publishing House, Meerut (UP)
2. Trivedi, P. R. (2004). Environmental Pollution and Control. India: APH Publishing Corporation.
3. Rao, M. N. (1989). Air Pollution. India: Tata McGraw-Hill.
4. SM. Khopkar (2007). Environmental Pollution Monitoring and Control.
5. Misra, S. P., Pandey, S. N. (2010). Essential Environmental Studies (2Nd Edition). India: Ane Books India.
6. Singal, S. P. (2005). Noise pollution and control strategy. India: Alpha Science International.
7. Radioactive Pollution and Biological Effects of Radioactivity. (2023). Switzerland: MDPI AG.
8. Maiti, S. K. (2004). Handbook of Methods in Environmental Studies, 1: Water and Wastewater Analysis. India: ABD Publishers.
9. Maiti, S. K. (2010). HandBook Of Methods In Environmental Studies (2 Vol. Set). India: Oxford Book Company.

BASIC LIFE SCIENCES - I

COURSE CODE: U24ES3MJ02 COURSE CREDIT: 04 (03 theory+01 practical)

1 credit - 15 lectures

1 lecture is 60 minutes

Course Objective: The students will get acquainted with the primitive to advance level of plant and animal diversity.
Learning Outcome: The knowledge of students will be upgraded in the areas of unicellular and multicellular organisms and their cell structures.

Sr. No	Syllabus	No. of lectures	Credits
Module-I: Plant and Animal Diversity	**Introduction to Plant Diversity:** General Characteristic Features with Examples of - Algae, Fungi, Lichens, Bryophyta, Pteridophyta, Gymnosperms and Angiosperms. • **Introduction to Animal** Diversity: General Characteristic Features with Examples of different groups under Non-Chordates and Chordates. – Invertebrates and vertibrates	**15**	**1**
Module II: Cell Biology and Microscopy	**Ultrastructure of Prokaryotic Cell:** Concept of Cell Shape and Size.Detail Structure of Slime Layer, Capsule, Flagella, Pilli, Cell Wall(Gram Positive and Negative), Cell Membrane, Cytoplasm and Genetic Material Storage Bodies and Spores **Ultrastructure of Eukaryotic Cell:** Plasma membrane, Cytoplasmic Matrix, Microfilaments, Intermediate Filaments, and Microtubules Organelles of the BiosyntheticEndoplasmic Reticulum & Golgi Apparatus. Lysosome, Endocytosis, Phagocytosis, Autophagy, Proteasome Eucaryotic Ribosomes, Mitochondria and Chloroplasts Nucleus External Cell Coverings: Cilia And Flagella **Comparison of Prokaryotic And Eukaryotic Cells**	**15**	**1**

Module III: Types of Nutrition and Nutritional adaptations	**Autotrophic nutrition** – Importance of photosynthesis in plants and autotrophic prokaryotes. Macro and micronutrients for plants. Insectivorous plants **Heterotrophic nutrition** – ex. holozoic, saprophytic (fungi) and parasitic (Cuscuta, Tapeworm) i) fluid feeders (ex. Mosquito or Housefly) ii) microphagous (ex. Amoeba or Paramecium) iii) macrophagous (mammals) Digestive systems of mammals Human and Ruminant Digestion Evolutionary adaptation associated with diet eg. dental, stomach and intestine	**15**	**1**

Practical:

COURSE CODE	TITLE	HOURS	CREDITS
U24ES3MJP02	**BASIC LIFE SCIENCES - I**	**30**	**1**

1. Observation of Nostoc, Spirulina, Chlorella under a compound microscope.
2. Identification and classification of animal and plant species into respective groups.
3. Identification of parts of cell and cell organelles with the help of photomicrographs.
4. Components and working of simple, compound, dark field and phase contrast microscope.
5. Study of phytoplankton and zooplankton from pond water.
6. Isolation and study morphology of fungi.

References:

- Gangulee, Das and Dutta, 2015. College Botany Volume I and II latest edition. Central Education enterprises.
- Sharma, OP, 2002. Textbook of Thallophytes, Tata McGraw Hill Publishing Co. New Delhi
- Sharma, PD, 2005. Fungi and Allied Organisms, Narosa Publishing House, New Delhi.
- G M Smith Cryptogamic Botany Volume I and II by McGraw Hill.
- Campbell, N.A. and Reece, J. B. (2008) Biology 8th edition, Pearson Benjamin Cummings, San Francisco.
- Raven, P.H et al (2006) Biology 7th edition Tata McGraw Hill Publications, New Delhi
- P.S. Verma and V.K. Agarwal Cell Biology, Genetics, Molecular biology, Evolution and Ecology S. Chand an Co.Ltd., (2009)

Environmental Policies and Regulations

COURSE CODE: U24ES3MJP03 **COURSE CREDIT: 02 (Theory)**

1 credit - 15 lectures

1 lecture is 60 minutes

Course Objective: To introduce students to the environmental acts, rules and international environmental treaties.

