

APPENDIX E

(See rules 10 and 11)

SYLLABUS FOR EXAMINATION FOR DIRECT RECRUITMENT/PROMOTION TO THE POST OF ASSISTANT DIVISIONAL FIRE OFFICER

Time: 3 hours

Total Marks= 100

1. Air Conditioning System:

Types and operation, Location of equipment, Fresh-Air intakes, Air Cooling Equipment, Air Filters & Cleaners Ducts, Smoke Control-passive & active, Fan Controls etc. Unit Air-Conditioners, Care & Maintenance Hazard assessment at different stages of Refrigeration design/circuit and corresponding Protective Prevention methods.

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.

2. AIR-CRAFT RESCUE AIR-PORT PROTECTION

Categorisation of Aerodrome and provision of Air-Craft fire safety, Air-Craft Power-Plants, Aviation Fuels, Air-Craft Fuel-Systems and other design consideration. Special type of fuel tanks in Air-craft (double Sealed and self-sealing). Air-Craft Fuse-lage-compartments, Air-Craft fire Detection and Extinguishing Systems including Fire-Extinguishers, Means of egress from Air-Craft, Air-Craft Rescue and Fire Control, Air-Port & Heliport Design safety, Special Air-Port facilities and Installations, Hazards dealing with Air-Port Terminal Complex, Typical Modern Air-craft and Special Military Air-craft, Problems in dealing with Air-craft carrying Ammunition, Bombs, Nuclear Weapons and pre-caution to be taken in rescuing persons from "Ejection Seats".

3. APPLIANCE DESIGN

Development in Design & construction of Fire Engines & Fire Appliances, Design parameters of various types of pumps and their characteristic, Standardisation of Design. I.S.S of related standards for Water Tenders, Emergency – Tenders, Foam Crash Units, Hose laying lorries, Turn Table Ladders and Hydraulic Platforms.

4. AUTOMATIC FIRE DETECTION SYSTEM INCLUDING BUILT IN P.A. SYSTEM

Introduction-Description and Operating Principles of (i) Heat Detectors, (ii) Smoke Detectors, (iii) Gas Sensing Fire Detectors and (iv) Flame Detectors, (v) Integrating of Automatic Fire-Detector, P.A. System, Computer & Printer Systems as in "Analogous systems"

Ambient conditions affecting Detector-response, Selection of Detectors & Defector Installations, Care maintenance and Testing of Detectors.

Manually-operated fire-alarms, Control and Indicating Equipment.

5. BUILDING CONSTRUCTION & STRUCTURAL FIRE PROTECTION

Introduction, Role of Architecture in Fire safe design & Modern buildings, Fire test of Element of Structures, Fire of Structures, Fire hazards in building – precautions to prevent spread of fire between buildings – Means of limiting spread of fire within buildings and Means of Escape as per N.B.C., fire Protection requirements for buildings and as per national Building Code, Access for Fire Appliances to buildings.

6. COURT OF LAWS

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, Porjury, Structures of some related sections of the Indian Penal code.

7. CHEMISTRY OF FIRE

Basis Combustion Processes-reaction-Chemical Processes-Diffusion Flames. Flash Point, Premixed Flames, Explosions, Flame and propogation in tubes-Flame Arresters, Detonation-Carbon in flames- Radiation.

Special Types of Combustion-Surface Oxidation Deep seated fires-Spontaneous Heating & Ignition-Combustion of Metals-Explosives-Unstable Chemical-Rocket Propellants.

Organic Compounds, flammable nature of Organic Compounds, Hydrocarbons, Solvents and Organic Acids.

8. COMMUNICATION, MOBILIZATION & COMPUTER APPLICATION

Mobilising, Planning and Operational requirements, Implications of Centralised Mobilising, 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, Personal Pagers Systems, Use of Standard Equipment in hazardous conditions. Introduction to Computer, Computer Principles and Application of Computer to Fire Service.

