



UNDERGRADUATE DEGREE PROGRAMME

B.Sc. Industrial Safety and Disaster Management

Three Years

CURRICULUM & SYLLABUS

REGULATION 2026

Choice Based Credit System (CBCS)

&

Learning Outcomes Based Curriculum Framework (LOCF)

Academic Year

2026 -2027

**Department of Nautical Science
School of Maritime Studies
Vels Institute of Science Technology and
Advanced Studies (VISTAS)
Thalambur, Chennai**



B.Sc. Industrial Safety and Disaster Management

REGULATION 2026

CURRICULUM AND SYLLABUS

(Based on Choice Based Credit System)
Effective from the Academic Year 2026 – 27

**Department of Nautical Science
School of Maritime Studies
Vels Institute of Science Technology and
Advanced Studies (VISTAS)
Thalambur, Chennai**



SCHOOL OF MARITIME STUDIES

VISION OF THE SCHOOL

Aims to provide Excellent quality training leading candidates to become Engineering & Navigating officers in the shipping industry by innovating new technologies, consistent with its strategic goals and by realizing maximum efficiency through superior management.

MISSION OF THE SCHOOL

MISSION OF THE SCHOOL	
M1	To be an outstanding Academic Institution, always aiming to impart comprehensive training to new aspirants to a maritime career.
M2	To select potential candidates and train them to be knowledgeable and competent Maritime Officers in conformance with global standards of the maritime industry.
M3	To develop Post Sea related training for the seafarers who seek higher certification
M4	To continuously update our education and training program in accordance with the latest developments in the Maritime industry through proactive and progressive measures.
M5	To cultivate the spirit of inquiry and independent thinking.



INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES (VISTAS)
(Deemed to be University Estd. u/s 3 of the UGC Act, 1956)
PALLAVARAM, THALAMBUR, PERIYAPALAYAM-CHENNAI
ACCREDITED BY **NAAC** WITH **A++** GRADE
INSTITUTION WITH **UGC 12B** STATUS

DEPARTMENT OF NAUTICAL SCIENCE
B.Sc. Industrial Safety and Disaster Management

VISION OF THE PROGRAM

To develop competent and socially responsible graduates with strong scientific knowledge and practical skills in Industrial Safety and Disaster Management, capable of contributing effectively to workplace safety, disaster risk reduction, and sustainable development.

MISSION OF THE PROGRAM

M1	Provide a strong scientific foundation in industrial safety, disaster management, and environmental protection through a structured and outcome-based curriculum.
M2	Equip students with practical skills in hazard identification, safety control measures, emergency preparedness, and disaster response through laboratory work, field training, and internships.
M3	Develop ethical values, legal awareness, and professional responsibility to ensure compliance with safety laws, standards, and governance frameworks.
M4	Encourage lifelong learning, adaptability, and career development to meet emerging challenges and technological advancements in industrial safety and disaster management.

PROGRAMME EDUCATIONAL OUTCOMES (PEO)	
PEO1:	Professional Competence: Develop a strong foundation in industrial safety and disaster management principles and apply them effectively in industrial, environmental, and community settings.
PEO2:	Safety Practice and Risk Reduction: Identify hazards, manage safety risks, and support disaster preparedness, response, and mitigation activities using scientific and systematic approaches.
PEO3:	Ethical, Legal & Social Responsibility: Demonstrate ethical conduct, professional responsibility, and compliance with safety laws, standards, and governance frameworks in occupational and disaster management contexts.
PEO4:	Career Development and Lifelong Learning: Pursue successful careers, higher education, professional certifications, and continuous learning in the fields of industrial safety, disaster management, and allied domains.

PROGRAMME OUTCOMES (PO)	
PO1:	Scientific Knowledge Apply fundamental knowledge of science, safety principles, and disaster management concepts to understand industrial and environmental hazards.
PO2:	Safety Problem Analysis Identify, analyze, and assess safety-related problems and disaster risks using scientific and systematic approaches.
PO3:	Hazard Identification & Risk Control Recognize workplace hazards and apply appropriate preventive and control measures to reduce risks in industrial and disaster-prone environments.
PO4:	Disaster Preparedness and Response Demonstrate knowledge of disaster preparedness, response, mitigation, and recovery practices at industrial and community levels.
PO5:	Application of Modern Tools Use basic digital tools, safety documentation systems, and emerging technologies to support safety management and disaster risk reduction.
PO6:	Ethics, Safety and Legal Compliance Understand professional ethics, safety responsibilities, and comply with relevant industrial safety laws, standards, and governance frameworks.
PO7:	Communication and Teamwork Communicate effectively through reports, documentation, and presentations, and work efficiently as an individual and as part of a multidisciplinary team.
PO8:	Lifelong Learning and Professional Development Recognize the need for continuous learning and professional development in the fields of industrial safety and disaster management.

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO1:	Industrial Safety Application Apply scientific principles, safety practices, and control measures to identify hazards and support safe operations in industrial and occupational environments.
PSO2:	Disaster Preparedness and Management Assist in disaster risk reduction, preparedness, response, and recovery activities at industrial, institutional, and community levels using systematic disaster management approaches.
PSO3:	Safety Systems, Compliance and Technology Use safety documentation systems, digital tools, and basic technologies while adhering to safety laws, standards, and governance frameworks in industrial safety and disaster management practices.



BOARD OF STUDIES

List of Members - Department of Nautical Science

S. No	Name and Designation	Address	Role
1.	Dr. Capt. N. Kumar Director	School of Maritime Studies, VISTAS	Chairman — BoS
2.	Mr. Benjamin Rodgers Experienced Safety Trainer	Seed for Safety, Chennai India	External Member and Industry Expert
3.	Mr. C. R. Jude Ilango Course Coordinator – Marine	Marine Engineering, School of Maritime Studies	Internal Member
4.	Mr. K E S Christopher Assistant Professor	Nautical Science, School of Maritime Studies	Internal Member
5.	Mr. R Rajapriyan Assistant Professor	School of Maritime Studies, VISTAS	Internal Member
6.	Dr. Arvind Kishor T S HOD/Naval Architecture	School of Maritime Studies, VISTAS	Internal Member

CURRICULUM STURCTURE

B.Sc. Industrial Safety and Disaster Management – Regulation 2026

Total number of Credits: 145

SEMESTER 1									
Category	Code	Course	Hour/Week			C	Maximum Marks		
			L	T	P		CIA	SEE	Total
AECC		English for Communication	4	0	0	4	40	60	100
CORE		Applied Mathematics	4	0	0	4	40	60	100
CORE		Applied Chemistry	4	0	0	4	40	60	100
CORE		Fundamentals of Industrial Safety and Disaster Management	4	0	0	4	40	60	100
DSE		Discipline Specific Elective - I	3	0	0	3	40	60	100
SEC		Human Factors, Psychology and Ergonomics	3	0	0	3	40	60	100
CORE P		Industrial Safety Practices	0	0	6	2	40	60	100
TOTAL			22	0	6	24			

CIA - Continuous Internal Assessment

SEE - Semester End Examination

***L – Lecture, *T- Tutorial, *P- Practical**

SEMESTER 2									
Category	Code	Course	Hour/Week			C	Maximum Marks		
			L	T	P		CIA	SEE	Total
AECC		Technical English and Safety Documentation	4	0	0	4	40	60	100
CORE		Applied Physics	4	0	0	4	40	60	100
CORE		Occupational Health and Industrial Hygiene	4	0	0	4	40	60	100
CORE		Disaster Risk Reduction and Climate Hazards	4	0	0	4	40	60	100
DSE		Discipline Specific Elective - II	3	0	0	3	40	60	100
SEC		Industrial Safety Laws and Compliance	3	0	0	3	40	60	100
CORE P		Basic Emergency Response	0	0	3	1	40	60	100
CORE P		Industrial Hygiene and Hazard Monitoring	0	0	3	1	40	60	100
TOTAL			22	0	6	24			

CIA - Continuous Internal Assessment

SEE - Semester End Examination

***L – Lecture, *T- Tutorial, *P- Practical**

SEMESTER 3									
Category	Code	Course	Hour/Week			C	Maximum Marks		
			L	T	P		CIA	SEE	Total
CORE		Safety Engineering and Accident Prevention	4	0	0	4	40	60	100
CORE		Industrial Process Safety and Hazard Control	4	0	0	4	40	60	100
CORE		Emergency Planning and Disaster Response Management	4	0	0	4	40	60	100
CORE		Industrial Incident Analysis and Safety Control	4	0	0	4	40	60	100
DSE		Discipline Specific Elective - III	3	0	0	3	40	60	100
SEC		Safety Codes Standards Practices	3	0	0	3	40	60	100
CORE P		Hazard Identification and Risk Assessment	0	0	3	1	40	60	100
CORE P		Personal Safety Techniques	0	0	3	1	40	60	100
TOTAL			22	0	6	24			

CIA - Continuous Internal Assessment

SEE - Semester End Examination

***L – Lecture, *T- Tutorial, *P- Practical**

SEMESTER 4									
Category	Code	Course	Hour/Week			C	Maximum Marks		
			L	T	P		CIA	SEE	Total
CORE		Fire Prevention and Protection Systems	4	0	0	4	40	60	100
CORE		Industrial Safety Management Systems	4	0	0	4	40	60	100
CORE		Disaster Mitigation and Preparedness Planning	4	0	0	4	40	60	100
CORE		Safety Audits, Risk Assessment and Loss Control	4	0	0	4	40	60	100
DSE		Discipline Specific Elective - IV	3	0	0	3	40	60	100
SEC		Safety Guidelines and Legal Frameworks	3	0	0	3	40	60	100
CORE P		Life-Saving Appliances and Water Survival	0	0	3	1	40	60	100
CORE P		Fire Fighting Mock-up and Fire Safety Drills	0	0	3	1	40	60	100
TOTAL			22	0	6	24			

CIA - Continuous Internal Assessment

SEE - Semester End Examination

***L – Lecture, *T- Tutorial, *P- Practical**

SEMESTER 5									
Category	Code	Course	Hour/Week			C	Maximum Marks		
			L	T	P		CIA	SEE	Total
CORE		Advanced Disaster Management and Governance	4	0	0	4	40	60	100
CORE		Natural Disasters: Causes, Impact and Management	4	0	0	4	40	60	100
CORE		Man-Made and Industrial Disasters	4	0	0	4	40	60	100
CORE		Disaster Response, Relief and Rehabilitation	4	0	0	4	40	60	100
DSE		Discipline Specific Elective - V	3	0	0	3	40	60	100
SEC		Disaster Management Codes Standards Practices	3	0	0	3	40	60	100
CORE P		Confined Space Entry and Permit-to-Work	0	0	3	1	40	60	100
CORE P		Emergency Response and Search and Rescue Techniques	0	0	3	1	40	60	100
TOTAL			22	0	6	24			

CIA - Continuous Internal Assessment

SEE - Semester End Examination

***L – Lecture, *T- Tutorial, *P- Practical**

SEMESTER 6									
Category	Code	Course	Hour/Week			C	Maximum Marks		
			L	T	P		CIA	SEE	Total
CORE		Industrial Safety and Disaster Operations Technology	4	0	0	4	40	60	100
CORE		Disaster Safety, Security and Risk Governance	4	0	0	4	40	60	100
CORE		Introduction to Safety Analytics and Digital Systems	4	0	0	4	40	60	100
DSE		Discipline Specific Elective - VI	3	0	0	3	40	60	100
SEC		Digital Tools and Professional Practices for Safety Managers	3	0	0	3	40	60	100
CORE P		Integrated Emergency Management Simulation	0	0	3	1	40	60	100
CORE P		Safety Audit and Compliance Assessment	0	0	3	1	40	60	100
PROJECT		Project Work	0	0	5	5	40	60	100
TOTAL			18	0	11	25			

CIA - Continuous Internal Assessment

SEE - Semester End Examination

***L – Lecture, *T- Tutorial, *P- Practical**

Category	Semester	Code	Course	Hour/Week			C
				L	T	P	
DSE	I		Mechanical and Electrical Safety	3	0	0	3
DSE			Fundamentals of Safety Awareness and Risk Perception	3	0	0	3
DSE	II		Environmental Science and Disaster Ecology	3	0	0	3
DSE			Environmental Pollution, Climate Risk and Sustainability	3	0	0	3