Learning Outcome: The knowledge of the student will be updated in the field of National and international efforts taken for environmental causes.

Sr. No	Syllabus	No. of lectures	Credits
Module-I: Introduction to Acts and Rules Legislations and its Amendments	Introduction to Act and Rule; History of inclusion of environment as a part of the Constitution; Amendments and their implementation; •National Environmental Policy •Environmental Regulation Framework in India; Constitutional perspective; Fundamental rights & duties and Directive principles of state policy ➢ Indian Forest Act, 1927 ➢ Indian Wildlife (Protection) Act, 1972 ➢ Water (Prevention and Control of Pollution) Act, 1974 ➢ Forest Conservation Act, 1980 ➢ Air (Prevention and Control of Pollution) Act, 1981 ➢ Public Liability Insurance Act, 1991 ➢ Biodiversity Act, 2002 ➢ National Green Tribunal Act, 2010 ➢ EPA and its Regulations.	**15**	**1**
Module-II: International Treaties and Conventions	➢ Stockholm Conference 1972 ➢ Vienna Convention 1985 ➢ Montreal Protocol 1987 ➢ Basel Convention 1989 ➢ Earth Summit 1992 ➢ UNFCCC- Kyoto Protocol 1997 ➢ Paris Agreement ➢ Convention on Desertification 1996;	**15**	**1**

References:

1. Leelakrishnan. P, 2008, Environmental Law Case Book ,Lexis Nexis, Butterworths
2. Mohanty. S. K., 2011, Environment and Pollution Law, Universal Law Publishing Co.Pvt. Ltd.
3. Shastri S C, 2008, Environmental Law, (2nd Edn.), Eastern Book Company, Lucknow
4. Singh Gurdip, 2004, Environmental Law in India, Mcmillan& Co.
5. Shantakumar S,2005 Introduction to Environmental Law, (2nd Edn.), Wadhwa& Company, Nagpur
6. Sahasranaman P B, 2008 Handbook of Environmental Law in India, Oxford University Press (India)

SUSTAINABLE TOURISM

COURSE CODE: U24ES3MIP01 **COURSE CREDIT: 02 (Theory)**
1 credit - 15 lectures
1 lecture is 60 minutes.

Course Objectives:

1. Students will understand the basic concept of tourism with the need sustainable approach to tourism
2. Students will analyze and explain the concept of sustainable tourism, considering its application and implications at loca national, and global levels.

Course outcome

1. Students will be able to comprehend the fundamental concept of tourism and recognize the imperative for adoptir sustainable practices within the tourism industry.
2. students will demonstrate the ability to critically analyze and articulate the concept of sustainable tourism, evaluating i relevance to sustainable development.

Sr. No.	Syllabus	No of Lectures
1.	**Module - I: Tourism and Sustainability**	
	Basic concept of tourism, Types of Tourism, and challenges faced for tourism development in India. Impacts of Tourism- Positive and negative- Social, Environmental, Cultural, and Economic, The Incredible India campaign, Need for sustainability in the tourism sector. Triple bottom line approach for tourism development, The triple bottom approach for tourism. National Strategy for Sustainable Tourism(GOI)	15
2.	**Module -II: Sustainable approach to tourism**	
	Concept of sustainable tourism, Example of Sustainable tourism, Ecotourism – A case study. Role of UNWTO for the promotion of sustainable tourism in the world, One Planet Sustainable Tourism Programme, Tourism for SDGs, Role of the Responsible Society of India for promoting sustainable tourism, Role and responsibilities of Government, NGO, Service industry, and tourists. Case study, Kerala, Sikkim, Role of Ministry of Tourism – National Tourism Policy, Sustainable Tourism Criteria for India (STCI)	15
.Total Lectures		30

References:

1) Introduction to Travel and Tourism by Lalitha Sharma, Centrum Press
2) Tourism Development Problems and Prospects by Meenakshi Thakur, Omega Publications
3) Tourism and Hospitality in the 21st Century, A. Lockwood and S. Medlik, Butterworth Heinemann
4) Travel and Tourism Management by D. Sunita Maral, late Dr. Sachin Pendse, Dr. Chandani Bhattacharje Sheth Publishers Pvt.
5) Ecotourism and Third World by Dr. Aradhana Salpekar, Jnanada Prakashan

Websites:-
UNWTO | World Tourism Organization a UN Specialized Agency
Home | Ministry of Tourism | Government of India
https://rtsoi.org/
MTDC | Maharashtra Tourism Development Corporation

Open Electives (OE)

Personality Development - II

COURSE CODE: U24MS3E01 **COURSE CREDIT: 02**

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

Course Objectives (CO)

1. Define key leadership styles and their applications.
2. Analyze the impact of communication styles on leadership effectiveness.
3. Explain the concept of a growth mind-set and its role in leadership development.
4. Discuss strategies for motivating individuals and teams.

