



GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP
DIRECTORATE GENERAL OF TRAINING

COMPETENCY BASED CURRICULUM

HEALTH, SAFETY & ENVIRONMENT

(Duration: One Year)

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL- 4



SECTOR – HEALTHCARE



Directorate General of Training

HEALTH, SAFETY & ENVIRONMENT

(Non-Engineering Trade)

(Revised in 2019)

Version: 1.2

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL - 4

Developed By

Ministry of Skill Development and Entrepreneurship

Directorate General of Training

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1. COURSE INFORMATION

During the one-year duration of “Health, Safety & Environment” trade, a candidate is trained on Professional Skill, Professional Knowledge and Employability Skill related to job role. In addition to this, a candidate is entrusted to undertake project work, extracurricular activities and on-the-job training to build up confidence. The broad components covered under Professional Skill subject are as below:-

The trainees will be able to identify accident prone areas and adopt methods for reducing accidents following safety precautions; identify and apply safety policy in an industry and list out the duties and implement safety targets, objectives, standards, practices and performances. They will also identify marking and evaluate performance of explosives. They can prepare profile with an appropriate accuracy as per safety precaution in workshop. They will be able to plan, select and implement safety and health objectives, targets and performance standards and identify the various techniques of fire and other hazards. They will also identify and select methods of operation of fire extinguishers as per requirements; plan and execute hose & hose fittings; select and prepare the hydrant and pump system for proper application; identify and select respiratory personal protective devices and its maintenance and measure the effect of radiation and control the radiation on human body.

The trainees will be able to identify parameters governing the safety in construction and its impact on environment. They will also identify various techniques of earthing fault protection. They can plan and apply the methods of plant design and housekeeping, check and verify various industrial Hazards in process of melting (Furnaces), Casing and Forging. They can identify various types of water relay management systems, execute the risk analysis exercise, select and use PPE and care and maintain the same. They will be able to apply the method of bulk storage system of LPG/CNG and prepare case study on major Chemical Disasters.

2. TRAINING SYSTEM

2.1 GENERAL

The Directorate General of Training (DGT) under Ministry of Skill Development & Entrepreneurship offers a range of vocational training courses catering to the need of different sectors of economy/ Labour market. The vocational training programmes are delivered under the aegis of Directorate General of Training (DGT). Craftsman Training Scheme (CTS) with variants and Apprenticeship Training Scheme (ATS) are two pioneer schemes of DGT for strengthening vocational training.

‘Health, Safety & Environment’ trade under CTS is one of the popular courses delivered nationwide through a network of ITIs. The course is of one-year duration. It mainly consists of Domain area and Core area. The Domain area (Trade Theory & Practical) imparts professional skills and knowledge, while the Core area (Employability Skill) imparts requisite core skills, knowledge, and life skills. After passing out the training program, the trainee is awarded National Trade Certificate (NTC) by DGT which is recognized worldwide.

Trainee broadly needs to demonstrate that they are able to:

- Read and interpret technical parameters/documents, plan and organize work processes, identify necessary materials and tools;
- Perform tasks with due consideration to safety rules, accident prevention regulations and environmental protection stipulations;
- Apply professional skill, knowledge & employability skills while performing jobs.
- Document the technical parameters related to the task undertaken.

2.2 PROGRESSION PATHWAYS

- Can join industry as Craftsman and will progress further as Senior Craftsman, Supervisor and can rise to the level of Manager.
- Can become Entrepreneur in the related field.
- Can join Apprenticeship programs in different types of industries leading to a National Apprenticeship certificate (NAC).
- Can join Crafts Instructor Training Scheme (CITS) in the trade for becoming an instructor in ITIs.
- Can join Advanced Diploma (Vocational) courses under DGT as applicable.

2.3 COURSE STRUCTURE

Table below depicts the distribution of training hours across various course elements during a period of one year: -

S No.	Course Element	Notional Training Hours
1.	Professional Skill (Trade Practical)	1200
2.	Professional Knowledge (Trade Theory)	240
3.	Employability Skills	160
	Total	1600

2.4 ASSESSMENT & CERTIFICATION

The trainee will be tested for his skill, knowledge and attitude during the period of course through formative assessment and at the end of the training programme through summative assessment as notified by the DGT from time to time.

a) The **Continuous Assessment** (Internal) during the period of training will be done by **Formative Assessment Method** by testing for assessment criteria listed against learning outcomes. The training institute has to maintain an individual trainee portfolio as detailed in assessment guideline. The marks of internal assessment will be as per the formative assessment template provided on www.bharatskills.gov.in.

b) The final assessment will be in the form of summative assessment. The All India Trade Test for awarding NTC will be conducted by Controller of examinations, DGT as per the guidelines. The pattern and marking structure are being notified by DGT from time to time. **The learning outcome and assessment criteria will be the basis for setting question papers for final assessment.** The examiner during final examination will also check the individual trainee's profile as detailed in assessment guideline before giving marks for practical examination.

2.4.1 PASS REGULATION

For the purposes of determining the overall result, weightage of 100% is applied for six months and one-year duration courses and 50% weightage is applied to each examination for two years courses. The minimum pass percent for Trade Practical and Formative assessment is 60% & for all other subjects is 33%. There will be no Grace marks.

2.4.2 ASSESSMENT GUIDELINE

Appropriate arrangements should be made to ensure that there will be no artificial barriers to assessment. The nature of special needs should be taken into account while undertaking the assessment. Due consideration should be given while assessing for teamwork, avoidance/reduction of scrap/wastage and disposal of scrap/waste as per procedure, behavioral attitude, sensitivity to the environment and regularity in training. The sensitivity towards OSHE and self-learning attitude are to be considered while assessing competency.