SCHOOL OF MARITIME STUDIES

B.Sc. Industrial Safety and Disaster Management – Regulation 2026

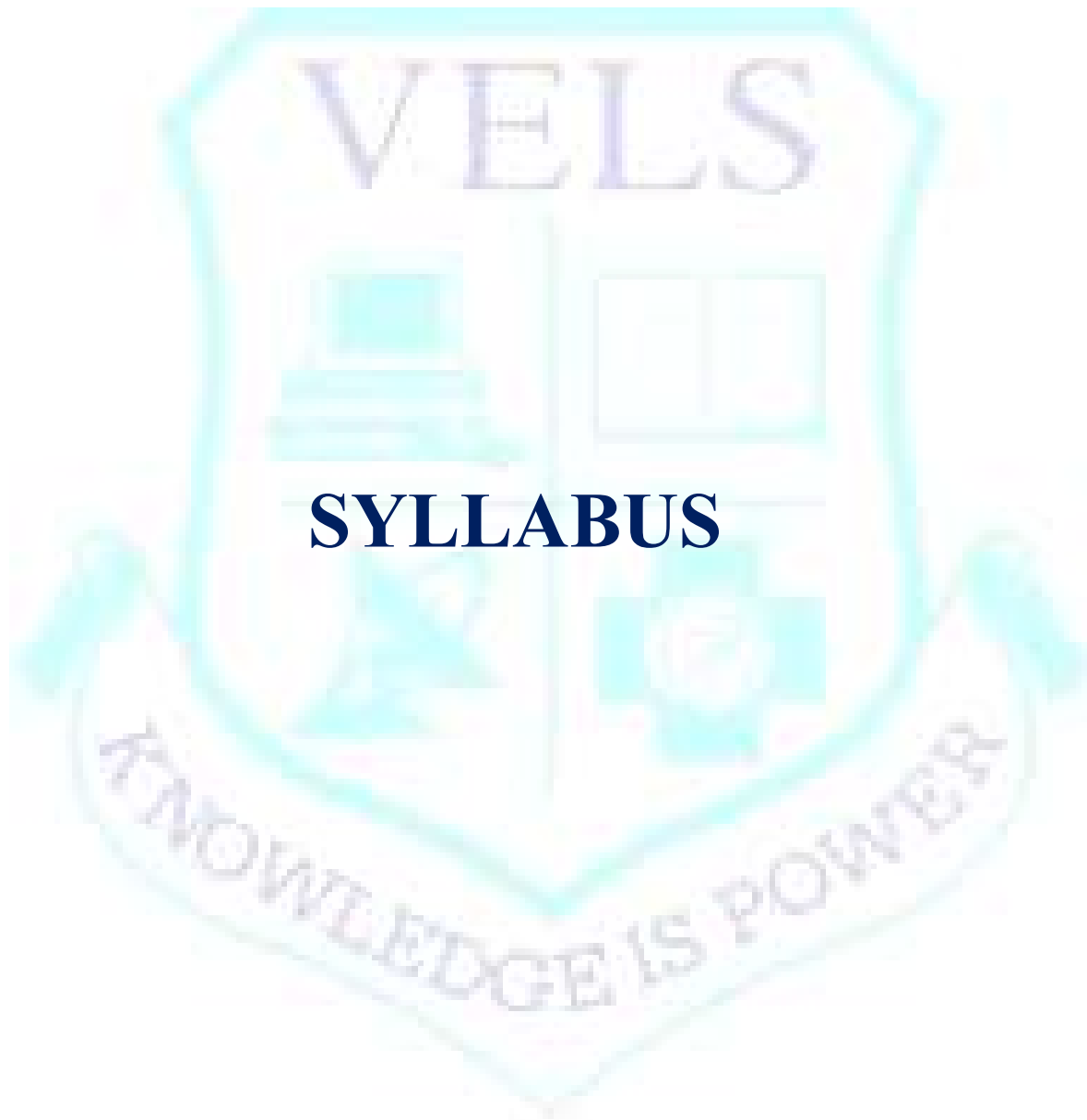
PASS MARKS

Semester - 1

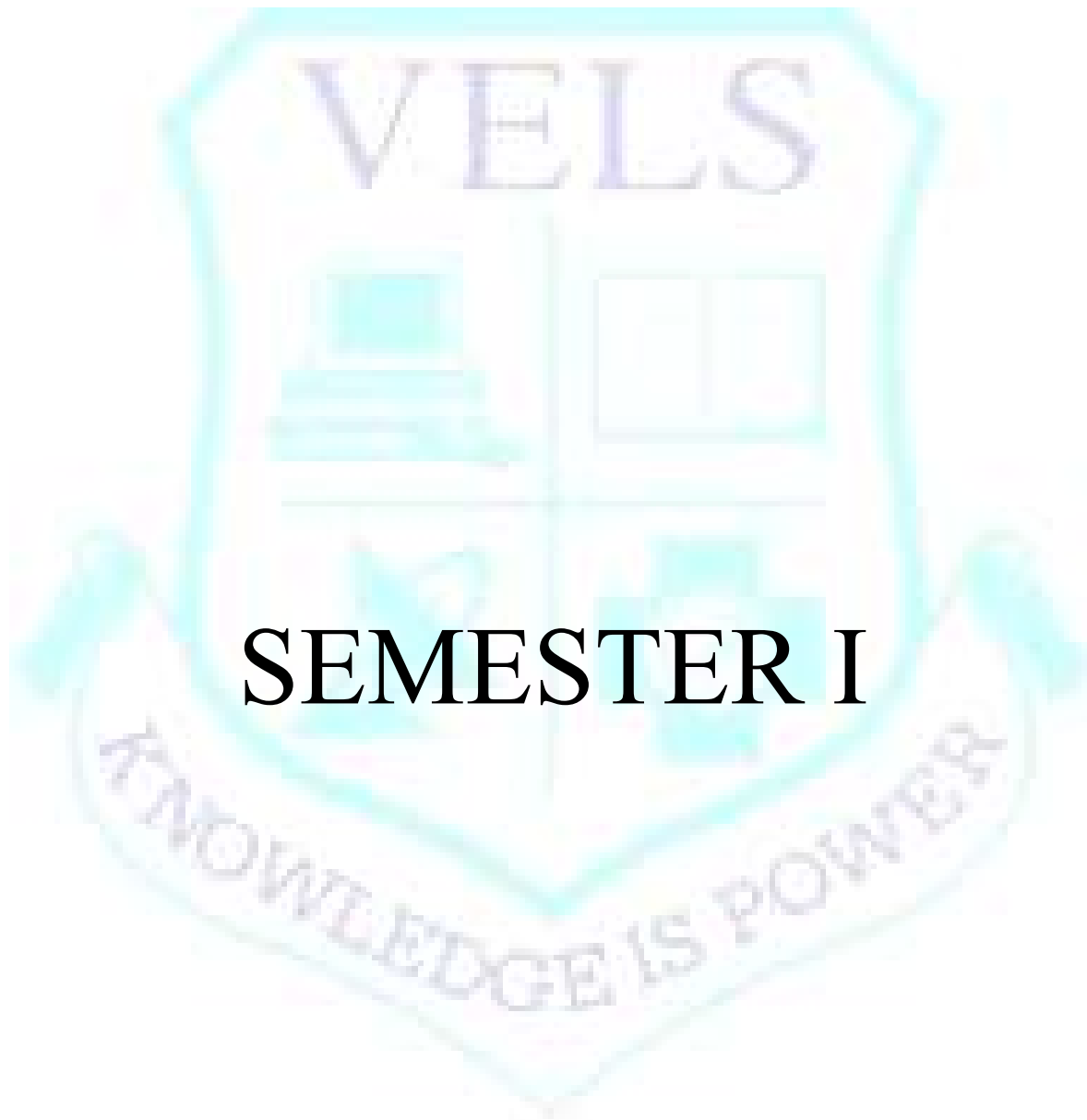
Sl.No	Code	Title of the Course	CIA		SEE		Total	
			Min.	Max.	Min.	Max.	Min.	Max.
AECC		English for Communication	--	40	24	60	40	100
CORE		Applied Mathematics	--	40	24	60	40	100
CORE		Applied Chemistry	--	40	24	60	40	100
CORE		Fundamentals of Industrial Safety and Disaster Management	--	40	24	60	40	100
DSE		Discipline Specific Elective - I	--	40	24	60	40	100
SEC		Human Factors, Psychology and Ergonomics	--	40	24	60	40	100
CORE P		Industrial Safety Practices	--	40	24	60	40	100

Semester - 2

S.No	Code	Title of the Course	CIA		SEE		Total	
			Min.	Max.	Min.	Max.	Min.	Max.
AECC		Technical English and Safety Documentation	--	40	24	60	40	100
CORE		Applied Physics	--	40	24	60	40	100
CORE		Occupational Health and Industrial Hygiene	--	40	24	60	40	100
CORE		Disaster Risk Reduction and Climate Hazards	--	40	24	60	40	100
DSE		Discipline Specific Elective - II	--	40	24	60	40	100
SEC		Industrial Safety Laws and Compliance	--	40	24	60	40	100
CORE P		Basic Emergency Response	--	40	24	60	40	100
CORE P		Industrial Hygiene and Hazard Monitoring	--	40	24	60	40	100



SYLLABUS



SEMESTER I

Code	Subject	Lecture	Tutorial	Practical	Credit
	English for Communication	4	0	0	4

Course Objective:

- To develop effective listening, speaking, reading and writing skills
- To enhance professional and workplace communication abilities
- To improve grammatical accuracy and vocabulary usage
- To build confidence in interpersonal and formal communication

UNIT – I BASICS OF COMMUNICATION 12

Meaning and definition of communication. Importance of communication in personal and professional life. Process of communication. Types of communication – verbal, non-verbal and written communication. Barriers to effective communication and strategies to overcome them. Listening skills – active listening, empathetic listening and effective listening techniques.

UNIT – II LANGUAGE STRUCTURE AND VOCABULARY 12

Parts of speech and their functions. Sentence structure – simple, compound and complex sentences. Common grammatical errors and corrections. Vocabulary development – synonyms, antonyms, homophones and commonly confused words. Technical and industrial vocabulary. Usage of words in professional and industrial contexts.

UNIT – III READING AND WRITING SKILLS 12

Reading comprehension of general, technical and safety-related passages. Note-making and summarizing techniques. Paragraph writing – coherence and clarity. Formal letter writing – official letters, complaint letters and enquiry letters. Email writing and workplace correspondence.

UNIT – IV SPEAKING AND PRESENTATION SKILLS 12

Pronunciation, stress and intonation. Accent neutralization. Public speaking skills and overcoming stage fear. Group discussion – structure, participation and leadership. Oral presentations – planning, structuring and delivery techniques. Interview skills – preparation, facing interviews and mock interview practices.

UNIT – V PROFESSIONAL COMMUNICATION AND SOFT SKILLS 12

Interpersonal communication and emotional intelligence. Team communication and leadership language. Report writing – incident reports, safety reports and technical reports. Resume writing and job application letters. Professional ethics, etiquette and workplace behavior.

Total Hours: 60

Course Outcome:

- CO 01: Understand the fundamentals and process of communication
- CO 02: Apply correct grammar and vocabulary in professional usage
- CO 03: Develop effective reading and writing skills for workplace requirements
- CO 04: Demonstrate confidence in speaking, presentations and interviews

CO 05: Exhibit professional ethics and interpersonal communication skills

Text Books:

1. Meenakshi Raman & Sangeeta Sharma – *Technical Communication: Principles and Practice*, Oxford University Press, 2nd Edition, 2011.
2. Sanjay Kumar & Pushp Lata – *Communication Skills*, Oxford University Press, 2nd Edition, 2015.

Reference Books:

1. Raymond Murphy – *English Grammar in Use*, Cambridge University Press, 4th Edition, 2019.
2. Courtland L. Bovee & John V. Thill – *Business Communication Today*, Pearson Education, 13th Edition, 2016.
3. Lesikar, Flatley & Rentz – *Business Communication: Making Connections in a Digital World*, McGraw-Hill Education, 12th Edition, 2014.



