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Ministry of Home Affairs
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**Fire Hazard and Risk Analysis in the Country for Revamping the
Fire Services in the Country**

**Final Report –
Fire and Emergency Services Training Infrastructure in the Country**

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Submitted by

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Executive Summary

The role of firefighter in fire and emergency services is to extinguish fire, rescue trapped persons, provide medical first-aid and also respond to various fire accidents and disasters caused by various natural and man-made hazards. The roles of firefighter cannot be performed until and unless sufficient *state-of-art* training is imparted to the fire service personnel, as there are several technological advancement in firefighting vehicles and equipment. The types of training and duration depend upon the type of entry level to the fire service department or change of responsibility on promotion. Various States/UTs have framed recruitment rules (RR) for each level, and these are being adhered to for filling the vacant positions. Broadly, there are two entry levels: 1) Fireman level and 2) Middle level (Sub Officer/ Assistant Station Officer). However, there are States like Tamilnadu, which also have direct entry at Officer Level (Divisional Officer) for the candidates selected through State Civil Service Examination. In addition, Delhi Fire Services also have provisions for direct entry at the levels of Station Officer, Divisional Officer, and Chief Fire Officer. Immediately after joining the Fire Services, it is mandatory that every fire personnel needs to undergo professional training.

The duration of training for Fireman varies from 2, 3, 4, 6, 9, and 12 months in different States/UTs and it is observed that syllabi, subject taught and fire drill duration varies from state to state, which need to be rationalized.

It is observed that many State/UT Fire Services do not have training facilities or give some training at Fire Stations levels as a temporary arrangement. For example, Rajasthan, Punjab, Haryana, Uttrakhand, Puducherry, Meghalaya etc. Some of the Fire Services have training centers to meet requirement of basic training to newly recruited Fireman/ constable-Fireman, such as Andhra Pradesh, Delhi, Karnataka, Tamilnadu, Uttar Pradesh, and Maharashtra.

The National Fire Service College (NFSC), Nagpur and various other regional and States/UTs fire training centers across the country are key institutions involved in improving the level of firefighters knowledge and their overall capabilities to face the challenges of fire-fighting. The RMSI team surveyed NFSC Nagpur, CISF Fire Training Center (NISA), Hyderabad, and various States/UTs fire training centers across the country and studied their programs to delineate their role and relationship for improvement in training facilities for firefighters.

Apparently, the syllabi, subjects taught and fire drills details vary from state to state. A few of the States/UTs Fire and Emergency Services have a well-defined training syllabus, specifying number of lecture hours allotted for each subject. However, none of the training course is accredited by any agency.

In view of the above, there is an immediate need to have a common syllabus and its accreditation, which should be followed by each State/UT Fire and Emergency Services in the country. Fire Project Cell, NDRF&CD should insists on various States/UTs Fire and Emergency Services to adopt a common syllabus and course duration with some modifications depending upon any special requirement of that State/UT. For having a common training syllabus and its accreditation, RMSI team reviewed international standard such as National Fire Protection Association (NFPA), which provides more emphasis on practical and level based trainings. In India, All India Council of Technical Education (AICTE) has set up guidelines for accreditation (<http://www.aicte-india.org/vocationaledu.htm>). These aspects have been taken into consideration, while formulating the courses in this report and their accreditation for different levels such as Certificate Course, Diploma, Advance Diploma, and B.E./B.Tech.

Training syllabus prescribed by Andhra Pradesh Fire Service is elaborate with subject wise details and has been taken as base and suitably amended/upgraded.

Six months duration (in case of 5 days/week working) training for Fireman/Fire Operator/Constable/Fireman Driver is proposed to be reasonable which should be adopted for all the State/UT Fire Services. In case, it is 6 days/week working, then duration of training period may be reduced to 5 months.

The immediate need of the State/UT Fire and Emergency Services in the country is to develop at least basic training facilities for Fireman and Leading Fireman. Whereas, Sub-Officer (SO) course and special courses may be started in the State/UT or Regional Fire Training Centre where enough strength is available to fully utilize the resources and capacity of the Training Centre. Moreover, the spare capacity and time in each training centre should be utilized for training to the public as part of public awareness programs.

This report is prepared based on the information gathered about training infrastructure available in various State/UT Fire Services in the country and through review of international practices.

1 Fire and Emergency Trainings

1.1 Introduction

The role of firefighter in fire and emergency services is to extinguish fire, rescue trapped persons, provide medical first-aid and also respond to various fire accidents and disasters caused by various natural and man-made hazards. The roles of a firefighter cannot be performed until and unless sufficient *state-of-art* training is imparted to the firefighter, as there are several technological advancement in firefighting vehicles and equipment. The type of training and its duration depends upon the type of entry level to the fire service department or change of responsibility on promotion. Various States/UTs have framed recruitment rules (RRs) for each level, and these are being adhered to for filling the vacant positions. Broadly, there are two entry levels in majority of the States/UTs: 1) Fireman Level and 2) Middle Level (Sub Officer/ Assistant Station Officer). Immediately after joining the Fire and Emergency Services, it is mandatory that every fire personnel needs to undergo professional training.

1.2 Aim of Training

The aim of the training is to provide physical fitness, knowledge, skills, vision and mental alertness needed from a firefighter to discharge his duty efficiently.

1.3 Importance of the Training

The working of a firefighter involves attending fire and emergency incidences, which requires that a firefighter should have basic information and knowledge about various materials and processes, buildings, chemicals, and hazards associated with them in normal condition and in fire conditions. Moreover, a firefighter has to know operation of various firefighting and rescue vehicles and specialized equipment and develop practical proficiency in their use under safe conditions. Life of a firefighter may be endangered, if he/she is put on duty without proper training.

Specialized training is proposed to be given to each firefighting officer because of the fact that he should be able to take appropriate decisions as a *'first responder'* for efficient firefighting and rescue without causing injuries to loss of life to himself or his team members. The especially trained teams, such as NDRF special battalions cannot be positioned in each State/UT, hence takes time to respond. The first response fire officer cannot remain a mute spectator and thus he should know how to handle an emergency and make reasonable attempt in the process.

1.4 Fire and Emergency Training Centre

The National Fire Service College (NFSC), Nagpur and various other regional/state/UT fire training centers across the country are key institutions involved in improving the level of firefighter knowledge and their overall capabilities to face the challenges of fire-fighting. The RMSI team surveyed NFSC Nagpur, CISF Fire Training Center (NISA), Hyderabad, and various States/UTs fire training centers across the country and studied their programs to delineate their role and relationship for improvement in training facilities for firefighters.

It is observed that the condition of Fire and Emergency Training Centre's infrastructure in organized States/UTs is good, however, in many of the States/UTs/Municipal Fire and Emergency Services do not have uniformity in their set up. Some Fire Services are suffering because of lack of trained manpower as well as specialized equipment and they do not have/cannot be expected to have good training set-up. A few State/UT Fire and Emergency Services do not have training facilities or give some training at Fire Stations levels as a temporary arrangement. For example, Rajasthan, Punjab, Haryana, Chandigarh, Uttarakhand, Puducherry, Meghalaya, Nagaland, and Manipur.

States like Delhi, Andhra Pradesh, Tamil Nadu, Karnataka, Uttar Pradesh, Maharashtra, Assam have fairly good training infrastructure but they have different duration training prescribed for the Fireman/ Fireman Driver/ Constable Fire/ Fire Operator etc. for entry into the Fire and Emergency Services. The duration of training for Fireman varies from 2 - 3 months in Chandigarh, Punjab and Haryana to 4, 6, 9 months in other States/UTs and 12 months in Assam (**Table 1-1**). Moreover, none of these training courses is accredited by any national agency.

Thus, there is a need to streamline the course curriculum/syllabus duration of various courses, for systematic training of firefighters in the country.

Table 1-1: Duration of Fireman Training in various States/UTs

Sr. No.	Name of State/UT	Duration (in months)	Remark
1	Delhi Fire Service	6	Delhi State Fire Services has a full-fledged Training Centre at Fire Safety Management Academy (FSMA), Rohini. The training course is of 6 months duration (26 weeks, 5 days/week) for the Fireman.
2	Jammu and Kashmir Fire and Emergency Services	6	No permanent training centre is available in the state, however State Fire and Emergency Services is managing training through adhoc training facilities at Regimental Training Centers of Gangyal and Bari Brahmna in Jammu Range and at Pampore in Kashmir Range.
3	Andaman & Nicobar Islands	9	A training centre is available at its Headquarter Fire Station (Aberdeen, Port Blair). The training course is of 9 months duration with a maximum capacity to train 30 fire personnel.
4	Rajasthan State Fire Services	-	There is no training centre available in such a large state. The State Fire Service provides some on the job-training on temporary basis to the newly recruited Fireman (mostly hired on contract).
5	Maharashtra Fire and Emergency Services	6	State has a full-fledged regional training center at State Fire Academy,

Sr. No.	Name of State/UT	Duration (in months)	Remark
			Santacruz (E), Mumbai. The National Fire Service College (NFSC), Nagpur is also in Maharashtra State, though it is providing its service for all the Fire Services in the country.
6	Puducherry Fire Services	6	No permanent training centre is present in the UT and Puducherry Fire Service is managing adhoc training facility available at D-Nagar Fire Station.
7	Himachal Pradesh	3	State has a training centre, which is located at Baldeyan, 22 km from Shimla. Fireman are recruited exclusively from Home Guard Volunteer having 2 months training as a Home Guard.
8	Chandigarh Fire Services	2	No permanent training centre available and this UT Fire Service is providing <i>adhoc</i> training to Fireman at Headquarter Fire Station located at Sector 17, Chandigarh.
9	Haryana State Fire Services	3	State has a very small training Centre at Sector-37, Gurgaon, which provides 3-months training to the in-service and private candidates (as a temporary arrangement), who are working with Haryana Fire Services (mostly on contract basis).
10	Punjab	2 - 3	No permanent training centre is available; <i>adhoc</i> training is given at Fire Service Headquarter, SAS Nagar, Mohali.
11	Uttarakhand Fire Service	-	No permanent training facility available in the State except adhoc arrangement for the training.
12	Uttar Pradesh Fire Service	6	Uttar Pradesh has a Fire Service Training Centre located in Unnao.
13	Dadra & Nagar Haveli	-	Dadra & Nagar Haveli UT does not have its own training centre and firefighters are being trained at Goa F&ES training centre as UT was earlier part of Goa.
14	Daman & Diu	-	Presently, Daman and Diu UT does not have its own training centre and firefighters are being trained at Goa F&ES training centre, as UT was earlier part of Goa.

