KNOWLEDGE INSTITUTE OF TECHNOLOGY, SALEM

(An Autonomous Institution)

Approved by AICTE, Affiliated to Anna University, Chennai.
Accredited by NBA (CSE, ECE, EEE & MECH), Accredited by NAAC with 'A' Grade

KIOT Campus, Kakapalayam – 637 504. Salem Dt., Tamil Nadu, India.

M.E. / M.Tech. Regulations 2023

M.E. – Industrial Safety Engineering

Curriculum and Syllabi

(For the Students Admitted from the Academic Year 2023 – 2024 onwards)

Version: 1.0	**Date:** 09.09.2023

	KNOWLEDGE INSTITUTE OF TECHNOLOGY(AUTONOMOUS), SALEM
	Approved by AICTE, Affiliated to Anna University, Accredited by NAAC and NBA (B.E.: Mech., ECE, EEE & CSE)
	website: www.kiot.ac.in

M.E. / M.Tech. REGULATIONS 2023 (R 2023)

CHOICE BASED CREDIT SYSTEM AND OUTCOME BASED EDUCATION

M.E. – INDISTRIAL SAFETY ENGINEERING

VISION OF THE INSTITUTE
To be a world class institution to impart value and need based professional education to the aspiring youth and carving them into disciplined world class professional who have the quest for excellence, achievement orientation and social responsibilities.

MISSION OF THE INSTITUTE	
A	To promote academic growth by offering state-of-art undergraduate, postgraduate and doctoral programs and to generate new knowledge by engaging in cutting – edge research
B	To nurture talent, innovation, entrepreneurship, all-round personality and value system among the students and to foster competitiveness among students
C	To undertake collaborative projects which offer opportunities for long-term interaction with academia and industry
D	To pursue global standards of excellence in all our endeavors namely teaching, research, consultancy, continuing education and support functions

VISION OF THE DEPARTMENT
To create competent and industry relevant Mechanical Engineers with professional and social values to meet global challenges.

MISSION OF THE DEPARTMENT	
M1	Enabling environment for effective teaching - learning and research to meet global challenges.
M2	Motivating students to pursue higher education and to excel in competitive examinations and entrepreneurship.
M3	Establish a continuous Industry Institute Interaction to make the students employable.
M4	Inculcate the students leadership quality with ethical values and spirit of team work.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)	
PEO 1	Possess a mastery of Health safety and environment awareness and safety management skills, to reach higher levels in their profession.
PEO 2	Proficient safety Engineer rendering professional expertise to the industrial and societal needs at national and global level subject to legal requirements.
PEO 3	Well communicate the information on Health safety and environment facilitating collaboration with experts across various disciplines so as to create and execute safe methodology in complex engineering activities.
PEO 4	Demonstrate professional and ethical attitude with awareness of current legal issues by rendering expertise to wide range of industries.

PROGRAM OUTCOMES (POs)	
Graduates Engineering will be able to:	
PO1	An ability to independently carry out research /investigation and development work to solve practical problems
PO2	An ability to write and present a substantial technical report/document
PO3	Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program
PO4	Create, select, learn and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling to safety, health and environmental engineering activities with an understanding of the limitations.
PO5	Demonstrate the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to occupational health and safety practices.
PO6	Recognise the need for, and have the preparation and ability to engage in life-long learning independently, with a high level of enthusiasm and commitment to improve knowledge and competence continuously

Program Specific Outcomes (PSOs)	
After the successful completion of M.E. Programme in Industrial Safety Engineering, the graduates will able to	
PSO 1	Assess Health, Safety and Environmental Issues related with Industrial activities to design control measures using traditional and modern IT tools based on standards and Industrial Act.
PSO 2	Able to enhance self-learning in the field of Safety, Health and Environment by literature review and sharing with EHS community.

KNOWLEDGE INSTITUTE OF TECHNOLOGY (AUTONOMOUS), SALEM - 637504											
M.E. INDUSTRIAL SAFETY ENGINEERING									Version : 1.0		
Courses of Study and Scheme of Assessment (Regulations 2023)									Date : 09.09.23		
S. No.	Course Code	Course Title	Periods / Week						Maximum Marks		
			CAT	CP	L	T	P	C	IA	ESE	Total
SEMESTER I											
-	-	Induction Programme	-	-	-	-	-	-	-	-	-
	THEORY										
1	ME23MA101	Probability and Statistical Methods	FC	4	3	1	0	4	40	60	100
2	ME23IS301	Principles of Safety Management	PC	3	3	0	0	3	40	60	100
3	ME23IS302	Environmental Safety	PC	3	3	0	0	3	40	60	100
4	ME23IS303	Occupational Health and Industrial Hygiene	PC	3	3	0	0	3	40	60	100
5	ME23IS304	Industrial Safety, Health and Environment Acts	PC	3	3	0	0	3	40	60	100
6	ME23IS305	Fire Engineering and Explosion Control	PC	3	3	0	0	3	40	60	100
7	ME23RM201	Research Methodology and IPR	RM	3	2	1	0	3	40	60	100
8	ME23AC7xx	Audit Course-I*	AC	2	2	0	0	NC	100	-	100
	PRACTICAL										
9	ME23IS306	Industrial Safety and Simulation Laboratory	PC	2	0	0	2	1	60	40	100
	EMPLOYABILITY ENHANCEMENT										
10	ME23PT801	Technical Seminar/Case Study Presentation	EEC	2	0	0	2	NC	100	-	100
Total				28	22	2	4	23	540	460	1000
SEMESTER II											
	THEORY										
1	ME23IS307	System Simulation and Hazard Analysis	PC	4	4	0	0	4	40	60	100
2	ME23IS308	Safety in Process Industries	PC	3	3	0	0	3	40	60	100
3	ME23IS4XX	Professional Elective-I	PE	3	3	0	0	3	40	60	100
4	ME23IS4XX	Professional Elective-II	PE	3	3	0	0	3	40	60	100
5	ME23XX5XX	Open Elective-I	OE	3	3	0	0	3	40	60	100
6	ME23MC705	Universal Human Values and Ethics	MC	3	3	0	0	3	40	60	100
7	ME23AC7XX	Audit Course-II*	AC	1	1	0	0	0	100	-	100
	EMPLOYABILITY ENHANCEMENT										
8.	ME23PT802	Research Paper Review and Presentation	EEC	2	0	0	2	1	100	-	100
9.	ME23PT803	Industrial Safety Assessment – Internship	EEC	4	0	0	4	2	100	-	100
Total				26	20	0	6	22	540	360	900

*indicates the course is optional

KNOWLEDGE INSTITUTE OF TECHNOLOGY (AUTONOMOUS), SALEM - 637504												
M.E. INDUSTRIAL SAFETY ENGINEERING											Version : 1.0	
Courses of Study and Scheme of Assessment (Regulations 2023)											Date : 09.09.23	
S. No.	Course Code	Course Title	Periods / Week						Maximum Marks			
			CAT	CP	L	T	P	C	IA	ESE	Total	
SEMESTER III												
	THEORY											
1	ME23IS309	Electrical Safety	PC	3	3	0	0	3	40	60	100	
2	ME23IS4XX	Professional Elective-III	PE	3	3	0	0	3	40	60	100	
3	ME23IS4XX	Professional Elective- IV	PE	3	3	0	0	3	40	60	100	
4	ME23XX5XX	Open Elective-II	OE	3	3	0	0	3	40	60	100	
	PRACTICAL											
5	ME23IS601	Project Work – Phase I	PW	12	0	0	12	6	60	40	100	
		Total		24	12	0	12	18	220	280	500	
SEMESTER IV												
	PRACTICAL											
1	ME23IS602	Project Work – Phase II	PW	24	0	0	24	12	60	40	100	
		Total		24	0	0	24	12	60	40	100	
Total Number of Credits: 75												

FOUNDATION COURSES (FC)											
S. No.	Course Code	Course Title	Periods / Week						Maximum Marks		
			CAT	CP	L	T	P	C	IA	ESE	Total
1.	ME23MA101	Probability and Statistical Methods	FC	4	3	1	0	4	40	60	100

RESEARCH METHODOLOGY AND IPR COURSES (RM)											
S. No.	Course Code	Course Title	Periods / Week						Maximum Marks		
			CAT	CP	L	T	P	C	IA	ESE	Total
1.	ME23RM201	Research Methodology and IPR	RM	3	2	1	0	3	40	60	100

PROFESSIONAL CORE COURSES (PC)											
S. No.	Course Code	Course Title	Periods / Week						Maximum Marks		
			CAT	CP	L	T	P	C	IA	ESE	Total
1.	ME23IS301	Principles of Safety Management	PC	3	3	0	0	3	40	60	100
2.	ME23IS302	Environmental Safety	PC	3	3	0	0	3	40	60	100
3.	ME23IS303	Occupational Health and Industrial Hygiene	PC	3	3	0	0	3	40	60	100
4.	ME23IS304	Industrial Safety, Health and Environment Acts	PC	3	3	0	0	3	40	60	100
5.	ME23IS305	Fire Engineering and Explosion Control	PC	3	3	0	0	3	40	60	100
6.	ME23IS306	Industrial Safety and Simulation Laboratory	PC	3	3	0	0	3	40	60	100
7.	ME23IS307	System Simulation and Hazard Analysis	PC	3	3	0	0	3	40	60	100
8.	ME23IS308	Safety in Process Industries	PC	3	3	0	0	3	40	60	100
9.	ME23IS309	Electrical Safety	PC	3	3	0	0	3	40	60	100