Code	Subject	Lecture	Tutorial	Practical	Credit
	Applied Mathematics	4	0	0	4

Course Objective:

- To provide fundamental mathematical knowledge required for industrial safety applications
- To develop analytical and problem-solving skills relevant to safety engineering
- To apply mathematical concepts in risk assessment, accident analysis, and safety management
- To strengthen quantitative reasoning for industrial and disaster management studies

UNIT – I ALGEBRA AND MATRICES 12

Algebraic expressions and equations. Linear and quadratic equations. Progressions – arithmetic and geometric progressions. Matrices – types of matrices, matrix operations, determinants and inverse of matrices. Applications of matrices in solving system of linear equations related to industrial problems.

UNIT – II CALCULUS – DIFFERENTIATION 12

Limits and continuity. Differentiation of algebraic, trigonometric and exponential functions. Applications of differentiation – rate of change, maxima and minima. Optimization problems with industrial and safety-related examples.

UNIT – III CALCULUS – INTEGRATION 12

Integration of standard functions. Definite and indefinite integrals. Methods of integration – substitution and integration by parts. Applications of integration – area under curves and practical problems related to engineering and safety analysis.

UNIT – IV PROBABILITY AND STATISTICS 12

Probability – basic concepts, addition and multiplication theorems. Conditional probability and Bayes’ theorem. Statistical measures – mean, median, mode, variance and standard deviation. Applications of probability and statistics in accident analysis and risk assessment.

UNIT – V APPLIED MATHEMATICS FOR SAFETY 12

Logarithms and exponential functions. Mathematical modeling basics. Numerical methods – solution of equations by simple iterative methods. Use of mathematics in safety management, hazard analysis, reliability studies and disaster prediction models.

Total Hours: 60

Course Outcome:

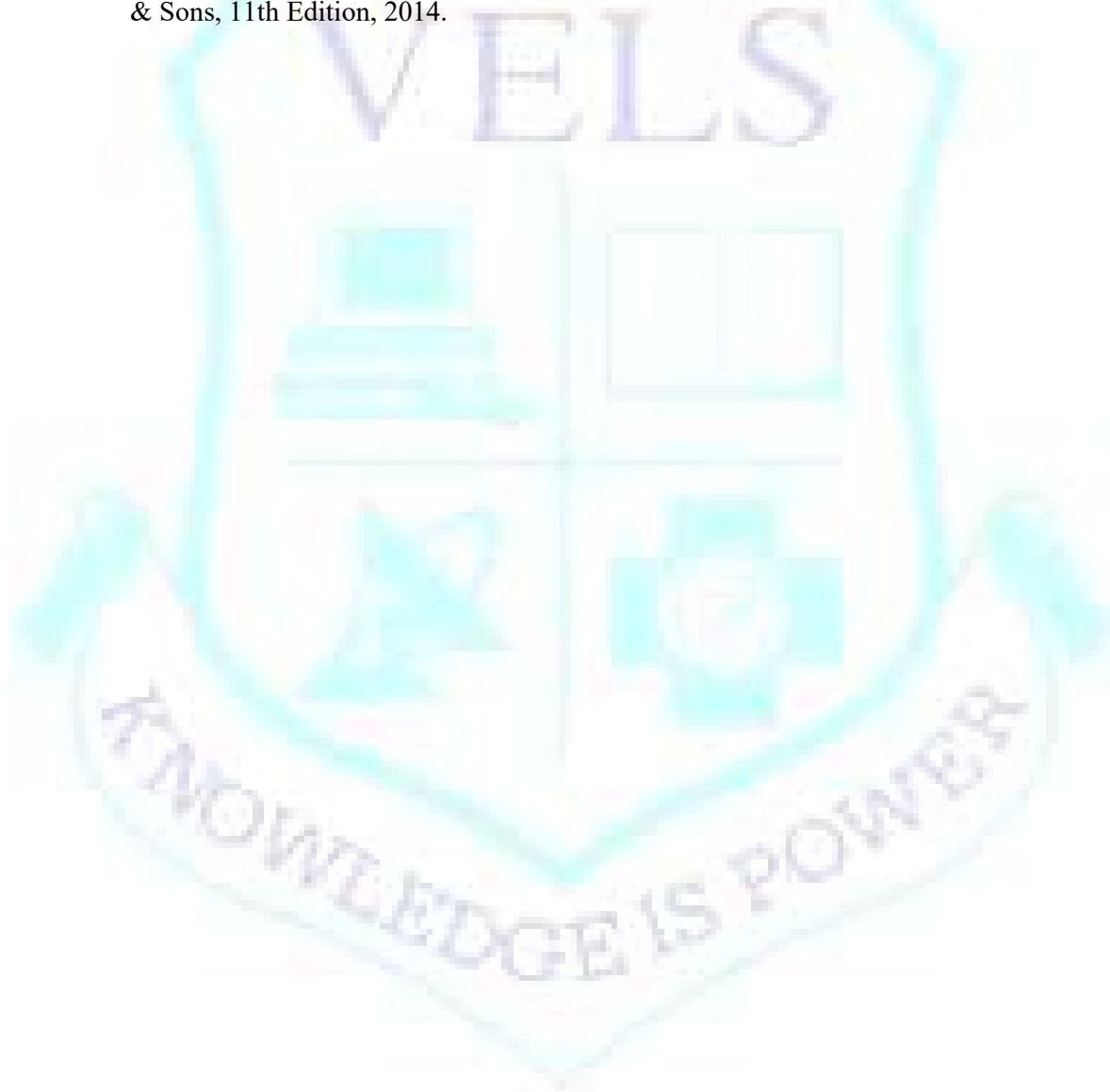
- CO 01: Understand basic algebraic and calculus concepts applicable to industrial safety
- CO 02: Apply differentiation and integration techniques to practical industrial problems
- CO 03: Analyze data using probability and statistical tools for safety assessment
- CO 04: Solve mathematical models related to risk, reliability and hazard analysis
- CO 05: Use mathematical reasoning in industrial safety and disaster management contexts

Text Books:

1. B.S. Grewal – Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2014.
2. Erwin Kreyszig – Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2011.

Reference Books:

1. K.A. Stroud – Engineering Mathematics, Palgrave Macmillan, 7th Edition, 2013.
2. S.C. Gupta & V.K. Kapoor – Fundamentals of Mathematical Statistics, Sultan Chand & Sons, 11th Edition, 2014.



Code	Subject	Lecture	Tutorial	Practical	Credit
	Applied Chemistry	4	0	0	4

Course Objective:

- To impart fundamental knowledge of chemistry relevant to industrial safety
- To understand chemical hazards, toxic substances and safe handling practice
- To study industrial chemicals, processes and associated risk
- To apply chemical principles in accident prevention and safety management

UNIT – I BASIC CHEMICAL PRINCIPLES 12

Atomic structure and periodic properties. Chemical bonding – ionic, covalent and metallic bonds. States of matter and gas laws. Chemical reactions and stoichiometry. Basic concepts of acids, bases and salts.

UNIT – II INDUSTRIAL CHEMICALS AND PROCESSES 12

Introduction to industrial chemistry. Manufacture, properties and uses of industrial chemicals – acids, alkalis, fertilizers, polymers and petrochemicals. Chemical reactions involved in industrial processes. Hazards associated with industrial chemical production.

UNIT – III TOXICOLOGY AND CHEMICAL HAZARDS 12

Introduction to toxicology. Classification of toxic substances. Dose–response relationship. Routes of exposure. Health effects of toxic chemicals. Chemical hazard identification and labeling systems. Material Safety Data Sheets (MSDS).

UNIT – IV FIRE, EXPLOSION AND REACTIVE CHEMICALS 12

Chemistry of fire and combustion. Flammability characteristics of chemicals. Explosive materials and explosive limits. Reactive chemicals and incompatibility. Chemical reactions leading to fires and explosions. Prevention and control of chemical fires and explosions.

UNIT – V INDUSTRIAL SAFETY AND ENVIRONMENTAL CHEMISTRY 12

Chemical safety management. Safe storage, handling and disposal of chemicals. Industrial effluents and waste management. Environmental pollution due to chemical industries. Chemical safety regulations and standards.

Total Hours: 60

Course Outcome:

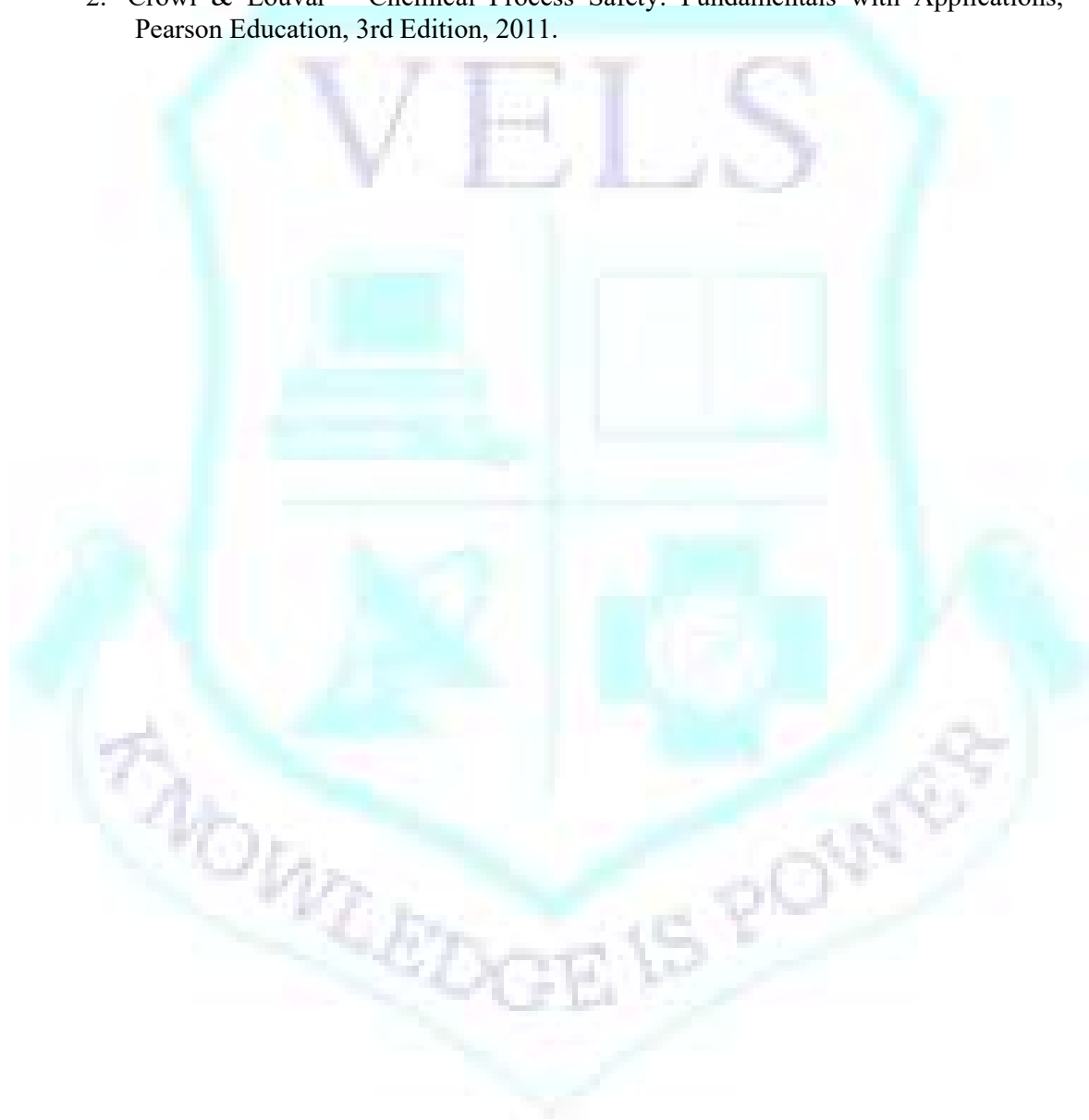
- CO 01: Understand fundamental chemical principles relevant to industrial safety
CO 02: Identify industrial chemicals and associated hazards
CO 03: Analyze toxicological effects and chemical risks
CO 04: Apply chemical knowledge in fire, explosion and accident prevention
CO 05: Implement chemical safety and environmental protection practices

Text Books:

1. Puri, Sharma & Pathania – Principles of Physical Chemistry, Vishal Publishing Co., 46th Edition, 2017.
2. B.K. Sharma – Industrial Chemistry, Goel Publishing House, 16th Edition, 2015.