Sr. No.	Name of State/UT	Duration (in months)	Remark
15	Goa	6	Presently, Goa state is running a full-fledged Regional State Fire Force Training Centre at Panaji.
16	Gujarat	6	Gujarat Fire & Emergency Services has a full-fledged Fire and Emergency Training Centre, at Kotarpur Waterworks, Ahmedabad for training of firefighters in the state.
17	Karnataka State Fire and Emergency Services	6	State has a well established Regional Fire Training Academy, namely, R.A. Mundkur Fire and Emergency Service Academy established in the year 1970 to train newly recruited and in service staff as well as personnel from private and other government organizations.
18	Madhya Pradesh	6	Madhya Pradesh State Fire Services does not have any training institute and Firemen are being trained for a 6-months course at a private institute, named All India Institute of Local Self Government.
19	Andhra Pradesh State Disaster Response and Fire Services	4	State Fire Services has a training Centre on the outskirts of Hyderabad. The course duration is 4 months (6 days/ week).
20	Bihar	-	A full-fledged State Training Centre is at advance stage of construction at Bihta, Patna (some parts already completed and training centre is partially functional). The training centre is expected to be fully functional in 2014. The permanent Firemen staff mostly have a 6 months training.
21	Kerala	12	Kerala FRS has a State Training Centre operational at Viyyoor, Thrissur district. The State also has a well-established Fire Service Training School at Fort Kochi.
22	Lakshadweep	-	The UT does not have any training facility; however, Firemen are being trained at Fire Service Training School, Fort Kochi.
23	Tamilnadu State Fire and Emergency Services	3	The State has a well established Regional Fire Training Centre located near Tambaram in Chennai. The Centre is running Fireman courses for fire

Sr. No.	Name of State/UT	Duration (in months)	Remark
			service personnel and private industries.
24	Arunachal Pradesh	6	Arunachal Pradesh Fire Service Force (APFSF) does not have any permanent training centre, however, the State does have a Police Training Centre (PTC) at Banderduwa, district Papum Pare. Fireman are being trained at PTC training centre for drill and discipline, and also trained formally at Regional Fire Training Centre (RFTC), Sila, North Guwahati, Assam.
25	Assam State Disaster Response and Fire Services	12	State has a Regional Fire Training Institute at Sila, North Guwahati. This training centre provides 6-months Constable Police Training followed by 6-months Constable Fire Training.
26	Chhattisgarh	-	Chhattisgarh state Fire Service does not have any permanent fire training centre, and training is being imparted as on a adhoc basis.
27	Jharkhand	6	Presently, Jharkhand State Fire Services has an adhoc Central Training Institute at Dhurwa Fire Station, Ranchi.
28	Manipur	6	The State does not have any permanent training centre. However, Manipur State Fire Service is providing fireman training at State Fire Service Headquarter, Imphal from time to time. Fireman are also sent for training at Regional Fire Training Centre, Guwahati, Assam
29	Meghalaya	4	No permanent training centre, <i>adhoc</i> training is provided at Shillong Fire Service Headquarter for duration of 4-months (5 days/week).
30	Mizoram	6	No permanent training centre available; Fireman are trained at Regional Fire Training Centre at Guwahati, Assam.
31	Nagaland	6	No permanent training centre at present; and fireman are being trained at Regional Fire Training Centre, Guwahati, Assam. However, State has acquired land near proposed Kohima Airport and planning to for setting up a training centre.
32	Odisha	9	State has a full-fledged Regional

Sr. No.	Name of State/UT	Duration (in months)	Remark
			Training Center at Bhubaneswar.
33	Sikkim	-	Sikkim State F&ES does not have any training centre. Currently, firefighters are being trained at Regional Fire Training Centre (RFTC) Sila, North Guwahati, Assam.
34	Tripura	6	The State has a Training Centre at Agartala with basic infrastructure which needs upgradation.
35	West Bengal	3	West Bengal Fire and Emergency Services has a full-fledged Regional Training Centre (Institute of Fire Service) at Behala, Kolkata.

1.5 Training and Syllabus for Fireman

RMSI team made a comparison of training syllabi of Andhra Pradesh, Delhi, and Karnataka Fire Services (**Table 1-2**). From Table 1-2, it is clear that there is much variation in total no of lectures for one subject and variation in subject selection as well.

After a critical review of these, the RMSI team has suggested number of lecturers on each topic. Some lectures on personality development, personal financial management, personal insurance management, knowledge on computers, Medical First Responder (MFR) have been added for over all development of Fireman/Fireman Operator/Fireman Driver. The use of Fire Hydrant is negligible in most of the cities in the country. Accordingly, it is suggested that number of lectures on Fire Hydrant be reduced and stand post Hydrant, Landing Valve in the Wet Riser/Dry Riser/Down Comer system in the buildings be included for dissemination of information. Similarly, information about multi-stage pumps, low/high pressure pumps have been included in the syllabus, along with water mist firefighting technology with respect to its advantages over conventional water jet/spray nozzles.

Table 1-2: A Comparison of theory lectures for Fireman training in Delhi, Karnataka, and Andhra Pradesh

Sr. No.	Subject	No. of Period (lectures)			
		Delhi	Karnataka	Andhra Pradesh	Suggested
1	Chemistry of Fire	6	10	9	8
2	Hose	12	5	12	12
3	Hose fitting	12	5	9	12
4	Ladders	12	6	9	9
5	Ropes and Lines	6	5	6	6
6	Extinguishers and Water Mist Technology	24	10	24	26
7	Mechanical Foam & Foam Making Equipments	12	5	12	12

Sr. No.	Subject	No. of Period (lectures)			
		Delhi	Karnataka	Andhra Pradesh	Suggested
8	Breathing Apparatus	21	4	12	12
9	Small Gears	15	5	9	12
10	Pumps and Primers	24	8	18	24
11	Water Tender and other Appliances	6	5	6	6
12	Hydraulics and water problems	6	8	8	8
13	Water Supply	12	2	6	6
14	Water Relay	6	2	6	6
15	Building Construction	12	4	12	12
16	Fixed Installations	12	2	12	8
17	Watch Room Procedure	23	12	10	10
18	Practical Firemanship	23	4	18	12
19	Salvage	6	2	9	6
20	Knots & Lines/ Ropes	6	5	6	6
21	Rural Fire	6	2	6	6
22	Electricity	12	2	12	8
23	Special services	12	2	9	4
24	Discipline	23	4	15	16
25	First Aid/ Recitation	6	8	4	6
26	Duties of Firemen		10	10	10
27	Personality Development			2	2
28	Personal Financial Management			2	2
29	Personal Insurance Management		5	2	2
30	Knowledge on Computer			5	14
31	Communication Skills		4	2	4
32	Administrative rules			4	4
33	Conduct Rules, service condition, and disciplinary proceedings				2
34	Fire Service Organization and Manual	6		2	2
35	Precaution in Handling POL, LPG, CNG Fires		12		12
36	Hydraulic Rescue Tools		5		5
37	High rise Building Fire		20		20
38	First Aid (ST. John Ambulance Certificate)				36
39	High Pressure Pump (basic information)				2

Sr. No.	Subject	No. of Period (lectures)			
		Delhi	Karnataka	Andhra Pradesh	Suggested
40	Other appliances and equipment carried on Advance Rescue Tender, Foam Tender, DCP Tender, Hose Tender etc.)				8
41	Protective Clothing				2
42	Topography	12			-
	Total	333	183	288	380

In addition to above, there is a need for Physical Drills, Fire and Rescue Drills, and Squad Drills. The Andhra Pradesh Fire Service has suggested 235 total hours for these drills (i.e., 45, 125, and 65 hrs respectively), which is 455 hours for Delhi. It is proposed to have 450 hours for these activities.

Taking above into considerations, it is proposed to have 6 months duration (in case of 5 days/week working) training for Fireman/ Fire Operator/ Constable/ Fireman Driver to be reasonable which may be adopted for all the State/UT Fire Services. In case, it is 6 days/week working, then duration of training period may be reduced to 5 months.

1.5.1 SYLLABUS OF AB-INITIO TRAINING OF FIREMAN

The detailed *ab-initio* syllabus for Fireman course is given in given in Table 1-3.

Table 1-3: Recommended training syllabus for Fireman

Sl. No.	Subject	Hours (Hrs: Mins)	No of Classes
1.	Chemistry of Fire 1. Combustion: - Contents, causes and types of fire. 2. Extinguishing Fire: - Methods available, starvation, smothering, cooling, advantages of water.	06:00	09
2.	Hose: - Description of delivery hose, unlined, non-percolating, hose for hose reel, methods of manufacture, silver yarn, strand or ply thread, warp and weft, plain and twill weave material used characteristics of hose, care and maintenance, standard tests, causes of decay.	08:00	12
3.	Hose Fittings:- Delivery hose couplings, instantaneous, suction hose coupling, threaded, branch holders and monitors, stand pipe, collecting heads, suction strainers, breeching, adopters, blank caps, hose ramps.	06:00	09
4.	Ladders	06:00	09

Sl. No.	Subject	Hours (Hrs: Mins)	No of Classes
	Types:- First floor, extension ladder (trussed and untrussed) short extension ladder, hook ladder and belt, scaling ladder, escape ladder, Turn Table Ladder, and construction, parts, care and maintenance, standard tests of extension ladder, hook and escape ladders.		
5.	Ropes and Lines Names with qualities of materials used for construction; names, length, size, use of the lines used in fire service, mechanical and chemical deterioration, care, maintenance and standard tests.	04:00	06
6.	Extinguishers and Water Mist Technology Extinguishers Types:- 1. Extinguisher which expel water or dilute chemical solution (soda acid, water gas cartridge, water stored pressure) 2. Foam Extinguisher (Chemical and Mechanical) 3. Extinguisher which expel vapor, forming liquids or gas (C.T.C, with types CO ₂ , DBE, BTM, DDM) 4. Dry Powder Extinguisher (Cartridge and stored pressure type) 5. Description, construction, charge or refills, methods of operation, use, advantages and disadvantages, care, maintenance and tests of all except (CBM, M.B,TBM, DDM) inhibitory factor of CTC and CO ₂ . Water Mist Technology: Water Mist Technology and its advantages over conventional Fire Fighting	17:20	26
7.	Mechanical Foam & Foam Equipment Description of foam, Types of foam compound, requirements for the production of Mechanical Foam, Foam making equipment (F.M.B.P.No. 2, F.M.B.P.No.10, F.M.B.P.No. 220, FB 5 X, description, parts and construction, working rates of consumption, production, use of method of application, care and maintenance of containers and equipment.	08:00	12
8.	Breathing Apparatus Function of oxygen in maintenance of life, composition of inhaled and exhaled air, importance of BA Set in Fire Service Types: (a) Atmospheric (b) Self-contained 1. Open circuit (Roberts and Normal air) (Duration) 2. Closed circuit (Proto and Salvus) (Duration) Names and function of the parts, contents, sequences of wearing, operational use, signals, recharging, care, maintenance and testing	08:00	12

Sl. No.	Subject	Hours (Hrs: Mins)	No of Classes
9.	<p>Small Gears</p> <ol style="list-style-type: none"> 1. Breaking away gears: Hammers, chisel, solo picks, pick axe, crow bar, door opener 2. Cutting away gears: Axe, lock and bolt cutter, wood saw, cut saw, hack saw, chopper, hay knives 3. Rescue gears: Jumping sheets, automatic escape, sling belt, safety, well hook, life buoy, life jacket, stretcher, First Aid Box, lines, fireman's axe, rubber gloves, gum boots, helmets, ceiling hook 4. Lights: Hurricane lamp, paraffin lamp, BA lamp, flood light, search light, electric torch 5. Turning over gear: shovels, spades, fork, drag hook, ceiling hook, plus-key tools 6. Transport gears: Life jacket, starting handle, cutter plier, screw driver, double ended spanners, screw and pipe wrenches, gland spanner, plug spanner, tyre lever, wheel braces, grease gun, oil can, hammer, file 7. Miscellaneous and special gears: Buckets, blower and exhauster, welding-cutting set, electric generator, chain saw, asbestos suit, blankets, fire bell, rocking stretchers, automatic escape, fire beaters, resuscitation apparatus 	06:00	09
10.	<p>Pumps and Primers</p> <p>Description of pump, types of pumps (Force pump, lift pump, bucket and plunger pump, rotary pump, and centrifugal pump)</p> <p>Description of centrifugal pump: Parts, gland packing and their function, advantages and disadvantages, types of primer (reciprocating, seal, induction), importance of atmospheric pressure, motor pump and trailer pump, size of pumps (portable, large, light, heavy and extra duty)</p> <p>Cooling (Direct and Indirect): Care, maintenance and different tests (monthly output test, six monthly vacuum test and suction inspection, weekly pressure test, six monthly deep lift test, gauges and their functions, practical pump, operation hints).</p>	12:00	18
11.	<p>Water Tender and other Fire Appliances</p> <p>Knowledge of various appliances in Fire Service, their parking at station and at fire.</p>	04:00	06
12.	<p>Hydraulics and Water Problems</p> <p>Composition of water, atmospheric pressure, weight and capacity of water per cu. ft. Practical and theoretical suction lift, friction loss, lifting water and water hammer</p>	05:20	08
13.	<p>Water Supply</p>	04:00	06