Learning Outcomes

1. Develop a strong foundation of leadership and
2. Learn leadership communication
3. Enhance your ability to motivate and inspire others
4. Build confidence in conflict resolution and decision-making

Unit No.	Topic	No. of Lectures required
Unit-I	**The Foundations of Leadership** • Defining leadership styles (e.g., transformational, democratic, servant) • Understanding the role of vision, mission, and values • Developing a growth mind-set and embracing challenges **Effective Communication for Leaders** • Delivering clear, concise, and inspiring messages • Practicing active listening and providing constructive feedback	10
Unit-II	**Motivation and Delegation** • Understanding what motivates individuals and teams • Setting SMART goals (Specific, Measurable, Achievable, Relevant, Time-bound) • Empowering team members and delegating effectively **Conflict Resolution and Decision-Making** • Developing strategies for navigating difficult conversations	20

	• Fostering a collaborative approach to problem-solving • Making sound decisions under pressure □ **Leading with Influence** • Understanding persuasion techniques and building buy-in • Fostering innovation and a culture of creativity • Leading by example and embodying your values	
	• **Total Lectures**	**30**

Course Activities:

- Self-Assessments: Identify your leadership strengths and areas for development.
- Interactive Exercises: Practice communication techniques, role-playing leadership scenarios.
- Case Studies: Analyze real-world leadership challenges and develop solutions.
- Action Planning: Create a personalized roadmap to implement learned skills

SCHEME OF EXAMINATION:

- **Continuous Evaluation Pattern**

Description	Marks
Onlinc Quiz	10
Individual Assignment	10
Group Project	25
Class Participation	5
Total	**50**

Passing criteria: Minimum 40% ie 20 marks out of 50

References:-

Neelamegam,V.(2010). Business Environment.New Delhi:Vrinda Publications.

1. Fernando.A.C.(2011). Business Environment. Chennai: Dorling Kinderslay (India) Pvt.Ltd. Licenses of pearson education in South Asia.
2. John F. Kennedy: "Special Message to the Congress on Protecting the Consumer Interest.," March 15, 1962. Online by Gerhard Peters and John T. Woolley, The American Presidency Project. http://www.presidency.ucsb.edu/ws/?pid=9108.
3. The Consumer Protection Act, 1986 (Amended up-to 2002)
4. United Nations guidelines for consumer protection retrieved from http://unctad.org/en/Pages/DITC/CompetitionLaw/UN-Guidelines-on-Consumer-Protection.aspx
5. Chaudhary et al. (2011), Consumer Protection and Consumerism In India, Zenith International Journal of Multidisciplinary Research.Vol.1 Issue 1,pp. 01-12.
6. Consumerism and Its Historical Aspects With Future Perspective retrieved from http://shodhganga.inflibnet.ac.in/bitstream/10603/4464/13/13_chapter%204.pdf
7. http://www.legalservicesindia.com/article/article/consumerprotectionlawinindia17391.html
8. http://www.legalserviceindia.com/article/l220PhenomenonOfConsumerism.htm

Applied Biodiversity and Wildlife Conservation

COURSE CODE: U26ES3VSC01 **COURSE CREDIT: 02 (Theory)**

1 credit - 15 lectures

1 lecture is 60 minutes

Course Objective

1. To introduce students to the basics of biodiversity, its types, threats, and conservation methods.
2. To help students understand wildlife basics, major threats to wildlife, and wildlife conservation methods.

Course Outcome

1. Students will be able to understand biodiversity concepts and explain basic biodiversity conservation practices.
2. Students will be able to understand wildlife conservation issues and identify career opportunities in wildlife conservation.

Sr. No	Syllabus	No. of lectures	Credits
Module 1- Biodiversity Conservation Approaches	Meaning and Importance of Biodiversity, Levels of Biodiversity: Genetic, Species and Ecosystem, Types of Species- Endemic Species, Native Species, Endangered Species, Threatened Species, Keystone Species, Indicator Species, Invasive Alien Species, Flagship Species, Threats to Biodiversity, Biodiversity Conservation Methods- In-situ Conservation, Ex-situ Conservation, Protected Areas and Biodiversity Hotspots, Biodiversity and Climate Change, Modern Tools in Biodiversity Conservation- GIS, Biodiversity Databases, Biodiversity Conservation in India	15	1

