

 Estd. 1962 "A++" Accredited by NAAC (2021) With CGPA 3.52	SHIVAJI UNIVERSITY, KOLHAPUR - 416004, MAHARASHTRA PHONE:EPABX-2609000, www.unishivaji.ac.in, bos@unishivaji.ac.in शिवाजी विद्यापीठ, कोल्हापूर - ४१६००४, महाराष्ट्र दूरध्वनी-ईपीएबीएक्स - २६०९०००, अभ्यासमंडळे विभाग दुरध्वनी ०२३१-२६०९०९४ ०२३१-२६०९४८७	
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Ref.No.SU/BOS/Science/148

Date: 26/05/2026

The Principal,
 All Concerned Affiliated Colleges/Institutions
 Shivaji University, Kolhapur.

Subject: Regarding revised syllabi of B.Sc. Part-III (Sem.V & VI) degree programme under the Faculty of Science and Technology as per NEP-2020 (2.0)

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the syllabi, nature of question paper of B.Sc. Part-III (Sem.V & VI) degree programme under the Faculty of Science and Technology as per NEP-2020 (2.0).

B.Sc. Part-III (Sem. V & VI) as per NEP-2020 (2.0)			
1.	Botany	9.	Geology
2.	Physics	10.	Zoology
3.	Statistics	11.	Chemistry
4.	Mathematics	12.	Electronics
5.	Microbiology	13.	Drug Chemistry
6.	Industrial Microbiology	14.	Pollution
7.	Biochemistry	15.	Food Science and Quality Control
8.	Computer Science (Optional)	16.	Biotechnology (Optional/Vocational)

This syllabus, nature of question and equivalence shall be implemented from the academic year 2026-2027 onwards. A soft copy containing the syllabus is attached herewith and it is also available on university website www.unishivaji.ac.in>Syllabus>Syllabus as per NEP2020.

The question papers on the pre-revised syllabi of above-mentioned course will be set for the examinations to be held in October /November 2026 & March/April 2027. These chances are available for repeater students, if any.

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours faithfully,



Dy Registrar

Encl: as above

for information and necessary action

Copy to:

1	Dean, Faculty of Science & Technology	6	Appointment Section A & B
2	Director, Board of Examinations and Evaluation	7	I.T.Cell /Computer Centre
3	Chairman, Respective Board of Studies	8	Eligibility Section
4	B.Sc.-M.Sc. Exam Section	9	Affiliation Section (T.1) (T.2)
5	Internal Quality Assurance Cell (IQAC Cell)	10	P.G. Seminar Section

SHIVAJI UNIVERSITY, KOLHAPUR.



A++

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Syllabus For

Bachelor of Science III

(POLLUTION)

PAPER IX, X (SEMESTER –V)

PAPER XI, XII (SEMESTER –VI)

(NEP 2020)

Syllabus Implemented From Academic Year 2026- 2027

STRUCTURE OF THE COURSE - B. Sc. III Pollution

SHIVAJI UNIVERSITY, KOLHAPUR NEP-2020(2.0): Credit Framework for UG(B.Sc.) Programme under Faculty of Science and Technology								
SEM (Level)	COURSES		OE	VSC/SEC	AEC/VEC/IKS	OJT/FP/CEP /CC/RP	Total Credits	Degree/Cum.Cr. MEME
	Course-1	Course-2						
SEMV (5.5)	Major IX (2): Environmental Management System Major X(2): Herbarium Technique and Environmental Plant Documentation Major P-V(4): (On IX and X) (Major)P V(a) Environmental Management (Major)P V(b) Herbarium Technique)	Major I (ELEC)(2): Any ONE: i) Environmental Health and Safety ii) Forest Ecophysiology Major P-I (ELEC)(2) Any ONE (corresponding to Major I (ELEC)): Practical course in i) Environmental Health and Safety Major I (ELEC): ii) Practical course in - Forest Ecophysiology	OE-5(2) (T/P) Environmental Perspectives in Tourism	VSC II(2) (Major specific) (P): I Practical Soil And Water Sampling	AEC III(2) (English)	OJT (04)	22	UG Degree 1 32
SEMV I (5.5)	Major XI (2): Environmental Toxicology Major XII(2): Ethnobotany Major P VI(4): (On XI and XII) (Major)P VI(a) Environmental Toxicology (Major)P VI(b) Ethnobotany	Major II (ELEC)(2): Any ONE: i) Geoinformatics and Environmental Systems ii) Hydroponics Major P-II(2) (ELEC) Any ONE (corresponding to Major II (ELEC)): i) Geoinformatics and Environmental Systems Major II (ELEC) ii) Hydroponics		VSC III(2) (Major specific) (T/P): II Practical Biofertilizer SEC III(2) (T/P): Practical Green Entrepreneurship and Eco-friendly Products	AEC IV(2) (English) IKS2 (Major specific)(2): Environmental History and Ecology in Modern India	FP-(02)	22	
Credits	8(T)+8(P)=16	4(T)+4(P)=8	2(T/P)	2(T/P)+4(P)=6	4+2=6	4+2=6	44	

Shivaji University, Kolhapur

Revised Syllabus for Bachelor of Science Part – III: Pollution

1. TITLE: Pollution

2. YEAR OF IMPLEMENTATION: - Revised Syllabus will be implemented from June, 2026 onwards.

Guide lines shall be as per B.Sc.Regular Programme.

Rules and Regulations shall be as per B.Sc.Regular Programme.

Preamble

In alignment with the vision of the National Education Policy (NEP) 2020, the B.Sc. Degree Course in Pollution Studies aims to promote a multidisciplinary, holistic, and application-oriented approach to learning. With growing global and national concern over environmental degradation, pollution control, and sustainable development, this program seeks to equip students with both foundational knowledge and practical skills to understand and address environmental challenges effectively.

The curriculum integrates concepts from physical, chemical, biological, and earth sciences, offering a strong interdisciplinary foundation. In line with NEP 2020's emphasis on experiential learning, the course incorporates laboratory work, field studies, and project-based learning to help students apply theoretical knowledge to real-world environmental problems.

The program encourages critical thinking, innovation, environmental ethics, and research aptitude among students. It also promotes flexibility through multiple entry-exit options and skill-based courses to enhance employability and lifelong learning in the environmental sector.

This syllabus is designed to produce responsible graduates who can contribute meaningfully to national and global efforts in pollution control, environmental management, and sustainable development, thereby supporting India's commitments under the Sustainable Development Goals (SDGs) and the Paris Agreement.