PROFESSIONAL ELECTIVES											
SEMESTER II, ELECTIVE I & II											
S. No.	Course Code	Course Title	Periods / Week						Maximum Marks		
			CAT	CP	L	T	P	C	IA	ESE	Total
1.	ME23IS401	Plant Layout and Material Handling	PE	3	3	0	0	3	40	60	100
2.	ME23IS402	Work Study and Ergonomics	PE	3	3	0	0	3	40	60	100
3.	ME23IS403	Human Factors in Engineering	PE	3	3	0	0	3	40	60	100
4.	ME23IS404	Maintainability Engineering	PE	3	3	0	0	3	40	60	100
5.	ME23IS405	Optimization Techniques	PE	3	3	0	0	3	40	60	100
6.	ME23IS406	Transport Safety	PE	3	3	0	0	3	40	60	100
7.	ME23IS407	Fireworks Safety	PE	3	3	0	0	3	40	60	100
8.	ME23IS408	Nuclear Engineering and Safety	PE	3	3	0	0	3	40	60	100
9.	ME23IS409	Safety in construction	PE	3	3	0	0	3	40	60	100

LIST OF OPEN ELECTIVES											
SEMESTER II & III											
S. No.	Course Code	Course Title	Periods / Week						Maximum Marks		
			CAT	CP	L	T	P	C	IA	ESE	Total
Except M.E. Computer Science and Engineering											
1.	ME23CP501	Security Practices	OE	3	3	0	0	3	40	60	100
2.	ME23CP502	Cloud Computing Technologies	OE	3	3	0	0	3	40	60	100
3.	ME23CP503	Block chain Technologies	OE	3	3	0	0	3	40	60	100
4.	ME23CP504	Deep Learning	OE	3	3	0	0	3	40	60	100
5.	ME23CP505	Design Thinking	OE	3	3	0	0	3	40	60	100
6.	ME23CP506	Principles of Multimedia	OE	3	3	0	0	3	40	60	100
Except M.E. Industrial Safety Engineering											
7.	ME23IS501	Environmental Safety	OE	3	3	0	0	3	40	60	100
8.	ME23IS502	Electrical safety	OE	3	3	0	0	3	40	60	100
9.	ME23IS503	Safety in Engineering Industry	OE	3	3	0	0	3	40	60	100
10.	ME23IS504	Design of Experiments	OE	3	3	0	0	3	40	60	100
11.	ME23IS505	Circular Economy	OE	3	3	0	0	3	40	60	100
Except M.E. Embedded System Technologies											
12.	ME23ES501	IoT for Smart Systems	OE	3	3	0	0	3	40	60	100
13.	ME23ES502	Machine Learning and Deep Learning	OE	3	3	0	0	3	40	60	100
14.	ME23ES503	Renewable Energy Technology	OE	3	3	0	0	3	40	60	100
15.	ME23ES504	Smart Grid	OE	3	3	0	0	3	40	60	100
Except M.E. VLSI Design											
16.	ME23VL501	Big Data Analytics	OE	3	3	0	0	3	40	60	100
17.	ME23VL502	Internet of Things and Cloud	OE	3	3	0	0	3	40	60	100
18.	ME23VL503	Medical Robotics	OE	3	3	0	0	3	40	60	100
19.	ME23VL504	Embedded Automation	OE	3	3	0	0	3	40	60	100

PROJECT WORK COURSES											
S. No.	Course Code	Course Title	Periods / Week						Maximum Marks		
			CAT	CP	L	T	P	C	IA	ESE	Total
1	ME23IS601	Project Work – Phase I	PW	12	0	0	12	6	60	40	100
2	ME23IS602	Project Work – Phase II	PW	24	0	0	24	12	60	40	100

AUDIT COURSES/MANDATORY COURSES												
AUDIT COURSES (Optional Courses)												
SEMESTER I & II												
S. No.	**Course Code**	**Course Title**	**Periods / Week**						**Maximum Marks**			
			CAT	**CP**	**L**	**T**	**P**	**C**	**IA**	**ESE**	**Total**	
1	ME23AC701	English for Research Paper Writing	AC	2	2	0	0	0	100	-	100	
2	ME23AC702	Disaster Management	AC	2	2	0	0	0	100	-	100	
3	ME23AC703	Constitution of India	AC	2	2	0	0	0	100	-	100	
4	ME23AC704	நற்றமிழ் இலக்கியம்	AC	2	2	0	0	0	100	-	100	
MANDATORY COURSES												
1	ME23MC705	Universal Human Values and Ethics	MC	3	3	0	0	3	40	60	100	

EMPLOYABILITY ENHANCEMENT COURSES												
S. No.	**Course Code**	**Course Title**	**Periods / Week**						**Maximum Marks**			
			CAT	**CP**	**L**	**T**	**P**	**C**	**IA**	**ESE**	**Total**	
1.	ME23PT801	Technical Seminar/Case Study Presentation	EEC	2	0	0	2	NC	100	-	100	
2.	ME23PT802	Research Paper Review and Presentation	EEC	2	0	0	2	1	100	-	100	
3.	ME23PT803	Industrial Safety Assessment – Internship	EEC	4	0	0	4	2	100	-	100	

SUMMARY							
S.No.	**Course Category**	**Credits per Semester**				**Credits**	**Credit %**
		I	**II**	**III**	**IV**		
1.	**FC**	4	-	-	-	4	5.32
2.	**RM**	3	-	-	-	3	4
3.	**PC**	16	7	3	-	26	34.68
4	**PE**	-	6	6	-	12	15
5.	**OE**	-	3	3	-	6	8
6.	**PW**	-	-	6	12	18	24
7.	**AC/MC**	✓	3	-	-	3	4
8.	**EEC**	-	3	-	-	3	4
	Total	**23**	**22**	**18**	**12**	**75**	**100**

CAT	Category of Course	**FC**	Foundation Courses	**AC/MC**	Audit Courses / Mandatory Courses
CP	Contact Periods	**RM**	Research Methodology & IPR	**EEC**	Employability Enhancement Courses
L	Lecture Periods	**PC**	Professional Core Courses	**IA**	Internal Assessment
T	Tutorial Periods	**PE**	Professional Elective Courses	**ESE**	End Semester Examination
P	Laboratory Periods	**OE**	Open Elective Courses		
C	Credits	**PW**	Project Work Courses		

ME23MA101	PROBABILITY AND STATISTICAL METHODS	Version: 1.0				
Programme & Branch	M.E INDUSTRIAL SAFETY ENGINEERING	CP	L	T	P	C
		4	3	1	0	4

Use of F test, t test and Chi-square test tables are permitted

Course Objectives:

1	To introduce the basic concepts of probability and standard distributions.
2	To provide the most appropriate estimator of the parameter in statistical inference.
3	To decide whether to accept or reject a specific value of a parameters.
4	To introduce the fundamentals of classifications of design of experiments which plays very important roles in the field of agriculture and quality control.
5	To learn methods for analyzing time series data to extract meaningful statistical characteristic of data.

UNIT–I	PROBABILITY AND RANDOM VARIABLES	9+3

Probability(L1) – Axioms of probability(L2) – Conditional probability and problems(L3) – Baye's theorem and problems (L3) - Random variables(L1) – Probability function(L2) – Moments (L2) – Moment generating functions and their properties (L2) – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions and problems (L3) – Function of a random variable(L2).

UNIT–II	ESTIMATION THEORY	9+3

Principle of least squares (L2) – Regression and problems (L3)– Multiple and partial correlations and problems (L3) – Estimation of parameters and problems (L3)– Maximum likelihood estimates(L2) – Method of moments and problems(L3).

UNIT– III	TESTING OF HYPOTHESIS	9+3

Sampling distributions (L2) – Small and large samples and problems (L3) – Tests based on Normal, t -distribution, Chi - square, Goodness of fit and F – distributions (L3).

UNIT – IV	DESIGN OF EXPERIMENTS	9+3

Analysis of variance (L1) – Completely randomized design (L3) – Randomized block design (L3) – Latin square design (L3) – 2^2 Factorial designs (L3).

UNIT–V	TIME SERIES	9+3

Characteristics and representation (L1) – Moving averages and problems (L3) – Exponential smoothing (L2) – Auto Regressive Processes and problems (L3).

Total : 45+15=60 PERIODS

OPEN ENDED PROBLEMS / QUESTIONS		
Course specific open ended problems will be solved during the classroom teaching. Such problems can be given as assignments and evaluated as internal assessment only and not for the end semester examination		
Course Outcomes: **Upon completion of this course the students will be able to:**		**BLOOM'S Taxonomy**
CO1	Explain probability axioms , rules and the moments of discrete and continuous random variables.	L2 - Understand
CO2	Interpret the concepts of estimator and various methods to find Estimator.	L2 - Understand
CO3	Utilize statistical tests in testing hypotheses on data.	L3 - Apply
CO4	Apply the basic concepts of classifications of design of experiments in the field of agriculture and quality control.	L3 - Apply
CO5	Explain various time series models and application of these models appropriately to engineering problems.	L2 - Understand
REFERENCE BOOKS:		
1.	Anderson, O.D, "Time Series Analysis: Theory and Practice", North - Holland, Amsterdam, 1982.	
2.	Devore, J. L., "Probability and Statistics for Engineering and Sciences", 9th Edition, Cengage Learning, 2016.	
3.	Gupta S.C. and Kapoor V.K.," Fundamentals of Mathematical Statistics", 12th Edition, Sultan and Sons, New Delhi, 2020.	
4.	Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers, 9th Edition, Pearson Education, Asia, 2016.	
VIDEO REFERENCES:		
1.	https://youtu.be/14PQawp_rjk	
2.	https://youtu.be/IEUTRhyoHNc	
WEB REFERENCES:		
1.	https://www.edanz.com/blog/anova-explained	
2.	http://stankova.net/book.pdf	
ONLINE COURSES:		
1.	https://nptel.ac.in/courses/110105087	
2.	https://onlinecourses.nptel.ac.in/noc23_ge25/preview	

Mapping of COs with POs and PSOs								
COs	**POs**						**PSOs**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**
CO1	2		1			1		
CO2	2		1					
CO3	2		1					
CO4	3		2					
CO5	1		1			1		
Average	2.2		1.6			1		
1–Low, 2 –Medium, 3–High.								

