GOVERNMENT OF TAMILNADU

DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI

STATE PROJECT COORDINATION UNIT

(Established under Canada India Institutional Cooperation Project)

CURRICULUM

Course Name	**FIRE, SAFETY, HEALTH AND ENVIRONMENT**
Course Code	ME/2020/020
Course Duration	200 Hours
Minimum Eligibility Criteria	ITI/10th/+2/Diploma/Graduates
Pre-requisites (if any)	-
Course Objectives	Training module has been designed for the participants to • Understand Industrial safety and safety standards • Understand Safety Working Practices • Understand the importance of Fire Safety • Understand the importance of Safety in Hazardous areas • Perform Safety Analysis • Understand Health, Environment and types of Disasters
Course Outcomes	At the end of training, the participants will be able to • Explain the importance of Safety in Industries and Safety Standards • Execute and follow Safety working practices in Industries • Identify and control the accidents due to fire • Explain the need for Safety in Hazardous working environments and the ways to work safely • Conduct Case Studies on Fire and safety aspects • Maintain Occupational Health • Explain Environment and Disaster types
Expected Job Roles	Line Safety Officer / Fire Officer / Safety Officer

TEACHING AND SCHEME OF EXAMINATION						
Course Code	Course Name	Hours		Assessment Marks		Duration of the Examination
				Min	Max	
ME/2020/020	**FIRE, SAFETY, HEALTH AND ENVIRONMENT**	Theory	150	40	60	3 Hours
		Practical	50	10	40	
		Total	200	50	100	

ME/2020/020 - FIRE, SAFETY, HEALTH AND ENVIRONMENT

DETAILED SYLLABUS

Unit No.	Modules	No. of Hours	
		Theory	Practical
I	**Introduction to Safety**	**10 Hours**	
1.1	Importance of Safety - Health and Environment - Health safety and Environmental policy - Fundamentals of safety - Classification of accidents	10	
1.2	Managements responsibility - Objectives of safety management - National safety council – DISH - Employees state insurance act 1948		
1.3	Approaches to prevent accidents - Principles of safety management - Safety organization - Safety auditing - Maintenance of safety - Measurements of safety performance		
1.4	Industrial noise and noise control - Industrial Psychology - Industrial accidents and prevention – sign boards and colours in safety		
1.5	Introduction to ISO 45001, ISO 14001 and OSHA		
II	**Safety Working Practices**	**20 Hours**	
2.1	Process safety management (P.S.M) as per OSHA - Legal aspects of safety - Safety with respect to plant and machinery - The explosive act 1884	20	
2.2	Personal protective equipment - Classification of hazards - Protection of respiratory system - Work permit system		
2.3	Hazards in refineries and process plants - Safety in process plants - pollution in some typical process industry		
2.4	Safe working practices - Housekeeping, safe working environment, safety device and tools, precaution in use of ladders - Safety instruction during crane operation		
2.5	Safety instruction for welding - Burning and cutting and gas welding equipment - Electrical safety - case studies		
2.6	Safety in use of electricity - Electric shock phenomena - Occurrence of electric shock - Medical analysis of electric shock and its effect -Safety procedures in electric plants - Installation of Earthing system		
III	**Safety in Hazardous areas**	**40 Hours**	
3.1	Safety in hazardous area - Hazard in industrial zones - Mechanical, Chemical, Environmental and Radiation hazards - Machine guards and safety device - slings - Load limits - Lifting tackles and lifting equipment - Hydrostatic test	20	
3.2	Confined space safety – Ergonomic safety		
3.3	Chemical hazards - Industrial toxicology - Toxic chemicals and its harmful effects on humans - Factors influencing the effect of toxic materials - Devices for measuring radiation		
3.4	Safety analysis and risk analysis - Risk management		