Reference Books:

1. S.S. Dara – A Textbook of Environmental Chemistry and Pollution Control, S. Chand & Company, 8th Edition, 2014.
2. Crowl & Louvar – Chemical Process Safety: Fundamentals with Applications, Pearson Education, 3rd Edition, 2011.



Code	Subject	Lecture	Tutorial	Practical	Credit
	Fundamentals of Industrial Safety and Disaster Management	4	0	0	4

Course Objective:

- To introduce fundamental concepts of industrial safety and disaster management
- To understand causes of industrial accidents and disasters
- To familiarize students with safety legislation, standards and management systems
- To develop awareness on disaster preparedness, mitigation and response strategies

UNIT – I FUNDAMENTALS OF INDUSTRIAL SAFETY 12

Introduction to industrial safety. Need and importance of safety in industries. Accident causation theories. Types of industrial accidents. Safety organization and safety culture. Roles and responsibilities of safety professionals.

UNIT – II SAFETY LEGISLATION AND STANDARDS 12

Overview of industrial safety legislation. Factories Act and allied rules. Occupational safety and health standards. Role of statutory authorities. Safety audits and inspections. Safety management systems.

UNIT – III HAZARD IDENTIFICATION AND RISK MANAGEMENT 12

Hazard identification techniques. Risk assessment and risk analysis. Job Safety Analysis (JSA). Hazard and Operability Study (HAZOP) – basic concepts. Risk control measures and hierarchy of controls.

UNIT – IV DISASTER MANAGEMENT CONCEPTS 12

Definition and classification of disasters – natural and man-made. Disaster management cycle. Institutional framework for disaster management. Disaster preparedness and planning. Emergency response and coordination.

UNIT – V DISASTER MITIGATION, RESPONSE AND RECOVERY 12

Mitigation strategies for industrial and natural disasters. Emergency response systems. Search and rescue operations – basic concepts. Rehabilitation and recovery. Role of government, NGOs and community in disaster management.

Total Hours: 60

Course Outcome:

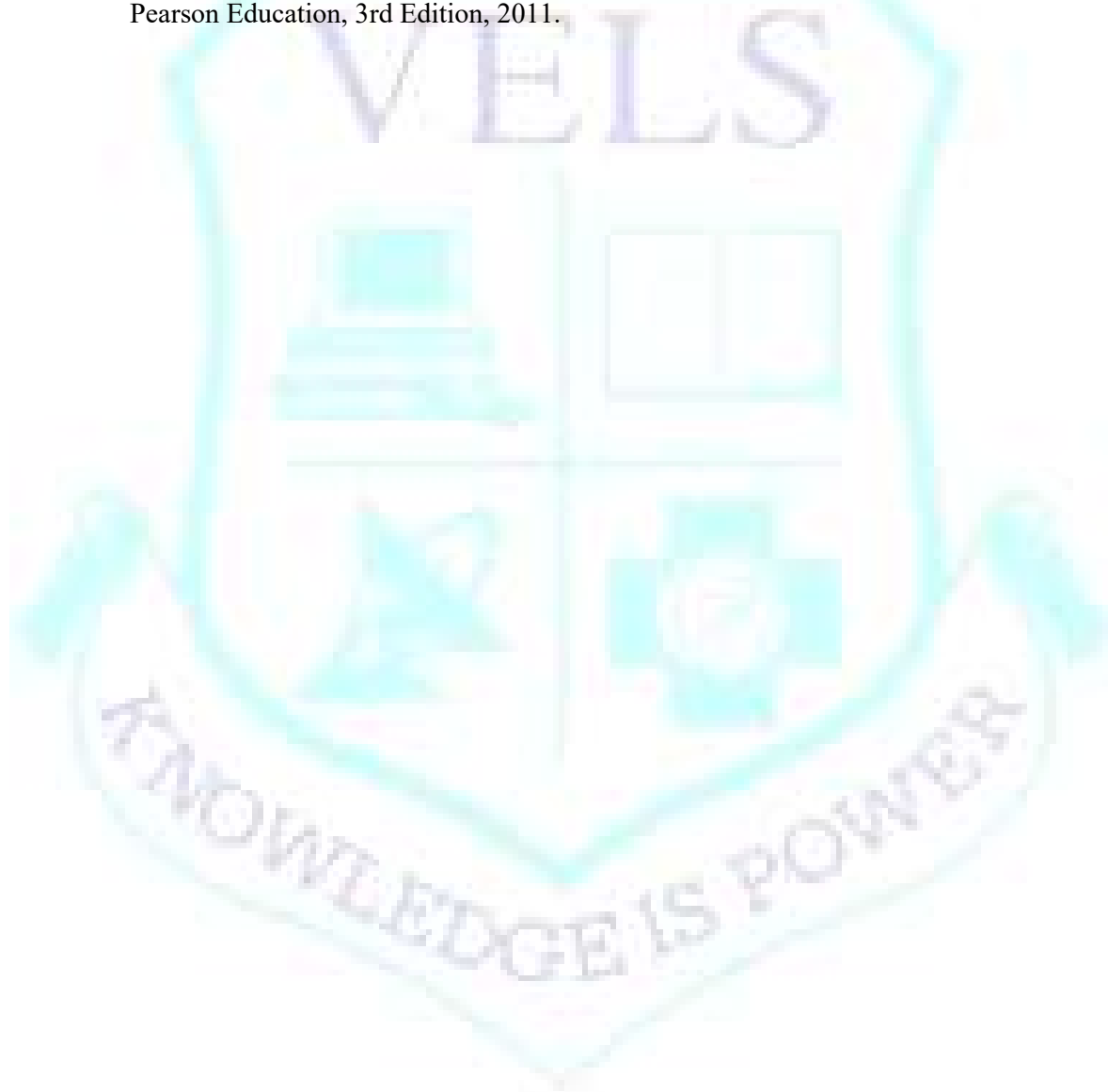
- CO 01: Understand basic principles of industrial safety and accident prevention
CO 02: Interpret safety legislation and regulatory frameworks
CO 03: Apply hazard identification and risk assessment techniques
CO 04: Understand disaster management concepts and institutional mechanisms
CO 05: Demonstrate knowledge of disaster preparedness, response and recovery

Text Books:

1. Hughes & Ferrett – Introduction to Health and Safety at Work, Routledge, 6th Edition, 2016.
2. R. P. Sharma – Industrial Safety and Environment, Khanna Publishers, 2014 Edition, 2014.

Reference Books:

1. C. S. Rao – Disaster Management, Tata McGraw-Hill, 2nd Edition, 2012.
2. Crowl & Louvar – Chemical Process Safety: Fundamentals with Applications, Pearson Education, 3rd Edition, 2011.



Code	Subject	Lecture	Tutorial	Practical	Credit
	Human Factors, Psychology and Ergonomics	3	0	0	3

Course Objective:

- To understand human behavior and its influence on workplace safety
- To study psychological factors affecting industrial accidents
- To introduce principles of ergonomics and human-machine interaction
- To promote safe work practices through behavioral and ergonomic approaches

UNIT – I INTRODUCTION TO HUMAN FACTORS 12

Human factors and their role in industrial safety. Human error and accident causation. Individual differences and human limitations. Perception, attention and memory. Role of human factors in accident prevention.

UNIT – II INDUSTRIAL PSYCHOLOGY AND SAFETY 09

Basic concepts of psychology. Motivation and behavior at work. Stress, fatigue and job satisfaction. Safety attitudes and behavior. Behavioral safety management. Role of training and supervision in safety.

UNIT – III ERGONOMICS FUNDAMENTALS 09

Definition and scope of ergonomics. Anthropometry and biomechanics. Work posture and manual material handling. Design of tools, equipment and workstations. Ergonomic risk factors and assessment methods.

UNIT – IV HUMAN-MACHINE SYSTEMS 09

Human-machine interaction. Display and control design. Workplace layout and illumination. Noise and vibration effects. Shift work and work-rest cycles. Ergonomic considerations in industrial system design.

UNIT – V SAFETY PSYCHOLOGY AND ACCIDENT PREVENTION 09

Safety psychology concepts. Unsafe acts and unsafe conditions. Accident investigation from human factors perspective. Behavioral modification techniques. Ergonomic interventions for accident prevention.

Total Hours: 45

Course Outcome:

- CO 01: Understand the role of human factors in industrial safety
CO 02: Analyze psychological causes of accidents and unsafe behavior
CO 03: Apply ergonomic principles in workplace design
CO 04: Evaluate human-machine interactions for safety improvement
CO 05: Implement behavioral and ergonomic strategies for accident prevention

Text Books:

1. Mark Sanders & Ernest J. McCormick – Human Factors in Engineering and Design, McGraw-Hill Education, 7th Edition, 2012.
2. Frank E. Bird Jr. & Germain – Practical Loss Control Leadership, Det Norske Veritas (DNV), 2014 Edition, 2014.

Reference Books:

1. Kroemer, Kroemer & Kroemer-Elbert – Ergonomics: How to Design for Ease and Efficiency, Pearson Education, 2nd Edition, 2001.
2. James Reason – Human Error, Cambridge University Press, 1st Edition, 1990.



Code	Subject	Lecture	Tutorial	Practical	Credit
	Practical - Industrial Safety Practices	0	0	6	2

Course Objectives

This course is designed to introduce first-year students to basic industrial safety practices through hands-on exposure using mechanical workshop and basic electrical laboratory facilities. The course emphasizes safe working habits, and hazard awareness at an introductory level.

List of Topics

1. Introduction to industrial safety, Safety signs, symbols, and color coding
2. Identification and use of basic PPE (helmet, gloves, goggles, safety shoes)
3. Practical demonstration of PPE usage and safety discipline
4. General workshop hazards (cutting, rotating, hot surfaces)
5. Safe handling of hand tools (spanners, hammers, chisels, files)
6. Safety practices in fitting, drilling, grinding, and welding areas
7. Machine guarding and safe work zones
8. Housekeeping and material handling practices
9. Preparation of a basic workshop safety checklist
10. Electrical hazards and shock prevention
11. Safe handling of wires, plugs, switches, and fuses
12. Earthing and insulation – demonstration
13. Safe practices while working with high voltage circuits
14. Introduction to electrical machines safety (motors, transformers)
15. Identification of unsafe electrical conditions

Total Hours: 90

Course Outcomes

- CO01: Understand basic industrial hazards in workshop and laboratory environments
 CO02: Follow safe operating procedures in mechanical and electrical labs
 CO03: Use basic personal protective equipment correctly
 CO04: Identify unsafe conditions and report hazards
 CO05: Respond to minor emergencies using basic safety procedures

Suggested Reference Material

1. K. U. Mistry – Industrial Safety and Hazard Management, 2011 (Revised Edition), Laxmi Publications, New Delhi.
2. National Safety Council (India) – Safety Manuals, 2015, National Safety Council of India, Mumbai.
3. Directorate General, Factory Advice Service & Labour Institutes (DGFASLI) – Factory Safety Guidelines (Introductory Level), 2014, Ministry of Labour & Employment, Government of India.
4. Institutional Workshop & Laboratory Safety Rules, Latest Edition (2020 or later), Published by the respective Institution / University.

The image features a large, faint watermark of the VELS logo in the background. The logo is a shield-shaped crest with a blue border. At the top, the word "VELS" is written in a blue, serif font. The shield is divided into four quadrants: the top-left contains a blue square, the top-right contains a blue book, the bottom-left contains a blue triangle, and the bottom-right contains a blue cross. A blue ribbon at the bottom of the shield contains the motto "KNOWLEDGE IS POWER" in a blue, serif font.

VELS

SEMESTER II

Code	Subject	Lecture	Tutorial	Practical	Credit
	Technical English and Safety Documentation	4	0	0	4

Course Objective:

- To develop technical English skills required in industrial and safety environments
- To enable students to prepare and interpret safety-related documents
- To enhance written and verbal communication for technical and legal purposes
- To promote clarity, accuracy and standardization in safety documentation

UNIT – I TECHNICAL COMMUNICATION FUNDAMENTALS 12

Nature and scope of technical communication. Difference between general and technical communication. Characteristics of effective technical writing. Technical vocabulary and terminology used in safety and industrial sectors.