Sl. No.	Subject	Hours (Hrs: Mins)	No of Classes
	Sources: 1) Hydrants, Types, construction, parts, care and maintenance and screw down and sluice valve type hydrants, hydrants gears of fittings. 2) Static tanks, 3) Well and other sources.		
14.	Water Relay Definition: - Types (open, closed and collector pumping) names of pumps at different positions, supply pump, intermediate pump, delivery pump), spacing of pumps - advantages and disadvantages, important points for carrying out relay and study of gauges.	04:00	06
15.	Building Construction Material used and their behavior in fire, brief idea of column, beam, joints and walls with openings, causes and signs of collapse.	08:00	12
16.	Fixed Installations Sprinklers, drenchers and risers, sprinkler heads (bolt type, fuse type or solder type), spacing of sprinklers heads, Fire Service inlet.	08:00	12
17.	Watch Room Procedure Definition and requirements of watch room and control room, receiving and transmitting of telephone calls, maintenance of occurrence book and its importance, standard message.	06:40	10
18.	Practical Firemanship Qualities of Fireman and his (1) Duties at Station turn out (2) Duties on way to fire (traffic regulation, fire bell, road accident) (3) Duties on reaching the spot (quick survey and reporting to the control point or OIC of the first attendance. Sending messages, placing of pumps, setting into hydrants, laying of hose, method of entry, rescue, removal of bodies working in smoke or darkness, room searching, finding and fighting the fire (4) After the fire (making up duties on return to Station)	12:00	18
19.	Salvage Definition-- Damage (direct, indirect) equipment required for salvage work, cleaning of water from building, reducing water and smoke damage.	06:00	09
20.	Knots & Lines Running and standing part, loop, bight, half hitch, thump or over hand knot, figure of eight, Carrick bend, reef knot, clove hitch, single sheet bend, double sheet bend, rolling hitch, timber hitch, round turn and two half hitches, fisherman's bend, draw hitch, slippery hitch, ship shank, cat's paw, bowline, running bowline, bowline on the bite, black wall hitch,	04:00	06

Sl. No.	Subject	Hours (Hrs: Mins)	No of Classes
	midshipman's hitch, waterman's hitch, chair knot, slicing (short, eye, back).		
21.	Rural Fires Difficulties (means of communications) delay in fire call, road condition,, lack of water supply system, combustible nature of dwelling and stocks, causes of village fire, normal appliances for village fire, hose and branches, methods of fighting the fire, fire beaters, wind ward, lee ward, fire breaks, counter firing, natural fire break.	04:00	06
22.	Electricity Sources of electricity (mechanical, chemical), static electricity, current (A.C., D.C.) brief idea about generator, transformer, main switch, fuse, short circuit, fireman's switch, neon signs, dangers of improper use of electricity, safety requirements and precautions while dealing with electrical fire.	08:00	12
23.	Special Service Calls Hints while dealing the rescue from sewers (sewers gases) wells, rivers and ponds, light accidents, building collapse, road accidents, electrocuted, lunatic on the tree or high buildings, acid on roads, leakage of gases, air crash, railway accident, life trapped in fire flood water etc., land slide and rescue of animals.	06:00	09
24.	Discipline Definition, how discipline is produced, orders, sign of discipline, essential requirements for a good disciplinarian, some of the things which a good disciplinarian must not do, discipline is an art, importance of discipline in Fire Service.	10:40	16
25.	First Aid	02:40	04
26.	Duties of Fireman Duties of Fireman in assisting the Driver Operator in the proper maintenance of equipment and gears of the vehicles, duties when posted on vehicles, duties when posted on sentry by turns, work shop duties, control room and watch room duties, duties of office orderlies and fire aids, dispatch messengers etc., legal duties in the interest of fire service when ordered by appropriate authority etc. the interest of fire service when ordered by appropriate authority etc.	06:40	10
27.	Personality Development	02:00	02
28.	Personal Financial Management	02:00	02

Sl. No.	Subject	Hours (Hrs: Mins)	No of Classes
29.	Personal Insurance Management	02:00	02
30.	Knowledge Gaining Methods through Computers, Internet Browsing, Fire Journals, News Papers, Books & Case Study	03:20	05
31.	Communication skills	02:00	02
32.	Administrative Rules including promotions & other Monetary benefits	02:40	04
33.	Conduct Rules, Service conditions & Disciplinary Proceedings	01:20	02
34.	Fire Service Organization and Manual Ranks in State/UT Fire Services, Fire Stations with their locations and telephone numbers, name of officers Fire Service Manual	04:00	04
35.	Precautions in handling POL, LPG and CNG fires	8:00	12
36.	Hydraulic Rescue Tools	3:20	5
37.	High Rise Building Fire and Rescue	13:20	20
38.	First Aid (ST. John Ambulance Certificate)	36:00	36
39.	High Pressure Pumps (basic information)	2:00	2
40.	Other appliances and equipment carried on Advance Rescue Tender, Foam Tender, DCP Tender, Hose Tender etc	5:20	8
41.	Protective Clothing	2:00	2
	Total		380

In addition to above, every Fireman/ Fireman- Operator/ Fireman- Operator- Driver needs to undergo for Physical Drills, Fire and Rescue Drills, and Squad Drills as part of practical course. It is proposed to have 450 hours for these activities.

1.5.2 REFRESHER TRAINING COURSES FOR IN SERVICE FIREMAN

It has been observed that Firemen entered into fire services at different point of time are having very divergent academic and technical qualifications. Keeping this, in mind, it is appropriate to have training course syllabus related to firefighting, fire prevention and fire safety, search and rescue (SAR), and medical first responder (MFR) for refresher training course. The other specialized courses/practical training should be working in smoke room, hydrocarbon fire, and B.A. Gallery.

1.6 Syllabus for promotion to Leading Fireman

While promotion from Fireman to Leading Fireman (LFM), fire personnel should undertake training course for Leading Fireman. This training should provide both theoretical and practical training required for effective deployment of firefighting and rescue vehicles and specialized equipment. The syllabus for Leading Fireman is given in Table 1-4.

Table 1-4: Syllabus for promotion to Leading Fireman

Sl No	Syllabus	Contents	Mode of teaching
1	Breathing Apparatus and Resuscitation	Types in use with their limitation circumstances in which sets are to be used – conditions when resuscitation is necessary, standard test	Theoretical (written and/or oral)
2	Chemical Extinguishers	Types of extinguishers in use and fires on which each one can be used; advantages and disadvantages and general methods of maintenance; standard tests.	Theoretical (written and/or oral)
3	Escape Ladders, Extension Ladders and Hook Ladders, with Drills	Types in use with their limitation care and maintenance; duties of each member of crew in performance of standard drills; standard tests;	Theoretical (written and/or oral)
4	First Aid	Method of approach and subsequent treatment in cases of shock, wounds, burns, bleeding, fractures and respiration failures	Theoretical (written and/or oral)
5	Foam and Foam Equipment	Types of foam making appliances in use with their limitations; circumstances, when these can be used; care and maintenance; standard tests.	Theoretical (written and/or oral)
6	Hose and Hose Drills	Types of delivery and suction hose in use its construction with care and maintenance; method of testing, cleaning, drying, repairing and stowing; duties of each member of crew in performance of standard three-men and four-men drills; standard tests.	Theoretical (written and/or oral)
7	Hydrants and Hose Fittings	Types of hydrants in use with sizes and construction of outlets; hose fittings, like couplings, breeching, collecting heads, branches with different types of nozzles, strainers, standpipes, hose wrappers, hose bandages, hose ramps, branch holders and their uses; standard test of hydrants.	Theoretical (written and/or oral)
8	Knots and lines	Types of lines in use, method of testing and different to which different knots can be put to standard test uses	Theoretical (written and/or oral)
9	Pumps and Pump Drills	Types of pumps with priming systems in use; and disadvantages; duties of each member of crew in case advantages of standard pump drill.	Theoretical (written and/or oral)
10	Practical Firemanship	Methods of entry into and searching a building, locating a fire and precautions to be observed when working in smoke laden building.	Theoretical (written and/or oral)

Sl No	Syllabus	Contents	Mode of teaching
11	Small Gear	Uses of special small gear, like door openers, bracking-in-tools, cutting plants; rescue gear; jacks and persuaders, pulleys; axes and preventers, etc.	Theoretical (written and/or oral)
12	Topography	Knowledge of the layout of the town/city with names of prominent localities, main roads, connecting such localities, names of different bazaars and important lanes; general spread of the fire hazards in the area served by the Fire Station concerned.	Theoretical (written and/or oral)
13	Watch room procedure	Functions of watch room; methods of keeping records of incoming and outgoing messages; mobilizing procedure; method of dealing with fire and emergency calls; standard messages.	Theoretical (written and/or oral)
14	Water problems	Types of water supplies, essential requirements for their use for fighting pressures in water mains, capacities making of pumps for tapping water mains.	Theoretical (written and/or oral)
15	Water relay	Meaning of collector and series pumping; normal relay distance; method of detecting disturbances in relay hose lines.	Theoretical (written and/or oral)
16	Breathing Apparatus and Resuscitation	Practical demonstration in harnessing a breathing set or using a resuscitation apparatus.	Practical
17	Chemical Extinguishers	Method of operation; recharging after use.	Practical
18	Escape Ladders, Extension Ladders and Hook Ladders, with Drills	Slipping and pitching; handling of hook ladders with pompier belt and ascending and descending on ladder.	Practical
19	First Aid	Methods of bandaging at different parts of body and artificial respiration.	Practical
20	Foam and Foam Equipment	Practical demonstration on how to use each equipment.	Practical
21	Hose and Hose Drills	Lifting, laying, making-up, adding, replacing or removing of hose as also carrying lines on upper floors on ladder.	Practical
22	Hydrants and Hose Fittings	Operation of hydrants and different hose fittings.	Practical
23	Knots and Lines	Practical tying up of various knots.	Practical
24	Pumps and Pump Drills	Operation of pumps and standard pump drill.	Practical
25	Rescue Drills	Picking up, lowering and carrying down insensible persons; rescue by fireman's lift and line rescue.	Practical
26	Squad Drills	Conducting practical squad drill with formation of squad, marching in step, turning with right and left inclination methods of March-past and presentation of parades.	Practical

2 Training and Syllabus for Fire Officers

As mentioned in section 1.1, there are two entry levels: 1) Fireman Level and 2) Middle Level (Sub Officer/ Assistant Station Officer). Immediately after joining the Fire Services, it is mandatory that every fire officer need to undergo mandatory professional training.

From the study of rank structure in different State Fire Service, it was observed that it is not only the training curriculum of various courses in different State/UT Fire Services but also the nomenclature of ranks as well is confusing in a way. The State like Delhi has rank of Sub-Officer (Fire unit in-charge above the rank of Leading Fireman (LFM)) and then Station Officer (St. O). However, in the State of Andhra Pradesh, Leading Fireman is promoted directly to Station Officer, who is in-charge of a Fire Station (there is no rank of Sub-Officer in the Andhra State Fire Service). In case of Tamilnadu, the Officer level rank structure is entirely different in the sense that St. O and DO are recruited directly with educational qualification of 12th and Graduate and sent for training.