ME23IS301	PRINCIPLES OF SAFETY MANAGEMENT	Version: 1.0				
Programme & Branch	M.E INDUSTRIAL SAFETY ENGINEERING	CP	L	T	P	C
		3	3	0	0	3

Course Objectives:

1	To achieve an understanding of principles of safety management.
2	To enable the students to learn about various functions and activities of safety department.
3	To enable students to conduct safety audit and write audit reports effectively in auditing situations.
4	To have knowledge about sources of information for safety promotion and training.
5	To familiarize students with evaluation of safety performance.

UNIT–I	CONCEPTS AND TECHNIQUES	9

History of Safety Movement (L1)-Evolution of Modern Safety Concept (L2)-General Concepts of Management (L1)-Planning for Safety for Optimization of Productivity (L2)-Productivity, Quality, and Safety (L3)-Line and Staff Functions for Safety (L2)-Budgeting for Safety (L2)-Safety Policy (L2)-Incident Recall Technique (IRT) (L2)-Disaster Control (L2)-Job Safety Analysis (L2)-Safety Survey (L2)-Safety Inspection (L2)-Safety Sampling (L2)-Evaluation of Performance of Supervisors on Safety (L2).

UNIT–II	SAFETY EDUCATION AND TRAINING	9

Importance of Training (L1)- Assessing competency (L2)-Identification of Training Needs (L1)-Training Methods (L2)- Programmes, Seminars (L1)-, Conferences (L1)-, Competitions (L1)-Method of Promoting Safe Practice (L2)-Motivation (L1)-Communication (L1)-Role of Government Agencies and Private Consulting Agencies in Safety Training (L1)-Creating Awareness (L2)-, Awards, Celebrations, Safety Posters, Safety Displays, Safety Pledge, Safety Incentive Scheme, Safety Campaign (L2)-Domestic Safety and Training (L2).

UNIT–III	SAFETY AUDIT	9

Components of Safety Audit (L1)-Types of Audit (L2)-Audit Methodology (L2)-Non-Conformity Reporting (NCR) (L2)-Audit Checklist and Report (L2)-Review of Inspection (L2)-Remarks by Government Agencies, Consultants, Experts (L2)-Perusal of Accident and Safety Records, Formats (L2)-Implementation of Audit Indication (L2)-Liaison with Departments to Ensure Coordination (L2)-Checklist (L2)-Identification of Unsafe Acts of Workers and Unsafe Conditions in the Shop Floor (L2).

UNIT–IV	ACCIDENT INVESTIGATION AND REPORTING	9

Concept of an Accident (L1)-Reportable and Non-reportable Accidents (L1)-Reporting to Statutory Authorities (L2)-Principles of Accident Prevention (L2)-Accident Investigation and Analysis (L2)-Records for Accidents, Departmental Accident Reports, Documentation of Accidents (L2)-Unsafe Act and Condition (L2)-Domino Sequence (L2)-Supervisory Role (L2)-Role of Safety Committee (L2)-Cost of Accident (L3).

UNIT – V	SAFETY PERFORMANCE MONITORING	9

ANSI (Z16.1) Recommended Practices for Compiling and Measuring Work Injury Experience (L1)-Permanent Total Disabilities(L2)-, Permanent Partial Disabilities(L2)-, Temporary Total Disabilities (L2)-Calculation of Accident Indices (L2)-Frequency Rate, Severity Rate, Frequency Severity Incidence, Incident Rate, Accident Rate, Safety "t" Score, Safety Activity Rate -Problems (L3) -Financial justification of hazard controls (L2).

Total : 45 PERIODS

OPEN ENDED PROBLEMS / QUESTIONS

Course specific open ended problems will be solved during the classroom teaching. Such problems can be given as assignments and evaluated as internal assessment only and not for the end semester examination

Course Outcomes: **Upon completion of this course the students will be able to:**		**BLOOM'S Taxonomy**
CO1	Summarize the various concepts and Techniques in the safety management.	L2 - Understand
CO2	Explain the safety education and training.	L2 - Understand
CO3	Organize a safety audit and prepare a report for the audit.	L3 - Apply
CO4	Develop an accident investigation report.	L3 - Apply
CO5	Examine the safety performance monitoring activities.	L4 - Analyze

REFERENCE BOOKS:

1.	"Accident Prevention Manual for Industrial Operations", N.S.C.Chicago, 13th Edition 2009.
2.	Blake R.B., "Industrial Safety" Prentice Hall, Inc., New Jersey,. 3 rd Edition 2000.
3.	Dan Petersen, "Techniques of Safety Management", McGraw-Hill Company, Tokyo, 1981.
4.	Heinrich H.W. "Industrial Accident Prevention" McGraw-Hill Company, New York, 1980
5.	John Ridley, "Safety at Work", Butterworth and Co., London, 1983
6.	Lees, F.P., "Loss Prevention in Process Industries" Butterworth publications, London, 2 nd edition, 1990.
7.	Relevant Indian Standards and Specifications, BIS, New Delhi. 8. "Safety and Good House Keeping", N.P.C., New Delhi, 1985.

VIDEO REFERENCES:

1.	https://www.youtube.com/watch?v=Pa0KfUwKIaU
2.	https://www.youtube.com/watch?v=VhOTDJVC8uM

WEB REFERENCES:

1.	https://www.osha.gov/safety-management/additional-resources-by-topic
2.	https://www.assp.org/education

ONLINE COURSES:

1.	https://onlinecourses.nptel.ac.in/noc22_mg55/preview
2.	https://onlinecourses.nptel.ac.in/noc20_mg43/preview

Mapping of COs with POs and PSOs								
COs	**POs**						**PSOs**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**
CO1		1		2	2		2	
CO2				2	3		2	
CO3	3	3	2	2	1	1	2	2
CO4	2	3	2	3	3		3	2
CO5			3	3		2	3	2
Average	2.5	2.3	2.3	2.4	2.25	1.2	2.4	2
1–Low, 2 –Medium, 3–High.								

ME23IS302	ENVIRONMENTAL SAFETY	Version: 1.0				
Programme & Branch	M.E INDUSTRIAL SAFETY ENGINEERING	CP	L	T	P	C
		3	3	0	0	3

Course Objectives:

1	To provide in depth knowledge in Principles of Environmental safety and its applications in various fields.
2	To give understanding of air and water pollution and their control.
3	To expose the students to the basis in hazardous waste management.
4	To provide knowledge on pollution monitoring and control devices.
5	To design emission measurement devices.

UNIT–I	AIR POLLUTION	9

Classification and properties of air pollutants (L1)-Pollution sources (L1)-Effects of air pollutants on human beings(L2), Animals, Plants, and Materials (L2)-Automobile pollution (L1)-Hazards of air pollution (L2)-Concept of clean coal combustion technology (L2)-Ultra violet radiation (L1), infrared radiation(L1), radiation from the sun (L1)-Hazards due to depletion of ozone (L2)-Deforestation (L2), ozone holes (L2), automobile exhausts, chemical factory stack emissions, CFC (L2).

UNIT–II	WATER POLLUTION	9

Classification of water pollutants (L1)-Health hazards (L2)-Sampling and analysis of water (L2)-Water treatment (L3)-Different industrial effluents and their treatment and disposal (L2)-Advanced wastewater treatment (L3)-Effluent quality standards and laws (L3)-Chemical industries, tannery, textile effluents (L2)-Common treatment (L2).

UNIT– III	HAZARDOUS WASTE MANAGEMENT	9

Hazardous waste management in India (L1)-Waste identification, characterization, and classification (L2)-Technological options for collection, treatment, and disposal of hazardous waste (L2)Selection charts for the treatment of different hazardous wastes (L2)-Methods of collection and disposal of solid wastes (L2)-Health hazards - (L2)-Toxic and radioactive wastes (L2)-Incineration and vitrification (L1)-Hazards due to bio-process(L1)-, dilution, standards, and restrictions (L1)-Recycling and reuse (L2).

UNIT – IV	ENVIRONMENTAL MEASUREMENT AND CONTROL	9

Sampling and analysis (L2)-Dust monitor (L2)-Gas analyzer(L1)-, particle size analyzer (L2)-Lux meter(L1)-, pH meter (L1)-Gas chromatograph (L1)-Atomic absorption spectrometer (L1)-Gravitational settling chambers(L1), cyclone separators(L1), scrubbers (L1)-Electrostatic precipitator(L1), bag filter(L1), maintenance (L2)-Control of gaseous emission by adsorption(L2), absorption(L2), and combustion methods (L2)-Pollution Control Board, laws (L1).

UNIT–V	POLLUTION CONTROL IN PROCESS INDUSTRIES	9

Pollution control in process industries (L2)-Cement, paper, petroleum, petroleum products, textile (L2)-Tanneries, thermal power plants (L2)-Dyeing and pigment industries (L2)-Eco-friendly energy (L2).