UNIT – II SAFETY DOCUMENTATION SYSTEMS 12

Types of safety documents. Safety manuals and standard operating procedures (SOPs). Permit-to-work systems. Safety signs, symbols and color coding. Importance of documentation in accident prevention.

UNIT – III REPORT AND RECORD WRITING 12

Incident and accident reports. Near-miss reporting. Investigation report structure. Inspection and audit reports. Maintenance and safety records. Objectivity and accuracy in reporting.

UNIT – IV LEGAL AND COMPLIANCE DOCUMENTATION 12

Statutory registers and records. Compliance documentation under safety laws. Preparation and interpretation of Material Safety Data Sheets (MSDS/SDS). Documentation for inspections, audits and legal proceedings.

UNIT – V DIGITAL AND PROFESSIONAL SAFETY COMMUNICATION 12

Email and memo writing in industrial settings. Technical presentations and briefings. Document control and version management. Ethics, confidentiality and professional responsibility in safety documentation.

Total Hours: 60

Course Outcome:

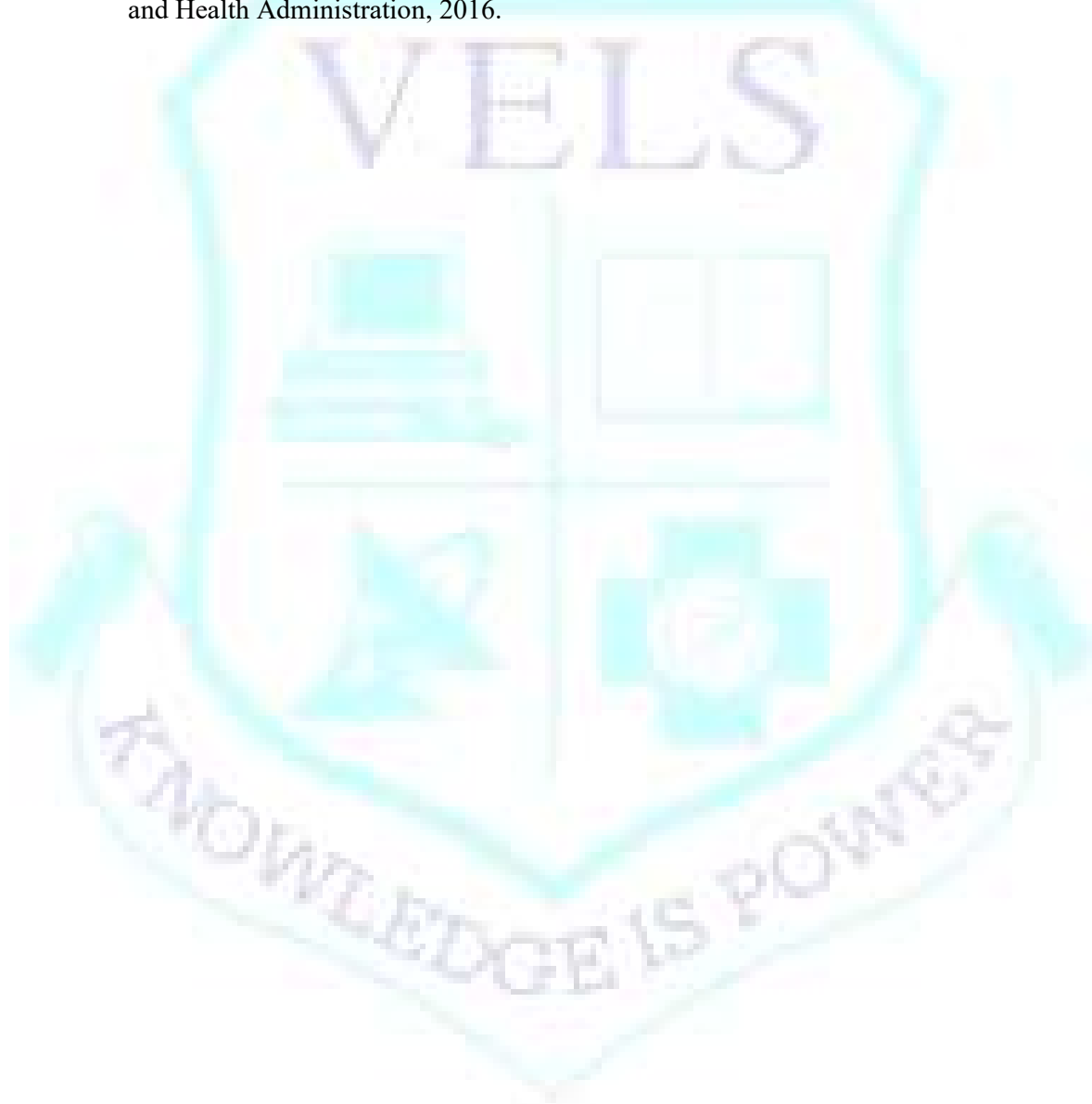
- CO 01: Understand principles of technical communication in safety contexts
CO 02: Prepare standard safety documents and operational records
CO 03: Write clear and accurate incident and investigation reports
CO 04: Interpret legal and compliance-related safety documentation
CO 05: Demonstrate professional communication skills in industrial environments

Text Books:

1. Meenakshi Raman & Sangeeta Sharma – Technical Communication: Principles and Practice, Oxford University Press, 2nd Edition, 2011.
2. Sanjay Kumar – Technical English, Oxford University Press, 2014 Edition, 2014.

Reference Books:

1. Courtland L. Bovee & John V. Thill – Business Communication Today, Pearson Education, 13th Edition, 2016.
2. OSHA – Safety and Health Program Management Guidelines, Occupational Safety and Health Administration, 2016.



Code	Subject	Lecture	Tutorial	Practical	Credit
	Applied Physics	4	0	0	4

Course Objective:

- To understand fundamental physics principles related to industrial safety
- To identify physical hazards, present in industrial environments
- To apply physics concepts in accident prevention and safety control
- To create awareness on electrical, thermal, noise and radiation hazards

UNIT – I MECHANICS AND SAFETY APPLICATIONS 12

Basic concepts of mechanics. Force, work, energy and power. Laws of motion. Friction and its role in industrial accidents. Stability, centre of gravity and balance. Applications of mechanics in material handling and accident prevention.

UNIT – II HEAT, THERMODYNAMICS AND SAFETY 12

Temperature and heat. Laws of thermodynamics. Heat transfer – conduction, convection and radiation. Thermal expansion and thermal stresses. Heat-related hazards and preventive measures in industries.

UNIT – III ELECTRICITY AND ELECTRICAL SAFETY 12

Basic electrical concepts – current, voltage, resistance and power. Ohm’s law. Electric shock and its effects on the human body. Earthing and grounding. Electrical insulation. Causes and prevention of electrical accidents.

UNIT – IV ACOUSTICS, LIGHT AND RADIATION 12

Sound and noise. Measurement of noise levels. Effects of noise and vibration on human health. Illumination and lighting standards. Radiation – ionizing and non-ionizing radiation. Radiation hazards and protective measures.

UNIT – V APPLIED PHYSICS IN INDUSTRIAL SAFETY 12

Pressure and vacuum systems. Basics of fluid mechanics. Industrial instrumentation safety. Physics behind fire and explosions. Application of physics principles in safety engineering and hazard control.

Total Hours: 60

Course Outcome:

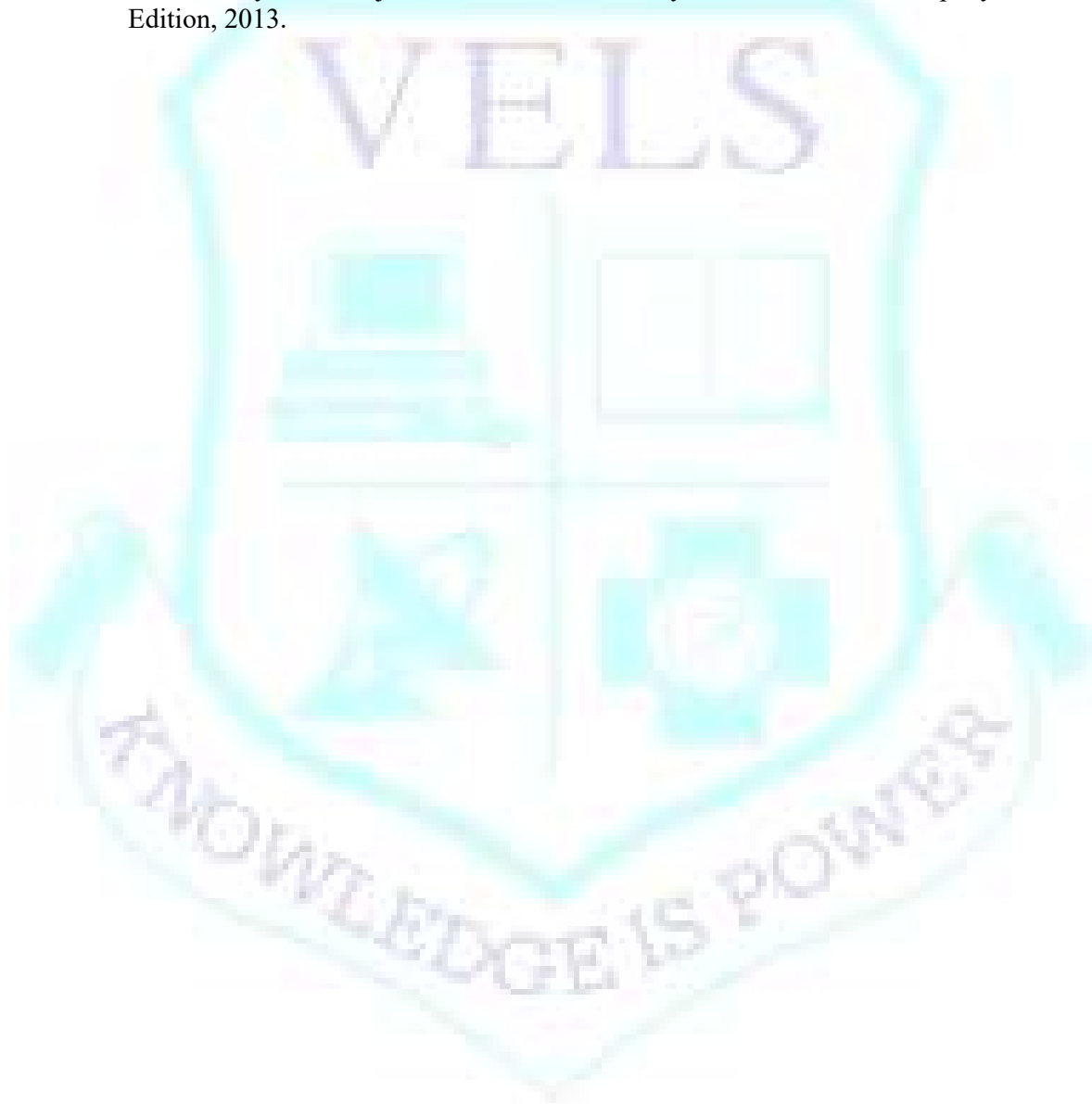
- CO 01: Understand fundamental physics concepts applicable to industrial safety
CO 02: Identify physical hazards related to mechanics and thermal systems
CO 03: Apply electrical safety principles to prevent accidents
CO 04: Analyze noise, illumination and radiation hazards in workplaces
CO 05: Use applied physics concepts for improving industrial safety

Text Books:

1. R. K. Rajput – Applied Physics, Laxmi Publications, 3rd Edition, 2015.
2. D. S. Mathur – Elements of Applied Physics, S. Chand & Company, 2014 Edition, 2014.

Reference Books:

1. Halliday, Resnick & Walker – Fundamentals of Physics, John Wiley & Sons, 10th Edition, 2014.
2. Subrahmanyam & Brij Lal – A Textbook of Physics, S. Chand & Company, 2013 Edition, 2013.



Code	Subject	Lecture	Tutorial	Practical	Credit
	Occupational Health and Industrial Hygiene	4	0	0	4

Course Objective:

- To understand the principles and importance of occupational health
- To identify occupational diseases and workplace health hazards
- To study industrial hygiene methods for hazard evaluation and control
- To promote safe and healthy working environments in industries

UNIT – I INTRODUCTION TO OCCUPATIONAL HEALTH 12

Concept and scope of occupational health. Importance of occupational health in industries. Occupational diseases – classification and causes. Role of occupational health services. Health surveillance and medical examination of workers.