Assessment will be evidence based comprising the following:

- Job carried out in labs/workshop
- Record book/ daily diary
- Answer sheet of assessment
- Viva-voce
- Progress chart
- Attendance and punctuality
- Assignment
- Project work

Evidences and records of internal (Formative) assessments are to be preserved until forthcoming examination for audit and verification by examining body. The following marking pattern to be adopted while assessing:

Performance Level	Evidence
(a) Weightage in the range of 60%-75% to be allotted during assessment	
For performance in this grade, the candidate should produce work which demonstrates attainment of an acceptable standard of craftsmanship with occasional guidance, and due regard for safety procedures and practices.	<ul style="list-style-type: none"> • Demonstration of good skills and accuracy in the field of work/ assignments. • A fairly good level of neatness and consistency to accomplish job activities. • Occasional support in completing the task/ job.
(b) Weightage in the range of 75%-90% to be allotted during assessment	
For this grade, a candidate should produce work which demonstrates attainment of a reasonable standard of craftsmanship, with	<ul style="list-style-type: none"> • Good skill levels and accuracy in the field of work/ assignments. • A good level of neatness and consistency

<p>little guidance, and regard for safety procedures and practices.</p>	<p>to accomplish job activities.</p> <ul style="list-style-type: none"> • Little support in completing the task/job.
<p>(c) Weightage in the range of more than 90% to be allotted during assessment</p>	
<p>For performance in this grade, the candidate, with minimal or no support in organization and execution and with due regard for safety procedures and practices, has produced work which demonstrates attainment of a high standard of craftsmanship.</p>	<ul style="list-style-type: none"> • High skill levels and accuracy in the field of work/ assignments. • A high level of neatness and consistency to accomplish job activities. • Minimal or no support in completing the task/ job.

3. JOB ROLE

Health, Safety and Environment Officer; applies theory and principles of environmental engineering and occupational health and safety at the work site to ensure a safe and healthful working environment, protect the surrounding environment that may be impacted by the facility, improve employee relations and productivity, and minimize business risk through the identification and elimination/minimization of environmental, health and safety risks.

Reference NCO-2015: 3257.0600 - Health, Safety and Environment Officer

4. GENERAL INFORMATION

Name of the Trade	HEALTH, SAFETY & ENVIRONMENT
Trade Code	DGT/1049
NCO - 2015	3257.0600
NSQF Level	Level-4
Duration of Craftsmen Training	One Year (1600 Hours)
Entry Qualification	<ul style="list-style-type: none"> a. Passed class 10 Examination b. The minimum physical requirements are <ul style="list-style-type: none"> 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.
Minimum Age	14 years as on first day of academic session.
Eligibility for PwD	LD
Unit Strength (No. of Student)	24 (There is no separate provision of supernumerary seats)
Space Norms	1000 Sq. m (for practical Training area)
Power Norms	2 KW
Instructors Qualification for:	
(i) Health, Safety & Environment Trade	<p>B.Voc/Degree in Fire & Safety Engineering/ Degree in Fire Science from AICTE/UGC recognized university/ college with one-year experience in the relevant field.</p> <p style="text-align: center;">OR</p> <p>Post Graduate Diploma (Minimum 2 years) in Industrial Safety Engineering/ Fire and Industrial Safety Engineering/ Health, Safety & Environment from recognized board of education or relevant Advanced Diploma (Vocational) from DGT with two-year experience in the relevant field.</p> <p style="text-align: center;">OR</p> <p>Defense/ Para Military Forces Officer JCOs/NCOs with 10 years of experience in the relevant field.</p> <p style="text-align: center;">OR</p>

	<p>National Examination Board Occupational Safety and Health (NEBOSH)/ Occupational Safety and Health Administrator (OSHA) Certification with one-year experience in the relevant field.</p> <p style="text-align: center;">OR</p> <p>NTC/NAC passed in the trade of Health Safety and Environment with 3 years of post-qualification experience in the relevant field.</p> <p><u>Essential Qualification:</u> Relevant National Craft Instructor Certificate (NCIC) in any of the variants under DGT.</p> <p><i>Note:- Out of two Instructors required for the unit of 2 (1+1), one must have Degree/Diploma and other must have NTC/NAC qualifications. However, both of them must possess NCIC in any of its variants.</i></p>		
(ii) Employability Skill	<p>MBA/ BBA / Any Graduate/ Diploma in any discipline with Two years' experience with short term ToT Course in Employability Skills from DGT institutes.</p> <p>(Must have studied English/ Communication Skills and Basic Computer at 12th / Diploma level and above)</p> <p style="text-align: center;">OR</p> <p>Existing Social Studies Instructors in ITIs with short term ToT Course in Employability Skills from DGT institutes.</p>		
(iii) Minimum Age for Instructor	21 Years		
List of Tools and Equipment	As per Annexure – I		
Distribution of training on hourly basis: (Indicative only)			
Total Hrs./ Week	Trade Practical	Trade Theory	Employability Skills
40 Hours	30 Hours	6 Hours	4 Hours

5. LEARNING OUTCOME

Learning outcomes are a reflection of total competencies of a trainee and assessment will be carried out as per the assessment criteria.

5.1 LEARNING OUTCOME (TRADE SPECIFIC)

1. Identify accident prone areas and adopt methods for reducing accidents following safety precautions.
2. Identify and apply safety policy in an industry and List out the duties and implement Safety Targets, Objectives, Standards, Practices and Performances.
3. Identify marking and evaluate performance of explosives.
4. Prepare profile with an appropriate accuracy as per safety precaution in workshop.
5. Select the construction site for visit, plan and prepare the report.
6. Select, plan and implement safety and health objectives, targets and performance standards.
7. Identify various techniques of fire and other hazards.
8. Identify and select methods of operation of fire extinguishers as per requirements.
9. Plan and execute hose and hose fittings.
10. Select and prepare the hydrant and pump system for proper application.
11. Identify and select respiratory personal protective devices and carry out its maintenance.
12. Measure the effect of radiation and control the radiation on human body.
13. Identify parameters governing the safety in construction and its impact on environment.
14. Identify various techniques of earthing standards and earth fault protection.
15. Plan and apply various methods of plant design and housekeeping.
16. Check and verify various industrial Hazards in process of melting (Furnaces), Casting and Forging.
17. Identify various types of water relay management systems.
18. Execute the risk analysis exercise.
19. Select and use PPE, care and maintain the same.
20. Apply the method of bulk storage system of LPG/CNG.
21. Prepare case study on major Chemical Disasters.