Module 2: Applied Biodiversity and Wildlife Conservation	Meaning and Importance of Wildlife, Basics of Wildlife Ecology, Wildlife Habitats and Habitat Requirements, Threats to Wildlife – Habitat Loss and Fragmentation, Poaching and Illegal Wildlife Trade, Pollution, Human–Wildlife Conflict – Causes and Mitigation Measures, Wildlife Conservation and Management Methods, Protected Areas for Wildlife Conservation – National Parks, Wildlife Sanctuaries, Biosphere Reserves, Wildlife Protection Act, 1972, Role of Local Communities and NGOs in Wildlife Conservation, Wildlife Monitoring Techniques – Wildlife Census Methods, Camera Trapping, Career and Job Opportunities in Wildlife Conservation	**15**	**1**

References:

1. Friis, R. (2012). Essentials of Environmental Health. United States: Jones & Bartlett Learning..
2. Bisesi, M. S., Koren, H. (2002). Handbook of Environmental Health, Volume I: Biological, Chemical, and Physical Agents of Environmentally Related Disease. Ukraine: CRC Press.
3. Ronald M. Atlas, Stanley Maloy (2014). One Health - People, Animal and the Environment. Wiley
4. Megan Landon (2006). Environment. Health and Sustainable Development. McGraw Hill Education.

Understanding Basic Forms of English Literature-1

Semester-III

COURSE CODE : U24ES3AEC01 **COURSE CREDIT: 02**

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

*** Course Objectives:**

1. To develop analytical skills and critical thinking through close reading of literary texts

2. To cultivate appreciation of language as an artistic medium and to help students to understand the importance o forms, elements and style that shape literary works

*** Course Outcomes:**

1. Learner will be able to recognize the culture and context of the work of literature

2. Learner will be able to imbibe the underlying philosophy and values reflected in literature

Module-1 Study of Poetry (Total 15 Lectures)

1. William Wordsworth: *The Solitary Reaper*

2. Edgar Albert Guest:*Don't Quit*

3. Nissim Ezekiel : *Island*

4.Kamala Das:*An Introduction*

5.Arun Kolatkar :*The Breakfast Time at Kala Ghoda*

Module-2 Study of Novel (Total 15 Lectures)

Lord of The Flies by William Golding

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: Total 20 Marks**

1	* Continuous Evaluation	10 Marks
2	Poetry Recitation /Presentation	05 Marks
3	Attendance	05 Marks

**Application oriented activities will be conducted*

B) Semester end examination 30 marks

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

Passing Criteria: 40% in Internal as well as in External(i.e.8 Marks in Internal exam of 20 marks and 12 marks i External exam of 30 marks respectively)

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National Service Scheme (NSS) Studies Paper-II

Course Code: U24CC3NSS01
Course Type: Co-curricular
Total Lectures per week (1 Period is 60 minutes): 2 Credits: 2

Unit No.	Topic	No. of Lectures required
Unit-I	**Social Integration:** • Social Integration Meaning of value and types • Human values and social responsibilities **Concept of NGOS:** • Definition, Formation, objective, functions, types • Government Organizations Vs NGO's • Case studies	15
Unit-II	**Community Welfare in Association with NGO -** • Environment awareness • Water Management • Energy conservation • Gender sensitization, • Healthy society	15
	Total Lectures	**30**

Course Outcomes (CO):

- Upon successful completion of this course, students will be able to:
  - CO1: Define and analyze the concept of social integration and its value in a community.
  - CO2: Explain the various types of NGOs and their function in promoting social integration and community development.
  - CO3: Evaluate the impact of NGO initiatives on specific areas of community well-being (environment, water management, energy conservation, gender equality, health).
  - CO4: Develop strategies for collaborating with NGOs to address community needs in the aforementioned areas.

Learning Outcomes (LO):

Unit 1: Social Integration

- LO 1.1: Define social integration and explain its importance in a diverse society.
- LO 1.2: Analyze the different types and values of social integration.
- LO 1.3: Explain how human values and social responsibilities contribute to a more integrated society.
- LO 1.4: Discuss the potential challenges to social integration and their impact on communities.

Unit 2: Concept of NGOs

- LO 2.1: Define NGOs and differentiate between various types (e.g., charitable organizations, advocacy groups service providers).
- LO 2.2: Explain the core objectives and functions of NGOs in promoting social good.
- LO 2.3: Analyze a case study to understand the practical work of an NGO.
- LO 2.4: Evaluate the strengths and limitations of NGOs as agents of social change.

Unit 3: Community Welfare in Association with NGOs

- LO 3.1: Identify the specific areas of community development addressed by NGOs (environment, water management, energy conservation, gender equality, health).
- LO 3.2: Analyze strategies employed by NGOs to promote community participation and empowerment in thes areas.
- LO 3.3: Critically evaluate the effectiveness of specific NGO interventions related to environment, water management, energy conservation, gender sensitization, or healthy society initiatives.
- LO 3.4: Develop strategies for building and maintaining successful partnerships between NGOs and communities to address these specific needs.

