

Syllabus For The Trade
of

FIREMEN

Under

Craftsmen Training Scheme (CTS)

Based on Semester System

Designed in – 2013

By

Government of India

Ministry of Labour & Employment (DGE&T)

CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE

BLOCK - EN-81, Sector -V, Salt Lake,

Kolkata – 700 091

**List of members of trade committee meeting for the trade of “Fireman”
under Craftsmen Training Scheme (CTS) ,**

Sl. No.	Name & Designation	Organisation	Remarks
1.	Mr. V.K.Garg, Chairman	DIFE, New Delhi	chairman
2.	Capt. Krishan Kumar, Vice Chairman	DIFE, New Delhi	Member
3.	Mr. L.K.Mukherjee, Deputy Director	CSTARI, Kolkata	Member
4.	Mr. M.C.Sharma, Joint Director	CSTARI	Member
5.	Mr. N. Nath, Asstt. Director	CSTARI	Member
6.	Mr. V.P.Jayarajan, Principal	DIFE, New Delhi	Member
7.	Co. J.N.Pandey, Director Training	DIFE, New Delhi	Member
8.	Mrs. Puspa Jindal, Principal	Govt. Sr. Sec. School, New Delhi	Member
9.	Mr. Narender Krahana, Sr. Instructor	DIFE, New Delhi	Member
10.	Mr. M.N.Sharma, Principal	ITI, PUSA, New Delhi	Member
11.	Mr. B.P.Minocha, Engineer	ITI, PUSA, New Delhi	Member
12.	Mr. Praveen Chaudhary, HOD (Fire & Industrial Safety)	DIFE, New Delhi	Member
13.	Mr. Manish Kumar, HOD (Admn.)	DIFE, New Delhi	Member
14.	Mr. J.S.Beniwal, Office Superintendent	DIFE, New Delhi	Member
15.	Lt. P.S.Bhadana, Deputy Director of Training	DIFE, New Delhi	Member
16.	Mr. B.L.Chauhan, Asstt. Director of Training	DIFE, New Delhi	Member
17.	Mr. Ashok Kumar Tiwari, Sr. Instructor	DIFE, New Delhi	Member
18.	Sub. Vijay Singh, Sr. Instructor	DIFE, New Delhi	Member
19.	Mr. Ram Ji Singh, AGM	GMR, IGI Airport	Member
20.	Mr. Sudesh Kumar Sharma,	DIFE, New Delhi	Member
21.	Mr. Nepal Singh, Sr. Instructor	DIFE, New Delhi	Member
22.	Mr. Jagdish Chander, Instructor	DIFE, New Delhi	Member
23.	Mr. Monu Singh, Jr. Instructor	DIFE, New Delhi	Member
24.	Mr. Ranjan Prasad, Sr. Instructor	DIFE, New Delhi	Member
25.	Mr. Anil Kumar, Jr. Instructor	DIFE, New Delhi	Member

List of members attended the Workshop to finalize the syllabi of existing CTS into Semester Pattern held from 6th to 10th May'2013 at CSTARI, Kolkata.