It is, therefore, necessary that training course curriculum and rank structure for different officer level training should be followed as per SFAC norms and States/UTs Fire Training Services may adopt this accordingly, i e.,

- **Sub-Officer course-** 6 months (with 2 months extra practical training for private/direct candidates);
- **Station Officer/ Instructor's course-** 6 months; and
- **Divisional Officers course-** 5 months

For directly recruited officers without any Fire Service training/experience, the total duration of training is recommended as 1000 hrs (which includes additional 200 hours for practical training). This is same as being followed at NFSC, Nagpur, and appears reasonable.

This may be followed until national level training curriculum on basis of vocational structure as suggested by AICTE (All India Council of Technical Education) is agreed upon and approved by DG, NDRF&CD, MHA and circulated to all the States/UTs for implementation. However, the revised structure for accreditation is proposed in Chapter 4 (Table 4.1).

2.1 Syllabus of *ab-initio* training course for Sub-Officers

The *ab-initio* course content, being followed at NFSC, Nagpur has been proposed with some modifications to be followed throughout the country in all the Regional/ State/ UT Fire Training Centers (**Table 2-1**, NDMA Guideline, 2012), which may be further revised time to time depending upon technological advancements in the Fire Services.

Table 2-1: Recommended training syllabus for Sub-Officers' course

Sl. No.	Course Contents	Hours
1	Aircraft Fire and Rescue: Lecture: Common terminology, preliminary about fire hazards in Air-Craft and action required for Rescue and fire-fighting, Resources of Fighting Fire in Airports. Main features of Crash Fire Tender (CFT) and Rapid Interventional Vehicle (RIV)	18
	Practical: Visit to Airport/Aircraft	12
2	Breathing Apparatus: Lecture: Introduction, Physiology of Respiration, Types of B.A. sets in use. Construction, Working principles and Stution maintenance, Discussion of ISI Standard	6
	Practical: Donning of Sets, Testing and Operation, Maintenance, Searching procedure with B.A. Sets, Line Signal-Use of.	12
3	Building Construction: Lecture: Introduction, highlighting importance of the subject, Classification of building in the country , Building materials and their behavior under fire conditions, signs of collapse of various types of occupancies and fire fighting techniques in relations to occupancies, Importance of fire escapes with respect to their positioning, Reference to NBC part IV.	10
	Practical: Rescue from voids	6
4	Basic Physics and Chemistry: Lecture: Heat and Combustion, oxidizing and reducing agents, acids. Flammable liquids classification and types of tanks, gases and vapors, flammable limits, specific gravity, vapour density, energy, melting point, boiling point, dust and explosion, liquid and gas fires, LPG, CNG in brief.	10
	Practical: Preparation and demonstration of the properties of various acids and alkalies, gases, organic flammable liquids and commonly used industrial chemical-Firefighting technique.	8
5	Discipline: Lecture: Introduction, importance of Discipline, General principles of discipline, essentials for disciplination and outward signs.	3
6	Fire Extinguisher and Water Mist Technology: Lecture: Classification of Fire and types of extinguishers, maintenance, method of operation, Reference to relevant IS. Advantages of water mist technology, surface area of the water droplets size, its use with foam concentrate	12
	Practical: Demonstration and practice with extinguishers, method of recharging after discharge. General maintenance and standard tests.	12
7	Electricity and their Fire Hazards: Lecture: General introduction , Fundamentals of electricity, Generation and Distribution , Common causes of electrical fire and its remedial measures, electrical hazards including static electricity and protective measures and firefighting procedures, Elementary knowledge of fire protection and firefighting in different premises, electrocution, use of safety devices MCB/ELCB.	12
	Practical: Demonstration and Determination of related electrical experiments,	

Sl. No.	Course Contents	Hours
	fighting electrical fires.	6
8	First Aid, Resuscitation and Ambulance aid: Lecture: Definition of First-Aid, Qualities of fire aiders, Shock-Signs and Symptoms, causes and management, Asphyxia –Signs and symptoms, cause and management; Wounds and Hemorrhage-Classification of injuries, Signs, Symptoms and management, Burns, Scalds and frost Bites signs and symptoms and management, handling Road accident victims with spinal cord injuries. Fractures: Causes, types, signs and symptoms, management, Sprain & Dislocation- signs and symptoms, Management and observation of patient, Snake Bite-Treatment and Management.	6
	Resuscitation: Introduction, Manual Technique a) Holger Nielson Method; b) Schaefer's Method; c) Silvestors Method; d) Mouth to Mouth (or to nose) Resuscitation Apparatus and their uses.	4
	Practical: Demonstration and practice of bandaging and wound treatment, Standard Drills using stretcher in Ambulance. Demonstration and practice	14
9	Means of Escape: Lecture: Classification of escape routes with reference to N.B.C. Practical: Escape from multi-storied building, lifts, wells, quarry use of ladder, knots, Blocks (with pulley).	4
		4
10	Fire Service Administration: Lecture: Fire service organization rank, duties of fire man ,writing O.B, log books Hose card, Fire reports, registers etc. Fire Service Organization, Executive duties of Officer-in-Charge of a Fire Station, Administrative duties of Officer-in-Charge of a station. (a) Writing of a report (b) Occurrence Book, (c) Hose Card/ Register, (d) Fire reports, (e) Workshop Orders, (f) Log books, (g) Stock Registers, (h) Orderly Room Registers, (i) Defaulter Register, (j) Leave Register, Station Discipline.	8
	Practical: Writing practices of all types of reports and registers.	6
11	Fixed Firefighting Installation: Lecture: Introduction of Sprinkler system and their care and maintenance and operational procedure, Elementary requirements of Drenchers, Rising Mains, Hose Reels and Down-comer, Automatic Fire Alarms, CO ₂ , Foam, Water mist, reference to relevant ISS.	8
12	Foam and Foam Making Equipment: Lecture: Introduction to all types of foam, Mechanical, Chemical, AFFF and High Expansion-Foam concentrates, properties of Foams and technique of extinguishment by foam, foam making equipment mechanical and chemical operational data of Mechanical Foam, High Expansion and Low Expansion Foam, care and Maintenance and Storage of Foam compound. Discussion on relevant ISS.	8
	Practical: Standard drills, care and maintenance of foam equipment and storing of foam Compound-fire –fighting technique.	10
13	Hose and Hose Fitting: Lecture: Types of suction and Delivery Hoses, material used, construction,	20

Sl. No.	Course Contents	Hours
	<p>Hose-reel, Hose, causes of decay, General-operational-misuse of Hose, Storage, Cleaning and drying, care and maintenance, marking of Hose, Repair of Hose, Standard tests of Delivery Hoses, Reference to Relevant ISS.</p> <p>Definition and different group of Hose Fittings. Types and construction of Suction; Hose & Delivery; Hose, Hose-Couplings, Suction Couplings, Wrenches. Branches, Monitors, Water-cum-foam Monitor, Nozzles & branch holders, collecting Head and suction hose, Fittings; frost valve, Deep lift suction fittings, Breaching, Adaptors and Blank cap suction reduction piece, Miscellaneous, Hose Fittings, Hose Ramps, Maintenance of Hose Fittings, Reference to relevant ISS.</p> <p>Practical: Standard Drills, Repairing Hose and Testing under varying pressure. Demonstration and Identification of above Hose Fittings.</p>	12
14	<p>Hydrant and Hydrant Fitting:</p> <p>Lecture: Type of fire Hydrants, Hydrant gears, stand pipe making, case & maintain operation testing using flow gauge. Hydrant and Water supplies, water distribution system, types and construction of Hydrants, Hydrant Gears and Equipment, Marking, Testing, cares maintenance Operation & Test of Hydrant using Flow Gauge, Reference to Relevant ISS.</p> <p>Practical: Standard Drills, operation of Hydrants and testing etc.</p>	6 5
15	<p>Hydraulics:</p> <p>Lecture: Calculating capacity rectangular and circular tanks. Pressure and Head, pressure and flow measurements, and problem relating to flow and velocity, Nozzle's discharge calculation of water, requirement for specific fire size.</p>	8
16	<p>Knots and Lines using Ropes:</p> <p>Lecture: Construction & Fibers used for rope, types and uses of lines, causes of Deterioration, Inspection and tests, Methods of testing, care and maintenance, standard knots and their used Reference to relevant ISS.</p> <p>Practical: Types of knots and their uses, hauling of equipment, using ropes for rescue, using different knots.</p>	5 2
17	<p>Ladders:</p> <p>Lecture: Introduction, Types of Ladders, Construction features of conventional Ladders, Operational use, elementary Knowledge of T.T.L. (Turn Table Ladder) & A.L.P. (Aerial Ladder Platform).</p> <p>Practical: Standard Drills, pitching and climbing Hints, practice of leg-lock. Taking on Arm hold. Standard tests and Maintenance, Rescue Operation from elevation, fixing extension ladder rope, using ladders as bridge.</p>	8 20
18	<p>Pumps and pump operation:</p> <p>Lecture: Classification of common types of pumps in use, construction, Methods of priming. Testing and Fault-finding, care and Maintenance and standard Test.</p> <p>Practical: Standard drills; pump operation at varying pressure and with different priming systems, practice using pumps if primer fails.</p>	6 10
19	<p>Rescue drill and rescue work:</p> <p>Practical: Picking up, Lowering & Carrying Casualty, Rescue by Lines and blocks.</p>	15
20	<p>Practical Firemanship:</p> <p>Lecture: Qualities of Fireman and his important duties at a Fire Station and fire</p>	4

Sl. No.	Course Contents	Hours
	ground. Practical: Methods of entry into buildings, searching of building for locating of fire, methods of rescue, precautions to be observed when working in smoke laden buildings.	7
21	Rural Fire: Lecture: Fire Hazards in rural areas and cause of fire, Hay stacks, Special appliance & equipment, Hay Fires, Method of Fire – fighting in rural areas. Practical: Fighting Hay Stack Fire and Bush Fire/using fire beater.	5 4
22	Salvage: Lecture: Introduction, Equipment for Salvage and working at Fires. Practical: Drills with SALVAGE equipment.	4 6
23	Small and Special Gears: Lecture: Function & Construction- General Purpose Tools; Breaking in and Cutting tools, Pulley blocks; Function & Construction—Lighting Function & Construction—Lifting & Rescue tools; Function & Construction—Special & Miscellaneous gear hydraulically operated diesel operated and electrically operated, Rescue Chute and Jumping Cushion. Care and maintenance of equipment. Practical: Practical use of equipment & Locker Drills (Stowage)—use of tools—Rescue by Chute, cage etc.	7 7
24	Ship Fire: Lecture: Elementary knowledge of ship, ship fire protection.	3
25	Special services: Lecture: Introduction, spread of fire and special Hazards, Method employed by fire services to rescue trapped persons in Lifts, Sewers, Trapped under vehicles, Debris of collapsed buildings and wells, Rescue of animals, Rescue from ponds and rivers etc. Practical: Rescue from water/vehicles, debris, wells, tunnels, positioning and using Blowers/Smoke Exhausters.	12 5
26	Squad drill and PT: Practical: Physical training as per standard table, Squad Drill, formation of Squad, Marching, Turning Formation and right and left Inclination, Methods of March past, Ceremonial—parade.	48
27	Watch Room Procedure and Mobilizing: Lecture: Identification of communication requirement of Fire Service, Watch Room, Control Room, General requirements, equipment Station Ground, Turn-out area, Area of Topography, and Telephone Call area, Mobilizing boards and maps. The log and occurrence book, introduction to various lines, communication Equipment in Fire Service, Introduction to Radio Communication and use of VHF sets and computers. Practical: Demonstration of Switchboard and Fire Alarm Operations, and Exercises in Control Room and Fire ground Wireless messages.	16 5

Sl. No.	Course Contents	Hours
28	Water Relay: Lecture: Types of relay-systems, advantages and disadvantages – Calculation of hose.	5
	Practical: Water Tender Drill, High elevation Drill use of carrying branch used, Hose on ladders, dividing breeching, collecting breeching – Hose clamp, use of accessories carried on WT.	6
29	Water Tender: Lecture: Essential Features: a) Water Tank : Capacity b) Fire Pump : Type capacity, Pressure single stage / multi stage c) Locker Space: Accessories carried on Water Tender d) Hose reel and Hose e) Functions, Operation of five-way valve and position of valves, portable pumps, Relevant ISS Reference. f) PTO g) Monitor	8
	<i>Other Vehicles:</i> Foam Tender, DCP Tender, BA/Control Van/ Light Van, QRT, Hose Tender	12
	<i>Specialized Vehicles:</i> ALP/Hydraulic Platform	6
	Practical: Water Tender Drill, High elevation Drill carrying branch and additional rope on ladders, use of dividing breeching, collecting breeching –Hose clamp, use of accessories carried on Water Tender. Other Vehicle Drill	20

Total weeks : 21 weeks, i.e. 105 days

Examination : 21 days, i.e. 104 hours

Holidays : 4 days

Preparation Leave : 5 days

Total working days for theory and practical : 75 days

For practical @ 3 ½ hours daily : 75 X 3 ½ hrs = 262 hrs.