Unit	Topics
Unit 1	**Social Integration**
Unit 2	**Concept of NGOS**
Unit 3	**Community Welfare in Association with NGO**

		Semester – III	
Course Name: National Service Scheme (NSS)		**Course Code:**	
Course Type		**Co-curricular**	
Focuses on		**Skill Development**	
Caters to		**Local, National, Global**	
Total Lectures per week (1 Period is 60 minutes)		**2**	
Credits		**2**	
Evaluation System		**Hours**	**Marks**
	Continuous Evaluation	**30**	**50**
		Total Marks	**50**

***For the Unit III – Students will be assigned Community Activity as per availability. They will be divided in a group of 2 and will be engaged for 20 hrs.**

The scheme of Examination shall be divided as follows.

- **Continuous Evaluation Pattern**

Description	Marks
30 hours activity related work such as • Attending lectures/ training sessions (10 Marks) • Field work & Maintenance of work record (25)	35
Project Report/Poster	5
Viva-voce by faculty in charge/ Internal Test	10
Total	**50**

References:

1. National Service Scheme Manual (Revised) Government of India, Ministry of Youth Affairs and Sports, New Delhi
2. National Service Scheme Manual University of Mumbai
3. National Service Scheme Manual for NSS District Coordinators National Service Scheme Cell, Dept. of Higher and Technical Education, Mantralaya
4. Rashtriya Seva Yojana Sankalpana Prof. Dr. Sankey Chakane, Dr. Pramod Diamond Publication, Pune
5. Annual Report of National Service Scheme (NSS) Dept. of Higher and Technical Education Mantralaya. Dept. of Higher and Technical Education Mantralaya.
6. Training Programme on National Programme scheme, TISS.
7. Orientation Courses for N.S.S. Programme officers, TISS.
8. Social Problems in India, Ram Ahuja.
9. National Service Scheme in India : A Case Study of Karnataka, M. B. Dishad, Trust Publications, 2001
10. http://www.thebetterindia.com/140/national-service-scheme-nss/
11. http://en.wikipedia.org/wiki/national-service-scheme
12. http://nss.nic.in/adminstruct
13. http://nss.nic.in/propexpan
14. http://nss.nic.in
15. http://socialworkness.org/about.html

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 four 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.

D) Scheme of Examination for 2 Credits shall be divided into two parts:-

- **Internal Assessment: 20 Marks**

Description	Marks
Internal tests of 10 marks each Q.1 Multiple choice Questions/True or False - 05 Marks Q.2. Attempt 2 questions out of 3 questions (5 marks each)- 05 Marks	10
One Project and Viva voce/Presentation/Case studies/Assignments	05
Attendance and Class behavior	05
Total	20

- **External Assessment: 30 Marks**

Paper Pattern

Total Marks: 30

Q.1 Answer any 2 two questions from the following…(Based on Unit I) (10Marks)

a. 05
b. 05
c. 05

Q.2 Answer any 2 two questions from the following… (Based on Unit II) (10Marks)

a. 05
b. 05
c. 05

Q.2 Answer any five questions from the following…(Mixed Questions) (10Marks)

a. 02
b. 02
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SIES (Nerul) College of Arts, Science & Commerce (Autonomous)
RISE WITH EDUCATION

CELEBRATING 25 YEARS 1998-2023

SIES (Nerul) College of Arts, Science and Commerce (Autonomous)
Syllabus for Approval (2026-27)

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	45% (Open Category) and 40%(Reserved Category)
4	Semester	IV
5	Level	UG
6	Pattern	3-4 years & 6-8 semesters Choice Based Grading System
7	To be implemented from	From Academic year 2026-27 in a progressive manner

Date: 21.02.2026

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)

B.Sc. Environmental Science Programme

(To be implemented from Academic Year- 2026-27)

No. of Courses	Course Code	Semester IV	Credits
1	*Major*		
1	U24ES4MJ01	Environmental Pollution Control and Management	**03**
	U24ES4MJP01	Practical's in Environmental Pollution Control and Management	**01**
2	*Major*		
1	U24ES4MJ02	Basic Life science-II	**03**
	U24ES4MJP02	Practical's in Basic Life science-II	**01**
	Minor		
	U24ES4MI01	Solid Waste Management	**03**
	U24ES4MIP01	Practical's in Solid Waste Management	**01**
4	*Open Electives(OE)*		
1	U24BE4E01	Introduction to International Economics (Department of Economics)	**02**
5	*VSC/SEC*		
1	U26ES4SEC01	Biosafety, Biohazards and Environmental Health	**02**
6	*AEC/VEC/IKS*		
1	U24ENAEC01	Understanding Basic Forms of English Literature-2	**02**
7	*OJT, FP, RP, CEP, CC*		
1	U25CC4 CEP01	Community Engagement Program	**04**
		Total Credits	**22**

SIES (Nerul) College of Arts, Science & Commerce (Autonomous)
RISE WITH EDUCATION

CELEBRATING 25 YEARS 1998-2023

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 (Semester IV)

(WITH EFFECT FROM THE ACADEMIC YEAR 2026-2027)

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 subjec 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.