Total : 45 PERIODS

OPEN ENDED PROBLEMS / QUESTIONS

Course specific open ended problems will be solved during the classroom teaching. Such problems can be given as assignments and evaluated as internal assessment only and not for the end semester examination

Course Outcomes: **Upon completion of this course the students will be able to:**		**BLOOM'S Taxonomy**
CO1	Illustrate and familiarize the basic concepts scope of environmental safety.	L2 - Understand
CO2	Interpret the standards of professional conduct that are published by professional safety organizations and/or certification bodies.	L2 - Understand
CO3	Explain the ways in which environmental health problems have arisen due to air and water pollution.	L2 - Understand
CO4	Examine the role of hazardous waste management and use of critical thinking to identify and assess environmental health risks.	L4 - Analyze
CO5	Apply concepts of emission measurement and design emission measurement devices.	L3 - Apply

REFERENCE BOOKS:

1.	E. C Wolfe, Race to Save to Save Planet, Wadsworth Publishing Co., Belmont, CA 2006.
2.	G. T Miller, Environmental Science: Working with the Earth, 11th Edition, Wadsworth Publishing Co., Belmont, CA, 2006
3.	M.J Hammer,., and M.J Hammer,., Jr., Water and Wastewater Technology, Pearson Prentice Hall, 2006
4.	Rao, CS, "Environmental pollution engineering:, Wiley Eastern Limited, New Delhi, 1 st January 2018.
5.	S. P. Mahajan, "Pollution control in process industries", Tata McGraw Hill Publishing Company, New Delhi, 2006.
6.	Varma and Braner, "Air pollution equipment", Springer Publishers, Second Edition.

VIDEO REFERENCES:

1.	https://www.youtube.com/watch?v=DAQapF-F4Vw&list=PL9108F6C4E154885A
2.	https://www.youtube.com/watch?v=5dukz1UOtkA&list=PLLy_2iUCG87BwOQUbS7WSdMVWHDXByk-w

WEB REFERENCES:

1.	https://tifac.org.in/index.php/programmes/activities/8-publication/145-industrial-air-pollution-control-technologies?showall=1
2.	https://www.unep.org/beatpollution/global-response-pollution

ONLINE COURSES:	
1.	https://onlinecourses.nptel.ac.in/noc23_ce14/preview
2.	https://onlinecourses.nptel.ac.in/noc23_ch72/preview

Mapping of COs with POs and PSOs								
COs	**POs**						**PSOs**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**
CO1		1	2			1	1	1
CO2		1	3	1		1	3	1
CO3		2	2		1	2	2	2
CO4	1	3	3	1	3		1	
CO5	1	1	3	3			3	
Average	1	1.6	2.75	1.66	2	1.33	2	1.33
1–Low, 2 –Medium, 3–High.								

ME23IS303	OCCUPATIONAL HEALTH AND INDUSTRIAL HYGIENE	Version: 1.0				
Programme & Branch	M.E INDUSTRIAL SAFETY ENGINEERING	CP	L	T	P	C
		3	3	0	0	3

Course Objectives:

1	To apply the knowledge of physical hazards and its control measures in an Industrial Environment.
2	To distinguish the types of chemicals for its health hazard and provide suitable control methods
3	To categorize various types of hazards arising out of biological and ergonomical aspects in a process and able to provide suitable corrective actions
4	To implement the functions and activities of Occupational health services.
5	To illustrate the various physiological functions of our body and the test methods for periodical monitoring of health.

UNIT–I	PHYSICAL HAZARDS	9

General physics concepts (e.g., force, acceleration, velocity, momentum, and friction) (L1), Noise (L1), compensation aspects (L2), noise exposure regulation (L2), properties of sound (L3), occupational damage (L2), risk factors (L2), sound measuring instruments (L2), octave band analyzer (L3), noise networks (L3), noise surveys (L2), noise control program (L2), industrial audiometry (L2), hearing conservation programs (L2),Vibration (L3), types (L1), effects (L2), instruments (L1), surveying procedure (L2), permissible exposure limit (L2),Ionizing radiation (L3), types (L1), effects (L2), monitoring instruments (L1), control programs (L1), OSHA standard (L1),Non-ionizing radiations (L3), effects (L2), types (L1), radiation hazards (L2), microwaves and radio-waves (L2), lasers (L2), TLV (L3),Cold environments (L2), hypothermia (L2), wind chill index (L3), control measures (L2),Hot environments (L2), thermal comfort (L3), heat stress indices (L3), acclimatization (L2), estimation, and control (L2).

UNIT–II	CHEMICAL HAZARDS	9

General chemistry concepts (e.g., nomenclature, balancing chemical equations, chemical reactions, ideal gas law, and pH) (L1) -Recognition of chemical hazards: dust (L1), fumes, mist (L1), Vapour (L1), fog, gases (L1), types (L1), concentration (L1).Exposure vs. dose (L2), TLV (L3)Methods of Evaluation: process or operation description (L2), Field Survey (L2), Sampling methodology (L2), Industrial Hygiene calculations (L3), Comparison with OSHAS Standard (L2), Air Sampling instruments (L2), Types (L1), Measurement Procedures (L2), Instruments Procedures (L2), Gas and Vapour monitors (L2), dust sample collection devices (L2), personal sampling (L2), Methods of Control: Engineering Control (L2), Design maintenance considerations (L2), design specifications (L2), General Control Methods (L2), training, and education (L1).

UNIT– III	BIOLOGICAL AND ERGONOMICAL HAZARDS	9

Classification of Biohazardous agents (L2): examples, bacterial agents(L1)-, rickettsial and chlamydial agents(L1)-, viral agents, fungal, parasitic agents, infectious diseases -Protocol for blood borne pathogen control – Covid,SARS (L1) - Protocol for Air borne pathogen control-Biohazard control program (L2), employee health program (L2), laboratory safety program (L2), animal care and handling (L1), biological safety cabinets (L2), building design (L1)-Work Related Musculoskeletal Disorders : carpal tunnel syndrome CTS(L2), Tendon pain, disorders of the neck(L2), back injuries(L2).

UNIT – IV	OCCUPATIONAL HEALTH AND TOXICOLOGY	9

Concept and spectrum of health (L2),Functional units and activities of occupational health services (L2), pre-employment, and post-employment medical examinations (L2),Occupational related diseases (L2), levels of prevention of diseases (L2), Notifiable occupational diseases: such as silicosis(L2), asbestosis(L2), pneumoconiosis(L2), siderosis (L2), anthracosis (L2), aluminosis (L2), and anthrax, Lead-nickel(L2), chromium(L2), and manganese toxicity (L2), gas poisoning (such as CO, ammonia, coal, and dust, etc.) (L2), their effects and prevention (L2),Cardio pulmonary resuscitation (L2), audiometric tests (L2), eye tests (L2), vital function tests (L2),Industrial toxicology (L2): local(L2), systemic(L2), and chronic effects(L2), temporary and cumulative effects(L2), Mutagens, teratogens, and carcinogens(L1),carcinogens entry into human systems(L2).

UNIT–V	OCCUPATIONAL PHYSIOLOGY	9

Man as a system component (L2), allocation of functions (L2), efficiency (L2), occupational work capacity (L1),Aerobic and anaerobic work (L2), evaluation of physiological requirements of jobs (L5), parameters of measurements (L2),Categorization of job heaviness (L2), work organization (L2), stress (L1), strain (L1), fatigue (L1), rest pauses (L1), shift work (L1), personal hygiene (L2).

Total : 45 PERIODS

OPEN ENDED PROBLEMS / QUESTIONS

Course specific open ended problems will be solved during the classroom teaching. Such problems can be given as assignments and evaluated as internal assessment only and not for the end semester examination

COURSE OUTCOMES: **Upon completion of this course the students will be able to:**		**BLOOM'S Taxonomy**
CO1	Apply the knowledge of physical hazards and its control measures in an Industrial Environment	L3 - Apply
CO2	Explain the types of chemicals for its health hazard and provide suitable control methods	L2 - Understand
CO3	Interpret various types of hazards arising out of biological and ergonomical aspects in a process and able to provide suitable corrective actions	L2 - Understand

CO4	Outline the functions and activities of Occupational health services.	L2 - Understand
CO5	Evaluate the various physiological functions of our body and the test methods for periodical monitoring of health.	L5 - Evaluate

REFERENCE BOOKS:	
1.	Benjamin O.Alli, Fundamental Principles of Occupational Health and Safety ILO 2008.
2.	Danuta Koradecka, Handbook of Occupational Health and Safety, CRC, 2010.
3.	E.J. McCornick, and M. S Sanders, Human Factors in Engineering and Design, Tata McGraw-Hill, 1992.
4.	Encyclopedia of "Occupational Health and Safety", Vol.I and II, published by International Labour Office, Geneva, 1985
5.	Hand book of "Occupational Safety and Health", National Safety Council, Chicago, 2002.
6.	Lawrence Slote , Handbook of occupational safety and health, Wiley, 2001.
7.	Louis J. Di Berardinis, Handbook of occupational safety and health Wiley, 1999.
8.	Interim guidance "COVID-19: Occupational health and safety for health workers", WHO & ILO,2021
VIDEO REFERENCES:	
1.	https://www.youtube.com/watch?v=n7oUOUCIblg
2.	https://www.youtube.com/watch?v=LcGDEKGiOOo
WEB REFERENCES:	
1.	https://www.who.int/india/health-topics/occupational-health
2.	https://www.ilo.org/safework/countries/asia/india/lang--en/index.htm
ONLINE COURSES:	
1.	https://onlinecourses.swayam2.ac.in/nou23_es01/preview
2.	https://onlinecourses.swayam2.ac.in/aic20_ed03/preview

Mapping of COs with POs and PSOs

COs	POs						PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**
CO1	1	1	3	2	2		3	1
CO2	1	1	3	2	2		3	
CO3		1	3		2	1	3	
CO4		1	3		1	1	1	
CO5			2		1	1		1
Average	1	1	2.8	2	1.6	1	2.5	1
1–Low, 2 –Medium, 3–High.								