Programme Specific Outcomes (POs)

After completion of the course successfully, students would be able to

1. Apply environment related technical skills for sustainability.
2. Develop the skills to identify Environmental problems.
3. Use the fundamnet also finder disciplinary subjects to solve environmental problems
4. Understand concept and components of environment, history and meaning and Interdisciplinary nature of Environmental Pollution.
5. Identify sources, nature and effects of pollutants on global and local environment.
6. Perform procedure for qualitative and quantitative analysis of pollutants.
7. Assess the effects of pollutants and suggest the control
8. Apply the environmental conservation strategies
9. Create the interest of the society in the conservation of natural resources and improve the

environmental quality through exhibitions and other similar activities.

6. **DURATION** - The course shall be a full time course.

7. **PATTERN** - Pattern of Examination will be Semester type for theory as well as practical.

8. **SCHEME OF EXAMINATION:-** (THEORY/PRACTICAL/INTERNAL):

Total marks shall be 50 for 2credit courses.

The university exam question paper in each semester end examination for each theory course(paper) for B.Sc. (all Semesters) shall be of 40 marks. Total marks for each course shall be based on continuous assessments and semester-end examination. The division of internal assessment and semester–end examination for B.Sc. will be as follows:

Particulars	2 Credit	Course Duration
1.Semester-end Examination	40Marks	1.5hrs.
2.Internal Assessment	10Marks	1.0hrs.
Total marks for each course	50Marks	—

1. The Examination for practical course will be of 50 marks at end of each semester. The rule for practical examination shall be as per the circular/ letter issued by respective board of studies.
2. The examination pattern for Co-Curricular Activities (CC), Field Project (FP), On Job Training (OJT),Community Engagement Program (CEP) and Research Project (RP) as per the University guidelines.

Internal Assessment Process shall be as follows:

- (a) The internal assessment should be conducted after completing 50% of syllabus of the course/s.
- (b) In case a student has failed to attend internal assessment on scheduled date, it shall be deemed that the student has dropped the test. However, in case of student who could not take the test on scheduled date due to genuine reasons, such a candidate may appeal to the Programme coordinator/Principal/Head of the Department. The programme coordinator/Principal/Head of the Department in consultation with the concerned teacher shall decide about the genuineness of the case and decide to conduct special test to such candidate on the date fixed by the concerned teacher but before commencement of the concerned semester- end examination.

The outline for continuous internal assessment activities shall be as under: Outline of continuous internal assessment activities

Level	Semester	Activities Per Semester	Marks
4.5	Semester–I	Assignment	10marks
	Semester–II	Unit test	10marks
5.0	Semester–III	Unit test	10marks
	Semester–IV	Oral examination/ Group discussion	10marks
5.5	Semester–V	Seminar/Group discussion/Field Work	10marks
	Semester–VI	Study tour/ Field Work/Project Work	10marks
6.0	Semester–VII	CaseStudy/FieldWork/ Project Work	10marks
	Semester–VIII	CaseStudy/FieldWork/ Project Work	10marks

EQUIVALANCE OF THE PAPER

Equivalence of papers and chances for the students in previous-Semester pattern: Two additional chances in subsequent semesters shall be provided for the repeater students of old three-year B.Sc.program.In such case the scores obtained by the students in NEP1.0/CBCS schemes should be converted in to equivalent credits in NEP 2.0.After that the students concerned shall have to appear for the examination as per this revised pattern. If a student fails in two consecutive chances, he/she must take admission for the respective course in NEP 2.0 .In such cases his/her previous performance of incomplete academic years (B.Sc.I, B.Sc.II, and orB.Sc.III) will be cancelled.

SCHEME OF TEACHING:

TEACHING HOURS: All courses under the B. Sc. II will be of 2 credits each. The theory courses will be taught for 30 hours and Practical courses for 60 hours. All the major and minor subjects will have Practical Courses. In addition, VSC, OE and SEC have practical modules.

9 DETERMINATION OFSGPA/CGPA:

1. Semester Grade Point Average (SGPA)

$$\frac{\sum(\text{Course credits} \times \text{Grade points obtained})}{\text{of a semester}}$$

$$\text{SGPA} = \frac{\text{-----}}{\sum(\text{Course credits}) \text{ of respective semester}}$$

2. Cumulative Grade Point Average(CGPA)

$$\text{CGPA} = \frac{\sum(\text{Total credits of a semester} \times \text{SGPA of respective semester})}{\text{of all semester}}$$

$$\frac{\sum(\text{Total course credits})}{\text{of all semesters}}$$

Gradation Chart:

%of Marks Obtained	Numerical Grade (Grade Point)	CGPA	LetterGrade
Absent	-	-	-
-0-34	0	0.0-4.99	F (Fail)
35-44	5	5.00-5.49	C
45-54	6	5.50-6.49	B
55-64	7	6.50-7.49	B+
65-74	8	7.50-8.49	A
75-84	9	8.50-9.49	A+
85-100	10	9.50-10.0	O(Outstanding)

10.Nature of Question Paper for B.Sc. Part – I, II & III (40 + 10 Pattern) according to Revised Structure as Per NEP - 2020 to be implemented from academic year 2026-27

Maximum Marks: 40

Duration: 1:30 hrs

Q. 1 Select the most correct alternative from the following

[8]

i) to viii) MCQ one mark each with four options

A)

B)

C)

D)

Q.2 Attempt any TWO of the following

[16]

A)

B)

C)

Q. 3 Attempt any FOUR of the following

[16]

A)

B)

C)

D)

E)

F)

SEMESTER–V

POLLUTION Paper IX (Major):

DSC: Environmental Management System

CREDIT: 2. LECTURE PERIODS: 2 PER WEEK

MARKS: 50

MODULE	SUB- MODULE	TOPICS	LECTURE PERIODS
1	Basics of Environmental Management		
	1.1 Introduction to EMS	Definition and concept of Environmental Management Importance and need of environmental management Introduction to Environmental Management System (EMS) Overview of ISO 14001; Role of environmental policies and regulations	08
	1.2 Environmental Planning and Impact Assessment	Environmental Planning Process Environmental Impact Assessment (EIA) – Steps Risk Assessment Waste Management Principles (3R – Reduce, Reuse, Recycle)	08
2	Environmental Monitoring and Applications		
	2.1 Environmental Monitoring and Auditing	Environmental Monitoring (Air, Water, Soil) Environmental Audit – Types & Importance Environmental Performance Indicators Carbon Footprint & Energy Audit (Basic Concept)	06
	2.2 Environmental Management Tools and Applications	Green Corporate Social Responsibility (CSR) & Environment ; Role of industries in environmental protection; Sustainable environmental practices	08
Total Lectures			30