6. ASSESSMENT CRITERIA

LEARNING OUTCOMES	ASSESSMENT CRITERIA
1. Identify accident prone areas and adopt methods for reducing accidents following safety precautions.	Identify the various accident-prone areas.
	Demonstrate the safety belt helmets, gloves and Goggles, uses it.
	Identify and apply Accident prevention techniques.
	Use Safety belt helmet gloves and goggles.
2. Identify and apply safety policy in an industry and List out the duties and implement Safety Targets, Objectives, Standards, Practices and Performances.	Carry out the plant safety inspection with the help of check list.
	Visit to industrial unit and review of prevailing safety Practices.
	Observe prevailing safety provision, their condition, welfare measures include medical facilities, crèches and religious places.
	Get acquainted with various compensations and Documentations.
3. Identify marking and evaluate performance of explosives.	Display explosives, identify and mark as per explosives act.
	Demonstrate hands on experience with hand and power tools.
	Perform measurement of Heat, Illumination and Noise Demonstration.
	Carry related electrical experiments.
4. Prepare profile with an appropriate accuracy as per safety precaution in workshop.	Identify various processes during production and safety.
	Witness construction and safety precaution observed.
5. Select the construction site for visit, plan and prepare the report.	Practice good housekeeping and study egress and safe access.
	Identify causes of accident during material handling.
	Perform pitching of ladders, proper use of safety belt and preparation of work permit.
6. Select, plan, and	Develop a workplace Safety and Health Policy.

	Plan safety and Health objectives and Targets, performance standards.
	Carry out Implementation and Operation Structure and responsibilities, individual responsibilities, Safety Consultation.
	Apply awareness and competence.
	Identify communication-information coming into the organization.
7. Identify various techniques of fire and other hazards.	Identify general causes and classification of fire, Demonstrate detection of fire, extinguishing methods, firefighting installations with and without water.
	Identify machine guards and its types, automation.
	Recognize high pressure hazards, safety, emptying, inspecting, repairing, hydraulic and non-destructive testing, hazards and control in mines.
8. Identify and select methods of operation of fire extinguishers as per requirements.	Identify Training Objectives and Methods, Deliver Training.
	Access to Specialist advice and Services.
	Maintain relationships within the organization, relationships outside the organization, external specialist safety and safety support.
9. Plan and execute hose and hose fittings.	Perform hose drill.
	Carry out hose pick up.
	Perform hose laying.
	Carry out hose joining.
	Perform hose replacement at different position.
10. Select and prepare the hydrant and pump system for proper application.	Identify Appropriate Action.
	Demonstrate risk assessment records and control.
	Familiarize with hydrant and its associated equipments.
	Demonstrate practical pump operation, fault finding of primer failure, method of ladder pitching and climbing Application of Arm Hold and Leg Lock.
11. Identify and select respiratory personal protective devices and carry out its maintenance.	Identify stages in plant life and unsafe condition in factories.
	Demonstrate maintenance and safety, basics safety programming, safety department functions, Rules and regulation of safety department.
	Check responsibility of management for safety in plant, safeguarding the public.

	Identify responsibility of government, Social organization and public authorities.
12. Measure the effect of radiation and control the radiation on human body.	Identify types and effects of radiation on human body, measure and detect radiation intensity.
	Identify effects of radiation on human body, measure disposal of radioactive waste, control radiation.
	Demonstrate industrial noise -sources and its control, effects of noise on the auditory system and health; measure noise.
	Demonstrate vibration - effects, measurement and control measures, Industrial Hygiene.
13. Identify parameters governing the safety in construction and its impact on environment.	Identify scope, importance and need for public awareness about our environment.
	Observe economic and social security, environment impact of transportation.
	Explain global warming and greenhouse effect, urbanization, acid rain.
	Demonstrate health and environment effect through chart.
	Explain environmental pollution — causes, effects and control measures of air pollution, water pollution, soil pollution.
14. Identify various techniques of earthing standards and earth fault protection.	Demonstrate safe limits of amperages, voltages, distance from lines etc. Joints and Connections, Overload and Short circuit protection.
	Explain earthing standards and earth fault protection, protection against voltage.
	Identify criteria in their selection, installation, maintenance.
	Explain Borrowed neutrals, Electrical equipment in hazardous atmosphere.
15. Plan and apply the methods of plant design and housekeeping.	Demonstrate Plant layout, design and safe distance, Ventilation and heat stress, Significance of ventilation, Natural ventilation.
	Apply Mechanical ventilation Air conditioning.
	Plan Safety and good housekeeping, Disposal of scrap and other trade wastes.
	Apply Spillage prevention, Use of colour as an aid of housekeeping, Cleaning methods.
	Inspect and make checklists, identify advantages of good houses.

16. Check and verify various industrial Hazards in process of melting (Furnaces), Casing and Forging.	Demonstrate prevailing condition in industry about Drinking Water Sanitary and Washing, Cloakrooms.
	Identify Facilities for Food and Drink Shelters and Living Accommodation.
	Explain Disaster management floods, earthquake, cyclone and slides.
	Identify role of individual in prevention of pollution.
17. Identify various types of water relay management systems.	Maintain ladders and trolleys.
	Design turntable ladders, water tender and special equipment.
	Identify Types of water relay system.
	Check various arrangements of water relay system.
18. Execute the risk analysis exercise.	Check definitions of incident, accident, injury, dangerous occurrences, unsafe acts, unsafe conditions, hazards, error, oversight, mistakes etc.
	Demonstrate Accident Prevention: Theories / Models of accident occurrences, Principles of accident prevention.
	Demonstrate Accident and Financial implications, Hazard identification and analysis, fault tree analysis, Job safety analysis, examples, Plant safety inspection objectives and types, check procedure of inspection.
19. Select and use PPE, care and maintain the same.	Select and Use Personal Protective Equipments: Need, selection, supply, use, care and maintenance, Personal protective devices for head, ear, face, eye, foot, knee and body protection, Respiratory personal protective devices.
	Carry out Cardiac massage, explain poisoning, wounds.
20. Apply the method of bulk storage system of LPG/CNG.	Identify General Consideration types of Storage.
	Plan and prepare layout of storages with specific reference to LPG, CNG, Chlorine, Ammonia.
21. Prepare case study on major Chemical Disasters.	Prepare case study on Major Chemical Disasters.
	Identify various Occupational Health Hazards.
	Explain Dangerous Properties of Chemicals, Dust, Gases, Fumes, Mist, Vapours, Smoke and Aerosols.