ME23IS304	INDUSTRIAL SAFETY, HEALTH AND ENVIRONMENT ACTS	Version: 1.0				
Programme & Branch	M.E INDUSTRIAL SAFETY ENGINEERING	CP	L	T	P	C
		3	3	0	0	3

Course Objectives:

1	To provide exposure to the students about safety and health provisions related to hazardous processes as laid out in Factories act 1948.
2	To familiarize students with powers of inspectorate of factories.
3	To help students to learn about Environment act 1986 and rules framed under the act.
4	To provide wide exposure to the students about various legislations applicable to an industrial unit
5	To provide exposure to the students about safety and health provisions related to hazardous processes as laid out in Factories act 1948.

UNIT–I	FACTORIES ACT – 1948	9

Statutory authorities (L2) – inspecting staff, health, safety, provisions relating to hazardous processes, welfare (L2), working hours, employment of young persons (L2) – special provisions – penalties and procedures (L2) -Tamilnadu Factories Rules 1950 under Safety and health chapters of Factories Act 1948 (L2). Forms, Registers and notices (L2) – Tamilnadu Safety Officer Rules 2005 (L2) - with updated Amendments (L2).

UNIT–II	ENVIRONMENT ACT – 1986	9

General powers of the central government (L2), prevention, control and abatement of environmental pollution (L2) -Biomedical waste (Management and handling Rules, 1989 (L2) -The noise pollution (Regulation and control) Rules, 2000 (L2) -The Batteries (Management and Handling Rules) 2001 (L2) - No Objection certificate from statutory authorities like pollution control board(L2). Air Act 1981 and Water Act 1974: Central and state boards for the prevention and control of air pollution (L2) -powers and functions of boards (L2) – prevention and control of air pollution and water pollution – fund – accounts and audit, penalties and procedures (L2).

UNIT– III	MANUFACTURE, STORAGE AND IMPORT OF HAZARDOUS CHEMICAL RULES 1989 AND MAJOR ACCIDENT HAZARD CONTROL RULES AND AMENDMENT	9

Definitions – duties of authorities (L1)– responsibilities of occupier (L2) – notification of major accidents (L2) – information to be furnished (L2) – preparation of offsite and onsite plans (L2) – list of hazardous and toxic chemicals (L2) – safety reports – safety data sheets (L2). Major Accident Hazard Control Rules (L2). Hazardous Wastes (management, handling and Transboundary Movement) Rules 2016 (L2).

UNIT – IV	OTHER ACTS AND RULES	9

Indian Boiler (Amendments) Act 2007 (L2), static and mobile pressure vessel rules (SMPV) (L2), motor vehicle rules, The Mines and Minerals (Development & Regulation) Amendment Act 2015 (L2), workman compensation act, rules (L2) – electricity act and rules (L2) – hazardous wastes (management, handling and transboundary) rules, 2008 (L2) - the building and other construction workers act 1996 (L2)., Petroleum rules, Gas cylinder rules 2016 (L2), Explosives Act 1884 (L2) - Pesticides Act (L2) – E waste (management) rules 2016 (L2).

UNIT–V	INTERNATIONAL ACTS AND STANDARDS	9

Occupational Safety and Health act of USA (The Williames - Steiger Act of 1970) (L2) – Health and safety work act (HASAWA 1974, UK) L2– ISO 14001 – ISO 45001 (L2), European Safety and Health Legislations (L2), American Petroleum Institute (API) Standards (L2), Oil Industry Safety Directorate (OISD) Standards (L2), National Fire Protection Association (NFPA) Standards (L2), Atomic Energy Regulatory Board (AERB) (L2), American National Standards Institute(ANSI) (L2).

Total : 45 PERIODS

OPEN ENDED PROBLEMS / QUESTIONS

Course specific open ended problems will be solved during the classroom teaching. Such problems can be given as assignments and evaluated as internal assessment only and not for the end semester examination

Course Outcomes: **Upon completion of this course the students will be able to:**		**BLOOM'S Taxonomy**
CO1	Interpret the requirements mentioned in factories act for the prevention of accidents.	L2 - Understand
CO2	List important legislations related to health, Safety and Environment act.	L1- Remember
CO3	Infer the manufacturing storage and import of hazardous chemical rule.	L2 - Understand
CO4	Summarize the statutory requirements for an Industry on registration, license and its renewal.	L2 - Understand
CO5	Develop an system of international act and standard.	L3- Apply

REFERENCE BOOKS:

1.	The Factories Act 1948, Madras Book Agency, Chennai, 2000
2.	The Environment Act (Protection) 1986, Commercial Law Publishers (India) Pvt.Ltd., New Delhi.
3.	Water (Prevention and control of pollution) act 1974, Commercial Law publishers (India) Pvt.Ltd.,New Delhi.
4.	Air (Prevention and control of pollution) act 1981, Commercial Law Publishers (India) Pvt.Ltd., New Delhi.
5.	The Indian boilers act 1923, Commercial Law Publishers (India) Pvt.Ltd., Allahabad.
6.	The Mines Act 1952, Commercial Law Publishers (India) Pvt.Ltd., Allahabad.
7.	The manufacture, storage and import of hazardous chemical rules 1989, Madras Book Agency, Chennai.

8.	Srinivasan S , "The Tamil Nadu Safety Officers Rules 2005" Madras Book Agency, Chennai, 28th Edition, 2017
VIDEO REFERENCES:	
1.	https://www.youtube.com/watch?v=Nc3WJf8Pyx0
2.	https://www.youtube.com/watch?v=G8l6bzhfIDg
WEB REFERENCES:	
1.	https://www.indiacode.nic.in/handle/123456789/1530?sam_handle=123456789/1362
2.	https://dgfasli.gov.in/factories-act-1948
ONLINE COURSES:	
1.	https://onlinecourses.nptel.ac.in/noc23_mg98/preview
2.	https://onlinecourses.swayam2.ac.in/nou23_ge81/preview

Mapping of COs with POs and PSOs								
COs	**POs**						**PSOs**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**
CO1		2	3		2		1	
CO2	1	1	3		2	2	1	2
CO3	1	1	3		2	1		1
CO4		1	3		2	1		1
CO5		1	3		2			
Average	1	1.2	3		2	1.33	1	1.33
1–Low, 2 –Medium, 3–High.								

ME23IS305	FIRE ENGINEERING AND EXPLOSION CONTROL	Version: 1.0				
Programme & Branch	M.E INDUSTRIAL SAFETY ENGINEERING	CP	L	T	P	C
		3	3	0	0	3

Course Objectives:

1	To provide an in depth knowledge about the science of fire.
2	To understand the causes and effects of fire.
3	To know the various fire prevention systems and protective equipment's.
4	To understand the science of explosion and its prevention techniques.
5	To understand the various fire prevention techniques to be followed in a building.

UNIT–I	PHYSICS AND CHEMISTRY OF FIRE	9

Fire properties of solid (L1), liquid and gases (L2) - fire spread (L3)- toxicity of products of combustion (L3) - theory of combustion and explosion (L3)– vapour clouds (L2) -Combustible dust (L2)– flash fire (L2)– jet fires L3– pool fires (L1)– unconfined vapour cloud explosion (L3), shock waves (L3)- auto-ignition (L3)– boiling liquid expanding vapour explosion (L3) – case studies – Flixborough (L2), Mexico disaster (L2), Pasedena Texas (L2), Piper Alpha (L2), Peterborough (L2) and Bombay Victoria dock ship explosions (L2).

UNIT–II	FIRE PREVENTION AND PROTECTION	9

Sources of ignition (L2) – fire triangle (L2)– principles of fire extinguishing (L2)– active and passive fire protection systems (L2) – various classes of fires (L1) – A, B, C, D, E – types of fire extinguishers (L2) – fire stoppers (L2)– hydrant pipes (L2) – hoses – monitors (L2) – fire watchers (L2)– lay out of stand pipes (L2) – fire station (L2)-fire alarms and sirens (L2) – maintenance of fire trucks (L2)– foam generators (L2) – escape from fire rescue operations (L2) – fire drills (L3)– notice-first aid for burns (L3).

UNIT– III	INDUSTRIAL FIRE PROTECTION SYSTEMS	9

Sprinkler (L2)-hydrants (L2)-stand pipes (L2) – special fire suppression systems like deluge and emulsifier (L3), selection criteria of the above installations (L2), reliability (L3), maintenance (L2), evaluation and standards (L2) – alarm and detection systems (L2). Other suppression systems (L2) – CO2 system (L2), foam system (L2), dry chemical powder (DCP) system (L2), Halon system (L2)– need for halon replacement (L2) – smoke venting (L2). Portable extinguishers (L2) – flammable liquids (L2) – tank farms (L2)– indices of in flammability (L2)-firefighting systems (L3).

UNIT – IV	BUILDING FIRE SAFETY	9

Objectives of fire safe building design (L3), Fire load (L3), fire resistant material and fire testing (L3) – structural fire protection (L2) – structural integrity (L2)– concept of egress design (L3)- exists (L2)– width calculations (L4)- fire certificates (L4) – fire safety requirements for high rise buildings (L4)– snookers (L2).

