

Syllabus
For The Trade of

HEALTH SAFETY AND ENVIRONMENT

Under

Craftsmen Training Scheme (CTS)

Designed in – 2011

By

Government of India
Ministry of Labour & Employment (DGE&T)
CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE
EN Block, sector – V, Salt Lake,
Kolkata – 700 091

List of Members present in the Trade Committee Meeting for designing the syllabus of HEALTH SAFETY AND ENVIRONMENT under Craftsmen Training Scheme(CTS) at DELHI INSTITUTE OF FIRE ENGINEERING, NEW DELHI on 10.02.2011 &

11.02.2011

Shri Anil Kumar, Director In Charge

SL NO	NAME & DESIGNATION S/SHRI	REPRESENTING ORGANIZATION	REMARKS
1	V K Garg, Chairman	Delhi Institute of Fire Engineering, New Delhi	Chairman
2	Capt Krishan Kumar, Vice Chairman	Delhi Institute of Fire Engineering, New Delhi	Member
3	Anil Kumar, Director	CSTARI, Kolkata	Member
4	Mrs Anita Srivastava, Deputy Director	DGE&T Hqrs, New Delhi	Member
5	L K Mukherjee, Deputy Director	CSTARI, Kolkata	Member
6	Dr. HS Kaparwan, Ex-Scientist F	DRDO, New Delhi	Member
7	Dr. Adarsh Kumar, Sr. Scientist	PUSA, New Delhi	Member
8	Alok Sharma, General Manager(Safety)	Indraprastha Gas Ltd., New Delhi	Member
9	Sunil Chaudhary, Asst. Director	Delhi Fire Services, New Delhi	Member
10	K S Dabas, DGM (Fire & Safety)	Indira Gandhi International Airport, New Delhi	Member
11	Jitendra Singh, Ex- Asstt. Comdt.	Central Industrial Security Force	Member
12	Mrs. Pushpa Jindal, Principal	Govt. Sr Sec School, N Delhi	Member
13	M N Sharma, Principal	ITI, PUSA, New Delhi	Member
14	B P Minocha, Instructor	ITI, PUSA, New Delhi	Member
15	V P Jayarajan, Principal	Delhi Institute of Fire Engineering, New Delhi	Member
16	Col J N Pandey, Director Training	Delhi Institute of Fire Engineering, New Delhi	Member
17	Lt P S Bhadana, Addl Director Training	Delhi Institute of Fire Engineering, New Delhi	Member
21	Ashok Kumar Tiwari, Sr. Instructor	Delhi Institute of Fire Engineering, New Delhi	Member
23	Raj Kumar, Sr Instructor	Delhi Institute of Fire Engineering, New Delhi	Member
24	Arun Sharma, Instructor	Delhi Institute of Fire Engineering, New Delhi	Member

GENERAL INFORMATION

1. Name of the Trade : HEALTH SAFETY AND ENVIRONMENT
2. N. C. O. code No :
3. Entry Qualification
 - a. Passed class 12th Exam. Under 10+2 system of education or its equivalent.
 - b. The minimum physical requirements are
 - i. Height - 165 cm
 - ii. Weight - 52 kg
 - iii. Chest - Normal 81 cm - Expanded 85 cm
 - iv. A registered MBBS doctor must certify that the candidate is medically fit to undertake the course

4. Duration of Craftsman Training : One Year

5. Space Norm : Class Rooms : 1 Sq meter/trainee

10000 Sq Yard (Practical Training Area)

6. Power Norms : 2 KW

7. Trainees per unit : 20

8. Qualification of the Instructor

Degree in Fire & Safety Engineering/Degree in Fire Science with one year experience in the relevant field.
OR

Post Graduate Diploma in Industrial Safety Engineering/ Fire and Industrial Safety Engineering /Post

Graduate Diploma in Health, Safety & Environment with two year experience in the relevant field.
OR

Defence Officers/ JCOs/ NCOs with 10 Yrs of experience in the relevant field

OR

National Examination Board Occupational Safety and Health (NEBOSH)/ Occupational Safety and Health Administration (OSHA) Certification + 1 Yr Experience

Note:* Common 10000 Sq Yard Practical Training area is required / used for three courses viz Health Safety and Environment, Fireman, Fire Technology and Industrial Safety Management, if an institute is running all the above mentioned trades.