3.5	First aid - Safety measures to avoid occupational diseases		
3.6	**Practical** ➢ Industrial Visit(s) ➢ Case studies related to accident prevention in industries ➢ Case studies related to accidents happened in industries		20
IV	**Fire Safety**	**60 Hours**	
4.1	Fire triangle – Heat – Combustible materials – requirement of Oxygen – Properties of flammable materials – fire hazards and spread of fire – fire prevention principle – precautions to Prevent fire – Types of fire	50	
4.2	Types, Class-A fire Class-B fire Class-C fire Class-D fire Class-E fire – Principle of firefighting – cooling, smothering and starvation – methods to extinguish – different types of fire – appropriate extinguishing agents		
4.3	Fire detectors – types of detectors – smoke detectors – Heat detectors – flame detectors – automatic fire alarm – servicing and maintenance		
4.4	Portable fire Extinguishers – water type Extinguishers – Chemical foam type – mechanical Foam type – soda Acid Type Extinguishers - Dry chemical power Type Fire Extinguishers - carbon dioxide type Fire Extinguishers – Halon type Fire Extinguishers		
4.5	Fixed Firefighting equipment - Fire man outfit – Fire Hydrant – pumps - types - Hoses and nozzles – types - Fixed Installations - Fire mains – water sprinkler system – carbon di oxide flooding system – Bulk CO_2system – Fire Ball		
4.6	Introduction to Building Management System - Fire safety equipment – legends and symbols - fire safety layout – automated firefighting systems		
4.7	**Practical** ➢ Demonstration of Fire Fighting Equipment		10
V	**Health, Environment and Disaster Safety Engineering**	**70 Hours**	
5.1	Health **-** Health meaning, industrial health meaning, significance of industrial health, occupational health and safety act, working conditions affecting health – cleanliness, lighting, temperature, ventilation, noise, dust and space, seating arrangements	50	
5.2	Physical wellbeing and mental wellbeing, job safety analysis, preparing job specification, preparing job description, designing work station for different jobs		
5.3	Environment **-** Basics of environment - introduction, working environment, types of work environment, need for environmental control, effects of environment factors on human body		
5.4	Waste – sources, harmful effects of waste, control of waste, waste recovery, waste treatment, and waste disposal. Air Quality management, water quality management, noise quality management, land pollution, solid waste management and waste management		

5.5	Environmental control and pollution control measures, effects of pollution on human and environment		
5.6	Disaster – meaning, types of disaster, disaster zoning, crisis, emergency service functions, disaster management cycle, creeping disaster, food security, disaster prevention, recovery, mitigation – meaning and differences		
5.7	**Practical** ➢ Handling different types of disaster and crisis		**20**
	Total Theory and Practical hours	**150**	**50**
	Total hours	**200**	

HARDWARE REQUIREMENT

S.NO	LIST OF TOOLS /EQUIPMENTS
1.	Fire Extinguisher of different types (Type A, B, C D)
2.	Personal Protective Equipment – I set
3.	Disaster Emergency Equipment Kit – 1 Set

REFERENCE BOOKS

S. NO.	NAME OF THE BOOK	AUTHOR	PUBLISHER
01	Industrial Safety Management	L.M. Deshmukh	McGraw-Hill Education LLC., India, 2005
02	Industrial Safety and Environment	A.K. Gupta	Laxmi Publications, India May 2006)
03	Safety Management – Industrial Safety	Ganguly and Changeriya	Chetan Publication, India 2016
04	Manual of Fire safety	N. Sesha Prakash	CBS Publishers, India First Edition October 2017
05	Fire safety and Risk Management Revision Guide	Jonathan Backhouse and Ed Ferrett	Routledge, UK First Edition 12 December 2016
06	Fire Protection: Detection, Notification, and Suppression	Till, Robert C, Coon, J.Walter	Springer, India Second Edition July 2018
07	Industrial Safety, Health and Environment Management Systems	R. K. Jain and Sunil S. Rao	Khanna Publishers, India 4th Edition, 2000
08	Electrical Safety, Fire Safety Engineering and Safety Management	Sunil S. Rao, R. K. Jain, and H. L. Saluja	Khanna Publishers, India Second edition, 1997
09	Practical Guide to Industrial Safety: Methods for Process Safety Professionals	Nicholas P. Cheremisinoff	CRC Press, India First Edition, October 2000