Course Outcome (COs):-

- To understand environmental management principles.
- To learn EMS framework and ISO standards.
- To conduct environmental audits and monitoring.
- To develop practical skills in environmental assessment

Paper X (Major): DSC:

HERBARIUM TECHNIQUES AND ENVIRONMENTAL PLANT DOCUMENTATION

CREDIT: 2. LECTURE PERIODS: 2PER WEEK

MARKS: 50

MODULE	SUB-MODULE	TOPICS	LECTURE PERIODS
1	Introduction to Herbarium and Plant Collection Technique		
	1. 1 Introduction to Herbarium	Meaning and concept of herbarium History and development of herbaria Role of herbarium in taxonomy and pollution studies Major Indian herbaria: Botanical Survey of India Central National Herbarium digital and virtual herbarium	06
	1.2 Plant Collection Technique	Field survey method, Tools used in plant collection Ethical collection practices ,Collection of aquatic, terrestrial and xerophytic plants Field notebook and data recording	08
2	Herbarium Preparation and Environmental Plant Documentation		
	2.1 Herbarium Preparation	Plant pressing and drying techniques Mounting of herbarium specimens Labeling and documentation Storage and preservation of specimens	08
	2. 2 Environmental Plant Documentation	Plant pressing and drying techniques, Mounting of herbarium specimens, Labeling and documentation, Storage and preservation of specimens	
Total Lectures			30

Course Outcome (Cos):-

- 1 – Understand herbarium techniques and importance.
- 2 – Learn methods of plant collection and preservation.
- 3 – Develop skills in plant identification and documentation.
- 4 – Apply herbarium knowledge in environmental studies.

REFERENCE BOOK LIST

1. Lawrence, G.H.M. – *Taxonomy of Vascular Plants*, Oxford & IBH Publishing.
2. Jain, S.K. & Rao, R.R. – *A Handbook of Field and Herbarium Methods*, Today & Tomorrow's Printers.
3. Bridson, D. & Forman, L. – *The Herbarium Handbook*, Royal Botanic Gardens, Kew.
4. Singh, G. – *Plant Systematics: Theory and Practice*, Oxford & IBH.
5. Sharma, O.P. – *Plant Taxonomy*, McGraw Hill Education.
6. Pandey, B.P. – *Plant Anatomy and Embryology*, S. Chand (for plant structure reference).
7. Radford, A.E. – *Fundamentals of Plant Systematics*, Harper & Row
8. Botanical Survey of India (BSI) – Online Digital Herbarium Resources.
9. Jain, S.K. & Rao, R.R. *Handbook of Field and Herbarium Methods* Today & Tomorrow's Printers, New Delhi.
10. Simpson, Michael G. *Plant Systematic* Academic Press.
11. Stace, C.A. *Plant Taxonomy and Biosystematics* Cambridge University Press.
12. Woodland, D.W. *Contemporary Plant Systematics* Prentice Hall.

LABORATORY COURSE PRACTICAL

Paper: (Major) P V (a)

(Total Marks-50)

Paper: (Major) P V (a)

Based on Paper IX:

(Major) P V (a): Environmental Management System

1. Study of environmental management concepts through charts and models.
2. Preparation of EIA flowchart showing different stages.
3. Survey of solid waste generation in college campus.
4. Classification of waste into biodegradable and non-biodegradable.
5. Demonstration of 3R concept (Reduce, Reuse, Recycle) using household waste.
6. Preparation of environmental monitoring data sheet.
7. Simple carbon footprint calculation of household activities.
8. Preparation of energy audit checklist for college building.
9. Preparation of report on cleaner production practices.
10. Field survey of local environmental problems.

LABORATORY COURSE PRACTICAL

Paper: (Major) P V (b)

Based on Paper X:

Herbarium Technique and Environmental Plant Documentation

1. Study of basic herbarium equipment (plant press, blotting paper, newspaper, field knife, GPS/mobile).
2. Demonstration of plant collection methods in field conditions.
3. Drying of plant specimens using blotting papers/newspapers.
4. Demonstration of proper arrangement of plant parts before pressing.
5. Mounting of dried plant specimen on herbarium sheet.
6. Preparation of herbarium label format.
7. Label writing and documentation for collected plant specimens.
8. Study of herbarium storage methods (folders, cabinets, insect protection).
9. Demonstration of poisoning / preservation techniques (concept only).
10. Preparation of mini herbarium (5–7 specimens) by each student.
11. Field survey report submission and herbarium specimen presentation.

Semester -VI
POLLUTION Paper XI (Major):
DSC: Environmental Toxicology

CREDIT: 2. LECTURE PERIODS: 2 PER WEEK

MARKS: 50

MODULE	SUB-MODULE	TOPICS	LECTURE PERIODS
1	Introduction to Environmental Toxicology		
	1.1 Introduction to Environmental Toxicology	Definition, concept and scope of Environmental Toxicology ,Types of toxic substances in environment, Sources of environmental pollutants (natural and anthropogenic), Classification of toxicants (chemical, biological and physical) Basic principles of toxicity: dose, exposure and response Acute and chronic toxicity	08
	1.2 Toxic Substances and Their Environmental Sources	Heavy metals (lead, mercury, cadmium, arsenic) Agricultural chemicals (pesticides, herbicides, fertilizers) Industrial pollutants and toxic wastes; Air pollutants with toxic effects; Toxic contaminants in soil and water Plastic and microplastic toxicity	08
2	Toxicity Assessment and Environmental Management		
	2.1 Effects of Toxicants on Living Organisms	Entry of toxic substances into living organisms Toxic effects on plants Toxic effects on animals and human health Bioaccumulation and biomagnifications Toxicity in aquatic ecosystems; Ecological impacts of environmental toxins	06
	2.2 Toxicity Assessment and Environmental Management	Methods for toxicity testing;Biomonitoring and Bioindicators; Environmental risk assessment; Toxic waste management and treatment; Pollution control strategies; Environmental laws related to toxic substances	08
Total Lectures			30

Learning Outcomes

1. Understand the basic concepts, classification and sources of environmental toxicants..
2. Identify major environmental toxicants and their sources in air, soil and water.
3. Explain and understand **the** impact of environmental toxicants on ecosystems, plants, animals and human health.
4. Develop knowledge about toxicity monitoring, risk assessment and management of toxic pollutants..
5. Develop skills for detection, monitoring and management of toxic pollutants.