UNIT – II PRINCIPLES OF INDUSTRIAL HYGIENE 12

Concept of industrial hygiene. Anticipation, recognition, evaluation and control of workplace hazards. Threshold Limit Values (TLVs). Monitoring and measurement of occupational exposures.

UNIT – III PHYSICAL AND CHEMICAL HEALTH HAZARDS 12

Physical hazards – noise, heat, cold, radiation and illumination. Chemical hazards – dusts, fumes, vapours, gases and mists. Routes of entry of chemicals into the human body. Health effects of exposure.

UNIT – IV BIOLOGICAL AND ERGONOMIC HAZARDS 12

Biological hazards – bacteria, viruses, fungi and parasites. Occupational infections. Ergonomic hazards – work posture, repetitive motion and manual handling. Prevention and control measures.

UNIT – V OCCUPATIONAL HEALTH LEGISLATION AND CONTROL MEASURES 12

Occupational health provisions under the Factories Act. Role of safety officers and medical officers. Personal protective equipment (PPE). Occupational health programmes and employee wellness initiatives.

Total Hours: 60

Course Outcome:

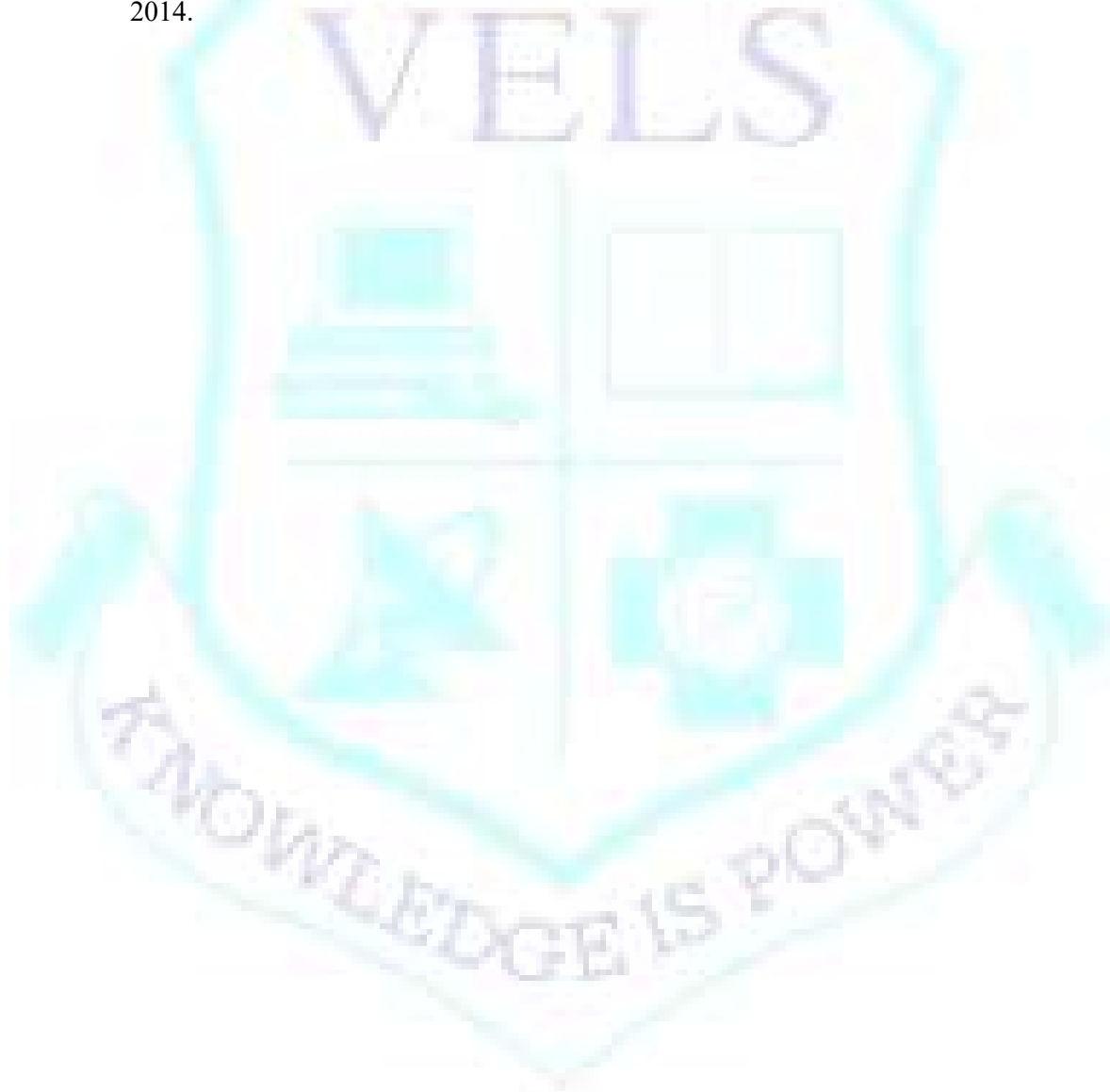
- CO 01: Understand the concepts and importance of occupational health
CO 02: Identify occupational diseases and industrial health hazards
CO 03: Apply industrial hygiene principles for hazard evaluation and control
CO 04: Analyze physical, chemical and biological health risks at workplaces
CO 05: Promote occupational health practices and legal compliance

Text Books:

1. Goelzer, Hansen & Sehrndt – Occupational Health, World Health Organization, 2010 Edition, 2010.
2. Roger L. Brauer – Safety and Health for Engineers, John Wiley & Sons, 2nd Edition, 2016.

Reference Books:

1. Plog, Quinlan & Tebbens – Fundamentals of Industrial Hygiene, National Safety Council, 6th Edition, 2012.
2. R. P. Sharma – Industrial Safety and Environment, Khanna Publishers, 2014 Edition, 2014.



Code	Subject	Lecture	Tutorial	Practical	Credit
	Disaster Risk Reduction and Climate Hazards	4	0	0	4

Course Objective:

- To understand the concepts and principles of disaster risk reduction
- To study climate change and climate-related hazards
- To analyze the impacts of disasters on society and the environment
- To develop knowledge on disaster preparedness, mitigation and resilience

UNIT – I INTRODUCTION TO DISASTER RISK REDUCTION 12

Concept of disaster, hazard, vulnerability, risk and resilience. Disaster risk reduction (DRR) – definition and importance. Disaster management cycle. Evolution of disaster risk management approaches.

UNIT – II CLIMATE CHANGE AND CLIMATE HAZARDS 12

Climate change – causes and impacts. Greenhouse effect and global warming. Climate-related hazards – floods, cyclones, droughts, heat waves and sea-level rise. Impacts on human health, infrastructure and ecosystems.

UNIT – III DISASTER RISK ASSESSMENT AND MITIGATION 12

Risk assessment and vulnerability analysis. Hazard mapping and risk profiling. Structural and non-structural mitigation measures. Early warning systems. Community-based disaster risk reduction.

UNIT – IV DISASTER PREPAREDNESS AND RESPONSE 12

Disaster preparedness planning. Emergency response mechanisms. Evacuation planning and shelter management. Role of government agencies, NGOs and community participation. Coordination during disaster response.

UNIT – V CLIMATE ADAPTATION AND DISASTER RESILIENCE 12

Climate adaptation strategies. Disaster resilience and sustainable development. Ecosystem-based disaster risk reduction. National and international frameworks – Sendai Framework for Disaster Risk Reduction. Role of governance and policy.

Total Hours: 60

Course Outcome:

- CO 01: Understand fundamental concepts of disaster risk reduction
- CO 02: Analyze climate change impacts and climate-related hazards
- CO 03: Apply disaster risk assessment and mitigation techniques
- CO 04: Understand disaster preparedness and emergency response systems
- CO 05: Promote disaster resilience and climate adaptation practices

Text Books:

1. C. S. Rao – Disaster Management, Tata McGraw-Hill, 2nd Edition, 2012.
2. R. K. Sharma – Disaster Management, Atlantic Publishers, 2014 Edition, 2014.

Reference Books:

1. IPCC – Climate Change Assessment Reports, Intergovernmental Panel on Climate Change, 2018.
2. Coppola, Damon P. – Introduction to International Disaster Management, Butterworth-Heinemann, 3rd Edition, 2015.
3. UNDRR – Sendai Framework for Disaster Risk Reduction 2015–2030, United Nations, 2015.



Code	Subject	Lecture	Tutorial	Practical	Credit
	Industrial Safety Laws and Compliance	3	0	0	3

Course Objective:

- To understand the importance and need for industrial safety legislation
- To familiarize students with major safety, health and environmental laws
- To develop knowledge on statutory compliance and enforcement mechanisms
- To promote safe, lawful and ethical practices in industrial organizations

UNIT – I INTRODUCTION TO INDUSTRIAL SAFETY LEGISLATION 12

Need for safety legislation. Evolution of industrial safety laws in India. Constitutional provisions related to labour safety. Role of regulatory authorities in enforcing safety legislation.

UNIT – II FACTORIES ACT AND ALLIED RULES 12

Objectives and scope of the Factories Act. Health, safety and welfare provisions. Duties and responsibilities of occupier, manager and workers. Working hours, leave and employment provisions. Penalties and offences.

UNIT – III OTHER IMPORTANT SAFETY LEGISLATIONS 12

The Boilers Act. The Explosives Act. Petroleum Act and Rules. Environment (Protection) Act. Overview of labour laws related to industrial safety and occupational health.

UNIT – IV COMPLIANCE, INSPECTION AND ENFORCEMENT 12

Statutory compliance requirements. Inspections by regulatory authorities. Documentation and record keeping. Legal procedures and prosecution. Role of courts and tribunals in safety enforcement.

UNIT – V SAFETY MANAGEMENT SYSTEMS AND AUDITS 12

Safety management systems. ISO standards related to occupational health and safety. Internal and external safety audits. Compliance audits and reporting. Continuous improvement in legal compliance.

Total Hours: 60

Course Outcome:

After successful completion of the course, students will be able to:

CO 01: Understand the framework and importance of industrial safety legislation

CO 02: Interpret provisions of major safety and labour laws

CO 03: Apply statutory requirements for industrial safety compliance

CO 04: Analyze inspection, enforcement and legal procedures

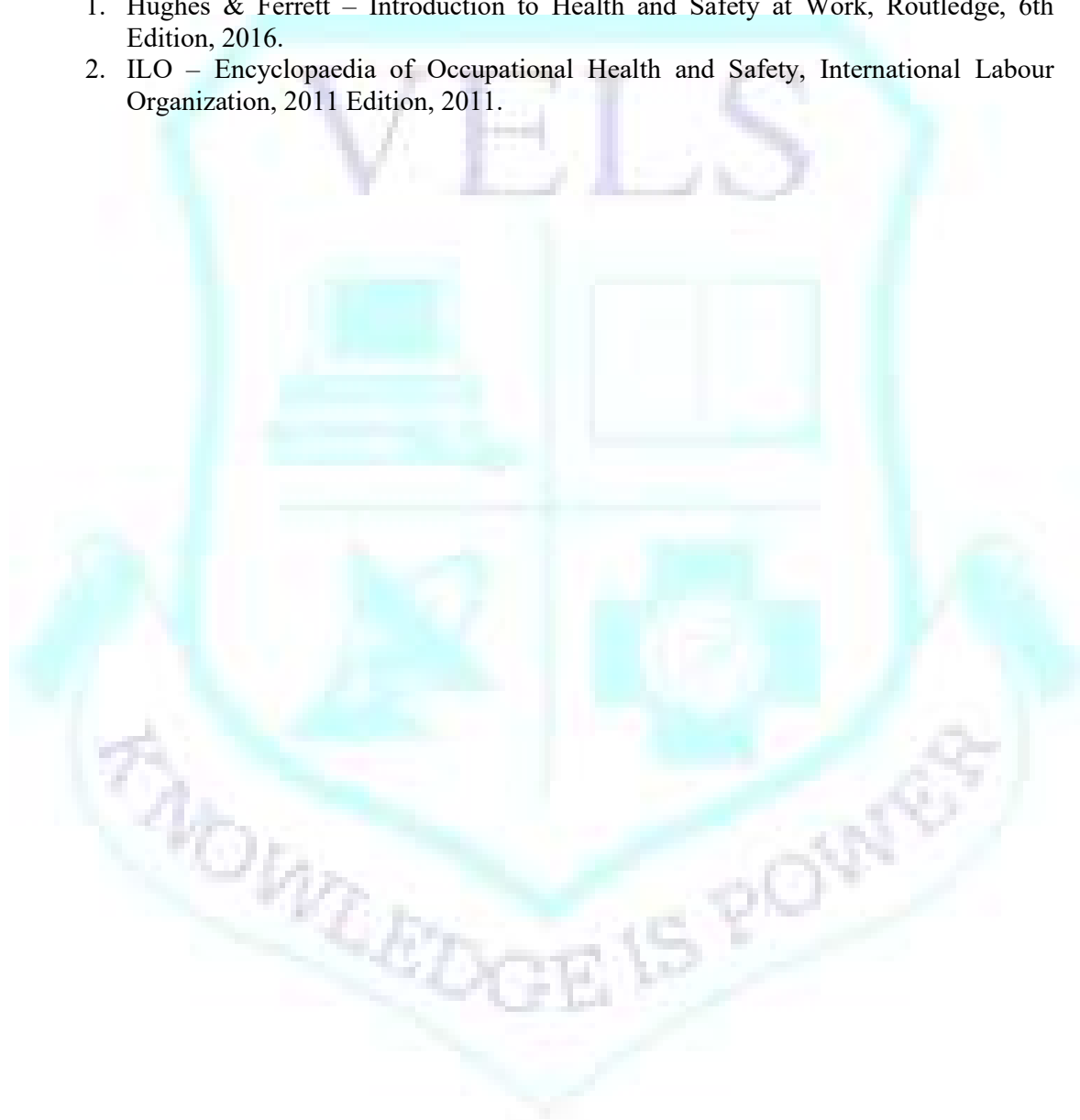
CO 05: Implement safety management systems to ensure legal compliance