9. EXPLOSIVES & RADIOACTIVE MATERIALS

Characteristics of Explosives and their general classification, General Principles to be followed in storage of Explosives, Fire-Fighting classification of Explosives and Fire Protection Measures, Transportation of Explosives, Explosives Act and Rules regarding permissible possession and Storing of Explosives.

Characteristics of Radio-Active materials, Procedure of handling Radio-active materials, Radiation units and Measurements, Radiation Exposure, Monitoring and Decontamination Procedure, Fire Protection Requirements for Radio active materials.

10. ELECTRICITY & FIRE RISK

Main equipment in 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, General defectors in wiring.

Common electrical equipment 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. Bursting of crucial electrical equipment.

Conductors and insulators used in electric low voltage circuits. Their suitability as fire resistance.

Earthing of Electrical equipments.

Fires due to Static Electricity.

Indian Standards (General reading)

1. I.S. 2206 (Part-I)..1962
Specifications for flame-proof electric lighting fitting.
2. I.S. 3034..1981
Code of practice for fire safety of industrial buildings Electrical Generating & distribution stations.
3. I.S. 1646-1961
Code of practice for fire safety of buildings (General) Electrical installation.
4. I.S. 2148-1968
Specifications for flame-proof enclosures Electrical Apparatus.

11. FIRE DRILL

Principles and Procedure-purpose of fire drills, formulating and Planning of fire Drill, Instructions and Training, Fire routing details, Frequency of drill, drill in respect of different occupancies viz. Factories, offices, Shop and Railway Premises-Hotels and Houses, Day Schools, Hospitals Places of Public Entertainment.

12. FIRE SAFETY LEGISLATION & INSPECTION

Brief knowledge of Acts, Rules and Regulations Pertaining to existing Fire Prevention Legislation.

- (i) Petroleum Act of 1934
- (ii) Calcium Carbide Rules 1987
- (iii) Explosives Rules of 1984
- (iv) Factories Act 1948
- (v) Cinematography Act 1952
- (vi) Inflammable Substances Act 1952
- (vii) Gas Cylinders Rules 1981

- Responsibilities and Obligations, Powers of Enforcement and Inspection of Fire Authorities and their Officers under Haryana Fire Services Act.
13. **FIXED FIRE-PROTECTION INSTALLATION**
Introduction, Principle 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 of System according Water and Extinguishing Systems and other Extinguishing Agents, Installations for Special Risks and Fire fighting in a sprinklered building.
 14. **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 Prewvention and Control Management, Evaluation and Planning of Public Protection Fire Prevention and Code Enforcement Constructional features and hazards peculiar to Public Entertainment & Assembly Places, Selection of site, Arrangement and Construction of building including public portion of the premises, Licencing on constructing of temporary structures and pandels 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 Cinematograph Act of 1948.
 15. **GAS AND DUST EXPLOSION**
Introduction-classification of Gases and their properties, Basic hazards of Gases and usage, Blevé, PUVCE and Safeguards, Factors influencing the explosibility of dusts, Hazards of Dusts, Dust-clouds Ignition sources, Factors influencing the destructiveness of Dust Explosions, Dust Explosion Test Apparatus and measuring procedures, Gas detection and Analysis Equipment and their practical uses.
 16. **HYDRAULICS:**
Collection & Interpretation of Data- Tabulation and graphical presentation of Data; Preparation and interpretation of graphs, histograms (bar charts), circular diagrams.
Define the 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.
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 supplies; 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 ; 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.
 17. **INVESTIGATION OF FIRES & 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; Procedures and sequence of Interviewing Witnesses and how to prepare Investigative Report ; 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; Method of preparing an Arson case legal aspects of Arson and Related Section I.P.C.
 18. **MANAGEMENT, COMMAND & CONTROL OF FIRE SERVICE**
Introduction to personality development, Group behavior and how to work in group, Understanding People, Managing time, Principle of Command, Introduction to law and discipline, Introduction to C.C.T.V.; guide to report-writing, appraisal system, Being interviewed by the media, Decision-making, Project management, Employee relation, Public relation, Speaking and debating, Finance for Management, Financial accountability, Selective and Panel Interviewing, Licences and resources of the Fire services and Probable sources of funds.