Semester -VI
POLLUTION Paper XII (Major):
DSC: Ethnobotany

CREDIT: 2. LECTURE PERIODS: 2PER WEEK

MARKS: 50

MODUL E	SUB- MODULE	TOPICS	LECTURE PERIODS
1	Introduction to Enthnobotany and importance		
	1.1 Introduction to Enthnobotany	Definition, concept and scope of Enthnobotany. Enthnobotany as an interdisciplinary science Importance and relevance of ethnobotany in modern context.	06
	1.2 Plants used by tribal communities	Major and minor tribal groups of India and their lifestyles. Plants used by tribal communities: Food plants, toxicants and beverages, Resins and oils, Miscellaneous uses	08
2	Ethnic Knowledge and Conservation		
	2.1 Methodology of ethnobotanical studies	Herbarium preparation. Study of ancient literature. Archaeological findings. Sacred groves and temples	08
	2.2 Enthnobotany and Medicinal Plants	Role of ethnobotany in modern medicine. Medico-ethnobotanical sources in India Study of important ethnomedicinal plants (habit, habitat, morphology, uses):- Azadirachta indica, Ocimum sanctum, Vitex negundo, Gloriosa superb, Tribulus terrestris Pongamia pinnata	08
Total Lectures			30

Course Outcome (Cos):-

1. To educate the students about the concept and importance of ethno botany as an interdisciplinary science.
2. To learn about the tribal of India, their life style and their role in conservation of medicinal plants.
3. To acquire basic knowledge about key medicinal plants used in ethno botany
4. To understand the legal aspect of ethno botany.

Semester -VI
LABORATORY COURSE PRACTICAL
Paper: (Major) P VI (b)

(Total Marks-50)

Based on Paper XI: Environmental Toxicology
Paper: (Major) P VI (b)

1. Study of laboratory safety rules in toxicology.
2. Identification of common environmental toxicants from charts/specimens.
3. Determination of Biological Oxygen Demand (BOD).
4. Determination of Chemical Oxygen Demand (COD) from Waste Water.
5. Detection of heavy metals in water samples (demonstration).
6. Determination of phosphate in water.
7. Observation of pesticide effects on seed germination.
8. Study of pollution indicator plants.
9. Observation of effects of pollutants on plant leaves.
10. Demonstration of biomagnifications using ecological diagrams.
11. Survey of plastic waste in local environment.
12. Determination of oil and grease from given water sample

LABORATORY COURSE PRACTICAL
Paper: (Major) P VI (b)
Based on Paper XII Ethnobotany
Paper: (Major) P VI (b)

1. Study of endemic plant species (India)
2. Field visit to sacred groves
3. Study of local flora.
4. Demonstration of useful products of medicinal plants.
5. Study of cultivation method of local agricultural area.
6. Study of commercial plants and their uses.
7. Survey of pesticides and fertilizers communal used in Farm.
8. Identification of soil types through physical method.
9. Study of irrigation method of local agricultural area
10. Study of indoor plants and theirs uses.
11. Study of ornamental plants.

Semester -V
POLLUTION
MAJOR PAPERS (Elective)
DSC: Environmental Health and safety

CREDIT: 2. LECTURE PERIODS: 2 PER WEEK

MARKS: 50

MODULE	SUB-MODULE	TOPICS	LECTURE PERIODS
1	Occupation, Monitoring for Safety, Health & Environment		
	1.1 Occupation, Safety And Management	Occupational Safety, Health and Environmental Safety, – Principles & practices, Role of Management in Industrial Safety, Planning for Safety: Planning: Definition, purpose, nature, scope and procedure. Management by objectives and its role in Safety	08
	1.2 Monitoring for Safety, Health & Environment	Environment Management System, Bureau of Indian Standards on Safety and Health: 14489 – 1998 and 15001 – 2000. Principles of Accident Prevention: Definition: Incident, accident, injury, dangerous, occurrences, unsafe acts, unsafe conditions, hazards, error, oversight, mistakes etc.	08
2	Personal Protective Equipment and Employee Participation in Safety		
	2.1 Personal Protective Equipment	Need for Personal Protection Equipment, Selection, Use, Care & Maintenance Respiratory and Non-respiratory Personal Protective Equipment, Head Protection, Ear Protection, Face and Eye Protection, Hand Protection, Foot Protection, Body Protection. Standards & regulations	06
	2.2 Education, Training and Employee Participation in Safety:	Techniques of training, design and development of training programs. Training methods and strategies types of training. Evaluation and review of training programs. Competence Building Techniques (CBT), Concept for training, safety as a on-line function. Employee Participation: Purpose, areas of participation, methods, Role of trade union in Safety, Health and Environment Protection	08
Total Lectures			30

Learning Outcomes

- 1:** Understand the basic concepts of occupational safety, health and environmental management.
- 2:** Identify hazards, unsafe acts and unsafe conditions in workplace environments.
- 3:** Demonstrate knowledge of personal protective equipment (PPE) and their proper use and maintenance.
- 4:** Understand safety planning, accident prevention and environmental monitoring systems.
- 5:** Develop awareness about safety training, competence building techniques and employee participation in safety programs.

Semester -V
LABORATORY COURSE PRACTICAL
MAJOR PAPERS (Elective)

Environmental Health and safety

(Total Marks-50)

1. Study of occupational hazards in laboratory / workshop environment.
2. Identification of unsafe acts and unsafe conditions in a workplace.
3. Preparation of workplace safety checklist for laboratory safety.
4. Study of incident and accident reporting formats used in industries.
5. Case study analysis of a major industrial accident and preventive measures
6. Preparation of a basic safety plan for a small laboratory or industry.
7. Preparation of risk assessment chart for common workplace hazards.
8. Study of Environmental Management System (EMS) components.
9. Familiarization with Bureau of Indian Standards (BIS) guidelines related to safety.
10. Preparation of environmental monitoring checklist for workplace safety.
11. Demonstration of basic safety audit procedure.
12. Identification and demonstration of different types of Personal Protective Equipment (PPE).
13. Study of respiratory protective equipment and their uses.
14. Study of non-respiratory PPE such as helmets, gloves, goggles and safety shoes.
15. Preparation of a safety training module for employees or students.
16. Demonstration of different training methods in safety education (lecture, demonstration, simulation).