UNIT–V	EXPLOSION PROTECTING SYSTEMS	9

Principles of explosion (L1)-detonation and blast waves (L3)-explosion parameters (L2) – Explosion Protection (L2), Containment (L2), Flame Arrestors (L2), isolation (L3), suppression (L2), venting (L2), explosion relief of large enclosure (L2)-explosion venting (L2)-inert gases (L2), plant for generation of inert gas (L2)-rupture disc in process vessels and lines explosion (L2), suppression system based on carbon dioxide (CO2) and halons (L3)-hazards in LPG L2, ammonia (NH3) (L3), sulphur dioxide (SO3) (L2), chlorine (CL2) (L2) etc.

Total : 45 PERIODS

OPEN ENDED PROBLEMS / QUESTIONS

Course specific open ended problems will be solved during the classroom teaching. Such problems can be given as assignments and evaluated as internal assessment only and not for the end semester examination.

COURSE OUTCOMES: **Upon completion of this course the students will be able to:**		**BLOOM'S Taxonomy**
CO1	Explain the basic concepts of fire and explosion science.	L2 - Understand
CO2	Demonstrate the different source of ignition and their prevention techniques.	L2 - Understand
CO3	Illustrate the operation of various types of firefighting equipments.	L2 - Understand
CO4	Summarize the causes and prevention of explosion.	L2 - Understand
CO5	Apply explosion protection techniques and their significances to suit the industrial requirement.	L3 - Apply

REFERENCE BOOKS:

1.	"Accident Prevention manual for industrial operations" N.S.C., Chicago, 1982.
2.	"Davis Daniel et al, "Hand Book of fire technology"
3.	"Fire Prevention and firefighting", Loss prevention Association, India.
4.	Derek, James, "Fire Prevention Hand Book", Butter Worths and Company, London, 1986.
5.	Dinko Tuhtar, "Fire and explosion protection"
6.	Fire fighters hazardous materials reference book Fire Prevention in Factories", an Nostrand Rein Hold, New York, 1991.
7.	Gupta, R.S., "Hand Book of Fire Technology" Orient Longman, Bombay 1977.
8.	Relevant Indian Acts and rules, Government of India.

VIDEO REFERENCES:

1.	https://www.youtube.com/watch?v=j-XNzBUKOoE
2.	https://www.youtube.com/watch?v=XADuwFDOyz0&pp=ygUPaGF6YXJkIGFuYWx5c2lz

WEB REFERENCES:

1.	https://www.graphicproducts.com/articles/hazard-analysis-risk-assessment/
2.	https://www.aiche.org/ccps/introduction-hazard-identification-and-risk-analysis

ONLINE COURSES:	
1.	https://onlinecourses.nptel.ac.in/noc23_mg98/preview
2.	https://onlinecourses.swayam2.ac.in/nou23_ge81/preview

Mapping of COs with POs and PSOs								
COs	**POs**						**PSOs**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**
CO1		3				2	2	2
CO2			3		2			
CO3			2	3			2	2
CO4		3			3			
CO5	2					2	2	3
Average	2	3	2.5	3	2.5	2	2	2.3
1–Low, 2 –Medium, 3–High.								

ME23RM201	RESEARCH METHODOLOGY AND IPR	Version: 1.0
(COMMON TO ALL BRANCHES)		

Programme & Branch	M.E. INDUSTRIAL SAFETY ENGINEERING	CP	L	T	P	C
		3	2	1	0	3

Course Objectives:

1	Analyze the significance of research and formulate well-defined research questions.
2	Apply appropriate research methods and critically evaluate research articles.
3	Create well-structured research papers and utilize research tools proficiently.
4	Produce effective technical reports and deliver impactful presentations.
5	Understand forms of intellectual property and analyze their implications on technological research and international cooperation.

UNIT–I	CONCEPT OF RESEARCH	6+3

Meaning and Significance of Research(L2)-Skills, Habits and Attitudes for Research (L1)-Time Management (L3) -Status of Research in India (L2)-Why, How, and What a Research is? (L2)-Types and Process of Research (L2)-Outcome of Research (L2)-Sources of Research Problem (L2)-Characteristics of a Good Research Problem (L2)-Errors in Selecting a Research Problem (L2)-Importance of Keywords (L1)-Literature Collection - Analysis (L2)-Citation Study - Gap Analysis (L2)-Problem Formulation Techniques (L2).

UNIT–II	RESEARCH METHODS AND JOURNALS	6+3

Interdisciplinary Research (L2)-Need for Experimental Investigations (L2)-Data Collection Methods (L3)-Appropriate Choice of Algorithms / Methodologies / Methods (L2)-Measurement and Result Analysis (L3)-Investigation of Solutions for Research Problem (L2)-Interpretation (L2)-Research Limitations (L2)-Journals in Science/Engineering (L2)-Indexing and Impact factor of Journals (L3)-Citations(L2)- h Index (L2)- i10 Index (L2)-Journal Policies (L4)How to Read a Published Paper (L2)-Ethical Issues Related to Publishing(L3)- Plagiarism and Self-Plagiarism (L2).

UNIT– III	PAPER WRITING AND RESEARCH TOOLS	6+3

Types of Research Papers (L2)- Original Article/Review Paper/Short Communication/Case Study(L2)-When and Where to Publish? (L2) - Journal Selection Methods (L2)-Layout of a Research Paper (L2)-Guidelines for Submitting the Research Paper (L2)-Review Process - Addressing Reviewer Comments (L3)-Use of tools / Techniques for Research (L3)-Hands-on Training related to Reference Management Software - EndNote (L3)- Introduction to Origin, SPSS,etc (L2)-Software for Detection of Plagiarism (L2)

UNIT – IV	EFFECTIVE TECHNICAL THESIS WRITING/PRESENTATION	6+3

How to Write a Report(L1)- - Language and Style (L1)-Format of Project Report (L1) - Use of Quotations (L2)-Method of Transcription Special Elements (L3)-Title Page - Abstract - Table of Contents - Headings and Sub-Headings (L2)-Footnotes - Tables and Figures - Appendix - Bibliography etc. (L3)-Different Reference Formats (L2)-Presentation using PPTs (L2).

UNIT–V	NATURE OF INTELLECTUAL PROPERTY	6+3

Patents(L1) - Designs(L2) - Trade and Copyright (L2)- Process of Patenting and Development (L2)- Technological research(L2)- innovation(L2)- - patenting(L2)-Development International Scenario (L2)-International Cooperation on Intellectual Property (L2)-Procedure for Grants of Patents (L2).

Total : 30+15=45 PERIODS

OPEN ENDED PROBLEMS / QUESTIONS

Course specific open ended problems will be solved during the classroom teaching. Such problems can be given as assignments and evaluated as internal assessment only and not for the end semester examination.

COURSE OUTCOMES: **Upon completion of this course the students will be able to:**		**BLOOM'S Taxonomy**
CO1	Illustrate the importance and objectives of research in contributing to knowledge and solving real-world problems.	L2 - Understand
CO2	Experiment with data collection techniques, choosing fitting approaches to ensure sound research framework and methodology.	L3 - Apply
CO3	Utilize research & analytic tools for enhancing the research publication	L2 - Understand
CO4	Apply knowledge to produce presentations and technical reports that effectively communicate research findings.	L3 - Apply
CO5	Explain types of intellectual property and comprehend patenting as essential for safeguarding innovation and creativity.	L2 - Understand

REFERENCE BOOKS:

1.	Cooper Donald R, Schindler Pamela S and Sharma JK, "Business Research Methods", Tata McGraw Hill Education, 11e (2012).
2.	DePoy, Elizabeth, and Laura N. Gitlin, "Introduction to Research-E-Book: Understanding and Applying Multiple Strategies", Elsevier Health Sciences, 2015.
3.	Walliman, Nicholas, "Research Methods: The basics", Routledge, 2017
4.	Bettig Ronald V., "Copyrighting culture: The political economy of intellectual property", Routledge, 2018.
5.	The Institute of Company Secretaries of India, Statutory body under an Act of parliament, "Professional Programme Intellectual Property Rights, Law and practice", September 2013.

VIDEO REFERENCES:

1.	https://www.youtube.com/watch?v=1vf8ZvADxfY&list=PLLhSIFfDZcUWRlgiXMkd1rNeLSz1You4O
2.	https://www.youtube.com/watch?v=eIUaS51U05M&list=PLIEVEMAFhG4_JmLtWGr6G0PRGB13xapyC

WEB REFERENCES:	
1.	https://www.researchgate.net/
2.	https://www.wipo.int/about-ip/en/
ONLINE COURSES:	
1.	https://onlinecourses.nptel.ac.in/noc23_ge36/preview
2.	https://onlinecourses.nptel.ac.in/noc22_hs59/preview

Mapping of COs with POs and PSOs								
COs	**POs**						**PSOs**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**
CO1	3	2	1			1		
CO2	3	3		2				
CO3	3			3	1			
CO4	3	3						
CO5	2	2		2		1		
Average	2.8	2.5	1	2.33	1	1		
1–Low, 2 –Medium, 3–High.								

ME23IS306	INDUSTRIAL SAFETY AND SIMIULATION LABORATOY	Version: 1.0				
Programme & Branch	M.E. INDUSTRIAL SAFETY ENGINEERING	CP	L	T	P	C
		2	0	0	2	1

Course Objectives:

1.	To provide opportunity to operate the equipment to acquire practical knowledge.
2.	To know the various PPEs and software.
3.	To carry out experiments to find out the environmental parameters.
4.	To assess the impact of sensitivity of chemicals on explosivity.
5.	To run the software to assess the consequence effects of major accidents. To learn the proper use of various kinds of physics laboratory equipment.