Sl. No.	Name & Designation	Organisation	Remarks
1.	R.N. Bandyopadhyaya, Director	CSTARI, Kolkata-91	Chairman
2.	K. L. Kuli, Joint Director of Training	CSTARI, Kolkata-91	Member
3.	K. Srinivasa Rao, Joint Director of Training	CSTARI, Kolkata-91	Member
4.	L.K. Muhkerjee, Deputy Director of Training	CSTARI, Kolkata-91	Member
5.	Ashoke Rarhi, Deputy Director of Training	ATI-EPI, Dehradun	Member
6.	N. Nath, Assistant Director of Training	CSTARI, Kolkata-91	Member
7.	S. Srinivasu, Assistant Director of Training	ATI-EPI, Hyderabad-13	Member
8.	Sharanappa, Assistant Director of Training	ATI-EPI, Hyderabad-13	Member
9.	Ramakrishne Gowda, Assistant Director of Training	FTI, Bangalore	Member
10.	Goutam Das Modak, Assistant Director of Trg./Principal	RVTI, Kolkata-91	Member
11.	Venketesh. Ch. , Principal	Govt. ITI, Dollygunj, Andaman & Nicobar Island	Member
12.	A.K. Ghate, Training Officer	ATI, Mumbai	Member
13.	V.B. Zumbre, Training Officer	ATI, Mumbai	Member
14.	P.M. Radhakrishna pillai, Training Officer	CTI, Chennai-32	Member
15.	A.Jayaraman, Training officer	CTI Chennai-32,	Member
16.	S. Bandyopadhyay, Training Officer	ATI, Kanpur	Member
17.	Suriya Kumari .K , Training Officer	RVTI, Kolkata-91	Member
18.	R.K. Bhattacharyya, Training Officer	RVTI, Trivandrum	Member
19.	Vijay Kumar, Training Officer	ATI, Ludhiana	Member
20.	Anil Kumar, Training Officer	ATI, Ludhiana	Member
21.	Sunil M.K. Training Officer	ATI, Kolkata	Member
22.	Devender, Training Officer	ATI, Kolkata	Member
23.	R. N. Manna, Training Officer	CSTARI, Kolkata-91	Member
24.	Mrs. S. Das, Training Officer	CSTARI, Kolkata-91	Member
25.	Jyoti Balwani, Training Officer	RVTI, Kolkata-91	Member
26.	Pragna H. Ravat, Training Officer	RVTI, Kolkata-91	Member
27.	Sarbojit Neogi, Vocational Instructor	RVTI, Kolkata-91	Member
28.	Nilotpal Saha, Vocational Instructor	I.T.I., Berhampore, Murshidabad, (W.B.)	Member
29.	Vijay Kumar, Data Entry Operator	RVTI, Kolkata-91	Member

GENERAL INFORMATION

1. **Name of the Trade** : Firemen
2. **NCO Code No.**
3. **Duration** : 6 months (1 semester)
4. **Power Norms** : 2 KW
5. **Space Norm** : Class Rooms: 20 Sq meter
10000 Sq Yards (Practical Training Area)
6. **Entry Qualification** : (a) Passed 10th class examination
(b) **The minimum physical requirements are**
 - i. Height - 165 cm
 - ii. Weight - 52 kg
 - iii. Chest - Normal 81 cm - Expanded 85 cm
 - iv. A registered MBBS doctor must certify that the candidate is medically fit to undertake the course
7. **Unit Strength** : 20 Trainees
8. **Instructor's/Trainer's Qualification** : (i) Degree in Fire & Safety Engineering/Degree in Fire Science with one year experience in the relevant field.
(ii) Post Graduate Diploma in Industrial Safety Engineering/ Fire and Industrial Safety Engineering /Post Graduate Diploma in Health, Safety & Environment with two year experience in the relevant field
(iii) Defence Officer JCOs/NCOs with 10 years of experience in the relevant field
(iv) National Examination Board Occupational Safety and Health (NEBOSH)/Occupational Safety and Health Administrator (OSHA) Certification-1 Yr Experience
(v) NTC/NAC in the trade of Fireman with 3years experience in the relevant field
9. **Desirable qualification** : Preference will be given to a candidate with Craft Instructor Certificate

Note: At least one Instructor must have degree /Diploma in the relevant field

Note: 1. Training area measuring 10000 Sq Yards for Practical Training , common to all courses is required/ used for all the three courses Viz Health Safety and Environment, Firemen, Fire Technology and Industrial Safety Management, if an institute is running all the above mentioned trade courses.