SYLLABUS FOR THE TRADE OF HEALTH SAFETY AND ENVIRONMENT UNDER (CTS)

Week No.	Theory	Practical
1	<p>Importance of safety and general precautions observed in the Institute and in the section. Importance of the trade in the development of Industrial economy of the country. What are the related instructions, subjects to be taught, achievement to be made, recreational facility, medical facilities and other extra curricular activities of the Institute. (All necessary guidance to be provided to the new comers to become familiar with the working of Industrial Training Institute system including stores procedures, Safe and proper usage of electric and water resources. Introduction of First aid. Road safety. Operation of electrical mains. Introduction of safety kits.</p>	<p>Familiarization with the Institute, Documentation of Student, Issuance of Dress, Books, Hostel Accommodation (If required) and Store. Importance of trade training, Equipments used in the trade, types of work done by the trainees in the trade. Introduction to safety equipments and their uses. Introduction of first aid, Road safety, operation of Electrical mains.</p>
2	<p>HAZARD : Introduction to Hazard, Causes, Identification, Evaluation & Control of Hazard. HAZOP Analysis, Sources for Information on Hazard Evaluation</p>	<p>Site visit for Hazard identification and Evaluation .</p>
3	<p>RISK ANALYSIS : Definition of Risk, Risk Analysis, Introduction to Failure Mode & Effect Analysis (FMEA), Fault Tree Analysis (FTA), Event Tree Analysis (ETA).</p>	<p>Study of Risk at work site and preparation and initiation of reports.</p>
4	<p>ACCIDENT : Definition of Accidents, Classification of Accidents, Need for the Analysis of Accidents, Methods Adopted for Reducing Accidents, Investigation of Accidents, Safety Slogans</p>	<p>Visit to accident prone area Practical usages of Safety belt helmets, gloves, and goggles.</p>
5	<p>PREPARATION & ASSESSMENT OF SAFETY AUDIT : Introduction to Safety Checklist, Plant Safety Inspection, Safety Precautions adopted in the Plant, Safety Tag System, Safety Audit Report</p>	<p>Carry out the plant safety inspection with the help of check list.</p>

6	<p>SAFETY CONCEPT : Introduction to Safety Management, Safety Policy, Safety Committee, Safety Review, Responsibility of Management, Safety Officers Duties & Responsibilities, Safety Targets, Objectives, Standards, Practices and Performances.</p> <p>Motivation & Communication as part of Safety Programme.</p>	Visit to industrial unit and review of prevailing safety Practices.
7	<p>ILO CONVENTION : Introduction of ILO and Conventions</p> <p>FACTORIES ACT 1948 (Amended) :-</p> <ul style="list-style-type: none"> ○ Health - Cleanness, Disposal of Waste, Ventilation and Temperatures, Dust & Fumes, Drinking Water, Lighting, Latrines & urinals. ○ Safety - Fencing of machineries, Work on or near machinery in motion, Hoists and lifts, Pressure plants, Floors, Stairs and means of escape, Protection against fumes & gases, Safety offers. ○ Welfare - Washing facilities in Dry clothing, Storing, Sitting, First Aid Appliances, Canteen, Shelters for rest & lunch, Crèches, Welfare offers, Right & Obligation of workers. ○ Provision Related to Hazardous Processes- Site Appraisal Committees, Disclosure of information by occupier, Responsibilities of occupier in relation to hazardous processes, Workers participation in safety management. 	Visit to industrial unit to observe prevailing safety provision, their condition, welfare measures include medical facilities, crèches and religious places.
8	<p>SOCIAL SECURITY LEGISLATION : Social Security Legislation, Introduction to</p>	Awareness about various compensations and Documentation