10	Industrial safety and Health Management	C. Ray Asfahl and David W. Rieske	Pearson, India 7th Edition 2018
11	Industrial Safety and Environment	Anupama Prashar and Prathibha Bansal	S.K. Kataria & Sons Publishers, India 2010
12	Principles of Industrial Safety	Joel M. Haight	American Society of Safety Engineers, USA First Edition, February 2013
13	Handbook of Occupational Safety and Industrial Psychology	S.P. Rana, P.K. Goswami and Dr, Indu Rathee	S. Chand Publishing, India 2014
14	Construction Safety	R. K. Mishra	Aitbs Publishers, India 2017
15	Industrial Safety, Health and Environment Management Systems	R. K. Jain and Suni S. Rao	Khanna Publishers, India 4th Edition, 2000
16	Safety, Occupational Health and Environmental Management	S.C. Sharma and Vineet Kumar	Khanna Publishers, India First edition, 2013
17	Handbook of OSHA Construction Safety and Health	Charles D. Reese, and James V. Eidson	CRC Press, Inida 2nd Edition, March 2006
18	Occupational Health and Safety : Terms, Definitions and Abbreviations,	Robert G Confer, and Thomas R Confer	CRC Press, India 2nd Edition, 1999
19	Safety and Hazards Management in Chemical Industries	M. N. Vyas	Atlantic Publishers & Distributors Pvt Ltd, India First Edition, January 2017
20	First Aid Manual: The Authorised Manual of St John Ambulance, St. Andrews Ambulance Association and the British Red Cross Society	British Red Cross Society	DK Publishing (Dorling Kindersley), UK 9th Revised Edition, April 2011
21	Emergency First Aid: The Authorised Manual of St John Ambulance, St. Andrews Ambulance Association and the British Red Cross Society	Michael Webb	DK Publishing (Dorling Kindersley), UK 9th Revised Edition, April 2011

ASSESSMENT AND CERTIFICATION

S. No.	Criteria for Assessment
1.	A trainee will be assessed based on the performance in End Examination for Theory and Practical conducted internally in the Project Polytechnic College for a duration of 3 hours
2.	A trainee must have 75% of attendance to appear for End examination in Theory and Practical.
3.	The assessment for theory part will be based on the marks scored in the end examination on the knowledge bank of questions (3 Marks descriptive type questions)
4.	The assessment for practical part will be based on the marks scored in the end examination conducted by the Project Polytechnic and assessed by the Examiners approved by Strategic Plan Implementation Committee (SPIC) of the project polytechnic.
5.	The passing criteria for successful completion of training is every trainee should score 50% of marks in theory and practical examination.
6	On successful completion of training, Certificate will be issued to the participants by the Directorate of Technical Education through the Project Polytechnics.

END EXAMINATION

ALLOCATION OF MARKS

S.NO	Description	Max.Marks
1.	Theory Examination	60
2.	Practical Examination	
	a) Case study Report Submission/ Demonstration	30
	b) Viva Voce	10
	Total Marks	**100**

THEORY MODEL QUESTION PAPER

ME/2020/020 FIRE, SAFETY, HEALTH AND ENVIRONMENT

(Maximum Marks: 60)

(N.B: Answer any **twenty** questions) **(20 x 3 = 20 Marks)**

1. List any three types of accidents.
2. Give the importance of National Safety Council.
3. What are the main benefits of ESI act 1948?
4. Give examples of personal protective equipment.
5. What are the importances of explosive act 1884?
6. Write the safety tips to be followed for overhead crane operation.
7. Give the safety instructions to be followed during welding operation.
8. What are the different types of Hazard in industrial zones?
9. Explain the hydrostatic testing process.
10. What are the factors influencing the effect of toxic materials?
11. Explain about any three devices used for measuring radiation
12. What is meant by fire Triangle? Explain it.
13. Discuss about the term heat.
14. Write notes on any three fire preventing principles.
15. What are the different types of Fire?
16. Write the main fundamental principle of fire fighting
17. Explain any three different types of fire detectors.
18. Write the uses of portable fire extinguishers.
19. What are the different types of fire safety equipments?
20. Define the term health.
21. Discuss about mental wellbeing.
22. Discuss about working environment.
23. Write notes on types of working environment.
24. Explain different solid wastes?
25. Discuss about natural disaster?