7. TRADE SYLLABUS

SYLLABUS FOR HEALTH, SAFETY & ENVIRONMENT TRADE			
DURATION: ONE YEAR			
Duration	Reference Learning Outcome	Professional Skills (Trade Practical) With Indicative Hours	Professional Knowledge (Trade Theory)
Professional Skill 120 Hrs; Professional Knowledge 24 Hrs	Identify accident prone areas and adopt methods for reducing accidents following safety precautions.	<ol style="list-style-type: none"> 1. Familiarisation with the Institute, Documentation of Student, Issuance of Dress, Books, Hostel Accommodation (If required) and Store. (06hrs.) 2. Importance of trade training, Equipments used in the trade, types of work done by the trainees in the trade. (10 hrs.) 3. Introduction to safety equipments and their uses. Introduction of first aid, Road safety, operation of Electrical mains. (14hrs.) 4. Knowledge of General Safety, Occupational health and hygiene. (30hrs.) 	<p>HAZARD: Introduction to Hazard, Causes, Identification, Evaluation & Control of Hazard. HAZOP Analysis, Sources for Information on Hazard Evaluation.</p> <p>Preparative work (Obtain basic information, information should be converted into suitable form, Plan the sequence & meeting schedule), Team composition & approach. Methodology, Advantages of HAZOP Study Limitation of HAZOP study. (12 hrs)</p>
		<ol style="list-style-type: none"> 2. Site visit for Hazard identification and Evaluation. (15 hrs.) 3. Study of Risk at work site and preparation and initiation of reports. (15 hrs.) 	<p>RISK ANALYSIS: Definition of Risk, Risk Analysis, Introduction to Failure Mode & Effect Analysis (FMEA), Fault Tree Analysis (FTA), Event Tree Analysis (ETA). (06 hrs)</p>

		4. Visit to accident prone area Practical usages of Safety belt helmet gloves, and goggles. (30hrs.)	ACCIDENT: Definition of Accidents, Classification of Accidents, Need for the Analysis of Accidents, Methods Adopted for Reducing Accidents, Investigation of Accidents, Safety Slogans Principles of Accident(Heinrich theory), Accident ratio study, identification of unsafe mechanical/ physical conditions, identification of unsafe acts. Frequency Rate, Prevention Methods. (06 hrs)
Professional Skill 90 Hrs; Professional Knowledge 18 Hrs	Identify and apply safety policy in an industry and List out the duties and implement Safety Targets, Objectives, Standards, Practices and Performances.	5. Carry out the plant safety inspection with the help of check list. (15 hrs.)	PREPARATION & ASSESSMENT OF SAFETY AUDIT : Introduction to Safety Checklist, Plant Safety Inspection, Safety Precautions adopted in the Plant, Safety Tag System, Safety Audit Report Objective of safety audit, type of audit, Audit team, Elements of safety audit, Method of audit, audit steps, concept and lay out of audit report. (06 hrs)
		6. Visit to industrial unit and review of prevailing safety Practices (15 hrs.)	
		7. Visit to industrial unit to observe prevailing safety provision, their condition, welfare measures include medical facilities, crèches and religious places.(30hrs.)	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
8. Awareness about various compensations and			

		Documentation. (30hrs.)	Performances. Motivation & Communication as part of Safety Programme. Duties & responsibility of an owner, Duties and responsibilities of a worker, Role of a supervisor Role of a safety engineer ILO CONVENTION: Introduction of ILO and Conventions. (12 hrs)
Professional Skill 60 Hrs; Professional Knowledge 12 Hrs	Identify marking and evaluate performance of explosives.	9. Display of explosives, their identification and marking as per explosives act. (15 hrs.) 10. Hands on experience with Hand and power tools. (15 hrs.) 11. Measurement of Heat, Illumination and Noise Demonstration. (15 hrs.) 12. Determination of related electrical experiments.(15 hrs.)	FACTORIES ACT 1948 (Amended):-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, Creches, Welfare offers, Right & Obligation of workers.(12 hrs)
Professional Skill 30 Hrs; Professional Knowledge 06 Hrs	Prepare profile with an appropriate accuracy as per safety precaution in workshop.	13. Visit to workshop and steel furniture houses to witness various processes during production and safety. Precaution adopted. (15	WELFARE & TRAINING: General Provision, Drinking Water, Sanitary & Washing, Cloakrooms, Facilities for Food & Drink, Shelters & Living Accommodation,

		hrs.) 14. Visit to construction site to witness construction and safety precaution observed. (15 hrs.)	Information & Training. (06 hrs.)
Professional Skill 60 Hrs; Professional Knowledge 12 Hrs	Select the construction site for visit, plan and prepare the report.	15. Construction Site Visit Practices of good House Keeping and Study of egress and safe access. (15 hrs.) 16. Construction Site Visit and identifying of causes of accident during material handling. (08hrs.) 17. Construction Site Visit, Pitching of ladders, proper use of safety belt and preparation of work permit. (07 hrs.)	ENVIRONMENT PROTECTION: Safety and Protection of existing environment, Principles & Practices in Prevention & Control of Pollution, Water Pollution, Introduction to Hazardous Waste Management. (06 hrs.)
		18. Visit to excavation Site, identification and discussion with site engineer about safety precaution taken. (30hrs.)	Social Security Legislation: Social Security Legislation, Introduction to Workman's Compensation Act, Contract Labour Regulation Act. (06 hrs.)
Professional Skill 90 Hrs; Professional Knowledge 18 Hrs	Select, plan, and implementsafety and Health objectives, targets and performance standards.	19. Developing a workplace Safety and Health Policy. (10 hrs.) 20. Planning – safety and Health objectives and Targets, performance standards. (10 hrs.) 21. Implementation and Operation Structure and responsibilities, individual responsibilities, Safety Consultation. (10 hrs.)	Miscellaneous Acts & Rules Explosives Act 1884 and Rules. General provision of Gas Cylinders Rules, The Building and other Construction Worker's Welfare Cess Act & Rules 1996. Environment Protection Legislation: Introduction to Prevention and Control of Pollution Act 1981 and 1982, Environment