For Theoretical @ 3 hr and 20 minutes : 75 X 3 1/3 hrs = 250 hrs.

(excluding 10 minutes break)

2.2 Syllabus for Station Officer's and Instructor's course

The broad objectives for the Station Officer and Instructor course are:

- To train the officer, who are in-charge of the Fire Station or likely to hold independent charge of Fire Station.
- To look after the fire prevention wing in the station jurisdiction.
- To impart training (theory and practical) in fire-prevention (inspection, awareness, and training) and handle any disastrous situation.

The *ab-initio* course content, being followed at NFSC, Nagpur has been proposed to be followed throughout the country in the Regional/State Fire Training Centers (**Table 2-2**, NDMA Guideline, 2012), which may be revised from time to time depending upon the technological advancements in Fire Services.

Table 2-2: Recommended training syllabus for Station Officer and Instructor

Sl No	Syllabus	Contents	Mode of Teaching
1	Breathing apparatus	Types in use with brief description of working principles; circumstances in which each type can be used; care and maintenance. Harnessing and actual use in smoke or gas laden chamber and standard test.	Theoretical Oral and Practical
2	Building construction	Types of buildings; properties of various building materials and their behavior in heat and fire, different construction of walls, roofs, floors, stairs, hearths and chimneys with flues, doors, windows, etc; their advantages and disadvantages in relation to fire risk. Placing of lifts, stairs, fire escapes, etc. in relation to occupancies.	Theoretical
3	Chemical extinguisher	Types in use with constructional details working principles with limitations of use their advantages and disadvantages; care and maintenance. Operational working; procedure of recharging after discharge and standard test.	Theoretical Oral and Practical
4	Chemistry and Heat	Principles of chemistry; heat and combustion; fundamental chemical reactions with risk involved; risks with important chemical compounds and volatile liquids. Laboratory experiments of production of heat, combustion and evolution of gases due to chemical reactions.	Theoretical Oral and Practical
5	Discipline	General rules of discipline; its importance in Fire Service and how it can be maintained; procedures in dealing with disciplinary matters.	Theoretical
6	Electricity	Principles of electricity and fire risks in relation to generation, distribution, domestic and industrial electrical hazards. Creation of sparks due to static charge, short circuits and leakages.	Theoretical Oral and Practical
7	Escape ladder (optional if not in use)	Types in use with brief description of constructions and working with appropriate identification of parts; care and maintenance.	Theoretical

SI No	Syllabus	Contents	Mode of Teaching
		Standard drills in slipping, pitching, bridging, correct methods of ascending and descending; standard tests.	Oral and Practical
8	Exercises (situation and tactical)	Exercises in practical fire fighting, with fire ground conditions incorporating various fire drills using different fire appliances and ladders and message work; night exercises.	Oral and Practical
9	Fire Service Administration	Fire Station administration; maintenance of records of hose, occurrences, watch room work, fire engines and other appliances; preparation of report of fires; special services and periodical returns.	Theoretical
10	*First Aid	General procedure; treatment of shock, wounds, burns and scalds, hemorrhage, fractures, etc. method of artificial respiration and bandaging. Oral and practical Demonstration of methods of treatment; artificial respiration and bandaging.	Theoretical
11	Fixed Fire Fighting Installation	Systems of Dry risers, rising mains, internal hydrants, fire resisting doors and shutters and their uses.	Theoretical
12	Foam and foam equipment	Types and composition of foam and their properties, expansion ratio, stability, methods of creating mechanical and chemical foam with advantages and disadvantages. Construction and working principles of foam making equipment like foam branches, multiple jet and inline inductors, foam pourers and towers etc.; care and maintenance. Standard drills with foam equipment and standard tests.	Theoretical Oral and Practical
13	Gas Fires (optional)	Properties of different gases, the hazards relating to gases, hazards of domestic gas installations.	Theoretical
14	Hook ladder	Constructional features; identification of parts; care and maintenance of ladder and belt. One man and/two men standard drills to 4 th floor with hose and rescue lines, standard tests.	Theoretical Oral and Practical
15	Hose	Construction of delivery and suction hose; operational misuse; methods of testing; cleaning, drying and repairing, care and maintenance. Repairing and darning of hose, standard tests.	Theoretical Oral and Practical
16	Hose Drills	Three and four men standard drills; carrying, running, laying and making up of hose; adding, removing, replacing and raising to upper floors.	Oral and Practical
17	Hose fittings	Construction of delivery and suction couplings, branches, nozzles, spray, diffuser, stream form and revolving branches, basement sprays, collecting and dividing breechings, suction collection heads, etc; their use, care and maintenance.	Theoretical

SI No	Syllabus	Contents	Mode of Teaching
18	Hydrants	Construction of different types of hydrants, sizes of outlets and outlet fittings; methods of connecting to fire pumps, marking and hydrant pits and covers; care and maintenance.	Theoretical
19	Internal combustion engines	Principles of Internal combustion engine; types of ignition systems; electrical system; use of fuel, care and maintenance. Demonstration of actual moving parts in dismantled i.e. engines.	Theoretical Oral and Practical
20	Knots and Lines	Types and composition of lines; working load, braking load and testing load; various knots and their uses; care and maintenance. Tying of various knots; splicing and whipping of lines; standard tests.	Theoretical Oral and Practical
21	Ladders	Types in use with brief description of construction and working with appropriate identification of parts; care and maintenance. Standard drills in slipping and pitching; correct methods of ascending and descending; standard tests.	Theoretical Oral and Practical
22	Physical & Squad Drills	Conduct of squad and physical drills with appropriate sequence and words of command; methods of presentation of parades and march past.	Oral and Practical
23	Pumps	Types use with constructional details and working principles; types of primers and methods of priming; testing and fault finding; care and maintenance. Demonstration of operating pumps of different types and priming systems, from hydrants and from an open source of water supply; standard test.	Theoretical Oral and Practical
24	Pump Drills	Standard drills with hose; hose reels; foam making equipments and places including upper floors; visual signals and whistle signals.	Oral and Practical
25	Plan Reading (optional)	Importance of plan reading; methods of reading with explanation of common symbols in use.	Theoretical
26	Practical Firemanship	Qualities of a fireman; his important duties at Fire Station and Fire Ground. Methods of entry, rescue, room searching, working in darkness and in thick smoke; line signals.	Theoretical Oral and Practical
27	Rescue drills	Picking up, lowering and carrying insensible persons with Fireman's life and lines rescues.	Oral and Practical
28	Refrigeration (optional)	Principles of refrigeration; properties and hazards of different refrigerants and actions to be taken in case of leakage.	Theoretical
29	Resuscitation	Description of resuscitation sets, methods of working and circumstances when used; care and maintenance.	Theoretical

SI No	Syllabus	Contents	Mode of Teaching
		Demonstration in use of resuscitation set.	Oral and Practical
30	Rural Fires	Causes of rural fires; precautions to be taken in rural areas; methods of fighting rural fires.	Theoretical
31	Salvage	Meaning of salvage; how fire loss can be reduced by salvage; salvage equipments and their uses. Demonstration in salvage sheeting, indoor and outdoor chutes, drawing and mopping.	Theoretical Oral and Practical
32	Small Gear	Types and uses of breaking in tools, door-openers, persuaders, bolt croppers, rescue gear, jacks and pulley blocks, axes, preventers, rakes, saws, etc. Demonstration in the operation of small gear.	Theoretical Oral and Practical
33	Special appliances	Brief description and working principles of oxy-acetylene cutting plant, blower and exhaustor machine, portable lighting sets, etc; their uses and precautions to be taken. Operation of special gears	Theoretical Oral and Practical
34	Special Services	Rescue of trapped persons from sewers, lifts, collapsed buildings and drowning; rescue of animals; methods to be used and precautions to be taken.	Theoretical
35	Sprinklers, Drenchers and CO ₂ Installations	Brief description and working principles of 'wet', 'dry' and 'alternate' systems of sprinklers and drenchers, CO ₂ methyl bromide etc; installation; methods of spacing locating and uses, care and maintenance.	Theoretical
36	Turn Table Ladders (Optional, if not in use)	Description and working principles of turn table ladders their advantages, situations when these can be used and precautions to be taken when in use; care and maintenance. Demonstration of operating the ladder with varying loads, uneven surfaces and weather conditions, standard tests.	Theoretical Oral and Practical
37	Watch Room Procedure	Functions of watch room; method of working with fire alarm and telephone systems; fire around and control room messages; mobilizing procedure; maintenance of records, etc. Demonstration of receiving and transmitting messages, log keeping and mobilization of Fire Force in major incidents.	Theoretical Oral and Practical
38	Water Problems	Study of pressure; heads, rate of flow, capacity and friction loss in relation to behavior of water under pressure; discharge pressures of pumps and different nozzles. Demonstration of discharge of water from different nozzles at varying pressures; effect of jet and spray and length of throw.	Theoretical Oral and Practical
39	Water Supply	Principles of 'series' and 'collector' pumping; methods of arranging relays. Demonstration of 'series' and 'collector' pumping.	Theoretical Oral and Practical

SI No	Syllabus	Contents	Mode of Teaching
40	Lecturette (optional – For Instructors)	Methods of imparting instructions and conducting training on various subjects on fire fighting, fire prevention, etc.	Theoretical
41	<i>Special Risks Group-I:</i> Hazardous storages in warehouses	Warehouses and storage sheds for hazardous goods and their construction from fire risk point of view, methods of storage and precautions to be taken.	Theoretical
	<i>Special Risks Group-II:</i> Ships and Dock Risks	Principles of nautical stability of floating objects and safety limits; causes of fires in ships and methods of fire fighting.	Theoretical
	<i>Special Risks Group-III</i> Aircraft fires and rescue	Construction of aircraft; locations, emergency exits, fuel tanks, batteries, etc; usual causes of fires in aircraft; methods of rescue and of fire fighting.	Theoretical

*: *Structure and Functions of Human Body, Asphyxia and Triage, Handling and Transportation of Injured persons shall be added.*

2.3 Syllabus for Divisional Officers' course

The broad objectives for the Divisional Officer course are:

- (a) To impart advanced level of training in the Field of Fire Engineering and Fire Service Management for the officers of supervisory level of the Fire Services of the country
- (b) Enabling them to take over charge as a Middle Management cadre or Additional Divisional or Divisional Fire Officer, and
- (c) To make officer capable to run the Fire Service with efficiency and manner to save the lives and national property from various fire and emergency situations.