Environmental Pollution Control and Management

COURSE CODE : U24ES4MJ01 COURSE CREDIT: 03+01 (03 theory+ 01 practical)

1 credit - 15 lectures

1 lecture is 60 minutes

Course Objective:

1. To understand the concept Air and Noise Pollution control and management.
2. To know about the concept of Water Pollution control and management.
3. To gain knowledge about Soil and Radioactive Pollution control and management.

Course Outcome:

1. To acquire the knowledge of the basic concept of Air and Noise pollution control and management.
2. To understand the concept of Water pollution control and management.
3. To relate about Soil and Radioactive Pollution control and management.

Sr. No	Syllabus	No. of lectures
01	**Module -I: Air, Noise Pollution Control and Management** **Air Pollution Contro**l: Control for particulate matter - Gravitational Settling, Cyclonic Separation, Filtration, Wet Scrubbing, Electrostatic precipitation • Control for VOCs - Absorption in suitable liquids, Condensation, Adsorption, Incineration • Control for gaseous emissions – NO2, SO2, Air Pollution Control by planting trees and growing vegetation, recent case studies. **Noise pollution Control:** The concept of Sound, Sound Pressure Level, Frequency and Propagation, Objectives of noise monitoring, noise monitoring system, noise monitoring equipment, Noise Control, Case Studies.	15
02	**Module-II: Water pollution Control and Management** **Water Pollution Control:** Physical unit process, - Screening, Flocculation, Sedimentation, Filtration • Chemical unit process - Chemical Precipitation, Adsorption process, Disinfection process • Biological unit process - Role of Microorganism, Activated sludge process, Aerated lagoons, Stabilization ponds, Trickling Filters, Sludge management. • Advance wastewater treatment processes - Ion – exchange process, Reverse Osmosis, Electro-dialysis, Carbon Adsorption • Concept of Zero waste discharge, Prevention and Control of Water Pollution.	15

03	**Module-III: Soil and Radioactive pollution Control and Management** **Soil Pollution Control:-** Control of sewage, domestic and industrial waste, Ecofarming and Ecotechnology, Biotechnology, Integrated nutrient Management, Genetic Resource Management, Land use systems, Soil Solarisation. Integrated Pest Management. **Radioactive pollution Control:-** Radiation Safety Standards, Preventive measures from radiation, Control from radiation, Control of Occupational radiation exposure, Minimising X-ray Hazards, Disposal methods of Radioactive wastes, Converting Radiowaste into solid form and other disposal methods.	15

COURSE CODE	TITLE	CREDITS	HOURS
U24ES4MJP01	**Environmental Pollution Control and Management**	1	30

Minor Experiments:

1. Determination of oil and grease content in polluted water samples.
2. Estimation of Turbidity in Water Samples.
3. Estimation of Alkalinity in Water Samples.
4. Air, water and noise pollution - case studies from India.

Major Experiments:

4. Determination of SOx in ambient air using HVS.
5. Determination of NOx in ambient air using HVS.
6. Determination of noise monitoring in selected areas using a sound level meter.
7. Estimation of Fluoride content in water samples.

References:

1. Sharma B.K :(2001), Environmental Chemistry, GOEL Publishing House, Meerut (UP)
2. Trivedi, P. R. (2004). Environmental Pollution and Control. India: APH Publishing Corporation.
3. Khopkar, S. M. (2007). Environmental Pollution Monitoring and Control. India: New Age International (P) Limited.
4. Environment pollution control and management - Indira Gandhi National Open University, school of interdisciplinary and trai disciplinary studies.
5. Soil Pollution: From Monitoring to Remediation. (2017). Netherlands: Elsevier Science.
6. Chemistry, Emission Control, Radioactive Pollution, and Indoor Air Quality. (2011). Croatia: Intech Open

BASIC LIFE SCIENCES – II

COURSE CODE: U24ES4MJ02 **COURSE CREDIT: 04 (03 theory+01 practical)**

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

Course Objective: To acquaint the students with the world of microorganisms.
Learning Outcome: The learners will gain insight into microbial diversity, their culturing and growth with the help of microscopic technique.