Disaster Management.

- (a) Natural disaster (Earthquake, flood, cyclone)
- (b) Air disaster (Plane crashes inhabitants)
- (c) Nuclear, Biological & chemical disaster (NBC)
- (d) Train carrying inflammable involved accident.

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.

20. PLAN DRAWING & 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 of Plan Drawings, Marking and syndicate discussion and Evaluation.

21. STORAGE & TRANSPORTATION OF HAZARDOUS MATERIALS

Introduction-types of dangerous substances, Composite sign, its structure and use Emergency Action Code (Hazchem) and International systems (Transport Emergency Cards)

Chemical Incidents and Decontamination Procedure, General rules for Fire Arrangements, Storage and Handling of the highly flammable liquids and liquefied Petroleum.

Methods of Transportations, Marking systems in use on Road, Rail and shipping and Air.

22. EVALUAION TECHNIQUE OF FIRE-FIGHTING APPLIANCES & EQUIPMENTS

- (a) Pumps and primers
- (b) Hose-Delivery & Suction
- (c) Extinguishing Media
 - (i) D.C.P
 - (ii) Foam (Protein AFFF, ATC/AFFF)

23. SPECIAL FIRES

Planning & Techniques in dealing with Port Fires Oil Terminal Fires, Oil Refinery Fires, Oil Platform Fires, Oil Tanker Fires, Oxygen Tanker Fries, LPG Botting Plant Fires.

24. KNOWLEDGE OF NATIONAL BUILDING CODE PART-III & IV.

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Principal Secretary to Government Haryana,
Urban Local Bodies Department.

APPENDIX E

(see rule 11 and 12)

Syllabus for examination for direct recruitment/promotion to the post of Fire Station Officer:-
Time: 3 Hours

Total Marks= 100

1. **AIR-CRAFT FIRES & RESCUE**
General Introduction of Airport, Airport-runways, ATC Tower Hangers etc. Airport Fire Organizations, Water Resources, special appliances and equipment. Aircraft Construction, types, General description and risks associated, crashes and fires, Rescue and Fire-fighting techniques, Ejection seat in Military Air-craft, Fire Prevention in Airport.
2. **AIR-CONDITIONING & REFRIGERATION**
Introduction, Types of Air-conditioning Systems, Hazards and Structural precautions, Precautions and Special problems associated with each systems, principle of Refrigeration and types, Common refrigerents and their properties, Basic precaution, Hazards and Method of Control in Refrigerating and Air conditioning plant.
3. **BREATHING APPARATUS**
Introduction and Need/Importance of Breathing Apparatus in Fire Services, Compressed Air Breathing Apparatus-description of the set, face-mask and demand valve whistle manifold and reducer, Airline equipment, Testing and Maintenance, Working duration of Breathing Apparatus, Breathing Apparatus Equipment, Distress Signal Unit, Communication Equipment, Guide and Personnel Lines-Calculation of condition and duration. Reference to ISS Specification.
4. **BUILDING CONSTRUCTION & STRUCTURAL FIRE PROTECTION**
Introduction, Fire Assistance of Elements of structure, Behaviour of Elements of structure in a Fire and Causes of Wall Collapse, Criteria for assessing the fire properties of building materials and Elements of Structure, Fire load and grading of occupancies by fire load, Classification of Building based on occupancy and Fire ones as per N.S.C Occupational hazard and Structural Fire Precautions including Means of Escape-Fire Protection in Buildings.
5. **PHYSICS & CHEMISTRY FOR COMBUSTION**
Combustion related properties of matter, Mechanism of Extinction-Effects of combustion, spontaneous-combustion, Hazardous materials.
6. **DISCIPLINE**
Introduction, Discipline vis-à-vis Leadership, General rules and principles of discipline in the Fire Service, Management and enforcement.
7. **ELECTRICITY**
Sources Generation-methods, conductors, Insulators, Distribution and special hazards of Transformer and Sub-stations, Cables, Junction Boxes, Wiring Systems, Switches-Switch Gears etc. Lighting Lamps, Static Electricity, Electrical Hazards-Shock and Protection, Fire-fighting techniques for live installations.
8. **EXPLOSIVE**
Introduction, Types of Chemical Explosives, Chemical Classification of Explosives, Principles of Storage & Transportation, Fire-fighting Classifications and Fire-fighting technique.
9. **FIRE EXTINGUISHERS**
Construction and Practical use of
 - (i) Water type Extinguishers
 - (ii) Foam and Mechanical Foam Extinguishers
 - (iii) Vapour Forming-Liquids or Gas Extinguishers-use of Halon Extinguishers.
 - (iv) Dry Chemical Powder Extinguishers, Maintenance Procedure of all type of Extinguishers, Indian Standard Specifications for different sizes/types of extinguishers.
10. **FIRE SERVICE ADMINISTRATION**
Structure of Fire Service organization:
 - (a) Organisation of Fire Service
 - (b) Duties of different level of commands