2. The stores marked with star are common and will be used for all the three courses.

**Syllabus for the Trade of “FIREMEN” under CTS.
Duration : Six months**

First Semester

Semester Code:FIM:SEM I

Week no	Trade practical	Trade theory
1	Familiarization with the Institute, Documentation of Student, Issuance of Dress, Books, Hostel Accommodation (If required) and Store. Importance of trade training, Equipments used in the trade, types of work done by the trainees in the trade. Introduction to safety equipments and their uses. Introduction of first aid, Road safety, operation of Electrical mains. Associated Safety Hazards & risk, Occupational Health Hazards and associated environment related issue.	Basics of Physics & Chemistry related to Fire :Physical properties of matter, Definition of Density, Relative density, Effects of density on behaviour of gases, Vapour density, Melting & Boiling point, introduction to Heat and Combustion, Measurement of temp and conversion of their scales, Definition of Flammable liquids, Gases & vapors, sp heat, latent heat.
2	Demonstration of the properties of various <ul style="list-style-type: none"> • Alkalies • Acids • Gases • Organic flammable liquids and commonly used industrial chemical 	Anatomy of Fire : Definition of Combustion, Elements of Combustion, Products of Combustion, Flash point, Fire point, Ignition temperature and spontaneous combustion.
3	Fire-fighting technique Familiarization and demonstration of First Aid Extinguishers	Classification of Fires : Classification of Fire and types of extinguishers, maintenance, method of operation. Techniques of fire extinction-Smothering cooling and starvation. Care and Maintenance of First Aid Fire Extinguishers.
4	Fire Extinguisher Drills <ul style="list-style-type: none"> • Drill I : Water CO2 Extinguisher Drill 9L • Drill II : Chemical Foam Extinguishing 9 L • Drill III :Mechanical Foam Extinguisher 9L • Drill IV : Stored Pressure Water Extinguisher 9 L • Drill V : Dry Chemical Powder 5 Kg • Drill VI : Dry Chemical Powder 10 Kg 	Extinguishing Media and Foam Making Equipment : Water as an extinguishant- its merits, demerits and modification. Introduction to all types of foam concentrate, properties of foams and techniques of extinguishment by foam, types of foams, Characteristics of good foam, foam making Equipment- Mechanical. High Expansion and Low Expansion Foam. Storage of foam Compound. Dry Chemical Powder- Types and application. Carbon dioxide as extinguishant.

	<ul style="list-style-type: none"> • Drill VII : ABC Extinguisher 5 Kg/ 10 Kg • Drill VIII : CO2 Extinguisher 4.5 Kg 	
5	<p>Method of recharging after discharge, General maintenance. Familiarization of foam making branch and use of FB2X, FB5X and FB10X.</p>	<p>Hose and Hose Fittings : Type of Suction & Delivery Hoses, Material used in Construction. Hose-reel, and Causes of decay, Operational use of Hose, Storage, Care & Maintenance. Repairing and Binding of Hose, Coupling and Collecting head adopters, Nozzles.</p>
6	<p>Fire Extinguisher Drills</p> <ul style="list-style-type: none"> • Drill I : Water CO2 Extinguisher Drill 9L • Drill II : Chemical Foam Extinguishing 9 L • Drill III : Mechanical Foam Extinguisher 9L • Drill IV : Stored Pressure Water Extinguisher 9 L • Drill V : Dry Chemical Powder 5 Kg • Drill VI : Dry Chemical Powder 10 Kg • Drill VII : ABC Extinguisher 5 Kg/ 10 Kg • Drill VIII : CO2 Extinguisher 4.5 Kg 	<p>Hydraulics : Introduction & Units of measuring Length, Area and Volume of regular and irregular shapes, Pressure & their conversion, Principal Characteristics of pressure and pressure head. Calculation of capacity of tanks of different shapes & sizes.</p>
7	<p>Method of recharging after discharge, General maintenance. Familiarization and demonstration of Hose and Hose fittings</p> <ul style="list-style-type: none"> • Drill – I : Hose pick up Drill • Drill – II : Hose Running Drill with one hose • Drill – III : Hose Running with two hose • Drill – IV : Hose Running with Three hose 	<p>Source of Water Supply : Construction, Capacity and use, Open Source- SWT, Capacity, Ponds, Rivers, Streams, Sea. Hydrants- Types & Uses. Over Head Tanks- Capacity and Use.</p>
8	<p>Demonstration of effect of pressure on pump discharge rate and on ground use of pressure pumps. Techniques to Handle various branches. Quiz Competition for the syllabus Covered</p>	<p>Pump and Primers : Classification of common pumps in use in Fire Service and its types, centrifugal pump, its parts, construction & their function, different types of primers, Reciprocating and Gas Ejector primers, Care and Maintenance, introduction to Cooling Systems & its importance.</p>

