

FIRE AND SAFETY ENGINEERING SECTOR



**Under Skill Development Initiative (SDI) Scheme
Based on
Modular Employable Skills (MES)**



**Government of India
Ministry of Labour & Employment
Directorate General of Employment & Training**

List of members attended the Trade Committee Meeting for designing the course curriculam
on FIRE & SAFETY ENGINEERING Sector
under Skill Development Initiative Skill (SDIS)
based on Modular Employable Skills (MES) held on 27.02.2009

Sl. No.	Name and Designation S/Sri	Organisation	
1.	S.D.Lahiri, Director	C.S.T.A.R.I., Kolkata	Chairman
2.	Pranab Kumar Chakraborty, Dy. Manager (Fire & Safety)	Garden Reach Ship Builders & Engineers Ltd.	Member
3.	Asit Kumar Sarkar, Chief instructor	West Bengal fire & Emergency Services	Member
4.	Sumit Mazumder, Officer	National insurance Co. Ltd.	Member
5.	N.C.Dey Sarkar, Vice principal	Supervisors' Training Centre, Eastern Railway	Member
6.	Shyam Chandra Mondal, Station officer	Institute of fire & Emergency Services, W.B.	Member
7.	Abir Mukhopadhyay, Dy. Manager	National insurance Co. Ltd.	Member
8.	R.N.Roy, Deputy Chief Mechanical Engineer (safety)	Eastern Railway	Member
9.	T.S. Majhi, Safety officer	Coal India Ltd.	Member
10.	Kunal Nandi, Managing Partner	Keemee securities & Fire Services	Member
11.	A. Banerjee, Manager (Safety & Fire)	Garden Reach Ship Builders & Engineers Ltd.	Member
12.	Subal Chandra Pal, Sub - Officer	Director General Fire & Emergency Services, W.B.	Member
13.	Sumit Sengupta, Asstt. Fire Officer	Kolkata Port Trust	Member
14.	Bipul Mondal, Administrative Officer (Safety)	Biocco Lawrie Ltd.	Member
15.	Prosenjit Ghose, Chief Manager (HRD/ Safety)	Metal & Steel Factory	Member
16.	Ashok Kumar Chakraborty, Manager, Fire Prevention	International Airport Authority of India, Kolkata	Member
17.	Vishal Bagaria, Director	Vishal Profin Pvt. Ltd.	Member
18.	Tapas Dutta, Field Supervisor	Keemee securities & Fire Services	Member
19.	Ishwar singh, Joint Director	Regional Directorate of Apprenticeship Training (Eastern Region)	Member
20.	Anil Kumar, Joint Director	C.S.T.A.R.I., Kolkata	Member
21.	M.C.Sharma, Joint Director	C.S.T.A.R.I., Kolkata	Member
22.	L.K. Mukherjee, Dy. Director	C.S.T.A.R.I., Kolkata	Member
23.	Abhinoy Nandi, Dy. Director	C.S.T.A.R.I., Kolkata	Member
24.	S.B. Sardar, Asstt. Director	C.S.T.A.R.I., Kolkata	Member
25.	R.N.Manna, Training Officer	C.S.T.A.R.I., Kolkata	Member
26.	P.K.Dutta, Training Officer	C.S.T.A.R.I., Kolkata	Member
27.	Mohan singh, Training Officer	C.S.T.A.R.I., Kolkata	Member
28.	M.K.Batabyal, Jr. Technical Assistant	C.S.T.A.R.I., Kolkata	Member
29.	Pradip Biswas, Jr. Draughtsman	C.S.T.A.R.I., Kolkata	Member

**Course Curricula based on Modular
Employable Skills (MES) in
“FIRE & SAFETY ENGINEERING” Sector.**

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Skill Development based on Modular Employable Skills (MES)

Background

The need for giving emphasis on Skill Development, especially for the educated unemployed youth (both for rural & urban) has been highlighted in various forums. Unfortunately, our country's current education system does not give any emphasis on development of skills. As a result, most of the educated unemployed youths are found wanting in this area, which is becoming their Achilles heel.