List of Experiments/Exercises and Skills

1.	**First aid concepts:** Study of Emergency Kits ,First – aid, road safety signs and signals -Safety Software Demo
2.	**Noise level measurement and analysis:** Measurement of sound pressure level in db for impact, continuous and intermittent sources at various networks, peak and average values
3.	**Friction test:** Explosive materials like barium nitrate, gun powder, white powder, amorces composition etc.
4.	**Impact test:** Explosive materials like gun powder, white powder, amerce composition etc. Burst strength test of packaging materials like paper bags, corrugated cartoons, wood etc. Auto ignition temperature test.
5.	**Exhaust gas measurement and analysis:** Measurement of sox, nox, cox, hydrocarbons.
6.	**Environmental parameter measurement:** Dry bulb temperature, wet bulb temperature, determination of relative humidity, wind flow and effective corrective effective. Particle size measurement, Air sampling analysis.
7.	**Personal protective equipment:** Respiratory and non-respiratory-demonstration-self contained breathing apparatus. Safety helmet,Belt, hand gloves, goggles, safety shoe, gum boots, ankle shoes, face shield, nose mask, ear plug, ear muff, anti-static and conducting plastics/rubber materials, apron and leg guard.
8.	**Fire extinguishers and its operations:** Water Co2,Foam,Carbon dioxide (Co2),Dry chemical powder and, Currently amendment fire safety systems
9.	**Static charge testing:** on plastic, rubber, ferrous and non-ferrous materials

10.	**Illumination testing:** - by lux meter and photo meter.
11.	**Electrical safety:** Insulation resistance for motors and cables, Estimation of earth resistance Earth continuity test, Sensitivity test for MCB, ELCB, RCCB, MCCB
12.	**Software usage:** Dispersion modeling of various highly dangerous chemicals using aloha software Software usage - accident analysis ,safety audit packages, consequence analysis (CISCON), fire, explosion and toxicity index (FETI), reliability analysis for mechanical system and electrical System, failure mode analysis
13.	**Experiments on simulation to be added Discrete and continuous**

List of Equipment Required:

1.	Noise level meter	:	1 Number
2.	Friction tester	:	1 Number
3.	Impact tester	:	1 Number
4.	Exhaust gas analyzer	:	1 Number
5.	High volume sampler	:	1 Number
6.	PPE Set	:	1 Number
7.	Fire extinguisher set	:	1 Number
8.	Static charge tester	:	1 Number
9.	First aid kid	:	1 Number
10.	Lock out/Tag out	:	1 Number
11.	Software	:	ALOHA, CAMEO
12.	Extend SIM		
13.	System	:	12 Number

Course Outcomes: **Upon completion of this course the students will be able to:**		**BLOOM'S Taxonomy**
1.	Make use of various equipment's to bring out the safety environment in the industry.	L3 - Apply
2.	Measure the particulate matter and assess the impact of air pollution.	L5 - Evaluate
3.	Experiment with equipment's to find out various environmental parameters.	L3 - Apply
4.	Utilize the personal protective equipment in-dependently.	L3 - Apply
5.	Identify the various problems with the use of software and hence to predict the real situations on major accidents.	L3 - Apply
		TOTAL: 30 PERIODS

Mapping of COs with POs and PSOs								
COs	**POs**						**PSOs**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**
CO1		3				2	2	2
CO2			3		2			
CO3			2	3			2	2
CO4		3			3			
CO5	2					2	2	3
Average	2	3	2.5	3	2.5	2	2	2.3
1–Low, 2 –Medium, 3–High.								

ME23PT801	TECHNICAL SEMINAR / CASE STUDY PRESENTATION	Version : 1.0				
(COMMON TO ALL BRANCHES)						
Programme & Branch	M.E. INDUSTRIAL SAFETY ENGINEERING	CP	L	T	P	C
		2	0	0	2	0

Course Objectives:

1	To encourage the students to study advanced engineering developments.
2	To prepare and present the technical and case study reports.

Method of Evaluation:

The students need to identify an area of interest or topic in their programme of study or case study and prepare a 5-10 page report and a presentation. Based on the report and presentation, the course is evaluated for 100 marks. Minimum 50 marks is essential to pass. In case a student fails, he has to make such presentation in the subsequent semesters. The evaluation guidelines will be issued by the Head of the Department before the commencements of the course. The objectives are improving literature searching capabilities, comprehension and ability to write reports and to make presentations. It is assessed in Internal Assessment mode only and no End Semester Examination.

Total : 30 PERIODS

Course Outcomes: At the end of this course, the students will demonstrate the ability to		**BLOOM'S Taxonomy**
CO1	Perform the review and present technological developments in their field.	L3 - Apply
CO2	Interpret the case study report and make a decision.	L3 - Apply

Mapping of COs with POs & PSOs

COs	POs						PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
1		3						1
2		3						1
Average		3						1
1–Low, 2 –Medium, 3–High.								

ME23AC701	ENGLISH FOR RESEARCH PAPER WRITING	Version: 1.0				
(COMMON TO ALL BRANCHES)						
Programme & Branch	M.E INDUSTRIAL SAFETY ENGINEERING	CP	L	T	P	C
		2	2	0	0	0

Course Objectives:

1	To teach how to improve writing skills and level of readability
2	To tell about what to write in each section
3	To summarize the skills needed when writing a Title
4	To infer the skills needed when writing the Conclusion
5	To ensure the quality of paper at very first-time submission

UNIT–I	INTRODUCTION TO RESEARCH PAPER WRITING	6

Planning and Preparation (L2), Word Order (L1), Breaking up long sentences (L2), Structuring Paragraphs and Sentences (L1), Being Concise and Removing Redundancy (L1), Avoiding Ambiguity and Vagueness (L2).

UNIT–II	PRESENTATION SKILLS	6

Clarifying Who Did What (L2), Highlighting Your Findings (L1), Hedging and Criticizing (L1), Paraphrasing and Plagiarism (L1), Sections of a Paper (L1), Abstracts, Introduction (L1).

UNIT–III	TITLE WRITING SKILLS	6

Key skills are needed when writing a Title (L1), key skills are needed when writing an Abstract (L1), key skills are needed when writing an Introduction (L1), skills needed when writing a Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check (L1).

UNIT–IV	RESULT WRITING SKILLS	6

Skills are needed when writing the Methods (L1), skills needed when writing the Results (L2), skills are needed when writing the Discussion (L2), skills are needed when writing the Conclusions (L2).

UNIT–V	VERIFICATION SKILLS	6

Useful phrases (L1), checking Plagiarism (L1), how to ensure paper is as good as it could possibly be the first- time submission (L1).

TOTAL: 45 PERIODS

OPEN ENDED PROBLEMS /QUESTIONS		
Course specific open ended problems will be solved during the classroom teaching. Such problems can be given as assignments and evaluated as internal assessment only and not for the end semester examination		
Course Outcomes: **Upon completion of this course the students will be able to:**		**BLOOMS Taxonomy**
CO1	Understand that how to improve your writing skills and level of readability	L2 – Understand
CO2	Learn about what to write in each section	L1 – Remember
CO3	Understand the skills needed when writing a Title	L2 – Understand
CO4	Understand the skills needed when writing the Conclusion	L2 – Understand
CO5	Ensure the good quality of paper at very first-time submission	L2 – Understand
TEXTBOOKS:		
1.	Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011.	
2.	Day R How to Write and Publish a Scientific Paper, Cambridge University Press 2006.	
REFERENCE BOOKS:		
1.	Goldbort R Writing for Science, Yale University Press (available on Google Books) 2006.	
2.	Highman N, Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book 1998.	

ME23AC702	DISASTER MANAGEMENT	Version: 1.0				
(COMMON TO ALL BRANCHES)						
Programme & Branch	M.E INDUSTRIAL SAFETY ENGINEERING	CP	L	T	P	C
		2	2	0	0	0

Course Objectives:

1	Summarize basics of disaster
2	Explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.
3	Illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
4	Describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
5	Develop the strengths and weaknesses of disaster management approaches

UNIT–I	INTRODUCTION	6

Disaster: Definition(L1), Factors and Significance(L1); Difference between Hazard And Disaster(L2); Natural and Manmade Disasters: Difference, Nature, Types and Magnitude(L1).

UNIT–II	REPERCUSSIONS OF DISASTERS AND HAZARDS	6

Economic Damage (L1), Loss of Human and Animal Life (L1), Destruction Of Ecosystem (L1). Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches (L1), Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts (L1).

UNIT–III	DISASTER PRONE AREAS IN INDIA	6

Study of Seismic Zones (L1); Areas Prone To Floods and Droughts (L1), Landslides And Avalanches (L1); Areas Prone To Cyclonic and Coastal Hazards with Special Reference To Tsunami (L1); Post-Disaster Diseases and Epidemics (L1)

UNIT–IV	DISASTER PREPAREDNESS AND MANAGEMENT	6

Preparedness: Monitoring Of Phenomena Triggering a Disaster or Hazard (L2); Evaluation of Risk: Application of Remote Sensing (L1), Data from Meteorological And Other Agencies (L1), Media Reports: Governmental and Community Preparedness (L1).