9	<p>Industrial/ Fire Service Station Visit Familiarization and demonstration of Hydrant and its associated equipments.</p> <ul style="list-style-type: none"> • Hydrant Drill I : Opening of single line of three hoses. • Hydrant Drill II : Change of burst hose • Hydrant Drill III : Increase one length hose • Hydrant Drill IV : Decrease one length hose 	<p>Fixed Installations :</p> <ol style="list-style-type: none"> a. Water Based : Risers Mains- Wet riser, Dry riser, Hose reel installation, use and maintenance, Introduction to hydrants. b. Non Water Based : Foam Base- Foam pourer, DCP, CO2, Based installation use and maintenance.
10	<ul style="list-style-type: none"> • Hydrant Drill V : Use of Collecting, breaching • Hydrant Drill VI : Disconnect collecting breaching • Hydrant Drill VII : Use of Dividing Breaching • Hydrant Drill VIII : Disconnect of Dividing Breaching 	<p>Automatic Fire Detection cum Alarm System : Types of Detectors- Smoke, Heat, Flame/Gas Detectors, Operating principles, Control Panel and MCP criteria for their use and maintenance.</p>
11	<p>Familiarization and demonstration of Centrifugal pump, water tender drill with open and closed water.</p> <ul style="list-style-type: none"> • Drill I : Pen water pump drill (Dry Drill) <p>Drill II : Lose water pump drill with hard/soft suction</p>	<p>Ladders : Introduction of Types of ladders, Extension Ladder, Hook Ladder, Use, Care and maintenance of ladders, Pitching of Ladders, Parts and Components</p>
12	<p>Familiarization and demonstration of Centrifugal pump, water tender drill with open and closed water.</p> <ul style="list-style-type: none"> • Drill I : Pen water pump drill (Dry Drill) <p>Drill II : Lose water pump drill with hard/soft suction</p>	<p>Rope and Knots : Introduction and use of lines. Causes of deterioration, inspection of lines, care and Maintenance, Standard knots and their uses</p>
13	<p>Familiarization and demonstration of Hydrant and its associated equipments.</p> <ul style="list-style-type: none"> • Hydrant Drill I : Opening of single line of three hoses. • Hydrant Drill II : Change of burst hose • Hydrant Drill III : Increase one length hose • Hydrant Drill IV : Decrease one length hose • Hydrant Drill V : Use of Collecting, breaching 	<p>Small & Special Rescue Gears : Different types of small gears, Fireman Axe, Ceiling Hook, Crowbar, Door breaker, Padlock removers, Spreader, Cutters, Lifting Equipment and different type of Saw used during fire fighting & rescue techniques.</p>

	<ul style="list-style-type: none"> Hydrant Drill VI : Disconnect collecting breaching Hydrant Drill VII : Use of Dividing Breaching Hydrant Drill VIII : Disconnect of Dividing Breaching 	
14	Familiarization and demonstration of Smoke detectors, Heat Detector, Flame Detectors, Gas Detector.	Building Construction : Building Materials and their behaviour under fire conditions, Signs of building collapse and rescue operation, Importance of fire escapes with respect to their positioning for construction and provisioning of fire fighting measures
15	Demonstration of Control Panel	Fire Fighting Appliances : Introduction of Portable fire pump, Capacity, Use and maintenance. Fire tender, Types, Use and maintenance. Foam Tender- General Requirements, use, Operation and Maintenance special Appliances.
16	<p>Extension Ladder Drill Introduction of parts of extension ladder,</p> <ul style="list-style-type: none"> Drill I : Pitching of ladder Drill II : Climbing the ladder Drill III : Use leg Lock Drill IV : Ladder Drill with Fireman Lift Drill V : L2 Drill 	Electricity & Fire Hazards : General Introduction, Fundamentals of electricity, Common Causes of electrical fires and its remedial measures, Electrical Hazards, protective measures and fire fighting procedure.
17	<p>Types of Knots and their uses.</p> <ul style="list-style-type: none"> Drill I : Thumb Knots Drill II : Figure of 8 knots Drill III : Reef Knot Drill IV : Chair Knot Drill V : Half Hitch <ul style="list-style-type: none"> Clove Hitch Rolling Hitch Tender Hitch Drill VI : Bowline 	Breathing Apparatus : Introduction of BA Set, Types of BA Sets in use, Components and function. Working Principles of normal compressed air BA set and its Station maintenance.
18	<p>Familiarization with various types of Fire Fighting Small and Special rescue gear.</p> <p>Familiarization of Water Tender.</p> <ul style="list-style-type: none"> Drill I : L-2 Drill with ladder and water tender Drill II : Foam Drill with FBI0X single delivery Drill III : Foam Drill with 	Practical Firemanship : Duties & responsibilities of fire crew at a fire station & Fire Ground Methods of entry, Rescue & fire fighting in smoke logged building.