As India is on the path of economic development and the share of service sector's contribution to the GDP of the country is increasing (53% of GDP) it is becoming imperative that Government of India along with other nodal agencies play an important role in providing employable skills, with special emphasis on Skills.

Hence, need of the hour is some policy change at Apex level which will address the needs of the changing economy and look at providing mandatory skills training to all educated unemployed youths, with a view to have them gainfully employed. This shift in policy will ultimately benefit all the stake holders, namely the individuals, industry, Government and the economy by way of providing employment, increasing the output/productivity and ultimately resulting in a higher GDP for the nation.

- **Frame work for skill development based on 'Modular Employable Skills (MES)'**

Very few opportunities for skill development are available for the above referred groups (educated unemployed youth). Most of the existing skill development programmes are long term in nature. Poor and less educated persons cannot afford long term training programmes due to higher entry qualifications, opportunity cost, etc. Therefore, a new framework for skill development has been evolved by the DGET to address the employability issues.

The key features of new framework for skill development are:

- Demand driven short term training courses based on modular employable skills decided in consultation with Industries.
- Flexible delivery mechanism (part time, week ends, full time)
- Different levels of programmes (foundation level as well as skill up gradation) to meet demands of various target groups
- Central Government will facilitate and promote training while vocational training (VTP) providers under the Government and Private Sector will provide training
- Optimum utilization of existing infrastructure to make training cost effective.
- Testing of skills of trainees by independent assessing bodies who would not be involved in conduct of the training programme, to ensure that it is done impartially.
- Testing & certification of prior learning (skills of persons acquired informally)

The Short Term courses would be based on "Modular Employable Skills (MES)".

The **concept for the MES** is:

- ✓ Identification of minimum skills set. Which is sufficient to get an employment in the Labour market.
- ✓ It allows skills upgradation, multi skilling, multi entry and exit, vertical mobility and life long learning opportunities in a flexible manner.
- ✓ It also allows recognition of prior learning (certification of skills acquired informally) effectively.

- ✓ The modules in a sector when grouped together could lead to a qualification equivalent to National Trade Certificate or higher.
- ✓ Courses could be available from level 1 to level 3 in different vocations depending upon the need of the employer organisations.
- ✓ MES would benefit different target groups like:

Workers seeking certification of their skills acquired informally
 Workers seeking skill upgradation
 Early school drop-outs and unemployed
 Previously child Labour and their family

INTRODUCTION

Economic growth in India is increasingly supported by robust industrial growth. Fire & Safety Engineering Sector is one of the relatively lesser known but significant sectors that support almost all industrial activity. However, notwithstanding its importance and size (INR 4 trillion), it has traditionally not been accorded the attention it deserves as a separate sector in itself. The level of inefficiency in Fire & Safety activities in the country has been very high across all modes.

The required pace of efficiency and quality improvement will demand rapid development of capabilities of Fire & Safety Engineering service providers. And with Fire & Safety Engineering being a service oriented sector, skill development will emerge as a key capability.

This lack of focus on developing manpower and skills for the Fire & Safety Engineering sector has resulted in a significant gap in the numbers and quality of manpower in the sector.

This gap, unless addressed urgently, is likely to be a key impediment in the growth of the Fire & Safety Engineering sector in India and in consequence, could impact growth in industry and manufacturing sectors as well.

This underscores the need identifying areas where such manpower and skill gaps are critical, and developing focused action plans to improve the situation.

A look at the required initiatives for manpower development in the sector makes it clear that sustainable development of the sector's manpower requires a collaborative public private effort. The level of commitment demonstrated by each stakeholder would largely determine the direction that the sector heads towards.

Age of participants

The minimum age limit for persons to take part in the scheme is 14 years but there is no upper age limit.

Curriculum Development Process

Following procedure is used for developing course curricula

- Identification of Employable Skills set in a sector based on division of work in the Labour market.
- Development of training modules corresponding to skills set identified so as to provide training for specific & fit for purpose

- Organization of modules in to a Course Matrix indicating vertical and horizontal mobility. The course matrix depicts pictorially relation among various modules, pre requisites for higher level modules and how one can progress from one level to another.
- Development of detailed curriculum and vetting by a trade committee and by the NCVT

(Close involvement of Employers Organizations, State Governments and experts, vocational Training providers and other stakeholders are ensured at each stage).