	Workman's Compensation Act, Contract Labour Regulation Act.	
9	<p>MISCELLANEOUS ACTS & RULES</p> <ul style="list-style-type: none"> Explosives Act 1884 and Rules. General provision of Gas Cylinders Rules, The Building and other Construction Worker's Welfare Cess Act & Rules 1996. 	Display of explosives, their identification and marking as per explosives act.
	Environment Protection Legislation: Introduction to Prevention and Control of Pollution Act 1981 and 1982, Environment Protection Act 1986	
10	<p>SAFETY IN THE ENGINEERING INDUSTRY : Introduction to Machine Operations & Guarding, Safety in the use of Machines, Safety precautions while using Hand Tools & Power Tools, Selection, Maintenance & Care of Hand and power tools.</p>	Hands on experience with Hand and power tools.
11	<p>INDUSTRIAL LIGHTING : Introduction to Lighting, Ventilation, Heat Stress, Cold Stress, Noise & Vibration.</p>	Measurement of Heat, illumination and Noise
12	<p>ELECTRICAL SAFETY : Electrical Hazards, Static Electricity.</p>	Demonstration and Determination of related electrical experiments
13	<p>SAFETY IN MELTING, BOILERS : Hazards in process of melting (Furnaces), Casing, Forging. Automatic Manufacturing Activity – Machining, Chipping, Grinding, Safety Precautions in use of Boilers.</p>	Visit to work shop and steel furniture houses to witness various processes during production and safety precaution adopted.
14	<p>CONSTRUCTION INDUSTRY : General safety</p>	Visit to construction site to witness construction and safety precaution

	precautions related to construction industry, Safety in the use of Construction Machinery.	observed.
15	BASIC PHILOSOPHY OF SAFETY : Peculiarities & Parameters governing the safety in construction e.g. Site Planning, Layout, Safe Access / Egress.	Construction Site Visit Practices of good House Keeping and Study of egress and safe access
16	MATERIAL HANDLING : Safety related to Mechanical and Manual Material Handling, Lifting Appliances & Gear, Transport / Earthmoving & Material Handling Equipments – Cranes, Forklift Truck, Hoists, and Conveyors.	Construction Site Visit and identifying of causes of accident during material handling
17	WORKING AT HEIGHT, CONFINED SPACE & COMPRESSED AIR : Safety precaution related to Scaffolds, Ladders, Work at height including Roof Work, Fall arrestors, Cofferdams, Confined Space, Work in Compressed Air. Introduction to Work Permit System.	Construction Site Visit, Pitching of ladders, proper use of safety belt and preparation of work permit.
18	EXCAVATIONS, DEMOLITIONS & STRUCTURAL FRAMES : Safety related to Excavation, Demolitions Frame Work & Concrete Work, Pile Driving and Work Over Water.	Visit to excavation Site, identification and discussion with site engineer about safety precaution taken.
19	Basic Physics and Chemistry related to Fire - Definition of Matter and energy, Physical properties of matter like Density, specific gravity, Relative density, Vapour density, Melting & Boiling point, flammable limits, latent heat, etc, Effects of density on behaviour of gases, , Basics of oxidizing and reducing agents, Acids. Flammable liquids- classification and types of tanks, Dust and Explosion, Liquid and Gas Fires, LPG.	Demonstration of:- <ul style="list-style-type: none"> • Various acids. • Alkalis & Gases • Organic flammable liquids and commonly used industrial chemical- Fire-fighting technique.
20	Anatomy of Fire : Definition of	Drill I : Water CO2 Extinguisher Drill 9L

