SARVAJANIK UNIVERSITY
SarvajanikCollege of Engineering and Technology
Masters of Technology
Environmental Engineering

M.Tech.I Semester I

Subject Name: Environmental Risk Assessment and Management **Subject Code:**MTEN14106

Type of course: PE-II
Prerequisite: Basic Knowledge of Environment Studies and Occupational health and Safety.
Rationale: The graduate engineer employed in industry requires knowledge of matters relating to human health risks and their mitigation.

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	150
3	0	2	4	60	25	15	30	20	

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1.	**Introduction:** Dimensions of environmental health, Causative agents of diseases, Social factors, Urban problems, Housing and health, Economy and health, Climate and other atmospheric elements, Violence, Chronic and communicable diseases, Occupational health, Epidemiological data, Occupational health hazards, Environmental exposure and diseases, industrial toxicants, Ergonomics, Controlling stress of life.	3	10 %
2.	**Elements of Environmental Risk Assessment:** Hazard identification and accounting, Fate and Behavior of toxics and persistent substances in the environment, Receptor exposure to Environmental Contaminants, Dose Response Evaluation, Exposure Assessment, Exposure Factors, Slope Factors, Dose Response calculations and Dose Conversion Factors, Risk Characterization and consequence determination, Vulnerability assessment, Uncertainty analysis, Event tree and fault tree modelling and analysis	10	25 %
3.	**Risk Assessment Process:** Conceptual frame work, Hazard identification, Hazard assessment, Risk estimation, Risk evaluation, Risk mitigation, Risk assessment in option evaluation, Risk assessment during operation of risk assessment.	10	25 %
4.	**Tools for Risk Management:** HAZOP and FEMA methods, Risk communication and Risk Perception, comparative risks, Risk based decision making, Risk based environmental standard setting, Design of risk management programs, Case studies on risk assessment and management program.	8	20 %

PE-II: Program Elective -II

5.	**Maximum Credible Accidents (MCA) Analysis:** Hazard indices viz. Dow's fire and explosion. Index (FEI) and MOND index, degree of hazard, toxicity index	5	10 %
6.	**Consequence Analysis:** Development and assessment of various scenarios, determination of extent of damage, Disaster Management Plan (DMP) and Emergency preparedness plan (EDP)	6	10 %

Suggested Specification table with Marks (Theory/Practical):

% Distribution of Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
30	**20**	**20**	**10**	**10**	**10**

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

Note: This specification table shall be treated as a general guideline for students andteachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Text Books:

Sr. No.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1.	Risk Assessment of Environmental and Human Health Hazards: A Textbook of Case Studies	Dennis J. (ed). Paustenbach	John Wiley and Sons, ISBN-10 : 0471849987	1989	
2.	Handbook of Environmental Risk Assessment and Management	Peter P. Calow	Wiley-Blackwell, Ishbhn-10: 9780865427327	1997	1st
3.	Environmental Health Risk Assessment, Guidelines for assessing human health risks from environmental hazards		Enhealth		
4.	Environmental Risks and Hazards	Susan L. Cutter	Pearson, Ishbhn-10: 0137538561	1993	Facsimile Edition
5.	Risk Assessment in Environmental Management: A Guide for	D. Kofi Asante-Duah	Wiley, Ishbhn-10: 9780471981473	1998	1st

PE-II: Program Elective -II

	Managing Chemical Contamination Problems				
6.	Environmental Risk Management	Paul Pritchard	Routledge, ISBN 9781853835988	2000	1st

Course Outcome:

Sr. No.	CO Statement After learning this subject, students will be able to	Marks % weightage
CO-1	Understand the Environmental Risk and its Elements of Risk Assessment. (R, *U- Cognitive level*)	10
CO-2	Identify the diseases associated with occupation. (*U, A, N- Cognitive level*)	10
CO-3	Identify the hazards in industrial operation and propose prevention measures. (*R, U, E- Cognitive level*)	20
CO-4	Apply different methodology for Environmental Risk Assessment. (*U, E, N- Cognitive level*)	30
CO-5	Develop risk management plan. (*U, N, C- Cognitive level*)	30

LIST OF PRACTICALS:
Term Work will comprise of assignments and exercises based on MCA analysis, Hazard indices, Dow's fire and explosion index, toxicity index, fault tree analysis, HAZAN and HAZOP, DMP and Emergency preparedness Plan.

List of Open Source/learning website:

- https://www.youtube.com/watch?v=DxZ2rX0AtcM
  - Introduction to Risk Assessment
- https://www.youtube.com/watch?v=qQaeBfIb6TY
  - Environmental Risk Assessment
- https://www.youtube.com/watch?v=NCPIgAcR2SI
  - Environmental Risk Assessment & Management