Text Books:

1. R. P. Sharma – Industrial Safety and Environment, Khanna Publishers, 2014 Edition, 2014.
2. K. V. K. Subramanian – Safety, Health and Environment Laws, Asia Law House, 2016 Edition, 2016.

Reference Books:

1. Hughes & Ferrett – Introduction to Health and Safety at Work, Routledge, 6th Edition, 2016.
2. ILO – Encyclopaedia of Occupational Health and Safety, International Labour Organization, 2011 Edition, 2011.



Code	Subject	Lecture	Tutorial	Practical	Credit
	Practical - Basic Emergency Response	0	0	3	1

Course Objective:

This course aims to introduce students to basic emergency response procedures required during industrial and community emergencies. The course focuses on hands-on training, situational awareness, and safe response actions.

UNIT I: Introduction to Emergency Response **9**

1. Meaning and types of emergencies (industrial, fire, electrical, medical)
2. Role of first responder – do's and don'ts
3. Basic communication, Emergency contact and Emergency response and reporting procedures

UNIT II: Fire and Evacuation Response **9**

4. Causes of fire in industrial and institutional environments
5. Fire classes and basic fire response methods
6. Identification and handling of portable fire extinguishers and Evacuation procedures

UNIT III: First Aid and Medical Emergency Response **9**

7. Principles of first aid, Familiarization with first aid kit contents, Management of cuts, bleeding, burns, fractures, and fainting
8. Response to electrical shock and heat stress
9. Demonstration of CPR and recovery position

UNIT IV: Disaster Response – Basic Level **9**

10. Natural and man-made disasters
11. Basic response to floods, earthquakes, cyclones, and industrial accidents
12. Personal safety, Emergency shelter and basic relief measures during disasters

UNIT V: Emergency Equipment and Mock Drills **9**

13. Identification and use of basic emergency equipment (stretchers, emergency alarms)
14. Personal protective equipment during emergencies
15. Team roles during emergency response, Conducting integrated mock drills, post-drill review and reporting

Course Outcomes

After successful completion of the course, students will be able to:

- CO01: Recognize different types of emergencies
- CO02: Perform basic emergency response actions safely
- CO03: Demonstrate simple first aid and life-saving techniques
- CO04: Participate effectively in mock drills and evacuation procedures
- CO05: Understand the importance of communication during emergencies

Reference Books:

1. National Disaster Management Authority (NDMA) – Basic Disaster Response Guidelines, 2016
2. Indian Red Cross Society – First Aid Manual, 2018
3. National Safety Council (India) – Emergency Response & Fire Safety Manuals, 2015
4. Institutional Emergency & Disaster Management Plan – Latest Edition

Code	Subject	Lecture	Tutorial	Practical	Credit
	Practical - Industrial Hygiene and Hazard Monitoring	0	0	3	1

Course Objectives

This course aims to introduce students to basic industrial hygiene concepts and simple hazard monitoring practices through observation, demonstration, and elementary measurements. The focus is on recognition of workplace hazards, personal hygiene, and basic monitoring techniques suitable for first-year undergraduate students.

UNIT I: Introduction to Industrial Hygiene 9

1. Meaning and importance of industrial hygiene, Role of industrial hygienist
2. Types of occupational health hazards (physical, chemical, biological, ergonomic)
3. Personal hygiene practices at workplace

UNIT II: Physical Hazard Identification 9

4. Observation of noise sources and Demonstration of basic noise measurement in workplaces
5. Identification of vibration, heat, lighting, and radiation hazards - Recording and interpretation
6. Observation of illumination levels in work areas - Recording and interpretation

UNIT III: Chemical Hazard Awareness and Monitoring 9

7. Common chemical hazards and Routes of exposure in laboratories and workshops
8. Demonstration of gas detector / indicator tubes
9. Safe handling and storage practices and Material Safety Data Sheet (MSDS)

UNIT IV: Biological and Ergonomic Hazards 9

10. Identification of biological hazards - Housekeeping and sanitation practices
11. Ergonomic hazards - Observation of hazards in workplaces
12. Basic ergonomic improvement at workplaces

UNIT V: Basic Hazard Monitoring and Reporting 9

13. Simple workplace hygiene survey
14. Use of basic monitoring formats and checklists
15. Preparation of basic hazard monitoring report, discussion and interpretation of findings


Course Outcomes

After completing this course, students will be able to:

- CO01: Understand the concept of industrial hygiene
- CO02: Identify common workplace health hazards
- CO03: Observe and record basic hygiene conditions
- CO04: Use simple monitoring devices under supervision
- CO05: Follow personal and workplace hygiene practices

Reference Material

1. K. U. Mistry – Industrial Safety and Hazard Management, 2011
2. National Safety Council (India) – Industrial Hygiene Manuals, 2015
3. ILO – Introduction to Occupational Health and Safety, 2013
4. Institutional Workplace Hygiene & Safety Guidelines – Latest Edition

The logo of VIT (Vellore Institute of Technology) is a shield-shaped emblem. At the top, the word 'VIT' is written in large, stylized letters. Below it, the motto 'WISDOM BEGETS KNOWLEDGE' is inscribed. At the bottom of the shield, a banner contains the motto 'KNOWLEDGE IS POWER'. The entire logo is rendered in a light blue, semi-transparent style.

**DISCIPLINE
SPECIFIC
ELECTIVE
COURSES
(DSE)**

Code	Subject	Lecture	Tutorial	Practical	Credit
	Mechanical and Electrical Safety	3	0	0	3

Course Objective:

- To understand electrical and mechanical hazards in industrial environments
- To study safety principles related to electrical and mechanical systems
- To identify causes of electrical and mechanical accidents
- To apply preventive and control measures for safe industrial operations

UNIT – I FUNDAMENTALS OF ELECTRICAL SAFETY 9

Basic electrical concepts. Electrical hazards and their effects on human body. Electric shock, burns and arc flash hazards. Factors influencing severity of electric shock. Electrical safety regulations and standards.

UNIT – II ELECTRICAL SAFETY PRACTICES AND CONTROL MEASURES 9

Earthing and grounding systems. Electrical insulation and protective devices. Fuses, circuit breakers and relays. Lockout and tagout procedures. Safe work practices in electrical installations and maintenance.

UNIT – III MECHANICAL HAZARDS IN INDUSTRIES 9

Mechanical hazards associated with machinery and equipment. Rotating machinery hazards. Material handling hazards. Pressure vessels and lifting equipment hazards. Causes of mechanical accidents.

UNIT – IV MACHINE GUARDING AND MECHANICAL SAFETY CONTROLS 9

Principles of machine guarding. Types of guards and safety devices. Interlocks and emergency stop devices. Safe operation of mechanical equipment. Maintenance and inspection of machinery.

UNIT – V PREVENTIVE MAINTENANCE AND SAFETY MANAGEMENT 9

Preventive and predictive maintenance concepts. Permit-to-work systems for electrical and mechanical jobs. Safety during installation, commissioning and shutdown. Accident prevention through maintenance management.

Total Hours: 45

Course Outcome:

- CO 01: Understand electrical and mechanical hazards in industrial settings
- CO 02: Apply electrical safety principles and protective measures
- CO 03: Identify mechanical hazards and accident causes
- CO 04: Implement machine guarding and mechanical safety controls

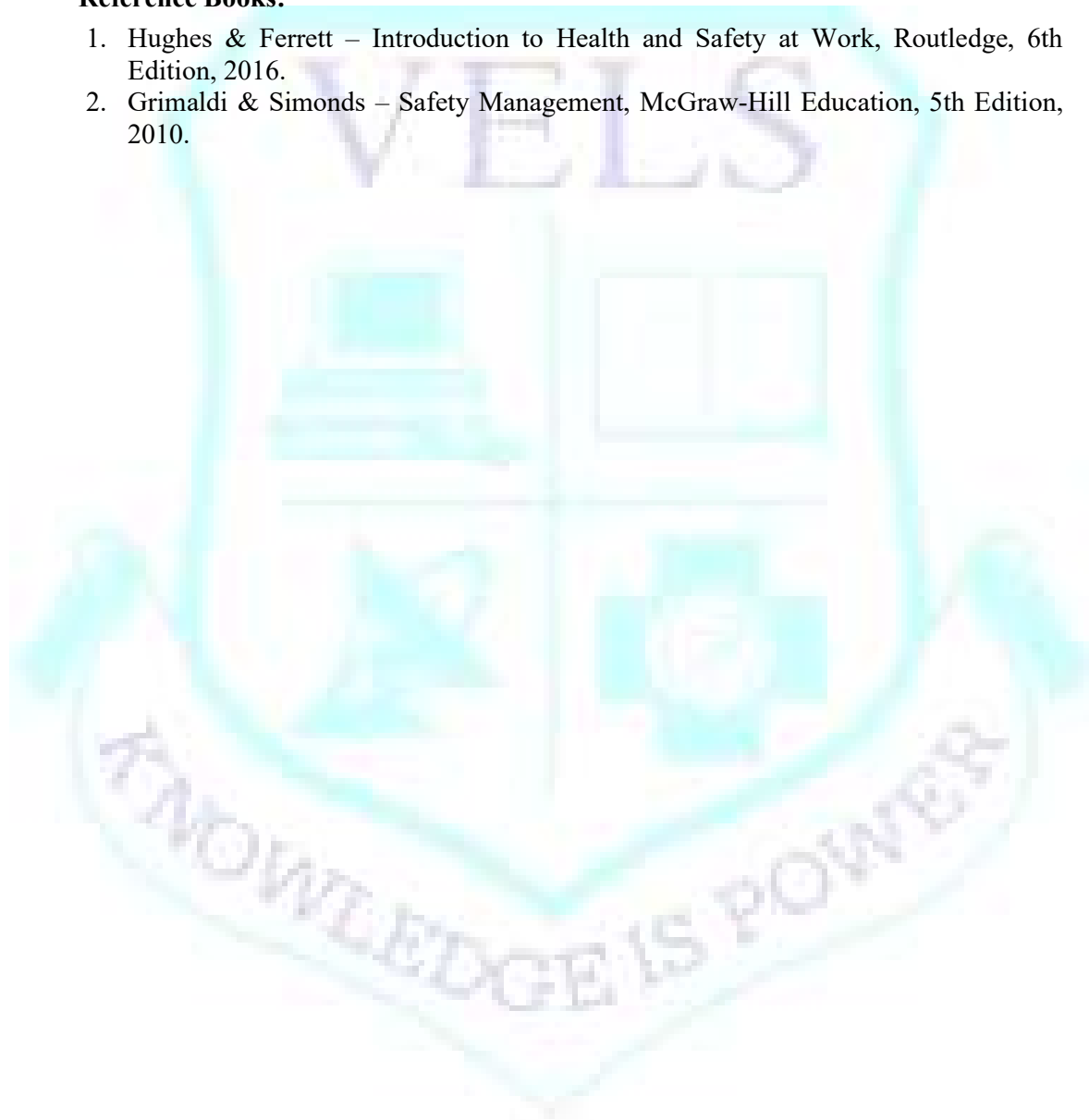
CO 05: Promote safe electrical and mechanical maintenance practices

Text Books:

1. R. P. Sharma – Industrial Safety and Environment, Khanna Publishers, 2014 Edition, 2014.
2. V. K. Jain – Electrical Safety Engineering, CBS Publishers, 2013 Edition, 2013.