	Combustion, Elements of Combustion, Products of Combustion, Heat of reaction and calorific value, Flash point, Fire point, Ignition temperature and spontaneous combustion.	Drill II : Chemical Foam Extinguishing 9 L Drill III : Mechanical Foam Extinguisher 9L Drill IV : Stored Pressure Water Extinguisher 9 L Drill V : Dry Chemical Powder 5 Kg Drill VI : Dry Chemical Powder 10 Kg Drill VII : ABC Extinguisher 5 Kg/ 10 Kg Drill VIII : CO2 Extinguisher 4.5 Kg
21	Classification of Fire & Extinguishers : Classification of Fire and types of extinguishers, maintenance, method of operation, Halon and its detrimental effect on environment. Alternatives of Halon.	Drill I : Water CO2 Extinguisher Drill 9L Drill II : Chemical Foam Extinguishing 9 L Drill III : Mechanical Foam Extinguisher 9L Drill IV : Stored Pressure Water Extinguisher 9 L Drill V : Dry Chemical Powder 5 Kg Drill VI : Dry Chemical Powder 10 Kg Drill VII : ABC Extinguisher 5 Kg/ 10 Kg Drill VIII : CO2 Extinguisher 4.5 Kg
22	HOSE & PUMPS, WATER TENDER : Fire Service Hose & Hose Fittings, Fixed Fire Fighting Installations Ropes & lines, Practical Firemanship, Small & Special Gears, Water Tender.	Familiarization and demonstration of Hose and Hose fittings Drill – I : Hose pick up Drill Drill – II : Hose Running Drill with one hose Drill – III : Hose Running with two hose Drill – IV : Hose Running with Three hose Familiarization and demonstration of Water tender Water tender drill with close water. Drill I : L-2 Drill with ladder and water tender Drill II : Foam Drill with FB10X single delivery Drill III : Foam Drill with FB5X single delivery Drill IV : Wet Drill with double delivery Drill V : Dry Drill with double delivery
23	HYDRANT, DETECTORS & LADDERS : Introduction to Hydrant & Hydrant Fittings,	Familiarization and demonstration of Hydrant and its associated equipments.

	<p>Water Supply requirements for fire fighting, Introductions to pump & Primers, Detectors & Ladders.</p>	<p>Hydrant Drill I : Opening of single line of three hoses.</p> <p>Hydrant Drill II : Change of burst hose</p> <p>Hydrant Drill III : Increase one length hose</p> <p>Hydrant Drill IV : Decrease one length hose</p> <p>Hydrant Drill V : Use of Collecting, breaching</p> <p>Hydrant Drill VI : Disconnect collecting breaching</p> <p>Hydrant Drill VII : Use of Dividing Breaching</p> <p>Hydrant Drill VIII : Disconnect of Dividing Breaching</p>
		<p>Familiarization and Demonstration of working detector</p> <ul style="list-style-type: none"> • Smoke • Heat • Flame detectors <p>Demonstration and familiarization of Extension Ladder</p> <ul style="list-style-type: none"> • Introduction of parts of extension ladder • Rescue Operation from buildings. <p>Drill I : Pitching of ladder</p> <p>Drill II : Climbing the ladder</p> <p>Drill III : Use leg Lock</p> <p>Drill IV : Ladder Drill with Fireman Lift</p> <p>Drill V : L2 Drill</p>
24	<p>BREATHING SETS : Classification of Respiratory Personal Protective Devices, Selection of Respiratory Personal Protective Devices, Instruction & Training in the use, Maintenance</p>	<p>Familiarization and Demonstration of Parts of BA Set.</p> <p>Drill I : Donning, running and Rescue of casualty through tunnel.</p>

	and Care of Self Containing Breathing Apparatus.	
25	HOUSE KEEPING & WASTE DISPOSAL : Introduction to Good House Keeping & Maintenance, Disposal of Waste Material.	Hose Keeping facilities.
26	OCCUPATIONAL HAZARDS & DANGEROUS CHEMICALS : Introduction to Occupational Health Hazards & Dangerous Properties of Chemicals, Dust, Gases, Fumes, Mist, Vapours, Smoke and Aerosols, Concepts of Threshold Limit Values, Classification of Hazards.	Demonstration of health and environment effect through chart
27 & 28	OCCUPATIONAL HEALTH, HEALTH HAZARDS & PHYSIOLOGICAL EFFECTS : Occupational Health, Definition as per WHO, Common Occupational Diseases: Occupation involving Risk of Contracting these Diseases – Mode of Causation of the Disease and its effects. Occupational Health Hazards, Adverse Effects of Noise, Vibration, Cold, Heat, Stress, Improper Illumination, Thermal Radiation, Ionizing and Non-ionizing Radiations, Application of Ergonomics in Industry for Safety.	Measurement of Noise, Heat and Illumination.
29	RESUSCITATION & FIRST AID : Burns, Fractures, Toxic Ingestion, Bleeding, Wounds and Bandaging, Artificial Respiration, Techniques of Resuscitation.	<ul style="list-style-type: none"> • Familiarization and study First Aid Box • Stretcher Drill • Fireman Lift Drill • Use Bandage • Standard drills on Ambulance Techniques of CPR 1) One Sitter