The *ab-initio* course content, being followed at NFSC, Nagpur, has been proposed (*with slight modifications*) to be followed throughout the country (**Table 2-3**, NDMA Guideline, 2012), which may be revised from time-to-time depending upon the technological advancements in Fire Services.

Table 2-3: Recommended training syllabus for Divisional Officers' course

Sl No	Course Contents	No of Periods
1	<p>Air Conditioning Heating and Ventilation System: Introduction: Air-Conditioning system, Types and operation, location of Equipment, fresh air-intakes, Air-filters and cleaners, Ducts, Smoke control-Passive and Active, Fan controls etc. Unit, Air-conditioners, Care and Maintenance. Hazard assessment at different stages of Refrigeration design circuit and corresponding protective and Prevention methods, Fire Dampers, Disadvantages of using false ceiling area as return air passage. Heating appliances and their application, Distribution of Heat by ducts and pipes, Installation of Heating appliances. Requirements of Mechanical ventilation systems, special venting problems, pressurization and stack effect.</p>	15
2	<p>Air Craft Rescue and Air Port Protection: Categorization of Aerodrome and provision of Aircraft, Fire safety, Aircraft power plants, Aviation Fuels, Air-craft Fuel systems and other design considerations. Special type of fuel tanks in Aircraft (double sealed and self sealing), Air craft Fuselage compartments, Aircraft Fire detection and Extinguishing systems including Fire-Extinguishers, Means of Egress from Aircraft, Air craft Rescue and Fire control. Airport and Heliport Design Safety with respect to Spread of Smoke, Fire, and Smoke management System. Special Airport facilities and Installations, Hazards dealing with Airport Terminal Complex, Typical Modern Aircraft and special Military Aircraft carrying Ammunition, Bomb, Nuclear weapon and precautions to be taken in rescuing persons from "Ejection seats".</p>	10
3	<p>Appliance Design: Development in Design & construction of Fire Engines, Fire appliances, Design parameters of various types of pumps and their characteristics, standardization of Design. I.S.S related to Water Tenders, Emergency Tenders, Water Carriers, Breakdown Lorries, Control-unit, Hose laying Lorries, Turn Table Ladder and Hydraulic platform/ Aerial Ladder Platform.</p>	16
4	<p>Automatic Fire Detection System including built in P.A. System: Introduction- Description and Operating Principles of a) Heat Detectors. b) Smoke Detectors. c) Gas sensing Fire Detectors. d) Flame Detectors.</p>	15

Sl No	Course Contents	No of Periods
	e) Integrating of Automatic Fire-Detector, P.A. system, computer & Printer systems in "Analogous Systems". f) Using C.C.T.V. for fire detection, ambient conditions, affecting Detectors response, selection of Detectors and Detector Installations, Care, Maintenance and Testing of Detectors. g) Automatic operation of Dampers connected to Alarm systems & BMS (Building Management System).	
5	Building Construction & Structural Fire Protection: Introduction, Role of Architecture in Fire safe Design & Modern buildings, Fire test of element of structures, Fire hazards in building- Rx Precautions to prevent spread of fire between buildings, Means of lighting, spread of fire within building and means of escape as National Building Code (NBC). Fire protection requirements for building as per NBC. Access for Fire Appliances to building & Fire service inlet connection.	16
6	Court of Law: Introduction Procedure in Law courts, Summoning witnesses, Preparation of cases, Formalities in appearing before the court of Presiding officer, Methods of giving evidence, Importance of Fire Reports, Perjury, Structures of some related sections of the Indian Penal Code.	9
7	Chemistry of Fire: Basic combustion processes- Reaction- Chemical processes- Diffusion flames, Flash point, premixed flames, Explosions, Bunsen Burner, Flame and propagation in tubes- Flames Arrestors donation- Carbon in flames- Radiation. Special Types of Combustion- Surface Oxidation Deep seated fires- spontaneous heating and Ignition, Combustion of Metals Explosives- Unstable chemicals- Rocket propellants- Industrial Flames- Flames burning in air streams. Organic compounds, Flammable nature of Organic Compounds, Hydrocarbons, Solvents and Organic Acids.	16
8	Communications, Mobilization and Computer Applications: Mobilizing, Planning and Operational requirements, Implications of Centralized Mobilizing, Types of Signaling Systems in use. Radio in Fire service, Characteristics of Frequencies, Selection and Allocation, Types of Radio Scheme, Mobile Radio Equipment, Transportable and personal sets, Use of standard Equipment in hazardous conditions. Introduction to Computer, Computer Principles and Application of Computer to Fire Service for Command & Control Systems & Hazard Information.	20
9	Explosives and Radioactive Materials: Characteristics of Explosives and their general classifications, General Principles to be followed in storage of Explosives, Fire Fighting classifications of Explosives and fire protection measures, Transportation of Explosives, Explosives Act and Rules regarding permissible possession and storing of Explosives. Characteristics of Radioactive materials, Procedure of Handling Radio-Active materials, Radiation units and Measurements, Radiation Exposure, Monitoring and Decontamination Procedure, Fire Protection requirements for Radioactive materials.	15
10	Electricity and its Fire Risks: Main equipment in power generating stations and sub-stations, possible faults in these equipments that are likely to result in Fire Hazard. Precautions to be taken in boiler house, turbine house, coal yard and switch-yards regarding location of the equipment to minimize the damage due to Fire. Considerations in transmissions and distribution lines, Healthy electrical circuits with reference to sufficient insulation and clearances. Salient features of domestic and	15

Sl No	Course Contents	No of Periods
	industrial wiring, General defect in wiring. Common electrical equipments in domestic and industrial use. Types of faults in these equipments which may result in fire hazard. Necessary precautions. Fire in Electric traction system. Use of oil in electrical equipment such as transformer, O.C.B. Cables etc. Oil as a source of fire. Busting of crucial electrical equipments. Requirements of soaking Pits for Oil transformers Conductors and insulators used in electrical low voltage circuits. Their suitability as Fire resistance. Earthing of Electrical Equipments. Fires due to Static Electricity. Indian Standards (References) a) I.S. 2206 (Part I)-1962 Specifications for flame proof electric lighting fitting. b) I.S. 3034-1981 Code of Practice for Fire safety of industrial buildings electrical generating and distribution stations. c) I.S. 1646-1961 Code of Practice for Fire safety of buildings (General) Electrical Installation. d) I.S. 2148-1968 Specifications for flame-proof enclosures Electrical Apparatus	
11	Fire Drills: Principles and Procedure- Purpose of fire drills, formulating and planning of Fire Drill, Instructions and Training, Fire routine details, Frequency of drill, Drill in respect of different occupancies viz., Factories, Offices, Shops and Railway premises, Hotels and Houses, Day Schools, Hospitals, Places of Public Entertainment.	10
12	Fire Safety Legislation and Inspection: Acts, Rules and Regulations pertaining to existing Fire Preventive Legislation including updation/modifications, if any. a) Petroleum Act of 1934. b) Calcium Carbide Rules 1987. c) Explosives Rules of 1984. d) Factories Act 1948. e) Cinematography Act 1952. f) Inflammable substances Act 1952. g) Gas Cylinders Rules 1981. Responsibilities and delegations, Powers of Enforcements and Inspection of Fire Authorities and their officers under existing Fire Services Act. a) West Bengal Fire Services Act b) Goa Fire Service Act c) Delhi Fire Prevention & Fire Safety Act d) U.P Fire Service Act. e) Tamil Nadu Fire Services Act f) Maharashtra Fire Service Act g) Study of Modern Fire services Bill h) Himachal Pradesh Fire Services Act. i) Bihar Fire Services Act j) J & K Fire Services Act k) Assam Fire Services Act l) Kerala Fire Services Act m) U.K. Fire Precautions Act	15
13	Fixed Fire Protection Installation:	15

Sl No	Course Contents	No of Periods
	Introduction, Principles of Design as per Code of practice prepared by Bureau of Indian Standards and N.B.C., Risk- Categories and classes of system, General Requirements and Grading systems according to water supplies available, Installation for using water and Extinguishing systems and other Extinguishing Agents, Installation for special risks and Fire Fighting in a sprinkled building & Oil transformers.	
14	<p>Fire Protection Survey of various risks and Inspection of Public Entertainment & Assembly Places: Introduction, Assessing the magnitude of the Fire Hazards, Role of the fire Protection-Community and Identification of the Fire problems, House-Keeping Practices, Fire Loss Prevention and Control Management, Evaluation and Planning of Public protection-Fire prevention and Code of Enforcement.</p> <p>Constructional features and hazards peculiar to public Entertainment and Assembly places, Selection of site, Arrangement and construction of building including public portion of the premises, Licensing on constructing of temporary structures and pandals and fire precautionary measures, calculation of exit, sitting arrangement- gangways, stairways, safety curtain, storage and dressing rooms, projection-enclosure, lighting and electrical installations, safety lighting, provision of fire protection equipments, procedure in case of fire in such places- as per Cinematography Act of 1948.</p>	15
15	<p>Dust and Gas Explosion and Gas Detection System: Introduction- Classification of gases and their properties, Basic hazards of Gases and usage , BLEVE, PUVCE and safeguards, factors influencing the Explosivity of dusts, Hazards of Dusts, Dust cloud Ignition Sources , Factors influencing the destructiveness of Dust Explosion, Dust Explosion Test Apparatus and Measuring procedures, Gas detection and Analysis Equipment and their practical uses.</p>	15
16	<p>Hydraulics: Collection & Interpretation of Data- Tabulation and graphical presentation of Data; Preparation and interpretation of graphs, histograms (bar charts), circular diagrams (pie charts). Define that terms: a) Density b) Specific gravity c) Pressure on fluids and demonstrate the relationship between the three solve basic problems involving the units referred to a, b, c above, Define atmospheric pressure and describe methods of measuring it; show how the principle of atmospheric pressure is used in pumping systems either as an aid to flow or as a means of measuring flow; Calculate the capacity of irregularly shaped open water supplies. Mathematical problems relating to metacentric height, buoyancy, stability and forces in simple structure.</p> <p>In relation to pumps, define water power, brake power and efficiency; Carry out basic calculations involving these terms; Define the laws of friction and use them to calculate energy losses in piped water supplied; Explain the relationship between velocity and discharge of water through hose of differing internal surfaces and diameters; Calculate the velocity and quantity of flow of water in pipelines and hose of differing internal surfaces and diameters, Explain the relationship between branch pressure, nozzle diameter and discharge from a branch; Discuss the purpose and design of branches and nozzles; Define the term jet reaction and be able to calculate jet reaction forces; Calculate both theoretical and effective height of a jet. Flow calculation by Bernoulli's Theorem and its applications. Water Relaying- Spacing of appliances, Calculation of output and pressure, Practical considerations in different situations.</p>	12
17	<p>Investigation of Fire and Arson: Introduction, Importance and Reasons for through Investigation, Process of Investigation; Investigations on the site; Sources of Ignition; Role of Scientific Forensic Laboratory in the Investigation of Fires; Procedure and sequence of Interviewing</p>	12