UNIT–V	RISK ASSESSMENT	6

Disaster Risk: Concept and Elements (L1), Disaster Risk Reduction (L1), Global and National Disaster Risk Situation (L1). Techniques of Risk Assessment (L1), Global Co-Operation in Risk Assessment and Warning (L1), People's Participation in Risk Assessment. Strategies for Survival (L1)

TOTAL: 30 PERIODS

OPEN ENDED PROBLEMS /QUESTIONS		
Course specific open ended problems will be solved during the classroom teaching. Such problems can be given as assignments and evaluated as internal assessment only and not for the end semester examination		
Course Outcomes: **Upon completion of this course the students will be able to:**		**BLOOMS Taxonomy**
CO1	Summarize basics of disaster	L1 – Remember
CO2	Explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.	L2 – Understand
CO3	Illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives	L2 – Understand
CO4	Describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.	L2 – Understand
CO5	Develop the strengths and weaknesses of disaster management approaches	L2 – Understand
TEXTBOOKS:		
1.	Goel S. L., Disaster Administration And Management Text And Case Studies", Deep & Deep Publication Pvt. Ltd., New Delhi, 2009.	
2.	NishithaRai, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "'New Royal book Company, 2007.	
REFERENCE BOOKS:		
1.	Sahni, Pradeep Et.Al. ," Disaster Mitigation Experiences And Reflections", Prentice Hall OfIndia, New Delhi, 2001.	

ME23AC703	CONSTITUTION OF INDIA	Version: 1.0				
(COMMON TO ALL BRANCHES)						
Programme & Branch	M.E INDUSTRIAL SAFETY ENGINEERING	CP	L	T	P	C
		2	2	0	0	0

Course Objectives:

1	To understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2	To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional
3	To role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
4	To address the role of socialism in India after the commencement of the Bolshevik Revolution 1917 And its impact on the initial drafting of the Indian Constitution

UNIT–I	HISTORY OF MAKING OF THE INDIAN CONSTITUTION	6

History(L1), Drafting Committee(L1), (Composition & Working)

UNIT–II	PHILOSOPHY OF THE INDIAN CONSTITUTION	6

Preamble (L1), Salient Features (L1).

UNIT–III	CONTOURS OF CONSTITUTIONAL RIGHTS AND DUTIES	6

Fundamental Rights (L1), Right to Equality (L1), Right to Freedom (L1), Right against Exploitation (L1), Right to Freedom of Religion (L1), Cultural and Educational Rights (L1), Right to Constitutional Remedies (L1), Directive Principles of State Policy (L1), Fundamental Duties (L1).

UNIT–IV	ORGANS OF GOVERNANCE	6

Parliament (L1), Composition (L1), Qualifications and Disqualifications (L1), Powers and Functions (L1), Executive (L1), President (L1), Governor (L1), Council of Ministers (L1), Judiciary, Appointment and Transfer of Judges (L1), Qualifications, Powers and Functions (L1).

UNIT–V	LOCAL ADMINISTRATION	6

District's Administration head: Role and Importance (L1), Municipalities: Introduction, Mayor and role of Elected Representative, CEO, Municipal Corporation (L1). Pachayati raj: Introduction (L1), PRI: Zila Panchayat (L1). Elected officials and their roles (L1), CEO Zila Pachayat: Position and role (L1). Block level: Organizational Hierarchy(Different departments) (L1), Village level:Role of Elected and Appointed officials (L1), Importance of grass root democracy (L1).

UNIT–VI	ELECTION COMMISSION	6

Election Commission: Role and Functioning (L1). Chief Election Commissioner and Election

Commissioners (L1) - Institute and Bodies for the welfare of SC/ST/OBC and women (L1).
Total: 30 PERIODS
OPEN ENDED PROBLEMS /QUESTIONS
Course specific open ended problems will be solved during the classroom teaching. Such problems can be given as assignments and evaluated as internal assessment only and not for the end semester examination

Course Outcomes: **Upon completion of this course the students will be able to:**		**BLOOMS Taxonomy**
CO1	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.	L2 – Understand
CO2	Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.	L2 – Understand
CO3	Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.	L2 – Understand
CO4	Discuss the passage of the Hindu Code Bill of 1956.	L2 – Understand

TEXTBOOKS:	
1.	The Constitution of India,1950(Bare Act),Government Publication
2.	Dr.S.N.Busi, Dr.B. R.Ambedkar framing of Indian Constitution,1st Edition, 2015.
REFERENCE BOOKS:	
1.	M.P. Jain, Indian Constitution Law, 7th Edn., LexisNexis,2014.
2.	D.D. Basu, Introduction to the Constitution of India, LexisNexis, 2015.

ME23AC704	நற்றமிழ் இலக்கியம்					Version: 1.0
(COMMON TO ALL BRANCHES)						
Programme & Branch	M.E INDUSTRIAL SAFETY ENGINEERING	CP	L	T	P	C
		2	2	0	0	0

Course Objectives:

1	சங்க இலக்கியம் பற்றி மாணவர்களுக்கு எடுத்துரைத்தல்
2	நீதி நூல்கள் வாயிலாக அறக்கருத்துகளை எடுத்து கூறுதல்.
3	சிலப்பதிகாரம், மணிமேகலை காப்பியங்களை எடுத்துரைத்தல்.
4	இலக்கியங்களில் காணப்படும் அருள்நெறிக் கதைகளைப் பற்றி விளக்குதல்.
5	தற்காலத் தமிழ் இலக்கியங்களை மாணவர்களுக்கு தெரியப்படுத்துதல்.

UNIT–I	சங்க இலக்கியம்	6

1. தமிழின் துவக்க நூல் தொல்காப்பியம் - எழுத்து, சொல், பொருள் (L1)
2. அகநானூறு (82) - இயற்கை இன்னிசை அரங்கம் (L1)
3. குறிஞ்சிப் பாட்டின் மலர்க்காட்சி (L1)
4. புறநானூறு (95, 195) – போரை நிறுத்திய ஔவையார் (L1)

UNIT–II	அறநெறித்தமிழ்	6

1. அறநெறி வகுத்த திருவள்ளுவர் - அறம் வலியுறுத்தல், அன்புடைமை, ஒப்புறவு அறிதல், ஈகை, புகழ் (L2)
2. பிற அறநூல்கள் – இலக்கிய மருந்து - ஏலாதி, சிறுபஞ்சமூலம், திரிகடுகம், ஆசாரக்கோவை (தூய்மையை வலியுறுத்தும் நூல்) (L2)

UNIT–III	**இரட்டைக்காப்பியங்கள்**	6

1. கண்ணகியின் புரட்சி- சிலப்பதிகார வழக்குரை காதை (L1)
2. சமூக சேலை இலக்கியம் மணிமேகலை – சிறைக்கோட்டம் அறக்கோட்டமாகிய காதை (L1)

UNIT–IV	**அருள்நெறித்தமிழ்**	6

1. சிறுபாணாற்றுப்படை – பாரி முல்லைக்கு தேர் கொடுத்தது, பேகன் மயிலுக்குப் போர்வை கொடுத்தது, அதியமான் ஔவைக்கு நெல்லிக்கனி கொடுத்தது, அரசர் பண்புகள். (L2)
2. நற்றிணை – அன்னைக்குரிய புன்னை சிறப்பு (L2)
3. திருமந்திரம் (617,618) இயமம் நியமம் விதிகள் (L2)
4. தர்மசாலையை நிறுவிய வள்ளலார் (L2)

5. புறநானூறு – சிறுவனே வள்ளலானான் (L2)
6. அகநானூறு (4) – வண்டு (L2)
7. நற்றிணை (11) – நண்டு (L2)
8. கலித்தொகை (11) – யானை, புறா (L2)
9. ஐந்திணை ஐம்பது (27) – மான் (L2)
    a. ஆகியவை பற்றிய செய்திகள் (L2)

UNIT–V	நவீன தமிழ் இலக்கியம்	6

1. உரைநடைத்தமிழ் (L1)
   – தமிழின் முதல் புதினம் (L1)
   – தமிழின் முதல் சிறுகதை (L1)
   – கட்டுரை இலக்கியம் (L1)
   – பயண இலக்கியம் (L1)
   – நாடகம் (L1)
2. நாட்டு விடுதலை போராட்டமும் தமிழ் இலக்கியமும் (L1)
3. சமுதாய விடுதலையும் தமிழ் இலக்கியமும் (L1)
4. பெண் விடுதலையும் விளிம்பு நிலையினரின் மேம்பாட்டில் தமிழ் இலக்கியமும் (L1)
5. அறிவியல் தமிழ் (L1)
6. இணையத்தில் தமிழ் (L1)
7. சுற்றுச்சூழல் மேம்பாட்டில் தமிழ் இலக்கியம் (L1)

Total: 30 PERIODS

Course Outcomes: **Upon completion of this course the students will be able to:**		**BLOOMS Taxonomy**
CO1	சங்க இலக்கியம் மாணவர்கள் முழுமையாக அறிந்து பயன்பெறுதல்.	L1 - நினைவில் கொள்ளுதல்
CO2	அறநெறி இலக்கியம் வாயிலாக வாழ்வியலுக்குத் தேவையான தூய்மைப் பணிகளை மேற்கொள்ளுதல்.	L2 - புரிந்து கொள்ளுதல்
CO3	சிலப்பதிகாரம், மணிமேகலை காப்பியங்களில் உள்ள நீதிக்கருத்துகளை மாணவர்கள் தெரிந்துகொள்ளுதல்.	L1 - நினைவில் கொள்ளுதல்
CO4	இலக்கியங்களில் காணப்படும் அருள்நெறிக் கதைகளைப் பற்றி விளக்குதல்.	L2 – புரிந்து கொள்ளுதல்
CO5	தற்காலத் தமிழ் இலக்கியங்களை மாணவர்கள் தெரிந்து அவற்றின் வாயிலாக பயன் அடைதல்.	L1 – நினைவில் கொள்ளுதல்

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Note:

Syllabus for the courses offered from 2nd Semester to 4th Semester, will be added after the approval of the Board of Studies (BoS) & Academic Council (AC) in due course.