REFERENCE BOOK LIST

1. R.K. Jain and Sunil S. Rao – *Industrial Safety, Health and Environment Management Systems*, Khanna Publishers, New Delhi.
2. L.M. Deshmukh – *Industrial Safety Management: Hazard Identification and Risk Control*, Tata McGraw-Hill Publishing Company, New Delhi.
3. John Ridley and John Channing – *Safety at Work*, Butterworth–Heinemann / Routledge Publications.
4. H.W. Heinrich, D. Petersen and N. Roos – *Industrial Accident Prevention: A Scientific Approach*, McGraw-Hill Book Company.
5. Slote L. – *Handbook of Occupational Safety and Health*, John Wiley & Sons.
6. Goetsch D.L. – *Occupational Safety and Health for Technologists, Engineers and Managers*, Pearson Education.
7. Bureau of Indian Standards (BIS) –
IS 14489: Code of Practice on Occupational Safety and Health Audit.
8. Bureau of Indian Standards (BIS) –
IS 15001: Occupational Health and Safety Management Systems – Requirements.
9. United Nations General Assembly (1987) Report of the World Commission on Environment and Development: Our Common Future.

POLLUTION
Semester -V
MAJOR PAPERS (Elective)
Forest Ecophysiology

CREDIT: 2. LECTURE PERIODS: 2 PER WEEK

MARKS: 50

MODULE	SUB- MODULE	TOPICS	LECTURE PERIODS
1	Forest Ecosystem and Physiological Processes in Forest Trees		
	1.1 – Forest Ecosystem and Environmental Factors	Forest ecosystem concept, Forest types (tropical, temperate – basic idea), Forest layers (canopy, understory, ground layer), Microclimate in forest, Light, temperature, soil moisture in forests, Nutrient cycling in forests	06
	1.2 Physiological Processes in Forest Trees	Photosynthesis in forest trees, Respiration in woody plants, Transpiration and water transport, Stomatal regulation, Chlorophyll content, Growth and productivity	08
2	Pollution Stress - Adaptation and Conservation Physiology		
	2.1 – Forest Trees under Pollution Stress	Air pollution effects on forest trees, Acid rain impact, Dust and particulate deposition, Heavy metal stress, Visible injury symptoms, Forest decline concept	06
	2.2 Adaptation and Conservation Physiology	Drought adaptation in trees, Leaf modifications, Carbon sequestration, Stress tolerance mechanisms, Afforestation and forest management, Conservation strategies	10
	Total Lectures		30

COURSE OUTCOMES (COs)

After completion, students will be able to:

- 1** – Explain forest ecosystem structure and environmental factors.
- 2** – Describe physiological processes in forest trees.
- 3** – Analyze effects of pollution stress on forest vegetation.
- 4** – Perform simple ecophysiological experiments and field studies.
- 5** – Suggest conservation and afforestation strategies

Reference Books

1. Physiological Plant Ecology: Ecophysiology and Stress Physiology of Functional Groups
Author: Walter Larcher Publisher: Springer
2. Tropical Forest Plant Ecophysiology Editor: Stephen S. Mulkey Publisher: Springer / CBS Publishers
3. Plant Ecophysiology Author: Jean-Claude Leclerc Publisher: Science Publishers
- 4 Plant Ecology in a Changing World Authors: James R. Ehleringer & Russell K. Monson
Publisher: CRC Press
- 5 Textbook of Forest Science Editors: Asim Kumar Mandal & Abel Nicodemus
Publisher: Springer
- 6 Plant Ecology in a Changing World Authors: James R. Ehleringer & Russell K. Monson
Publisher: CRC Press
- 7 Plant Ecophysiology
Author: Jean-Claude Leclerc ,Publisher: Science Publishers
- 8.. Experimental Ecophysiology and Biochemistry of Trees and Shrubs
Authors: Aurelio Gonzalez-Rodriguez, Suresh Kumar Maiti, Asha Kumari
Publisher: Apple Academic Press
9. Ecophysiology of Coniferous Forests
Editors: William K. Smith, Jacques Roy, Thomas M. Hinckley,Publisher: Elsevier
10. Textbook of Forest Science
Editors: Asim Kumar Mandal, Abel Nicodemus,Publisher: Springer
11. Plant Physiology and Development
Authors: Lincoln Taiz, Eduardo Zeiger,Publisher: Sinauer / Oxford
12. Plant Ecology Authors: Michael J. Crawley,Publisher: Wiley-Blackwel.
13. Trees in a Changing Environment: Ecophysiology, Adaptation and Future Survival Editors: Michael Tausz & Nancy Grulke,Publisher: Springer
14. Relationship Between Forest Ecophysiology and Environment
Editor: Roberto Tognetti,Publisher: MDPI Books
15. Experimental Ecophysiology and Biochemistry of Trees and Shrubs
Authors: Humberto González-Rodríguez, Ratikanta Maiti & Aruna Kumari
Publisher: Apple Academic Press

Semester -V
LABORATORY COURSE PRACTICAL
MAJOR PAPERS (Elective)
Forest Ecophysiology
(Total Marks-50)

1. Study of forest types (chart/model)
2. Identification of forest tree species
3. Measurement of light intensity in field
4. Leaf area measurement
5. Stomatal index calculation
6. Temporary mount of stomata
7. Chlorophyll estimation (simple method)
8. Photosynthesis rate demonstration
9. Observation of pollution injury on leaves
10. Dust deposition comparison (roadside vs interior forest)
11. pH testing of rainwater sample
12. Heavy metal case study (secondary data)
13. Diameter at breast height (DBH) measurement
14. Carbon estimation (simple formula method)
15. Tree census survey
16. Seed germination test under stress

POLLUTION
Semester -VI
MAJOR PAPERS (Elective)
Geoinformatics and Environmental Systems

CREDIT: 2. LECTURE PERIODS: 2 PER WEEK

MARKS: 50

MODULE	SUB- MODULE	TOPICS	LECTURE PERIODS
1	Fundamentals of Environmental Systems and Natural Hazards		
	1.1 Fundamentals of Environmental Systems	Meaning and scope of Environmental Systems, Structure of the Earth – Crust, Mantle, Core, Rocks and Minerals – types and importance, Weathering and Soil Formation, Human impact on environment (mining, urbanization)	06
	1.2 Natural Hazards And impact on	Natural Hazards – Earthquake, Flood, Landslide, Human impact on environment (mining, urbanization)	08
2	Basics of Geoinformatics and Applications of Geoinformatics		
	2.1 Basics of Geoinformatics	Introduction to Geoinformatics, Components of GIS, Spatial and non-spatial data, Raster and vector data models, GPS – principles and uses, Introduction to Remote Sensing	06
	2.2 Applications of Geoinformatics	GIS in urban planning, GIS in agriculture and forestry, Basics of digital mapping, Concept of overlay analysis	10
			30

COURSE OUTCOMES (COs)