Development of Core Competencies

Possession of proper attitudes is one of the most important attributes of a competent person. Without proper attitudes, the performance of a person gets adversely affected. Hence, systematic efforts will be made to develop attitudes during the training programme.

The trainees deal with men, materials and machines. They handle sophisticated tools and instruments. Positive attitudes have to be developed in the trainees by properly guiding them and setting up examples of good attitudes by demonstrated behaviors and by the environment provided during training.

Some important core competencies to be developed are:

1. Communication skills
2. Better usage of English language/Vernacular
3. Presentation skills
4. Self management
5. Resume preparation
6. GD participation/facing techniques
7. Interview facing techniques

Following competencies should also be developed during level-II and higher courses:

1. Ability for planning, organizing and coordinating
2. Creative thinking, problem solving and decision-making
3. Leadership
4. Ability to bear stress
5. Negotiation

Duration of the Programmes

Time taken to gain the qualification will vary according to the pathway taken and will be kept very flexible for persons with different backgrounds and experience. Duration has been prescribed in hours in the curriculum of individual module, which are based on the content and requirements of a MES Module. However, some persons may take more time than the prescribed time. They should be provided reasonable time to complete the course.

Pathways to acquire Qualification:

Access to the qualification could be through:

- An approved training Programme.

Methodology

The training methods to be used should be appropriate to the development of competencies. The focus of the programme is on “performing” and not on “Knowing”. Lecturing will be restricted to the minimum necessary and emphasis to be given for learning through active participation and involvement.

The training methods will be individual centered to make each person a competent one. Opportunities for individual work will be provided. The learning process will be continuously monitored and feedback will be provided on individual basis.

Demonstrations using different models, audio visual aids and equipment will be used intensively.

Instructional Media Packages

In order to maintain quality of training uniformly all over the country, instructional media packages (IMPs) will be developed by the National Instructional Media Institute (NIMI), Chennai.

Assessment

DGE&T will appoint assessing bodies to assess the competencies of the trained persons. The assessing body will be an independent agency, which will not be involved in conducting the training programme. This, in turn, will ensure quality of training and credibility of the scheme. Keeping in view, the target of providing training/testing of one million persons through out the country and to avoid monopoly, more than one assessing bodies will be appointed for a sector or an area.

Certificate

Successful persons will be awarded competency-based certificates issued by **National Council for Vocational Training (NCVT)**.

Course Matrix

FIRE & SAFETY ENGINEERING

Level II

Module - II

Fire & Rescue operator

Level I

Module – I

Assistant Fire operator

Level –I

Module No -I

Name:	Assistant Fire operator
Sector	Fire & Safety Engineering
Code	FRS 101
Min. Entry qualification	10 th pass with physical fitness
Minimum age.	18 years.
Terminal competency	On completion of the training the trainees will be able to operate different types of fire fighting equipment to extinguish fire.
Duration:	300 hrs.
Objectives	After successful completion of the training the trainees will be able to work in the field of fire and hazards.

Sl no.	Theory	Practical
01	<u>Introduction of fire & safety.</u> Familiarization of Institute & workshop. General safety awareness Knowledge about the formation of Fire. Knowledge & concept of basic components of Fire. Different types of Fire - class A,B,C,D and identify Medias of Fire Extinction - Eg: water / DCP / Foam / CO2 etc Analyse the stage of Fire and to study the fire spread. Introduction of Tools and Equipments used in Fire Fighting To change the units from FPS to MKS. Common effects of Toxic gases.	Demonstration in General safety symbols and colour. Demonstration in different stage of fire. Demonstration of use of Breathing apparatus, proximity shoes, personal protective suits. Physical fitness training. Methods of put out of fire.
02	<u>Fire & Fire components</u> Effect of sand and blanketing in fire extinguishing. Knowledge of different types of Fire Extinguishers; their uses and maintenance.	Burning pits for fire - Fire Drill - use of Extinguishers Practical session for Fire Extinction. Practice different types of Fire Extinguishers.
03	Different types of Fire Hoses, Hose fittings, like Hose couplings, Branches, Nozzles etc and their	Identification of different types of Hoses –