			Protection Act 1986 (06 hrs.)
		<p>22. Awareness and competence. (15 hrs.)</p> <p>23. Communication- Information coming into the organization. (15 hrs.)</p> <p>24. Information Flow within the Organization. (15 hrs.)</p> <p>25. Document Control: Safety and Health System Records. (15 hrs.)</p>	<p>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 behavior of gases, , Basics of oxidizing and reducing agents, Acids. Flammable liquids- classification and types of tanks, Dust and Explosion, Liquid and Gas Fires, LPG. UCVE, BLEVE, Slope over, Boil over, Gas laws, P-V-T relation for perfect gas. (12 hrs.)</p>
<p>Professional Skill 30 Hrs;</p> <p>Professional Knowledge 06 Hrs</p>	<p>Identify various techniques of fire and other hazards.</p>	<p>Fire and other Hazards:</p> <p>47. General causes and classification of fire, Detection of fire, extinguishing methods, fire fighting installations with and without water. (10 hrs.)</p> <p>48. Machine guards and its types, automation. (10 hrs.)</p> <p>49. High pressure hazards, safety, emptying, inspecting, repairing, hydraulic and non-destructive testing, hazards and control in mines. (10 hrs.)</p>	<p>Anatomy of Fire: Definition of Combustion, Elements of Combustion, Products of Combustion, Heat of reaction and calorific value, Flash point, Fire point, Ignition temperature and spontaneous combustion. Fire Triangle, fire tetrahedron, fire pyramid, source of heat,(Chemical, mechanical, Electrical, Nuclear etc.), Classification of fire and method of fire extinguishment, oxygen and its effects on combustion, Mode of heat transfer(Conduction,</p>

			Convection & Radiation).(06 hrs.)
Professional Skill 30 Hrs; Professional Knowledge 06 Hrs	Identify and select methods of operation of fire extinguishers as per requirements.	26. Identify Training Objectives and Methods, Deliver Training. (08 hrs.) 27. Evaluation and feedback, Specialist Advice and Services.(07 hrs.) 28. Access to Specialist advice and Services. (07 hrs.) 29. Relationships within the organization, relationships Outside the organization, external specialist safety and safety support. (08 hrs.)	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. Types of fire extinguishing agents, Rating system for portable fire extinguishers, Limitation of fire extinguishers, inspection requirement.(06 hrs.)
Professional Skill 30 Hrs; Professional Knowledge 06 Hrs	Plan and execute hose and hose fittings.	30. Hose drill a) hose pick up b) hose laying c) hose joining d) hose replacement at different position (30 hrs.)	Hose & Pumps, Water Tender: Fire Service Hose & Hose Fittings, Fixed Fire Fighting Installations Ropes & lines, Practical Fireman ship, Small & Special Gears, Water Tender. Types of fire hoses, its construction, caused of decay care& maintenance Types of hose fittings, identification and use of hose fittings. Types of FFF installations Testing care & maintenance. (06 hrs.)
Professional Skill 30 Hrs; Professional Knowledge	Select and prepare the hydrant and pump system for proper application.	31. Identify Appropriate Action. (05 hrs.) 32. Risk assessment records and control. (05 hrs.) 33. A simple Risk estimation	Hydrant, Detectors & Ladders: Introduction to Hydrant & Hydrant Fittings, Water Supply requirements for firefighting, Introductions

06 Hrs		<p>example – Hazards, remedial measures. (05 hrs.)</p> <p>34. Motivation of employees, Insurance coverage of Industrial plant & personnel. (05 hrs.)</p> <p>35. Familiarization and demonstration of Hydrant and its associated equipments. (05 hrs.)</p> <p>36. Practical pump operation, fault finding of primer failure, method of ladder pitching & climbing Application of Arm Hold and Leg Lock. (05 hrs.)</p>	to pump & Primers, Detectors & Ladders.(06 hrs.)
Professional Skill 60 Hrs; Professional Knowledge 12 Hrs	Identify and select respiratory personal protective devices and carry out its maintenance.	<p>37. Stages in plant life and unsafe condition in factories. (15 hrs.)</p> <p>38. Maintenance & safety, basics safety programming, safety department, Rules and regulation of safety department. (15 hrs.)</p> <p>39. Responsibility of management for safety in plant, safeguards the public. (15 hrs.)</p> <p>40. Responsibility of government, Social organization and public authorities. (15 hrs.)</p>	<p>BREATHING SETS: Classification of Respiratory Personal Protective Devices, Selection of Respiratory Personal Protective Devices, Instruction & Training in the use, Maintenance and Care of Self Containing Breathing Apparatus.</p> <p>RESUSCITATION & FIRST AID: Burns, Fractures, Toxic Ingestion, Bleeding, Wounds and Bandaging, Artificial Respiration, Techniques of Resuscitation.(12 hrs.)</p>
Professional Skill 30 Hrs;	Measure the effect of radiation and	Radiation and Industrial Hazards:	Introduction to Radiation and Industrial Hazards (06