		II) Two Sitter III) Three Sitter IV) Four Sitter V) Fireman lift VI) CPR drill VII) Choking VIII) Shaffer's Method IX) Rescue drill X) Sylvester's Method XI) Holgar Nielsen Method XII) Eve Rocking Stretcher Method XIII) Emerson Method
		Mouth to Mouth Respiration.
30	PERSONAL PROTECTIVE EQUIPMENT Need for Personal Protection Equipment, Selection, Use, Care & Maintenance of Respiratory and Non-respiratory Personal Protective Equipment, Non-respiratory Protective Devices- Head Protection, Ear Protection, Face and Eye Protection, Hand Protection, Foot Protection, Body Protection.	Demonstration and use of <ul style="list-style-type: none"> • Helmet • Face Shield • BA Set • Body Harness • Gloves • Safety Goggles • Ear Protective Equipment (Ear muffs, Ear Plug) • Safety Shoes BA set, donning, running.
31	WELFARE & TRAINING : General Provision, Drinking Water, Sanitary & Washing, Cloakrooms, Facilities for Food & Drink, Shelters & Living Accommodation, Information & Training.	Demonstration of prevailing condition in industry about <ul style="list-style-type: none"> • Drinking Water • Sanitary & Washing, Cloakrooms • Facilities for Food & Drink Shelters & Living Accommodation
32 & 33	ENVIRONMENT PROTECTION : Safety and Protection of existing environment, Principles & Practices in Prevention & Control of Pollution, Water Pollution, Introduction to Hazardous Waste Management	Water Pollution Check Industrial Visit Visit to Hazardous Waste Management System Site in Industry
34	CHEMICALS & COLOUR CODES : UN & other	Familiarization with the Chemicals used in Industry

	classification of chemicals & colour coding, Safety in chemical industry.	
35	PRECAUTIONS IN PROCESSES : Precautions in processes and operations involving Explosive, Toxic Substances, Dusts, Gases, Vapour Clouds Formation and Combating, Workplace Exposure Limit, Control Measures.	Risk Analysis Exercise
36 & 37	CHEMICAL-COMPATIBILITY & TRANSPORTATION : Chemicals Compatibility considerations, Transportation of Chemicals, Toxic / Flammable / Explosive / Radioactive Substances by all modes – safety precautions, Use of material Safety Data Sheets.	Study of different MSDS to understand nature of toxics/ flammables/ explosives.
38	EMISSION & DISPERSION : Safety in case of Emissions and Dispersion, Liquid Discharge, Gas Discharge, Vapours – Liquids Discharge.	Adoption of safety practices during leakage of toxic gases.
39	BULK STORAGE : General Consideration, Types of Storage, Layout of storages with specific reference to LPG, CNG, Chlorine, Ammonia.	Visit to LPG/ CNG storage Site
40	CHEMICALS ACCIDENT PREVENTION & MAJOR CASE STUDIES : Major Industrial Accidents due to Chemicals (Bhopal Gas Tragedy) Emergency Planning, Major Industrial Disaster Case Studies.	Preparation of Case study of Major Chemical Disasters
41 & 49	Industrial Training (Attached with Industries for On the Job Training)	Industrial Training (Attached with Industries for On the Job Training)
50 & 51	REVISION	REVISION
52	EXAMINATION	EXAMINATION

LIST OF TOOLS & EQUIPMENTS FOR ONE BATCH (20 TRAINEES)