Sl No	Course Contents	No of Periods
	witness and How to prepare Investigative Reports, Arson- its meaning and Detection, Motives, suspicious circumstances and Arson Devices, Role of Fire officers in Investigation of Arson Fires, Collection and Preservation of Evidence; how to prepare an Arson case, Legal aspects of Arson and related sections of I.P.C.	
18	Management, Command, and Control of Fire Services: Introduction to personality, development, Group behavior and how to work in group. Understanding people, Managing time, Principles of Command, Introduction to law and discipline, Introduction to CCTV, Guide to report-writing, Appraisal system, Being interviewed by the media, Decision making, Project Management, Employee relation for Management, Financial Accountability, Selective and Panel interviewing, Licenses and resources of the Fire Services and Probable Funds. Disaster Management: a) Natural Disaster (Earthquake, Tsunami, Cyclone, Flood, Landslide) b) Air Disaster (Plane cases inhabitants) c) Nuclear, Biological & Chemical disasters (NBC). d) Train, carrying inflammable involved in accident.	20
19	Mechanics: Rest and Motion of the body, Fundamental knowledge of forces, Work, Energy and Machines. Practical considerations and problems related to all types of simple machines including mechanical advantages.	9
20	Plan Drawing and Reading: Importance of plan reading, Element of Engineering Drawing principle, use and value of plans and Explanation of Common symbols, Interpretation of symbols, Tactical exercises on plan Drawing, Marking and syndicate discussion and Evaluation.	9
21	Storage & Transportation of Hazardous Materials: Introduction- Types of dangerous substances, Composite sign, its structure & use, Emergency Action Code (Hazchem) & International Systems (Transport Emergency Cards). Chemical Incidents and Decontamination Procedure, Central rule for Fire Arrangements, Storage and Handling of the highly flammable liquids and liquefied petroleum. Methods of Transportation, Marking systems in use on road, rail, shipping, and air.	10
22	Method of Instruction: Planning for Instructions- Characteristics of a good Instructor, Level of Participants, Demonstration and Lectures, Coaching, Use of Training aids. Discuss and case Studies, Role Playing, Follow up and Evaluation. Lecturette Practice by the Trainee Officer.	50
23	Evaluation Technique of Fire-Fighting Appliances & Equipments: a) Pumps and Primers. b) Hose-Delivery & Suction. c) Hose fitting. d) Extinguishers Media I. D.C.P. II. Foam (Protein, AFF, ATC/AFFF)	7
24	Special Fires: Planning & Techniques in dealing with Port Fires, Oil Terminal Fires, Oil Refinery Fires , Oil Platform Fires, Oil Tanker Fires, Oxygen Tanker Fires, LPG Bottling Plant Fires & Using Fix Firefighting facilities.	8

SI No	Course Contents	No of Periods
25	Using Remote Control appliances/Robots for Smoke filled/ Unbreathable areas	4
26	Mutual Aids	2

2.4 Refresher Training Course for in-service Officers

The in-service fire officers have entered into fire services at different point of time having very divergent academic and technical qualifications. Keeping this, in mind, it is proposed to have refresher-training course for in-service fire officers. There is no specific syllabus recommended, however, it should be framed in-line with the duties assigned to the officer of the particular rank and in the area of their operation with respect to latest technological developments in the field, change in rules/regulations/government orders, if any. This should also include discussions about normal working, identification of weakness in the system, and possibilities of improvements with respect to firefighting and fire prevention procedures, safety and welfare of fire service personals. This may also include interactions from officials from different departments, like police, civil defense/ home guards, insurance agencies, department of industries, department of health, etc.

3 Specialized Training Courses

National Fire Service College (NFSC), Nagpur alone may not be able to meet the training requirement for the whole country; therefore, well-organized Regional/State Fire Training Centers should also be asked to develop such training facilities to meet the overall requirement of the Fire and Emergency Services in the country. This may be initially developed region-wise and subsequently in every state.

The specialized courses like Breathing Apparatus (BA), Advanced Search & Rescue, Rail Transport Accident, HAZMAT handling, Nuclear, Biological, and Chemical (NBC) handling, Fire Prevention, etc. should have well defined duration of training and subject with contents for classroom study as well as practical demonstrations/mock drills as well as actual use of available equipments. The following sections provide brief details for the specialized course content and their duration, which are being run by NFSC, Nagpur and National Civil Defence College, Nagpur (NDMA Guideline, 2012).

3.1 Breathing Apparatus (BA) Course:

DURATION: 12 Working days

OBJECTIVE: To impart training in Breathing Apparatus for the Fire service Personnel who are very often required to carry out rescue as well as Fire fighting Operations in an atmosphere that does not support life. The Breathing apparatus being highly sophisticated life saving equipment requires specialized training for its users for saving lives and property.

COURSE CONTENT: Physiology of Breathing and Circulation of Blood, General Requirement of Breathing Apparatus and their functions, Practical use of Breathing Apparatus, Maintenance, Recharging, Testing and Fault Finding in Breathing Apparatus. Signaling, Supervising Procedure during operational use of Breathing Apparatus. Use of Guy Lines and Tally Boards, Study of irrespirable Atmosphere, Effects of Hot and Humid Atmosphere, Assembly of sets and wearing procedures.

BA Compressors- single phase, three phase and their filling capacities; procedure for filling air in cylinders; Filling air through Air Compressors, quality of air, replacing air filters used in compressors, Gas masks, close circuit and open circuit BA sets, use of electronic safety devices for users of BA Set.

3.2 Advanced Search & Rescue Course:

DURATION: 3 Weeks

OBJECTIVE: To train Senior Fire Officials in advance techniques of Search and Rescue (SAR) by employing modern state-of-the-art equipment for rescue during disasters. On completion of training, the Fire Officials will be able to understand the concept of Search & Rescue, use of modern SAR equipment, and organize training in SAR.

COURSE CONTENT: Principles of Search and Rescue, Search & Locating techniques, Rescue strategies and techniques, Rope rescue, Tools Equipment and accessories, Structural triage and marking, Operational safety, Principles of shoring, Debris tunneling, Confined space rescue, Improvised rescue devices.

3.3 Rail Transport Accident Course:

DURATION: 2 weeks

OBJECTIVE: To train Fire Personnel in techniques of extrication, rescue and incident management during rail transport accident. On completion of the training programme, the Fire Personnel will be able to perform extrication and Rescue techniques in rail accidents, use of Rescue equipments, organize training on management of rail accident.

COURSE CONTENT: Assessment of Rail Assets, Principles of Rescue in Rail Transport Accidents, Techniques of Gaining Access, Extrication methodologies, Rescue strategies and techniques, Rescue Tools, Equipment & Accessories, START, Incident Management and Command System, Volunteer first aid and victim stabilization, Scene security and salvage, Rope rescue techniques.

3.4 Collapsed Structure Search and Location Course:

DURATION: 1 week

OBJECTIVE: To train trainers and disaster response personnel in operation of acoustic and visual search and locating devices. On completion of the training, the participants will be able to describe steps for search and locating, use acoustic and visual search devices, and conduct training on victim search and location.

COURSE CONTENT: The concept of basic victim search and location, Composition of search team, Modes, types and patterns of conducting a search, Steps for identifying probable victim location, Acoustic devices for search and location, Visual devices for search and location, INSARAG marking system, Care and maintenance of search devices.

3.5 Chemical Disaster First Responders Course:

DURATION: 2 weeks

OBJECTIVE: To train local emergency responders in preparing and responding to a hazardous materials incident. On completion of training the participants will be able to identify hazardous materials, select and employ proper PPE, and conduct Responder Operations against hazardous chemical event.

COURSE CONTENT: Threat from hazardous chemicals, Principles of toxicology, Identification of hazardous chemicals, Health effects of hazardous chemicals, Response planning, Safety in handling & transportation of chemicals, Confinement & containment of hazardous chemicals, Medical intervention, Use of PPE, Chemical detection instruments, Decontamination Procedures, Incident command and control, Evacuation Planning.

3.6 Earthquake Disaster Response Course:

DURATION: 3 weeks

OBJECTIVE: To train Responders in Earthquake Disaster Response Management so as to enable them to serve as Leaders of various teams organized post earthquake. On completion of the training programme, the participants will be able to understand the science of earthquakes, undertake Search and Rescue Operations, and organize Relief and Recovery measures.

COURSE CONTENT: Science of Earthquakes, Problem of SAR in Earthquakes, Principles of Search & Rescue (SAR), Study of Building collapse, Use of Ropes for rescue, Utility of Emergency Shoring, Precautions on entering damaged buildings, Use of Breathing Apparatus, Debris tunneling, Use of small tools and equipment, Lifting and stabilizing loads, Casualty Triage, Organizing of Relief & Recovery measures.

3.7 Fire Prevention Course:

DURATION: 6 weeks (including industrial visit of one week, the trainees are attached to a major Fire Service anywhere in India).

OBJECTIVE: This course is intended to impart training for the personnel in Managerial/Executive cadre in Industrial establishments who are directly concerned with the technical and operational aspects of Fire Prevention, Protection and Fire Fighting.

COURSE CONTENT: Assessment of Fire Hazard, Automatic Fire Detection and Alarm System, Causes of Fires and Arson Detection, Chemistry of Combustion, Dust Explosion, Fire Drills in Industrial Establishments, Fire Insurance, Fire Prevention Design Exercises, Fire Prevention Legislation, Fire Protection, Fire Protection Design in Industries, Fire Protection in Petro Chemical Industry, Fire Pumps, Fire Risk of Electricity, Fixed Fire Fighting Installations, Hazardous Goods, Hose and Hose Fittings, Industrial Buildings, Inflammable Liquids, Vapors and Gases, Lighting and Heating Systems, Management Risks, Means of Escape, Portable Fire Appliances, Radioactive Materials, Report Writing, Salvage, Ventilation System, Water Supply.

Practical: Drills and Demonstration of Hose, Ladders, Pump-Operation, Portable Fire Extinguishers, Fire Fighting Operation and Rescue Techniques.

3.8 Training of Trainers in Radiological & Nuclear Emergencies Course:

DURATION: 1 week

OBJECTIVE: To train senior level Fire Officials, in order to make them capable of acting as responders in the event of Radiological Emergencies. On completion of training, the participants will be able to understand Radiological Emergencies & their consequences, perform the responder actions and decontamination, evaluate the requirements of the shelters, and operate radiation detection equipments and donning & doffing of Personal Protective Equipment (PPE).

COURSE CONTENT: Radiation and Radioactive material, Health Effects of Ionization and Radiation, Radiological weapons and their effects, Protection against Radiation and Safety practices, Assessment of Shelter protection, Improvised individual/ family shelter, Management of Shelters by Volunteer population, Radiation Detection Procedures & instruments, PPE, Decontamination: Gross & Technical.

4 Accreditation of Various Fire Training Courses

The NFSC, Nagpur is the only Fire Service Training Centre in the country, which has its courses accredited by Ministry of HRD. The other Central Government Training Institutions i.e. Central Industrial Security Force (CISF) - National Industrial Security Academy (NISA) at Hyderabad is training its own Fire wing personnel with similar courses and also functioning under the control of MHA, but does not have any such accreditation. It is learnt that this matter was taken up by CISF with Ministry of Human Resource Development (HRD), but was not agreed to by the Ministry.

It is therefore necessary to adopt some system of education perhaps in line with All India Council of Technical Education (AICTE), making it possible to develop a system of accreditation of various courses namely certificate, diploma, advanced diploma level, B.E./B.Tech courses uniformly for the Fire Services throughout the country. It is important that a National Vocational Educational Qualification Framework (NVEQF) be put in place that will allow seamless integration into higher learning and enable them to acquire formal degree and higher skill so that they can perform higher-level jobs, while in service (Table 4-1).