	<p>use.</p> <p>Hydraulics – For study of pressure and velocity of water flow in hoses / pumps.</p> <p>Knowledge of Fire pumps and its working.</p> <ul style="list-style-type: none"> - working of Fire Engines. - Small Gears, special tools used in fire fighting and Rescue. - Personal Protective Equipments - different types of Respiratory and Non Respiratory PPEs. 	<p>Utility -</p> <p>Hose reel-</p> <p>Hose laying and Hose Drill –</p> <p>Fittings -</p> <p>Pump Drill and</p> <p>Fire fighting with Fire Tenders –</p> <p>Ladder Drill</p> <p>Calculate the capacity of a Tank and hence to assess the pumping time for fire fighting.</p> <p>Practice on special tools used in Fire field and Rescue operations.</p>
04	<p>Study about fire Hydrants and sprinklers system-</p> <p>Different types of Hydrants – Knowledge of their operational procedure.</p>	<p>Hydrant Drill - to operate and practice Fire fighting</p>
05	<p>Knowledge of Communication in any exigency</p>	<p>Demonstration of communication equipments</p>
06	<p><u>Safety in construction</u></p> <p>Safe works - Excavation Gas cutting, Welding etc:- all precautionary measures to be taken for work..</p> <p>House Keeping -.</p> <p>Work Permit system -</p> <p>First Aid –</p> <p>Evacuation – Root, System, Utility</p>	<p>Good House keeping practice.</p> <p>Demonstration on</p> <p>First aid for injury, Fracture, burns, Drowning in water, CPR (Cardio Pulmonary Resuscitation) etc.</p>
07	<p>Knowledge of Ground Drill / Hose Drill / Fire Drill / Hydrant Drill.</p> <p>Drills in Rope & Lines, Ladder Drill etc.</p> <p>Drill with Fire Tender.</p> <p>Mock drill</p>	<p>Practice-</p> <p>Ground Drill / Hose Drill</p> <p>Fire Drill / Hydrant Drill</p> <p>Drills in Rope & Lines, Ladder Drill etc.</p> <p>Drill with Fire Tender</p>
08	<p>Practical (wide demonstration)</p> <ul style="list-style-type: none"> - Will give a independent Training for tackling a Fire Hazard / Rescue / Accident and save lives / materials and properties 	

List of Tools & Equipments for 16 nos of Trainees

- | | |
|--|-----------|
| 1) Fire Extinguishers of -
Water /DCP /Foam /CO2 / etc. | 1 each |
| 2) Hoses /Branches /nozzles | 2nos each |
| 3) Small gear item, | 1 no |
| 4) Fire man Axe, | 1 no |
| 5) Spreader bars, | 1 no |
| 6) Bolt cutter. | 1 no |
| 7) Hoses with couplings | 1 each |
| 8) Fire pump | 1 each |
| 9) Tank | 1 no |
| 10) Fire nozzle | 1 no |

11) Extension.	1 no
12) Ladders.	1 no
13) BA sets,	1 no
14) Safety Helmet,	16 nos
15) Safety shoes,	16 nos
16) Safety Gloves,	16 nos
17) Safety goggles,	16 nos
18) Ear plugs,	16 nos
19) Safety Belts,	16 nos
20) Yard Hydrants of any factory.	As required
21) Explosive meter	1 no
22) First Aid Kit, Bandages, Scale , Cotton cloths.	1 set
23) Hose with Fittings	1 set
25) Hydrants	4 nos
26) Ropes pieces	As required
27) Extension Ladder Fire Tender	1 set
28) Communication Equipment (P A system)	1 set
29) Fire Fighting jackets	1 each
30) Fire Alarm (Manual & Automatic)	1 set

Level -2
Module –II

Name:	Fire & Rescue operator
Sector	Fire & Safety Engineering
Code	FRS 202
Min. Entry qualification	10 th pass and completion of Module-I of Fire & Safety .
Minimum age.	18 years.
Terminal competency	on completion of the training the trainees will be able to test, operate and maintain fire and safety protection equipments as per schedule.
Duration:	300 hrs.
Objectives	After successful completion of the training the trainees will be able to work as technical staff for installation, testing of machines of fire safety protection equipments.