<p>Professional Knowledge 06 Hrs</p>	<p>control the radiation on human body.</p>	<p>41. Types and effects of radiation on human body, Measurement and detection of radiation intensity.(08 hrs.) 42. Effects of radiation on human body, Measurement –disposal of radioactive waste, Control of radiation. (07 hrs.) 43. Industrial noise - Sources, and its control, Effects of noise on the auditory system and health, Measurement of noise. (08 hrs.) 44. Vibration - effects, measurement and control measures, Industrial Hygiene. (07 hrs.)</p>	<p>hrs.)</p>
<p>Professional Skill 120 Hrs; Professional Knowledge 24 Hrs</p>	<p>Identify parameters governing the safety in construction and its impact on environment.</p>	<p>46. Scope and Importance; need for public awareness about our environment. (12 hrs.) 47. Economic and social security; Environment impact of transportation. (12 hrs.) 48. Environmental impact assessment (EIA) — purpose, procedure and benefits of EIA; Biodiversity and its conservation. (12 hrs.) 49. Global warming and</p>	<p>Basic Philosophy of Safety: Peculiarities & Parameters governing the safety in construction e.g. Site Planning, Layout, Safe Access / Egress. Construction Industry: General safety precautions related to construction industry, Safety in the use of Construction Machinery. Industrial Lighting: Introduction to Lighting, Ventilation, Heat Stress, Cold Stress, Noise & Vibration.(24</p>

		<p>greenhouse effect, urbanization, acid rain. (14hrs.)</p> <p>50. Demonstration of health and environment effect through chart. (30 hrs.)</p> <p>51. Case studies, population explosion, family welfare programmers-HI V/AIDS, women and child welfare. (20 hrs.)</p> <p>52. Environmental pollution – causes, Effects and control measures of air pollution, water pollution, soil pollution. (20 hrs.)</p>	hrs.)
<p>Professional Skill 30 Hrs;</p> <p>Professional Knowledge 06 Hrs</p>	<p>Identify various techniques of earthing standards and earth fault protection.</p>	<p>Electrical Hazards and Hazards in Construction Industry:</p> <p>53. Safe limits of amperages, voltages, distance from lines, etc., Joints and connections, Overload and Short circuit protection. (08 hrs.)</p> <p>54. Earthing standards and earth fault protection, Protection against voltage fluctuations, Effects of shock on human body Hazards from Borrowed neutrals. (07 hrs.)</p> <p>55. Electrical equipment in hazardous atmosphere. (08 hrs.)</p> <p>56. Criteria in their</p>	<p>Electrical Safety: Electrical Hazards, Static Electricity. Identification and Zoning of Hazardous area, Classification of products, (06 hrs.)</p>

		selection. Installation, maintenance. (07 hrs.)	
Professional Skill 60 Hrs; Professional Knowledge 12 Hrs	Plan and apply various methods of plant design and housekeeping.	<p>Plant design and Housekeeping:</p> <p>57. Plant layout, design and safe distance, Ventilation and heat stress, Significance of ventilation, Natural ventilation. (15 hrs.)</p> <p>58. Mechanical ventilation Air conditioning. (10 hrs.)</p> <p>59. Safety and good housekeeping, Disposal of scrap and other trade wastes. (15 hrs.)</p> <p>60. Spillage prevention, Use of colour as an aid of housekeeping, Cleaning methods. (10 hrs.)</p> <p>61. Inspection and Checklists, Advantages of good houses. (10 hrs.)</p>	Excavations, Demolitions & Structural Frames: Safety related to Excavation, Demolitions Framework& Concrete Work, Pile Driving and Work over Water (12 hrs.)
Professional Skill 60 Hrs; Professional Knowledge 12 Hrs	Check and verify various industrial Hazards in process of melting (Furnaces), Casing and Forging.	<p>62. Demonstration of prevailing condition in industry about Drinking Water Sanitary & Washing, Cloakrooms Facilities for Food & Drink Shelters & Living Accommodation. (30 hrs.)</p> <p>63. Disaster management floods, earthquake, cyclone, and slides, role of individual in prevention of pollution.</p>	<p>SAFETY IN MELTING, BOILERS: Hazards in process of melting (Furnaces), Casing, and Forging. Automatic Manufacturing Activity - Machining, Chipping, Grinding, Safety Precautions in use of Boilers. (06 hrs.)</p> <p>Precautions in Processes: Precautions in processes and operations involving Explosive, Toxic Substances, Dusts, Gases, Vapour Clouds</p>

		(30 hrs.)	Formation and Combating, Workplace Exposure Limit, Control Measures. (06 hrs.)
Professional Skill 60 Hrs; Professional Knowledge 12 Hrs	Identify various types of water relay management systems.	64. Maintenance of ladders and trolleys. (15 hrs.) 65. Design of turntable ladders, water tender and special equipment. (15 hrs.) 66. Identify Types of water relay system. (15hrs.) 67. Arrangements of water relay system. (15hrs.)	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 too(12 hrs.)
Professional Skill 90 Hrs; Professional Knowledge 18 Hrs	Execute the risk analysis exercise.	Principles of accidents prevention : 68. Definition: Incident, accident, injury, dangerous occurrences, unsafe acts, unsafe conditions, hazards, error, oversight, mistakes, etc. (30 hrs.) 69. Accident Prevention: Theories / Models of accident occurrences, Principles of accident prevention. (30 hrs.) 70. Accident and Financial implications, Hazard identification and analysis, fault tree analysis, Job safety analysis, examples, Plant safety inspection objectives and types check procedure inspection. (30 hrs.)	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. (18 hrs.)
Professional	Select and use PPE,	71. Body structure and	PERSONAL PROTECTIVE