TRADE: HEALTH SAFETY AND ENVIRONMENT

S.No	NAME OF THE TOOLS & EQUIPMENTS	QUANTITY
1.	Water CO2 Type Fire Extinguisher (9 Ltrs)	06
2.	Stored pressure Type Fire Extinguisher (9 Ltrs)	06
3.	Chemical Foam type Fire Extinguisher (9Ltrs)	06
4.	Mechanical Foam type Fire Extinguisher 9Ltrs	06
5.	CO2 Type Fire Extinguisher (4.5 Kg)	06
6.	BC Type Fire Extinguisher 5/10 Kg	04
7.	ABC Type Fire Extinguisher 5/10 Kg	04
8.	Extension Ladder (Size)45/35 ft *	02
9.	All types of Branches or Nozzles *	04
10.	Fire Hose *	
	a) 15m	10
	b) 30m	04
11.	First Aid Box *	02
12.	All Types of small gears *	1 Set
13.	BA Set (Negative & Positive Pressure) *	02
	a) Gas Cylinders	02
	b) Steel Back Plates	02
	c) Face Masks	02
14.	Portable Fire Pump / TFP *	02
15.	All types of couplings *	1 Set
16.	Hydrant-Stand Pipe Type *	02
17.	Fire Trays *	02
18.	Manual call point *	01
19.	Entry Suit/ Proximity Suit *	02
20.	Hose reel system *	01
21.	Nitrogen Cylinder *	01

22.	Hose Box	*	01
23.	Fire Fighting Point complete Set	*	01
24.	Section Hose 10 ft	*	02
25.	Section Wrench	*	02
26.	Metal Strainer	*	02
27.	Basket Strainer	*	01
28.	Sprinkler	*	02
29.	Ropes 100 ft Long	*	01
30.	Lines 100 ft Long	*	01
31.	Control Panel – Model	*	01
32.	Personal Protective Equipment		
33.	a) Helmet (Type A,B,C)		20
34.	b) Laser Welding Safety Goggles		10
35.	c) Face Shield		10
36.	d) Welding Shield		10
37.	e) Ear Muff		10
38.	f) Ear Plug		10
39.	g) Canal Caps		10
40.	h) Safety Shoes		20
41.	i) Asbestos Gloves		10
42.	j) Electrical Hand Gloves		10
43.	k) Hand Gloves (Rubber)		10
44.	l) Dust Mask		10
45.	Personal Protective Clothing for men		
	a) Safety Shirt		10
	b) Safety Trouser		10
	c) Safety Jacket		10
	d) Cooling Vest		10
	e) Gum Boots		10
46.	Personal Fall Arrest System (PFAS)	*	02

47.	Tripod	*	02
48.	Pulley	*	02
49.	Suspended Scaffold	*	02
50.	Gas Detector	*	02
51.	Plastic Tunnel (Sewer Rescue Drill)	*	04
52.	Body Harness		01
53.	Collecting Breeching	*	02
54.	Dividing Breeching	*	02
55.	Hydrant Flange	*	02
56.	Hydrant Key & Bar (With hydrant Spindle)	*	01
57.	Adopter for Air Store Pressure	*	02
58.	Hydraulic Pressure Testing Machine	*	01
59.	Sprinklers Head (Bulb Type, Fusible Type)	*	02
60.	Safety Belt		01
61.	Computer System	*	06
62.	Computer Table	*	06
63.	Computers Chairs	*	06
64.	White Board		01
65.	L.C.D. Projectors		02
66.	UPS 650 VA offline	*	06
67.	All types of Detectors 1 Pcs. of each	*	04
68.	Flux meter	*	06
69.	Dosi meter	*	01
70.	Cut model of Fire Extinguisher		02
71.	Fire Suit (Common for all classes)		02
72.	Fire Tender (one for the Institute)	*	01
73.	Rescue Van (one for the Institute)	*	01

LIST OF UNIFORM FOR ONE BATCH

1.	Uniform	
	1. Uniform set	2 Set each
	2. Combat Dress	2 Set each
	3. PT Kit	2 Set each
	4. Track Suit	2 Set each

* Note :In the above list of tools and equipments, the items bearing star mark are meant to be used for three courses viz Health Safety and Environment, Fireman, Fire Technology and Industrial Safety Management. If a institute is running all the above mentioned trades , items bearing star mark are not required to be purchased separately .