After completion, students will be able to:

- 1** – Explain forest ecosystem structure and environmental factors.
- 2** – Describe physiological processes in forest trees.
- 3** – Analyze effects of pollution stress on forest vegetation.
- 4** – Perform simple ecophysiological experiments and field studies.
- 5** – Suggest conservation and afforestation strategies

Reference Books

- 1.Albretcht, J. (2007): Key Concepts & Techniques in GIS, SAGE Publications Ltd., London
- 2.Burroughs, P.A. and McDonnell, R.A. (1998): Principles of Geographic Information Systems, Oxford University Press, New York
- 3.Clark, K.C. (2010): Getting Started with Geographic Information Systems, Prentice Hall, Upper Saddle River, New Jersey
- 4.Daniel, J., Loree, P. and Whitener, A. (2002): Inside Mapinfo Professional, Onword Press, Albany, New York
- Fazal, S. (2008): GIS Basics, New Age International (P) Limited, Publishers, New Delhi
- 4.Harvey, F. (2008): A Primer of GIS: Fundamental Geographic and Cartographic Concepts, The Guilford Press, New York
- 5.Heywood, D.I., Cornelius, S. and Carver, S. (2006): An Introduction to Geographical Information Systems, Prentice Hall, Upper Saddle River, New Jersey
- 6.Longley, P., Goodchild, M., Maguire, D.J. and Rhind, D.W. (2011): Geographic Information Systems and Science, John Wiley & Sons, New York
- 7.Shekhar, S. and Xiong, H. (eds.) (2008): Encyclopaedia of GIS, Springer, New York

POLLUTION
Semester -VI
MAJOR PAPERS (Elective)
LABORATORY COURSE PRACTICAL
Geoinformatics and Environmental Systems

1. Identification of common rocks
2. Study of soil profile
3. Preparation of simple hazard map (India outline)
4. Study of topographic map
5. Map reading – scale, contour, symbols
6. Collection of GPS coordinates (mobile GPS method)
7. Preparation of simple thematic map (manual method)
8. Study of map components (title, scale, legend, north arrow)
9. Manual digitization using tracing sheet
10. Preparation of land use map (colour method)
11. Study of topographic map
12. Collection of GPS coordinates (mobile-based)
13. Preparation of contour sketch
14. Preparation of thematic map (population/land use)

POLLUTION
Semester -VI
MAJOR PAPERS (Elective)
Hydroponics

CREDIT: 2. LECTURE PERIODS: 2 PER WEEK

MARKS: 50

MODULE	SUB- MODULE	TOPICS	LECTURE PERIODS
1	Introduction and Process of Hydroponics		
	1.1 Introduction to hydroponics	Define Hydroponics, Introduction to hydroponic technology ,Plants commonly used in hydroponics,Plant growth requirements-light, nutrition, temperature,	06
	1.2 Process of Hydroponics	Basic concept and design of hydroponic growing system, Medium of growing, Nutrient solutions used, Difference between soil and soilless cultivation, seed treatment Describe the process of raising seedlings for Hydroponic	08
2			
	1.3 Importance of hydroponics	Environmental control, Culturing of plants in hydroponic system, Importance of Hydroponics system in India, Use of hydroponics cultivation in agriculture	06
	1.4 Maintenance of hydroponics	Irrigation systems, Identification of the pests and diseases affected by plants in hydroponics and their control, identification and control of weeds, Maintenance of commercial hydroponic farming	10
			30

COURSE OUTCOMES (COs)

- To provide a sound basis of knowledge in horticultural principles as they apply to the culture, use, management of plants in various production situations
- Learn to grow plants commercially in hydroponics
- Learn about the equipment and materials used
- To develop the entrepreneurial skills by discovering the nature

POLLUTION
Semester -VI
MAJOR PAPERS (Elective)
LABORATORY COURSE PRACTICAL
Hydroponics

- 1 To study the plants used in hydroponics
- 2 To Prepare a solutions for plant growth
- 3 To Study of irrigation system and types
- 4 To study environmental parameters such as air, wind, humidity, temperature
- 5 To study of tools, and equipment required for of Hydroponic system
- 6 To study the process of filtering and sterilizing the water and nutrient solution
- 7 To study the frequency and dose of nutrient solution
- 8 To study water quality parameters -Electrical conductivity
- 9To study water quality parameters - TDS
- 10 To study water quality parameters PH and temperature as physical parameters.

Reference Books

1. Singh, D. J., & Davidson, J. (2016). Introduction to Hydroponics-Growing Your Plants Without Any Soil
Mendon Cottage Books
2. Resh, H. M. (2022). Hydroponic food production: a definitive guidebook for the advanced home gardener and the commercial hydroponic grower. CRC press.
3. Raviv, M., Lieth, J. H., & Bar-Tal, A. (Eds.). (2019). Soilless culture: Theory and practice: Theory and practice. Elsevier.

Semester-V
OPTIONAL ELECTIVE

Pollution Paper-V

OE: Environmental Perspectives in Tourism

CREDIT: 2
MARKS: 50

LECTURE PERIODS: 2PER WEEK

MODULE	SUB- MODULE	TOPICS	LECTURE PERIODS
1	Introduction to Ecotourism and Development		
	1.1 Introduction to Ecotourism and Evolution	Ecotourism Evolution, Principles, Trends and Functions of Ecotourism , Mass Tourism vs. Eco tourism, Ecotourism Activities & Impacts, Western Views of Ecotourism, Ecological Foot Prints. Relationship between Tourism & Ecology	06
	1.2 Alternative and Responsible Tourism Ecotourism, development	Sustainable Ecotourism. Resource Management, Socio-economic Development. Ecotourism Policies, Planning and Implementation. Eco-friendly Facilities and Amenities. Carrying Capacity, Alternative Tourism and Responsible ecotourism- Ecotourism Programming.	08
2	Eco Tourism Issues and Challenges		
	2.1 Eco Tourism Trends, Issues and Challenges	Conservation of Ecotourism Protected Area Management through Ecotourism. Community Participation - Types of Participation, Issues and Challenges - Ecotourism Projects - Case Studies on Thenmala Eco-Project, Similipal Ecotourism Project, Sunderbans Eco tourism Project, Nandadevi Biosphere Reserve.	06
	2.2 Role of National and International Agencies Ecotourism Development	Role of the International Ecotourism Society – the UNWTO, UNDP, WWF - Department of Forest and Environment - Government of India, ATREE, EQUATIONS	10
	Total Lectures		30