SI No	Theory	Practical
01	<p><u>Introduction of machinery & equipments</u> Study of the location map of Equipments and facilities either A/G or U/G and understand the Building structure. Working principle of petrol / Diesel / LPG / CNG Engine – Checking and testing of equipments like compressor / welding machines / Automobile vehicles / Crane etc. Knowledge of circuit diagram and wiring for Fire detectors / Fire Alarm systems. Knowledge on Electricity and electrical fire hazards.</p>	<p>Identify different equipment and facilities per drawing of a building. Visit any Automobile work shop and see different Parts of IC Engines.</p>
02	<p><u>Fire protection system</u> Classification of Buildings based on Occupancy and Hazard. Selection of type of Fire protection system and working concept of the building as per NBC / TAC. Study the variation of properties of materials with the variation of temperature. Knowledge of identification the stage of Fire.</p>	<p>Site visit – Fixed F/F systems like Risers /Hydrants / Flooding system/ Automatic sprinkler system. Identify different type of protection system and its operation.</p>
03	<p><u>Prevention of Accident</u></p>	<p>Rehearsal of Emergency Plan- in an operating</p>

	<p>Safety and Accident in an industry. Reducing or Preventing of Accidents. Emergency Planning to Tackle a Hazard Industrial Hygiene- Occupational Diseases and the way to control Occupational Diseases. Lighting - Proper illumination in industry and the role of safety in illumination Mechanical guarding - Prevents accidents. Knowledge about all safety measures in transporting of Hazardous materials.</p>	<p>plant. Video recorded case study & its analysis.</p> <p>Factory Visit Using of Explosimeter before doing a Hot work. Measurement of O2 levels, Measurement of Flammable gases, Measurement of SO2 level etc.</p>
04	<p><u>Safety in construction</u> – Different types of construction activities and the Safety measures. Prevent accidents / Fire or any other Hazards. Knowledge of productivity by eliminating Hazards. Tool Box Meeting-</p>	<p>Site visit of Construction Projects Demonstration on installation of safety measures.</p>
05	<p><u>Material Handling</u> Type of Equipments involved the Safety precautions to be taken during material handling (manual/mechanical). Scaffolding - Tagging of Scaffolds / Inspection of Erection of Scaffolds / Safety check.</p>	<p>To be acquainted with equipments like Fork Lift, Tipper Lorry, Pay Loader, C.P Blocks, Winches, HIABS, Cranes, conveyors etc. from an industrial Unit by site visit. Physical Examination of Plant & Machinery. To identify faulty equipments and recommend needful corrections and it is means of Accident Prevention.</p>
06	<p><u>Role of management</u> The Duties and responsibilities, Govt., Trade unions etc. in safety. Different Acts and Safety Rules Basic requirements of Fire Insurance and Risk transfer methods</p>	<p>Film show related to Safety. Log book maintenance in prescribed format</p>
07	<p>Viva / Mock interview - To provide Students Physical/Mental/Logical fitness and improve the attitude / Behaviour / Character test.</p>	
08	<p>Trail Interview – 1) Practical with Breathing apparatus (SCBA/BAIELSA) 2) Rescue operations 3) First Aid practice 4) Fire Alarm working 5) Handling of Foam making equipments(FMBs)</p>	

List of Tools & Equipments for 16 nos of Trainees

1) Cylinder / Piston,	1 No
2) Crank shaft / C.R	1 No
2) Fly wheel,	1 No
3) Valves etc	As require
4) B. A set Fire Rescue ladders / Ropes etc.	1 Set
5) Fire alarm Board	2 Nos
6) Explosive meter	1 set
7) Sound Meter	1 set
8) Oxygen Cylinder	4 nos.
9) Smoke Detector	1 set