Sr. No	Syllabus	No. of lectures	Credits
Module-I: Microbial Diversity	• Introduction to Microbial Diversity: Archaebacteria, Eubacteria, Cyanobacteria, Actinomycetes, Eumycota Habitats, Examples and Applications. • Bacteria: Classification, Types, Morphology (Size, Shape and Arrangement) Modes of cell division, Roles of Bacteria. • Viruses: General Characters, Classification (Plant, Animal and Bacterial Viruses), Roles of viruses.	15	1
Module-II: Nutrition and Cultivation of Microorganisms	Nutritional Requirements – Carbon, Oxygen, Hydrogen, Nitrogen, Phosphorus, Sulphur and Growth Factors. • Classification of Different Nutritional types of Organisms, Design and Types of Culture Media: Simple Medium, Differential, Selective and Enriched Media. Concept of Isolation and Methods of Isolation, Pure Culture Techniques	15	1
Module-III: Modifications of Mendel's laws and Mutations Modification of Mendel's laws	**Gene interactions:** incomplete dominance, co-dominance Multiple genes; Multiple alleles: Blood group; Epistasis; Linkage: Sex limited; sex influenced. **Mutations:** Point Mutations Chromosomal aberrations: Structural: deletion, duplication, inversion, Translocation. Numerical: euploidy & aneuploidy (e.g. Downs, Turners. Klienfelter's, Cri- du-chat)	15	1

Practical:

COURSE CODE	TITLE	HOURS	CREDITS
U24ES4MJP02	BASIC LIFE SCIENCES - II	30	1

1. Introduction to laboratory instruments- Autoclave, Hot air oven, Incubator, Rotary shaker, Centrifuge, Laminar air flow.
2. To prepare culture media.
3. Sterilization of media and glassware, aseptic transfer.
4. Isolation of bacteria from soil by serial dilution method
5. To perform gram staining of a given sample.
6. To study meosis and mitosis.

References:

• Dubey and Maheshwari, General Microbiology, S. Chand, New Delhi.
• Modi HA, Handbook of Elementary Microbiology, Shanti Prakashan
• Pelczar et al., Microbiology, Tata Mc Graw Hill Publishing Co.
• Stanier et al., General Microbiology, Printice Hall of India Pvt. Ltd., New Delhi
• Essentials of Human Genetics, S.M.Bhatnagar, M.L.Kothari & L.A.Mehta, (1994), Orient Longman's Publication.

Solid Waste Management

COURSE CODE : U24ES4MI01 COURSE CREDIT: 03 (03 theory)

1 credit - 15 lectures

1 lecture is 60 minutes

Course Objective:
To acquaint the students with the solid waste management and hazardous waste management

Course Outcomes:
1. Acquaint the students with the basic concept of solid waste and management.
2. Understand the different techniques of waste treatment.
3. Gain an understanding of the segregation of different types of waste such as Hazardous and Biomedical waste.

Sr. No	Syllabus	No. of lectures
01	**Module-I Introduction to solid waste, collection and storage of municipal solid waste** Sources and generation of solid waste, Types of solid waste • Classification based on composition, Characterization of waste. • Factors affecting solid waste management. • Impact of solid waste on environment, animals, plants and human health, • Different techniques used in collection, transport, and storage of municipal solid waste.	15
02	**Module- II: Management of Solid Waste** Different methods of solid waste treatment and disposal, Introduction to Vermiculture, Composting, Landfill (Selection, Site Investigation and Site Characterization), Landfill Planning and Designing, Construction and Operational Practices, Landfill Quality and Control. • Methods of disposal- incineration, pyrolysis. • Concept of Integrated Waste Management (Case study). Zero waste concept of solid waste management. Concept of 12R's. • Green techniques for waste treatment. Concept of waste to energy recovery in India (case study).	**15**

03	**Module- III- Hazardous and Biomedical waste and its management** Hazardous waste • Characterization of hazardous waste • Storage of hazardous waste, treatment and disposal of hazardous waste – stabilization, solidification, incineration, landfill • Impact of hazardous waste on environment and human health Biomedical waste • Characterization of bio-medical waste • Collection, storage, treatment and disposal of bio-medical waste • Impact of improper biomedical waste management	15

COURSE CODE	TITLE	CREDITS	HOURS
U23ES4MIP01	**Solid Waste Management**	1	30

a. Solid waste management-collection and physico-chemical analysis of solid waste characterization and classification of waste.
b. Composting methods – Pit/Vermicompost.
c. Estimation of organic carbon in compost.
d. Design aspects of incinerators, Sanitary landfill site, Biogas plant.
e. Waste generation pattern – questionnaire and survey
f. Estimation of Moisture content, bulk density in compost.

Biosafety, Biohazards and Environmental Health

COURSE CODE: U26ES4SEC01 **COURSE CREDIT: 02 (Theory)**

1 credit - 15 lectures

1 lecture is 60 minutes

Course Objective

1. To introduce students to the basics of biosafety, biohazards, and environmental health, and to understand the impact of the environment and climate on human health

2. To help students understand the relationship between environment, climate, and human health, and to become aware of common environment- and climate-related diseases.

Course Outcome

1. Students will be able to understand biosafety basics and follow safe practices to control biological hazards.

Students will be able to understand how the environment and climate affect human health and identify common environmental diseases.