	<p>FB5X single delivery</p> <ul style="list-style-type: none"> • Drill IV : Wet Drill with double delivery • Drill V : Dry Drill with double delivery 	
19	<p>Extension Ladder Drill Introduction of parts of extension ladder,</p> <ul style="list-style-type: none"> • Drill I : Pitching of ladder • Drill II : Climbing the ladder • Drill III : Use leg Lock • Drill IV : Ladder Drill with Fireman Lift • Drill V : L2 Drill <p>Visit to Construction Site</p>	<p>Fire Service Organisation : Introduction of Fire Service Organisation, Writing and importance of occurrence book, Duty Card/Register, Fire reports, Log books, Hose Book, Stock Registers, Leave Register etc. Station discipline and watch room procedure.</p>
20	<p>Demonstration and Determination of related electrical experiments Familiarization and Demonstration of Parts of BA Set.</p> <ul style="list-style-type: none"> • Drill – I Donning, running and Rescue of casualty through Tunnel 	<p>Rural Fires : Fire hazards in grasslands, Forest areas, rural areas and hay stacks. Causes of fire, Special appliances and equipment used. Methods of fire fighting in rural area</p>
21	<p>Methods of entry into building, searching of building of location of higher.</p> <ul style="list-style-type: none"> • Drill I : Rescue drill in smoke laden building. 	<p>Special Service : Introduction, Methods employed by fire Service to rescue trapped persons in lifts, Sewer, Trapped under vehicle, Debris of Collapsed building and Wells, Rescue of human beings/ animals from ponds & Rivers.</p>
22	<p>Writing practices of</p> <ul style="list-style-type: none"> ➤ Occurrence Book ➤ Duty Card/ Register ➤ Log Book ➤ Hose Book ➤ Stock Register 	<p>Medical First-Aid : Definition of first-aid, Quality of First Aider, Shock-sign and Symptoms, Asphyxia-Sign and Symptoms, Wounds and Hemorrhage- Classification of injuries, signs, symptoms and management of Burns, its severity. Scalds and frost bites, Signs and symptoms of management of heart attack. Fractures –Causes, types, Signs and symptoms, management, Sprain & dislocation –Sign & symptoms management & observation of patient, Snake Bites- Treatment & Management. Resuscitation- Different methods.</p>
23	<p>Fire Service Station Visit</p> <ul style="list-style-type: none"> • Drill I : Fighting Hay Stack fire • Fire Extinguisher Drills • Drill I : Water CO2 Extinguisher Drill 9L • Drill II : Chemical Foam 	

	<p>Extinguishing 9 L</p> <ul style="list-style-type: none"> • Drill III : Mechanical Foam Extinguisher 9L • Drill IV : Stored Pressure Water Extinguisher 9 L • Drill V : Dry Chemical Powder 5 Kg • Drill VI : Dry Chemical Powder 10 Kg • Drill VII : ABC Extinguisher 5 Kg/ 10 Kg • Drill VIII : CO2 Extinguisher 4.5 Kg <p>Picking up, Lowering & Carrying Casualty, Rescue by lines and blocks, Fireman Lift Drill.</p>	
24	<p>Fire Service Station Visit Familiarization and study First Aid Box</p> <p>Techniques of CPR</p> <ul style="list-style-type: none"> ➤ One Sitter ➤ Two Sitter ➤ Three Sitter ➤ Four Sitter ➤ Fireman lift ➤ CPR drill ➤ Choking ➤ Shaffer's Method ➤ Rescue drill ➤ Sylvester's Method ➤ Holgar Nielsen Method ➤ Eve Rocking Stretcher Method ➤ Emerson Method ➤ Mouth to Mouth Respiration. <p>Stretcher Drill Fireman Lift Drill Use Bandage Standard drills on Ambulance</p>	Project work preferably in cross sectional trade.
25	Revision	
26	Examination	