Table 4-1: Framework Option for a Candidate looking for higher level education

Qualification Level	Normal Qualification	Case I		Case II	
		Vocational Qualification	Certifying Body	Vocational Qualification	Certifying Body
6	4th Year Bachelor			B.E./B.Tech Fire Degree	University
5	3rd Year Bachelor	Advance Diploma	Board of Technology Education		
4	2nd Year Bachelor	Diploma			
3	1st Year Bachelor	Certificate	Board of Technology Education		
2	Hr. Sec. School grade XII			Grade XIIth	School Board
1	Hr. Sec. School grade XI			Grade XIth	School Board

4.1 AICTE Vocational Education Framework

Vocational education in India is implemented at Senior Secondary School level and funded by Ministry of HRD, Govt. of India because of following reasons:

- These are structured job oriented courses
- This is one of the thrust area of XIth 5 Year Plan
- There is a huge demand of educated skilled work force
- This model is already in use by Automobiles, Hotels and Tourism, IT, Telecom, Media and Entertainment, Hospitality and Tourism, Communication, Economics and Finance, Retail, Agriculture, Applied Arts, Tourism and Service Industry, Printing and Publishing etc. (<http://www.aicte-india.org/vocationaledu.htm>)

4.2 VET Framework

- AICTE has thought of Integrating VET (Vocational Educational Training) with main Education Stream.
- Provides for multilevel Entry and Exit systems after XII+ level and rejoin the stream as and when required
- Courses under this program will be nationally accredited under our national system

4.3 Certification

Each level @ 800 to 1,000 hours...../ year

- Skill Certification level I and II (Equivalent to standard XI and XII- by CBSE State Boards)
- Skill Certification level I, II and III (Equivalent to formal First Year of Engineering leading to Certificate of State Board of Tech. Education)
- Certification Level IV and V (Equivalent to formal Second Year of Engineering - leading to diploma of State Board of Technical Education)
- Certification Level VI (Equivalent to formal Third Year of Engineering - leading to Advance Diploma of State Board of Technical Education)
- Certification Level III to VI (Equivalent to formal I, II, III, and IV year of formal Bachelor's Degree program of Universities – Equivalent to B.E./B. Tech Degree)

5 Infrastructure for Fire and Emergency Training Centre

5.1 Introduction

The land and building requirements for a Fire and Emergency Training Centre will depend on total number of fire service personnel to be trained each year and type of training courses viz. Fireman/Fireman-driver/Fireman-driver-operator training, Leading Fireman training, Officer's training, Refresher courses, and or specialized training courses as well as senior level and promotional courses.

For land requirement, it is proposed that a suitable piece of land about 20 – 25 Acres should be allocated for a Fire Training Center as State/UT Fire Service may have to expand the training infrastructure later on, which will not be possible if extra space is not available. In case land availability is a bottleneck, a Fire Training Centre may be started with a land of 4-5 Acres.

The immediate proposal for the training center in each state/UT should include facilities for Fireman Training, Refresher Training, Computer Education, and Leading Fireman promotional course. The need of sub-officer/ station officer training may be met out from the neighboring State Regional Fire Training Center or NFSC, Nagpur as the case may be.

The conduct of Fireman/Fireman-driver/Fireman-driver-operator training course, promotional training course, refresher (short-term) training course, and specialized training courses like Breathing Apparatus, Collapsed Structure Search and Rescue, etc. shall have to be regular training feature throughout the year. 10% of the total operational strength is normally required to be under training as per Central Para Military Forces (CPMF) rules. As a thumb rule, each State/UT Fire Service should add this 10% manpower in each rank as training reserves and training courses may be planned as per need of the State/UT and upgrading technical skill of Fireman/ Leading Fireman/Sub-Officer/ Officer on regular basis.

5.2 Building Requirements

The normal requirements for building and other infrastructure for one batch (40 – 50 candidates) of fireman/fireman-driver/fireman-driver-pump operator for 6 months duration are given below. Apparently, it is possible to run two batches every year.

1. Lecture Room/ Class Room (50 SQM): for 40-50 persons = 1
2. Hall/ Auditorium for 80 – 100 persons (200 SQM with possibility of its division into two portions, if required)= 1
3. Model room/ library and offices (100 SQM)
4. Kitchen, Dining Hall, Dormitory for 80-100 persons (400 SQM)
5. Drill/ Parade Ground - Preferably with Saluting base (*depending upon availability of space*)
6. Jogging track along boundary wall or around the drill ground (*depending upon availability of space*)
7. Drill tower for Ladder and Rope rescue drills etc. (4 M x 3 M x 5 floors) – *a drill tower may not be required if 4 – 5 story building is available as part of sr. no. 8*

8. Four to Five storey utility building with sprinklers, hose reel, wet riser for Hot Fire Drill exercises and a high-rise building for fire drills (200 SQM x 2-stories, initially to start with one or two buildings with a provision for expansion into a high-rise building)
9. Burn Building/ BA Gallery: 10 M x 2 M x 2 floors with facility of artificial smoke and real fire situation, vertical access internally and externally, mechanical ventilation with thermal imaging camera and supervisor control room,
10. Facilities for collapse structure rescue / props etc.
11. Under ground water storage tank (50,000 litres) with tube well facility, pump house and hydrants
12. Facility for oil spill fire, Flange fire etc.
13. Area for road traffic accident rescue training with old/ condemned vehicles
14. Staff Quarter (60 to 140 SQM depending upon designation)
15. Garage for firefighting and rescue vehicles and storage room for specialized equipments
 - storage room can be part of specialized equipment Display/ Model room, or can be a part of burn building as only one part will be used as burn building and rest can be used for storage etc.

Note: *Parking space for the firefighting vehicles may vary from State to State, depending upon number of vehicles in the training center. Also, manpower required for these vehicles will also increase/decrease proportionately.*

5.3 Firefighting and Rescue Vehicles

1. Water Tender
2. Water Bowser
3. Foam Tender
4. DCP Tender
5. Hose Tender
6. ALP/TTL/Hydraulic Platform
7. Motor cycle with mist back-packs (10 litres)
8. Quick Response Tender/Vehicle (QRT/QRV)
9. Fire Boat
10. Rescue Boat
11. BA Van-cum-Light Van-cum-Control Van
12. Advanced Rescue Tender having equipment/accessories for handling HAZMAT
13. Educational Van

5.4 Specialized Equipment

In order to make training more effective, cut sections of equipment (wherever possible) along with initial charge equipment should be made available at the training centre:

1. Fire Extinguishers of different types (with initial charge)
 - (a) Water CO₂ (9 litres)
 - (b) Mechanical Foam 9 litres
 - (c) Dry Chemical Powder – 6 kg capacity and 9 kg capacity (gas cartridge type)
 - (d) Dry Chemical Powder (9 kg stored pressure type)
 - (e) CO₂ 2 kg, 4.5 kg, 9 kg with horn/ and connecting tool
 - (f) ABC type dry powder Fire Extinguisher
2. Fire Extinguishers of different types (cut-section)
 - (a) Water CO₂ (9 litres)
 - (b) Mechanical Foam 9 litres
 - (c) Dry Chemical Powder – 6 kg capacity and 9 kg capacity (gas cartridge type)
 - (d) Dry Chemical Powder (9 kg stored pressure type)
 - (e) CO₂ 2 kg, 4.5 kg, 9 kg with horn/ and connecting tool
 - (f) ABC type dry powder Fire Extinguisher
3. Trailer pump with primer for training purpose
4. Pump/primer: Centrifugal Pumps, Reciprocating Pump, Rotary pump etc.
5. Engine Cooling System
6. Power Take Off Gearbox (PTO) from Engine to Pump
7. Sprinkler Installation control valve with suitable water storage and pumping operation (100 SQM)
8. Automatic Fire Alarms of different types/working models
 - (i): Smoke Alarm (ionization type)
 - (ii). Smoke Alarm (optical type)
 - (iii). Heat Detector (fixed temperature)
 - (iv). Heat Detector (rate of rise)
 - (v). Line detector
 - (vi). Beam type detector (set containing transmission and receiver)
 - (vii). Infrared detector
 - (viii). UV detector
 - (ix). Control panel for above with battery backup
 - (x). Manual call point

9. Model room displaying different types of hose fittings/hoses, lifebuoy, life jacket and other accessories carried on water tender
10. Metal trays of different sizes
 - (i). 1m x 1m x 0.15 m
 - (ii). 2m x 2m x 0.15 m
11. Foam and foam making equipment
 - (i) FB - 5X with accessories
 - (ii) FB – 10X with accessories
 - (iii) Mechanical Foam generator with nozzle
 - (iv) Mechanical foam (AFFF) -200 litres
12. Ropes and display of various knots types
13. Teaching Aids
 - (i) Computer (Laptop)
 - (ii) Overhead Projector
 - (iii) Screen
 - (iv) Miscellaneous (White Board, Blackboard etc.)

Laptop has been suggested over desktop as it can be taken outside for demonstration.
14. Hydraulic Rescue Tool Kit: Combi-Tool (Cutter and Spreader), Pump, Power Wedge, Rescue Ram etc .
15. Electric/Petrol Powered Chain Saw/Cutter for Wood
16. Electric/Petrol Powered Chain Saw/Cutter for Concrete
17. Pneumatic Lifting Bags (1 set)
18. B.A. Set
19. B.A. Compressor
20. Victim Location Device (Acoustic)
21. Thermal Imaging Camera
22. Hand Held Gas Detector (4 Gases)
23. Portable Pump
24. Floating Pump
25. Smoke Exhauster/PPV
26. Personal Protection Equipment (PPE)
27. Diving Suit (Wet/Dry)
28. First Aid Box
29. Inflatable Lighting Tower
30. High Capacity LED Torch Light
31. Static Wireless Set
32. Mobile Wireless Set

33. Walky-Talky
34. Repeater (if required)
35. Megaphone
36. Gas Cutting Tools
37. Ladder – Aluminum Extension (35 feet)

Notes: *it will be ideal that each type of vehicle and equipment are made available permanently at the training centre, when State/UT fire service is fully developed. Wherever, State/UT Fire Service are dealing with Flood Rescue work, they may also have a swimming pool in the training centre. This may also be used for physical fitness activities. However, looking at the present scenario, where there is lack of infrastructure in the State/UT for fire fighting and rescue vehicles and specialized equipment, it is proposed that basic fire tender with all the SAR/MFR equipment and cut-sections are made available with the training centre. The number of equipment should be increased depending upon number of trainees to be trained at a Fire Training Centre. For practical/demonstration and hands on training, trainees can also be taken to a Fire Station, where these firefighting and rescue vehicles and specialized equipments are available or by calling the vehicles and equipment such as Advanced Rescue Tender, Aerial Ladder Platform, DCP Tender, Hose Tender etc. at the training centre, since these are required for few hours/days in a year.*

5.5 Staff for Training Centre (having Fireman Training and LFM Promotional Training)

Following is the minimum recommended staff for a training center:

1. Divisional Officer (Incharge of training center) =1
2. Asst. Divisional Officer =1
3. Station Officer = 1
4. Sub-Officer = 2
5. LFM = 4
6. FM Demonstrator = 6
7. FM Drivers = 2 (Depending on number of units at training centre)

Recommendations:

- (i) Level of Incharge may be raised to CFO/ Director (Training Centre) when SO/ St.O and other specialized courses are also conducted
- (ii) Number of lecture halls, dormitories/ hostel accommodation for officers and dining facilities should be augmented depending on number of senior level courses for officers
- (iii) Facility for computer training should also be added if the computer awareness training is incorporated with Fireman/ Fireman-driver/Fireman-driver-operator and or Leading Fireman or other training
- (iv) Training for special courses should be added as required

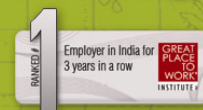
- (v) Operational officers could be used initially to start training centre and create a permanent set up in steps.
- (vi) Number of courses should be planned in a way so that training infrastructure is put to regular use throughout the year
- (vii) The spare capacity and time in each training centre should be utilized for training to the public (housing societies, schools, hospitals, high-rise buildings, shopping malls etc.) as part of public awareness program for Fire Prevention related activities.



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