Sr. No	Syllabus	No. of lectures	Credits
Module-1: Biosafety and Biocontrol of Biohazards	Introduction to Biosafety and Biohazards, Importance of Biosafety for Human and Environmental Health, Types of Biological Hazards, Biosafety Considerations for Plant Pathogens, Microorganisms Associated with Health Risks, Biosafety Guidelines in Laboratories and Workplaces, Hazard Symbols and Global Harmonized System (GHS), , Laboratory-Associated Infections, Risk Assessment of Biological Hazards, Control of Biohazards in Work Environments, Personal Protective Equipment (PPE), Safe Handling and Decontamination of Biological Materials, Basics of Biosafety, Biosecurity and Regulations	**15**	**1**
Module- II: Environments, Climate and Human Health	Introduction to Environmental Health, Climate and Human Health, Air Pollution Related Diseases – Asthma, Bronchitis, COPD, Heat-Related Illnesses – Heat Exhaustion, Heat Stroke, Cold-Related	**15**	**1**

	Illnesses – Hypothermia and Frostbite, Water-Borne Diseases – Cholera, Typhoid, Diarrhoea, Vector-Borne Diseases – Malaria, Dengue, Chikungunya, Climate Change and Emerging Diseases, Occupational and Environment-Related Health Issues, Basic Prevention and Control Measures, Role of Public Health and Environmental Management		

References:

1. Ta, L., Gosa, L., & Nathanson, D. A. (2019). Biosafety and biohazards: understanding biosafety levels and meeting safety requirements of a biobank (pp. 213-225). Springer New York.

2. Burnett, L. C., Lunn, G., & Coico, R. (2009). Biosafety: guidelines for working with pathogenic and infectious microorganisms. Current protocols in microbiology, 13(1), 1A1.

3. Munusami, R., & Ramasamy, M. (2022). Recent Trends Toward the Development of Biosensors for Biosafety and Biohazards. In Miniaturized Biosensing Devices: Fabrication and Applications (pp. 333-349). Singapore: Springer Nature Singapore.

4. Biological Safety: Principles and Practices. (2020). United States: Wiley.

Understanding Basic Forms of English Literature-2

COURSE CODE : U24ES4AEC01 **COURSE CREDIT: 02**

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

*** Course Objectives:**

1. To develop creative skills and narrative skills through close reading and appreciation of literary texts

2. To cultivate appreciation of language as an artistic medium and to help students to understand the performativ aspect of the literary work.

*** Course Outcomes:**

1. Learner will be able to utilize the literary characteristics of the work of literature for professional development

2. Learner will be able to express effectively after understanding the performative aspect of the literary work

Module-1 **Study of Short Stories (Total 15 Lectures)**

1.O'Henry :*The Last Leaf*

2.Doris Lessing: *The Habit of Loving*

3. Ruskin Bond: *The Night Train at Deoli*

4.R.K.Narayan: *An Astrologer`s Day*

5.SudhaMurty: *In Sahyadri Hills-A Lesson in Humility*

Module-2 **Study of Drama (Total 15 Lectures)**

A Doll's House by Henrik Ibsen

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: Total 20 Marks**

1	*Continuous Evaluation	10 Marks
2	Role Plays / Group Discussion/Group Presentation	05 Marks
3	Attendance	05 Marks

**Application oriented activities will be conducted*

B) Semesterend examination30marks

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

Passing Criteria: 40% in Internal as well as in External (i.e.8 Marks in Internal exam of 20 marks and 12 marks i External exam of 30 marks respectively)

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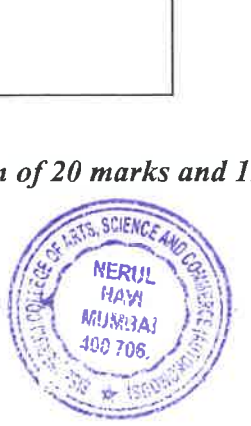

The scheme of examination shall be divided into two parts:

- **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.

D) Scheme of Examination for 2 Credits shall be divided into two parts:-

- **Internal Assessment: 20 Marks**

Description	Marks
Internal tests of 10 marks each Q.1 Multiple choice Questions/True or False - 05 Marks Q.2. Attempt 2 questions out of 3 questions (5 marks each)- 05 Marks	10
One Project and Viva voce/Presentation/Case studies/Assignments	05
Attendance and Class behavior	05
Total	20

- **External Assessment: 30 Marks**

Paper Pattern

Total Marks: 30

Q.1 Answer any 2 two questions from the following…(Based on Unit I) (10Marks)

a. 05
b. 05
c. 05

Q.2 Answer any 2 two questions from the following… (Based on Unit II) (10Marks)

a. 05
b. 05
c. 05

Q.2 Answer any five questions from the following…(Mixed Questions) (10Marks)

a. 02
b. 02
c. 02
d. 02
e. 02
f. 02
g. 02
h. 02

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