TRADE: FIREMEN
LIST OF TOOLS & EQUIPMENT
A. TRAINEES TOOL KIT FOR 20 TRAINEES + ONE

SI.No	NAME OF THE TOOLS & EQUIPMENTS	QUANTITY
1	Water CO2 Type Fire Extinguisher (9 Ltrs)	06 Nos
2	Stored pressure Type Fire Extinguisher (9 Ltrs)	06 Nos
3	Chemical Foam type Fire Extinguisher (9Ltrs)	06 Nos
4	Mechanical Foam type Fire Extinguisher 9Ltrs	06 Nos
5	CO2 Type Fire Extinguisher (4.5 Kg)	06 Nos
6	BC Type Fire Extinguisher 5/10 Kg	04 Nos
7	ABC Type Fire Extinguisher 5/10 Kg	04 Nos
8	Extension Ladder (Size)45/35 ft *	02 Nos
9	All types of Branches or Nozzles *	04 Nos
10	Fire Hose *	
	a) 15m	10 Nos
	b) 30m	04 Nos
11	First Aid Box *	02 Nos
12	All Types of small gears *	1 Set
13	BA Set (Negative & Positive Pressure) *	02 Nos
	a) Gas Cylinders	02 Nos
	b) Steel Back Plates	02 Nos
	c) Face Masks	02 Nos
14	Portable Fire Pump / TFP *	02 Nos
15	All types of couplings *	1 Set
16	Hydrant-Stand Pipe Type *	02 Nos
17	Fire Trays *	02 Nos
18	Manual call point *	01 No
19	Entry Suit/ Proximity Suit *	02 Nos
20	Hose reel system *	01 No
21	Nitrogen Cylinder *	01 No
22	Hose Box *	01 No
23	Fire Fighting Point complete Set *	01 No
24	Section Hose 10 ft *	02 Nos
25	Section Wrench *	02 Nos
26	Metal Strainer *	02 Nos
27	Basket Strainer *	01 No
28	Sprinkler *	02 Nos
29	Ropes 100 ft Long *	01 No
30	Lines 100 ft Long *	01 No
31	Control Panel – Model *	01 No
32	Personal Protective Equipment	
	a) Helmet (Type A,B,C)	20 Nos
	b) Laser Welding Safety Goggles	10 Nos
	c) Face Shield	10 Nos
	d) Welding Shield	10 Nos

	e) Ear Muff		10 Nos
	f) Ear Plug		10 Nos
	g) Canal Caps		10 Nos
	h) Safety Shoes		20 Nos
	i) Asbestos Gloves		10 Nos
	j) Electrical Hand Gloves		10 Nos
	k) Hand Gloves (Rubber)		10 Nos
	l) Dust Mask		10 Nos
33	Personal Protective Clothing for men		
	a) Safety Shirt		10 Nos
	b) Safety Trouser		10 Nos
	c) Safety Jacket		10 Nos
	d) Cooling Vest		10 Nos
	e) Gum Boots		10 Nos
34	Personal Fall Arrest System (PFAS)	*	02 Nos
35	Tripod	*	02 Nos
36	Pulley	*	02 Nos
37	Suspended Scaffold	*	02 Nos
38	Gas Detector	*	02 Nos
39	Plastic Tunnel (Sewer Rescue Drill)		04 Nos
40	Body Harness	*	01 No
41	Collecting Breeching	*	02 Nos
42	Dividing Breeching	*	02 Nos
43	Hydrant Flange	*	02 Nos
44	Hydrant Key & Bar (With hydrant Spindle)	*	01 No
45	Adopter for Air Store Pressure		02 Nos
46	Hydraulic Pressure Testing Machine	*	01 No
47	Sprinklers Head (Bulb Type, Fusible Type)	*	02 Nos
48	Safety Belt		01 No
49	Computer System	*	06 Nos
50	Computer Table	*	06 Nos
51	Computers Chairs	*	06 Nos
52	White Board		01 No
53	L.C.D. Projectors		02 Nos
54	UPS 650 VA offline		06 Nos
55	All types of Detectors 1 Pcs. of each		04 Nos
56	Flux meter		06 Nos
57	Dosi meter		01 No
58	Cut model of Fire Extinguisher	*	02 Nos
59	Fire Suit		02 Nos
60	Fire Tender (one For the Institute)		01 No
61	Rescue Van (one For the Institute)		01No.

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