Reference Books:

1. Hughes & Ferrett – Introduction to Health and Safety at Work, Routledge, 6th Edition, 2016.
2. Grimaldi & Simonds – Safety Management, McGraw-Hill Education, 5th Edition, 2010.



Code	Subject	Lecture	Tutorial	Practical	Credit
	Fundamentals of Safety Awareness and Risk Perception	3	0	0	3

Course Objectives

The course aims to:

- Develop basic safety awareness among students
- Introduce the concept of risk and how individuals perceive hazards
- Promote safe attitudes and behavior in workplaces and daily life
- Build a foundation for advanced safety and disaster management courses

UNIT I – Introduction to Safety Awareness 9

Meaning and importance of safety, safety in everyday life and workplaces, accident definition causes and consequences, unsafe acts and unsafe conditions, role of individuals in accident prevention, introduction to safety culture and safety mindset

UNIT II – Basics of Hazards and Risk 9

Meaning of hazard and risk, types of hazards including physical, mechanical, electrical, chemical and biological hazards, introduction to risk levels such as low medium and high, examples of common hazards in industrial and institutional environments.

UNIT III – Risk Perception and Human Behaviour 9

Concept of risk perception, factors influencing risk perception including experience training attitude stress and fatigue, difference between perceived risk and actual risk, role of human errors in accidents, importance of awareness and alertness.

UNIT IV – Safety Awareness at Workplace and Community 9

Safety awareness in workshops laboratories and offices, importance of safety signs symbols and color codes, basic use of personal protective equipment, safety awareness in public places and community settings, role of communication in promoting safety.

UNIT V – Developing a Safety-Oriented Mindset 9

Safety responsibility of individuals and organizations, hazard and near-miss reporting, basic safety rules and discipline, role of training and continuous learning, case examples of accidents due to lack of safety awareness, development of positive safety behavior.

Total Hours: 45

Course Outcomes

After completing this course, students will be able to:

- CO01: Understand basic safety concepts and terminology
- CO02: Identify common hazards in industrial and daily environments
- CO03: Explain how risk perception influences human behavior
- CO04: Demonstrate safety-conscious attitudes and practices
- CO05: Recognize the importance of prevention and preparedness

Text Book

1. K. U. Mistry, Industrial Safety and Hazard Management, Laxmi Publications, New Delhi, 2011.

Reference Books

1. Frank P. Lees, Loss Prevention in the Process Industries, Butterworth-Heinemann, 2005.
2. National Safety Council (India), Safety Awareness and Accident Prevention Manuals, National Safety Council of India, Mumbai, 2015.
3. ILO, Introduction to Occupational Safety and Health, International Labour Organization, Geneva, 2013.
4. DGFASLI, Factory Safety Guidelines (Introductory Level), Ministry of Labour and Employment, Government of India, 2014.



Code	Subject	Lecture	Tutorial	Practical	Credit
	Environmental Science and Disaster Ecology	3	0	0	3

Course Objective:

- To create awareness on environmental issues and ecological balance
- To understand the relationship between environment, ecology and disasters
- To study natural and man-made disasters and their environmental impacts
- To promote sustainable development and disaster risk reduction practices

UNIT – I ENVIRONMENT AND ECOLOGY BASICS 9

Environment – definition, scope and importance. Components of environment – lithosphere, hydrosphere, atmosphere and biosphere. Ecology and ecosystems – structure and functions. Energy flow and food chains. Ecological balance and sustainability.

UNIT – II NATURAL RESOURCES AND ENVIRONMENTAL POLLUTION 9

Natural resources – renewable and non-renewable resources. Conservation of natural resources. Environmental pollution – air, water, soil and noise pollution. Sources, effects and control measures. Climate change and global warming.

UNIT – III DISASTER ECOLOGY 9

Concept of disaster ecology. Impact of disasters on ecosystems. Ecological consequences of natural disasters such as floods, cyclones, earthquakes, landslides and droughts. Human-induced disasters and environmental degradation.

UNIT – IV ENVIRONMENTAL IMPACT AND DISASTER MANAGEMENT 9

Environmental Impact Assessment (EIA) – objectives and process. Environmental management plans. Disaster risk assessment and vulnerability analysis. Role of environment in disaster mitigation. Ecosystem-based disaster risk reduction.

UNIT – V SUSTAINABLE DEVELOPMENT AND ENVIRONMENTAL GOVERNANCE 9

Concept of sustainable development. Environmental policies and legislation. Role of national and international agencies. Community participation in environmental protection. Environmental ethics and disaster resilience.

Total Hours: 45

Course Outcome:

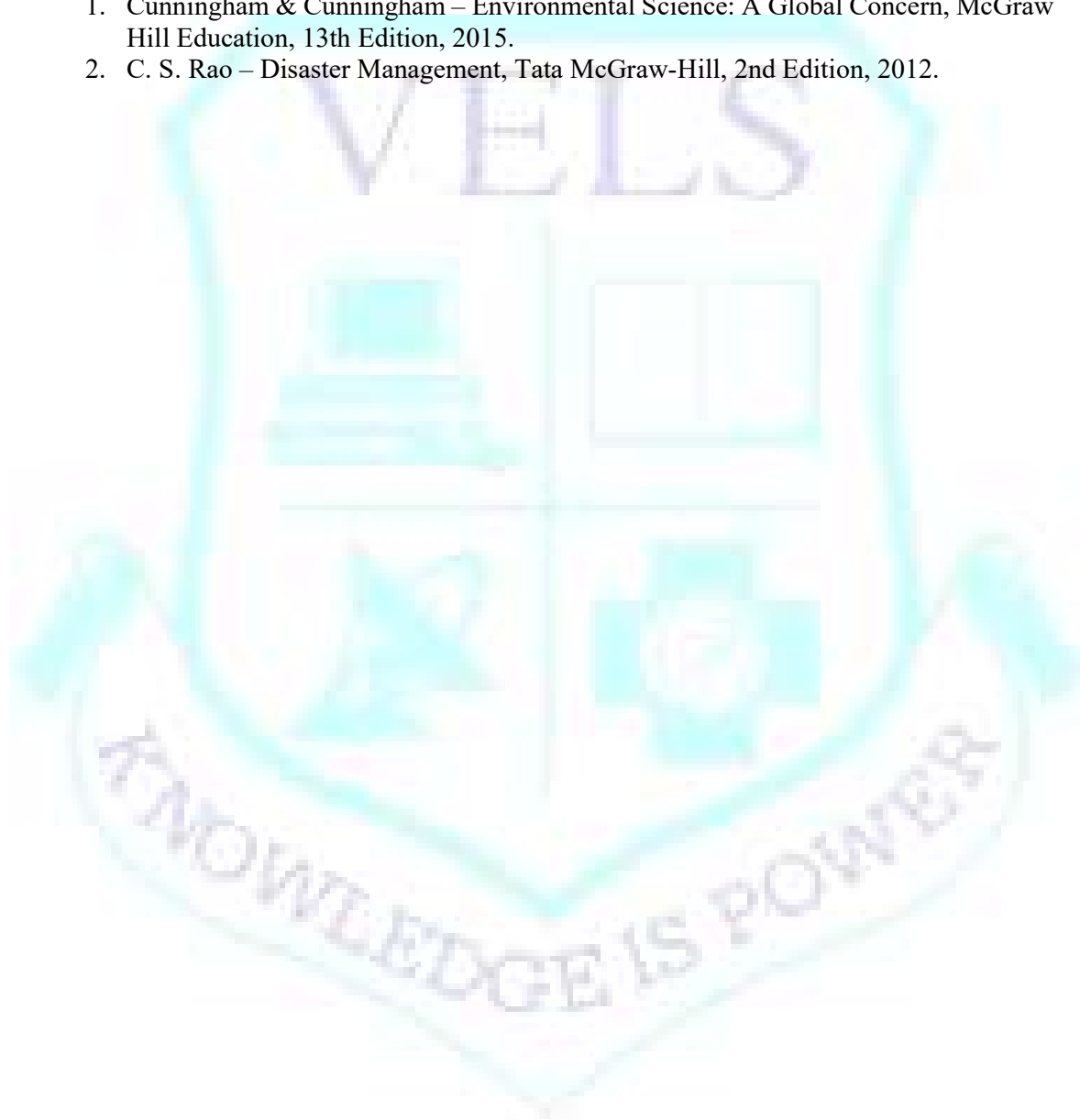
- CO 01: Understand basic environmental and ecological concepts
- CO 02: Identify environmental pollution sources and control measures
- CO 03: Analyze ecological impacts of natural and man-made disasters
- CO 04: Apply environmental management principles in disaster mitigation
- CO 05: Promote sustainable development and environmental responsibility

Text Books:

1. Erach Bharucha – Textbook of Environmental Studies, Universities Press, 2nd Edition, 2013.
2. R. Rajagopalan – Environmental Studies: From Crisis to Cure, Oxford University Press, 3rd Edition, 2016.

Reference Books:

1. Cunningham & Cunningham – Environmental Science: A Global Concern, McGraw Hill Education, 13th Edition, 2015.
2. C. S. Rao – Disaster Management, Tata McGraw-Hill, 2nd Edition, 2012.



Code	Subject	Lecture	Tutorial	Practical	Credit
	Environmental Pollution, Climate Risk and Sustainability	3	0	0	3

Course Objectives

To introduce students to basic concepts of environmental pollution, climate-related risks, and sustainability practices, with emphasis on their relevance to industrial safety, disaster management, and human wellbeing.

UNIT I – Environment and Pollution: Basic Concepts 09

Environment and its components, natural and built environment, meaning and types of pollution, sources and effects of pollution, relationship between environment, health, and safety, need for environmental protection.

UNIT II – Air, Water and Soil Pollution 09

Sources and effects of air pollution, common air pollutants and health impacts, water pollution sources and consequences, soil pollution and land degradation, basic pollution control measures, role of individuals and industries in pollution prevention.

UNIT III – Climate Change and Climate Risk 09

Concept of climate change, greenhouse effect and global warming, climate variability and extreme weather events, climate-related risks such as floods cyclones droughts and heat waves, impact of climate change on environment industry and society.

UNIT IV – Sustainability and Sustainable Development 09

Concept and principles of sustainability, sustainable development goals overview, resource conservation and energy efficiency, waste reduction reuse and recycling, role of green practices in industries and institutions.

UNIT V – Environmental Management and Community Responsibility 09

Environmental awareness and ethics, role of environmental laws and institutions, environmental impact at local and community level, individual and community participation in environmental protection, basic climate adaptation and mitigation measures.

Total Hours: 45

Course Outcomes:

CO1: Understand the basic concepts of environment and different types of environmental pollution.

CO2: Identify major sources and impacts of air, water, and soil pollution on human health and ecosystems.

CO3: Explain the causes and effects of climate change and associated climate-related risks.

CO4: Understand the principles of sustainability and sustainable development in industrial and community contexts.

CO5: Apply basic environmental awareness and sustainable practices at individual, institutional, and community levels.

Text Book

1. Erach Bharucha, Textbook of Environmental Studies, Universities Press, 2013.

Reference Books

1. R. Rajagopalan, Environmental Studies: From Crisis to Cure, Oxford University Press, 2011.
2. IPCC, Climate Change: Synthesis Report, 2014.
3. Ministry of Environment, Forest and Climate Change, Environmental Awareness Materials, Government of India.
4. UNEP, Sustainability and Environmental Management Manuals.