Learning Outcomes:-

1. Understand the concept, principles, functions and type of eco- tourism.
2. Identify activities and its impact on nature and environment..
3. Analyze the role of human activities in exacerbating environmental issues.
4. Evaluate and understand the responsibilities, issue and challenges, eco-tourism.
5. Gain the knowledge on sustainable eco-tourism and its socio- economic relevance,

Reference Books

1. Ralf C. Buckley Ecotourism – Principles and Practices
2. David A. Fennell Ecotourism
3. Jitendra K. Sharma Handbook of Environmental and Nature-Based Tourism
4. Luc Hens & An Thinh Nguyen Sustainable Tourism and Its Environmental and Human Ecological Effects
5. David Huddart & Tim Stott Adventure Tourism: Environmental Impacts and Management
6. Stephen F. McCool & Keith Bosak Reframing Sustainable Tourism
7. Stephen Wearing & Stephen Schweinsberg - Ecotourism
8. Jennifer Hill & Tim Gale- Ecotourism and Environmental Sustainability: Principles and Practice
9. Kelly Bricker & Jacqueline Kariithi Ecotourism and Sustainable Tourism: From Principle to Practice in the New Millennium
10. Ecotourism: Environment, Health and Education – Wei-Ta Fang, Arba'at Hassan & Max Horng

Vocational Skill Course (VSC)

SEMESTER-V

Pollution Paper II

Soil and Water Sampling

CREDIT: 2. PRACTICAL: 60 MARKS: 50

VSC: - Pollution Paper I Soil and Water Sampling

PRACTICAL

Soil and Water Sampling-I

1. Study of soil sampling tools
2. Collection of representative soil sample (surface soil and subsurface soil)
3. Composite soil sampling technique
4. Grid sampling method of soil
5. Study of Labeling, preservation and storage of soil samples
6. Preparation of soil samples for analysis
7. Determination of soil texture
8. Study of water sampling equipment
9. Collection of water samples from different sources
10. Preservation and storage of water samples
11. Interpretation of soil and water test reports
12. Determination of soil colour
13. Determination of soil moisture content and porosity.
14. Determination of total dissolved solids (TDS)
15. Determination of hardness of water

Course Outcomes:-

- To understand principles of soil and water sampling
- To learn standard sampling tools and methods
- To analyze basic physico-chemical properties
- To interpret soil and water quality for agriculture and environment

Vocational Skill Course (VSC)

SEMESTER-V

Pollution Paper II: VSC BIOFERTILIZER

SEMESTER-VI

CREDIT: 2.

PRACTICAL HOURS: 60

MARKS: 50

PRACTICAL-II

1. Interpretation of experimental data related to Biofertilizer.
2. Interpretation of experimental data related to Biofertilizer
3. study the concept, types and importance of Biofertilizer
4. Identification of common Biofertilizer
5. To study carrier materials used in Biofertilizer
6. Sterilization techniques used in Biofertilizer production
7. Isolation of Rhizobium from root nodules of leguminous plants
8. Isolation of Azotobacter from soil using selective media
9. Isolation of Phosphate Solubilizing Bacteria (PSB) from soil
10. To study the application of different Biofertilizer on plant growth
11. Demonstration of Biofertilizer production through photographs/videos.
12. Field study report on visit to the vermicomposting facility / rice field / organic farm.
13. Survey of Biofertilizer usage by local farmers (field-based practical)
14. Graphical representation of plant growth data after Biofertilizer treatment
15. Study the root system of leguminous plants.
16. Study the morphology of Azolla.

Course Outcomes:-

1. Understand the principals of Biofertilizer farming
2. Analyze the importance of soil health in organic and Biofertilizer farming
3. Evaluate the use Role of Biofertilizer and their mechanism of action in agriculture
4. Develop the knowledge of soil management plan.
5. Acquire technical knowledge in Biofertilizer production technology

Semester –VI
SEC –III (Credit-2)

CREDIT: 2.

PRACTICAL HOURS: 60

MARKS: 50

Green Entrepreneurship and Eco-Friendly Products

PRACTICAL-II

1. Identification of plant materials used in eco-products
2. Preparation of natural dyes from plant sources
3. Preparation of organic compost
4. Preparation of vermicomposting
5. Preparation of eco-friendly paper bags
6. Preparation of cloth bags from waste cloth
7. Preparation of herbal floor cleaner
8. Preparation of herbal mosquito repellent
9. Preparation of biodegradable seed balls
10. Preparation of eco-friendly decorations
11. Study of local eco-friendly products in market
12. Survey of consumer awareness about eco-products
13. Preparation of business plan for eco-product
14. Preparation of project report on green entrepreneurship

Learning Outcomes-

- 1:** Understand the concept of green entrepreneurship and sustainable business.
- 2:** Identify natural resources useful for eco-friendly products.
- 3:** Prepare simple eco-friendly products using biodegradable materials.
- 4:** Develop small business ideas related to environmental products.
- 5:** Promote environmental awareness through sustainable products

Reference Books

1. Green Marketing and Entrepreneurship- Arne Nygard
2. Greener Products (2nd Edition)- Al Iannuzzi
3. Sustainability, Innovation, and Entrepreneurship- Andrea Larson
4. Green to Gold: How Smart Companies Use Environmental Strategy- Daniel C. Esty & Andrew S. Winston
5. Natural Capitalism: Creating the Next Industrial Revolution- Paul Hawken, Amory Lovins & Hunter Lovins
6. Green Innovations for Industrial Development and Business Sustainability- Ravindra Sharma, Geeta Rana & Shivani Agarwal

SEMESTER-VI

INDIAN KNOWLEDGE SYSTEMS (IKS)

Pollution Paper II: IKS

Environmental History and Ecology in Modern India

MODULE	SUB- MODULE	TOPICS	LECTURE PERIODS
1	Traditional Environmental Practices and Resource Management		
	1.1 Introduction to Traditional Environmental Practices	Traditional use of natural resources in India Traditional water management systems (tanks, wells, ponds) Community management of forests and water Decline of traditional environmental practices	06
	1.2 Colonialism and Water Resource Management	Water resource management during colonial period Development of large-scale canal irrigation Environmental effects of canal irrigation Changes in traditional water systems	08
2	Wildlife Management and Movements in Modern India		
	2.1 Wildlife Management	Hunting practices in ancient and medieval India Hunting during colonial period and its social aspects Wildlife conservation and establishment of national parks Human–animal conflicts around protected areas	06
	2.2 Environmental Issues and Movements in Modern India	Industrial use of forest resources (biomass and wood) Environmental problems caused by large dams Urban environmental issues: health, hygiene, waste disposal and air pollution Environmental movements in India ,Forest Conservation Act (1980) ,Forest Rights Act (2006)	10
	Total Lectures		30

Course Outcomes:-

After completing this course, students will be able to:

- 1: Understand traditional environmental practices and natural resource use in India.
- 2: Explain the impact of colonial policies on water resources and irrigation systems.
- 3: Describe the history of wildlife management and conservation in India.
- 4: Analyze environmental problems and environmental movements in modern India.
- 5: Understand major environmental laws related to forests conservation act, forest rights act.