<p>Skill 60 Hrs; Professional Knowledge 12 Hrs</p>	<p>care and maintain the same.</p>	<p>Functions, Position of causality, the unconscious casualty, fracture and dislocation, Injuries in muscles and joints, Bleeding, Burns, Scalds and accidents caused by electricity, Respiratory problems, Rescue and Transport of Casualty. (20 hrs.) 72. Cardiac massage, poisoning, wounds. (20 hrs.) 73. Personal Protective Equipments: Need, selection, supply, use, care and maintenance, Personal protective devices for head, ear, face, eye, foot, knee and body protection, Respiratory personal protective devices. (20 hrs.)</p>	<p>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. (12 hrs.)</p>
<p>Professional Skill 30 Hrs; Professional Knowledge 06 Hrs</p>	<p>Apply the method of bulk storage system of LPG/CNG.</p>	<p>74. Visit to LPG/ CNG storage Site. (30 hrs.)</p>	<p>BULK STORAGE: General Consideration, Types of Storage, Layout of storages with specific reference to LPG, CNG, Chlorine, Ammonia. (06 hrs.)</p>
<p>Professional Skill 30 Hrs; Professional Knowledge 06 Hrs</p>	<p>Prepare case study on major Chemical Disasters.</p>	<p>75. Preparation of Case study of Major Chemical Disasters. (30hrs.)</p>	<p>OCCUPATIONAL HAZARDS & DANGEROUS CHEMICALS: Introduction to Occupational Health Hazards & Dangerous Properties of Chemicals, Dust, Gases, Fumes, Mist, Vapours, Smoke and</p>

			<p>Aerosols, Concepts of Threshold Limit Values, Classification of Hazards CHEMICALS ACCIDENT PREVENTION & MAIOR CASE STUDIES: Major Industrial Accidents due to Chemicals (Bhopal Gas Tragedy) Emergency Planning, Major Industrial Disaster Case Studies.(06 hrs.)</p>
<p>Project work/ Industrial visit</p>			

SYLLABUS FOR CORE SKILLS

1. Employability Skills (Common for all CTS trades) (160 hrs.)

Learning outcomes, assessment criteria, syllabus and Tool List of Core Skills subjects which is common for a group of trades, provided separately in www.bharatskills.gov.in

List of Tools & Equipment			
FIRE TECHNOLOGY AND INDUSTRIAL SAFETY MANAGEMENT (For batch of 24 Candidates)			
S No.	Name of the Tools and Equipment	Specification	Quantity
A. TRAINEES TOOL KIT (For each additional unit trainees tool kit sl. 1-10 is required additionally)			
1.	Water CO ₂ Type Fire Extinguisher	9 Liters	08 Nos.
2.	Stored pressure Type Fire Extinguisher	9 Liters	08 Nos.
3.	Chemical Foam type Fire Extinguisher	9 Liters	08 Nos.
4.	Mechanical Foam type Fire Extinguisher	9 Liters	08 Nos.
5.	CO ₂ Type Fire Extinguisher	4.5 Kg	08 Nos.
6.	BCType Fire Extinguisher	5/10 Kg	06 Nos.
7.	ABC Type Fire Extinguisher	5/10 Kg	06 Nos.
8.	Extension Ladder	Size-45/35 ft	03 Nos.
9.	All types of Branches or Nozzles		04 Nos.
10.	Fire Hose	a) 15m	12 Nos.
		b) 30m	05 Nos.
B. SHOP TOOLS, INSTRUMENTS – For 2 (1+1) units no additional items are required			
Lists of Tools:			
11.	First Aid Box		As required
12.	All Types of small gears		As required
13.	BA Set	Negative & Positive Pressure	02 Nos.
14.	a) Gas Cylinders		02 Nos.
	b) Steel Back Plates		02 Nos.
	c) Face Masks		02 Nos.
15.	Portable Fire Pump/TFP		02 Nos.
16.	All types of couplings		1 Set
17.	Hydrant-Stand Pipe Type		02 Nos.
18.	Fire Trays		02 Nos.
19.	Manual call point		01 No
20.	Entry Suit/ Proximity Suit		02 Nos.
21.	Hose reel system		01 No
22.	Nitrogen Cylinder		01 No
23.	Hose Box		01 No
24.	Fire Fighting Point complete Set		01 No

25.	Suction Hose	10 ft	02 Nos.
26.	Suction Wrench		02 Nos.
27.	Metal Strainer		02 Nos.
28.	Basket Strainer		01 No
29.	Sprinkler		02 Nos.
30.	Ropes	100 ft Long	01 No
31.	Lines 100 ft Long		01 No
32.	Control Panel – Model-Pump		01 No
33.	Personal Protective Equipment		
	a) Helmet	Type A,B,C	24 Nos.
	b) Laser Welding Safety Goggles		12Nos.
	c) Face Shield		12 Nos.
	d) Welding Shield		12 Nos.
	e) Ear Muff		12 Nos.
	f) Ear Plug		12 Nos.
	g) Canal Caps		12 Nos.
	h) Safety Shoes		24 Nos.
	l) Asbestos Gloves		12 Nos.
	j) Electrical Hand Gloves		12 Nos.
k) Hand Gloves (Rubber)		12 Nos.	
l) Dust Mask		12 Nos.	
34.	Personal Protective Clothing for men		
	a) Safety Shirt		12 Nos.
	b) Safety Trouser		12 Nos.
	c) Safety Jacket		12 Nos.
	d) Cooling Vest		12 Nos.
e) Gum Boots		12 Nos.	
C. LIST OF EQUIPMENT			
35.	Personal Fall Arrest System (PFAS)		02 Nos.
36.	Tripod		02 Nos.
37.	Pulley		02 Nos.
38.	Suspended Scaffold		02 Nos.
39.	Gas Detector		02 Nos.
40.	Plastic Tunnel (Sewer Rescue Drill)		04 Nos.
41.	Body Harness		01 No
42.	Collecting Breaching		02 Nos.
43.	Dividing Breaching (Hand control)		02 Nos.
44.	Hydrant Flange		02 Nos.
45.	Hydrant Key & Bar (With hydrant Spindle)		01 No
46.	Adopter for Air Store Pressure		02 Nos.
47.	Hydraulic Pressure Testing Machine		01 No