Books recommended for IKS

1. "Ecological Restoration: Principles, Values, and Structure of an Emerging Profession" by Andre F. Clewell and James Aronson
2. The Society for Ecological Restoration (SER): A professional organization dedicated to advancing the science and practice of ecological restoration.
3. The International Union for Conservation of Nature (IUCN): A global organization that works to conserve and restore ecosystems.
4. The Ecological Restoration Alliance: A network of organizations and individuals working to advance ecological restoration.
5. Erach Barouche – *Textbook of Environmental Studies* Publisher: Universities Press
6. P. D. Sharma – *Ecology and Environment* Publisher: Rastogi Publications
7. P. S. Verma & V. K. Agarwal – *Environmental Biology* Publisher: S. Chand / Rastogi Publications
8. Mahesh Rangarajan – *India's Environmental History* Publisher: Oxford University Press
9. V. B. Saharia – *Wildlife in India* Publisher: Natraj Publishers
10. "Ecological Restoration: An International Journal" (a peer-reviewed journal)
11. "Restoration Ecology" (a peer-reviewed journal)
12. "The Encyclopedia of Ecological Restoration" by the Society for Ecological Restoration

SHIVAJI UNIVERSITY, KOLHAPUR
FACULTY OF SCIENCE
B.Sc.III POLLUTION
ON-THE-JOB TRAINING (OJT) AND FIELD PROJECT
(As per NEP, 2020)

1. Course Title: **On-the-Job Training(OJT)and Field Project**
2. Course Code:.....
3. Credits: **04**
4. Total LearningHours:**120 Hours**
5. Semester: **VthSemester.**
6. Course Type:Mandatory|Skill-based|Experiential Learning
7. Nature of Assessment: Internal Assessment Only
8. Total Marks: **100**

9. Course Rationale

In accordance with the National Education Policy (NEP) 2020 and the Internship/OJT guidelines of Shivaji University, Kolhapur, This course aims to integrate theoretical knowledge with real-life practical exposure. The On-the-Job Training (OJT) and Field Project provide undergraduate Pollution students with hands-on experience in academic, research, industrial, ecological, and community-based settings, enabling holistic learning and skill development.

10. Course Objectives

The objectives of this courseareto:

1. Provide experiential learning through direct engagement with professional work environments.
2. Enable application of environmental conversation and protection related knowledge in laboratory, field, and industrial contexts.
3. Develop technical skills related to industrial pollution monitoring, EIA, ecology, biodiversity conservation.
4. Promote professional ethics, discipline, teamwork, and communicationskills.
5. Enhance employability, entrepreneurship, and research aptitude among students

Course Outcomes (COs)

Upon successful completion of the course, the learner will be able to:

1. Demonstrate hands-on skills in environmental and industrial pollution monitoring field and laboratory techniques.
2. Apply theoretical concepts of Environmental conservation and protection to practical situations.
3. Collect, document, analyze, and interpret field data related to environmental and industrial pollution monitoring.
4. Prepare structured scientific OJT/Field Project report.
5. Communicate findings effectively through oral presentation and viva-voce.

Nature of OJT/Field Project Work

Students shall complete OJT /Field Project in **any one** of the following approved areas:-

- Universities and Research Institutes
- Forest Department
- Environmental NGOs and Conservation Organizations
- Environmental Parameters analysis Laboratories
- Chemical and Textile Industries.
- Pharmaceutical Industries
- Agro-based Industries
- Any other related with subject

Duration and Hour Distribution

Component	Hours
Orientation and Planning	10
On-the-Job Training/ Field Work	80
Data Collection, Analysis & Report Writing	20
Presentation and Viva-Voce	10
Total	120 Hours

Guide lines for Students

1. Students must obtain prior approval from the Department and Course Coordinator.
2. OJT must be carried out at a recognized organization/industry/institution.
3. Maintain field diary is compulsory.
4. A completion certificate from the host organization is mandatory.
5. Students must follow institutional discipline and professional ethics.
6. Plagiarism in report writing is strictly prohibited.

OJT/Field Project Report Structure

1. Title Page
2. Certificate from Host Organization
3. Student Declaration
4. Introduction of Organization /Study Area
5. Objectives of OJT/Field Project
6. Methodology/ Nature of Data Collection Work
7. Observations and Results
8. Discussion
9. Learning Outcomes and Skills Acquired
10. Conclusion
11. Photographs/Field Evidence
12. References

Scheme of Evaluation (Internal –100Marks)

Component	Marks
Attendance, Discipline&Logbook	30
OJT/FieldProjectReport	30
Presentation/Seminar	20
Viva-Voce	20
Total	100 Marks

Detailed Evaluation Rubrics

A. Attendance, Discipline & Logbook (30Marks)

Criteria	Excellent (26–30)	Good (21–25)	Satisfactory (16–20)	Poor (≤15)
Regularity& Punctuality	Fully regular	Minor lapses	Occasional absence	Irregular
LogbookMaintenance	Complete, neat	Minorerrors	Incomplete	Poor
Professional Behaviour	Highly professional	Cooperative	Needs improvement	Unprofessional

B. OJT/FieldProjectReport(30Marks)

Criteria	Excellent	Good	Satisfactory	Poor
Structure&Organization	Scientific	Organized	Average	Poor
Content & Relevance	In-depth	Adequate	Limited	Poor
Data& Analysis	Accurate	Relevant	Basic	Inadequate
Language&Presentation	Clear	Minor errors	Average	Poor

C. Presentation/Seminar(20Marks)

Criteria	Excellent	Good	Satisfactory	Poor
Clarity&Confidence	Excellent	Good	Average	Poor
Subject Knowledge	Thorough	Good	Basic	Inadequate
UseofVisual Aids	Effective	Adequate	Minimal	None

A. Viva-Voce(20Marks)

Criteria	Excellent	Good	Satisfactory	Poor
Conceptual Understanding	Strong	Good	Basic	Poor
Applicationof Knowledge	Excellent	Good	Limited	Nil
Communication Skills	Clear	Adequate	Hesitant	Poor