48.	<i>Sprinklers Head (Bulb Type, Fusible Type)</i>		<i>02 Nos.</i>
49.	Safety Belt		01 No
50.	<i>Desktop computer</i>	CPU: 32/64 Bit i3/i5/i7 or latest processor, Speed: 3 GHz or Higher. RAM:-4 GB DDR-III or Higher, Wi-Fi Enabled. Network Card: Integrated Gigabit Ethernet, with USB Mouse, USB Keyboard and Monitor (Min. 17 Inch. Licensed Operating System and Antivirus compatible with trade related software.	<i>08Nos.</i>
51.	<i>Computer Table</i>		<i>08 Nos.</i>
52.	<i>Computers Chairs</i>		<i>08 Nos.</i>
53.	White Board		01 No
54.	L.C.D. Projectors		02 Nos.
55.	UPS		As required
56.	All types of Detectors 1 Peps. of each		05Nos.
57.	Flux meter		07Nos.
58.	Dosi meter		01 No
59.	<i>Cut model of Fire Extinguisher / Fire pump</i>		<i>02 Nos.</i>
60.	<i>Fire Suit</i>		<i>02 Nos.</i>
61.	<i>Fire Tender (one For the Institute)</i>		<i>01 No</i>
62.	<i>Rescue Van (one For the Institute)</i>		<i>01 No.</i>
D. Shop Floor Furniture and Materials - For 2 (1+1) units no additional items are required.			
63.	Instructor's table		1 No.
64.	Instructor's chair		2 Nos.
65.	Metal Rack	100cm x 150cm x 45cm	4 Nos.
66.	Lockers with 16 drawers standard size		2 Nos.
67.	Steel Almirah	2.5 m x 1.20 m x 0.5 m	2 Nos.
68.	Black board/white board		1 No.
69.	Fire Extinguisher		2 Nos.
70.	Fire Buckets		2 Nos.

Note:

1. *The items in bold italic are meant to be used for any of the two courses viz. Fireman/Fire Technology and Industrial Safety Management/Health Safety and Environment. If the institute is running any of the two trades, items in bold italic are not required to be purchased separately.*

The DGT sincerely acknowledges contributions of the Industries, State Directorates, Trade Experts, Domain Experts, trainers of ITIs, NSTIs, faculties from universities and all others who contributed in revising the curriculum.

Special acknowledgement is extended by DGT to the following expert members who had contributed immensely in this curriculum.

List of Expert Members participated/contributed for finalizing the course curriculum of Health, Safety & Environment held on 06.06.2017 at CSTARI, Kolkata			
S No.	Name & Designation Sh/Mr./Ms.	Organization	Remarks
1.	H. V. Samvatsar, Director	CSTARI, Kolkata	Chairman
1.	L.K. Mukherjee, DDT	-Do-	Co-ordinator
2.	Soumitra Chatterjee, MD	Dhruvsatya Centre for personal Transformation Pvt. Ltd.	Expert
3.	Purna Chandra Barad, Chief Manager- HR & Admin	Dhruvsatya Centre for personal Transformation Pvt. Ltd.	Expert
4.	Kanailal Biswas, Ex- Plant in charge	Zamil Steel Tower and Galvanizing factory, Dumman, Soudi Arabia	Expert
5.	Krishnendu Sarkar, Director	Akass Infrastructure pvt. Ltd., Kolkata	Expert
6.	Dipak Rungta, Manager	Lalit Hardware, Expert in Disaster Management power tools & Equipments, Kolkata-1	Expert
7.	N.B. Reshamwal, Asst. Director	Regional Labour Institute, Kolkata	Member
8.	Sourashis Mitra, Junior Assistant	Indian Institute of Engineering, Science and Technology, Shibpur (IEST), Howrah- 711103	Member
9.	Sujay Banerjee, Senior Instructor	West Bengal Fire & Emergency Services, Seal Para, Kolkata	Expert
10.	Shyam Chandra Mondal, Officer in Charge	West Bengal Fire & Emergency Services, Serampore, Mahesh Hoogly	Expert
11.	R.N. Bandhopadhaya, OSD	Directorate of Industrial Training- Govt. of West Bengal, Kolkata	Member
12.	Alok Sharma, Chief General Manager	Indraprastha Gas Limited, New Delhi	Expert
13.	Santokh Singh, Ex-Chief Fire Officer	Delhi Fire Services, New Delhi	Expert
14.	Capt. Krishan Kumar,	Delhi Institute of Fire Engineering,	Expert

	Chairman	New Delhi-77	
15.	Praveen Choudhari, Emergency Response Officer	Dolphin Energy Ltd., Qatar	Expert
16.	Lt. Col. RC Shukla, Principal	Delhi Institute of Fire Engineering, New Delhi-77	Expert
17.	P S Bhadana, Dy. Director	-do-	Expert
18.	B L Chauhan, Senior Instructor	-do-	Expert
19.	Bhagwati Prasad Ojha, HSE Engineer	-do-	Expert
20.	Praveen Kumar Garg, Sr. Manager HSE	Ouippo Oil & Gas Infrastructure Ltd., Gurgaon, Haryana	Expert
21.	Devki Nandan, HSE Expert	Indraprastha Gas Ltd.	Expert
22.	Sanjay Kumar, JDT/HOO	CSTARI, Kolkata	Member
23.	A.K. Mandal, ADT	-do-	Member
24.	M.K. Batabyal, TO	-do-	Member

ABBREVIATIONS

CTS	Craftsmen Training Scheme
ATS	Apprenticeship Training Scheme
CITS	Craft Instructor Training Scheme
DGT	Directorate General of Training
MSDE	Ministry of Skill Development and Entrepreneurship
NTC	National Trade Certificate
NAC	National Apprenticeship Certificate
NCIC	National Craft Instructor Certificate
LD	Locomotor Disability
CP	Cerebral Palsy
MD	Multiple Disabilities
LV	Low Vision
HH	Hard of Hearing
ID	Intellectual Disabilities
LC	Leprosy Cured
SLD	Specific Learning Disabilities
DW	Dwarfism
MI	Mental Illness
AA	Acid Attack
PwD	Person with disabilities