- (c) Chain of Command
- (d) Ranks and Rank Markings
- (e) Operational Jurisdiction.

Station Administration:

- (a) Introduction to Station Management
- (b) Routines work at Station level
- (c) Duties of Station Officers at Station level to subordinate ranks for supervision and man-management procedure, I, Liaison Works in other departments and the public at large.

11. FIRST-AID & AMBULANCE AID

Importance of First-aid in Fire Service structure and functions of the body-Blood Circulatory System, Wound accompanied by severe haemorrhage, Direct pressure, Pressure-points. Haemorrhage from an internal organ-signs, symptoms and management, Unconsciousness-causes, clinical-features and classifications, Emergency Care of burns, Respiratory Distress-Causes, signs, symptoms and Emergency care, Shock-causes, signs, symptoms and management.

12. FIXED FIRE FIGHTING INSTALLATION

Introduction, Purpose & principle of installation, Types of Installation-Manual and Automatic Suppression and their use, care and maintenance systems used in India and Regulations as per National Building Code. Codes of Practice prepared by Bureau of Indian Standard.

13. FOAM & FOAM MAKING EQUIPMENT

Introduction, Different foam concentrates, functional requirements & compatibility of foam-concentrate and dry chemical powder, Foam making equipment, Care and Maintenance of Foam making equipment. Reference to relevant Indian Standard Specifications.

14. FIRE HAZARDS IN SPECIAL RISKS AREA AND FIRE PROTECTION

- (a) Towns Other Gas Works
- (b) Oil Installation and Tanks.
- (c) Cross-Country pipelines of Gas mains.
- (d) Industrial Materials and Dangerous Chemicals.
- (e) Places of High Fire/Life Risks.
 - (i) Pressurised Tunnelling.
 - (ii) Oxygen enriched atmosphere.

15. FIRE SERVICE COMMUNICATION

Importance and function of Watch-room and Control room & its requirements. Procedure of handling of fire calls and special Service Calls etc, Identification of Communication requirement of Fire Service, Details of communication requirement of Fire Service.

- (a) Link Communication
- (b) Radio-Communication.

Communication Planning in Fire Service.

16. FIRE PREVENTION INSPECTION PROCEDURE

Preparation of check-list and follow-up procedure & maintenance of mastered register.

17. GAS, FIRES

Classifications, Characteristics of gases and their risks, Dust Explosion, LPG, its hazards and Fire Precautions, Methods used by the Fire Service of Extinguishing Gas Fires.

18. HOSE

Introduction, General Characteristics of Standard Delivery and Section Hose. Material, Construction Maintenance, Repairs & Testing and latest development as per bureau of Indian Standard-Reference to relevant Indian Standard Specifications.

19. **HOSE FITTINGS**
Standard Couplings, Branches and Nozzles special types of Branch and Nozzle, Branch Holders, Radial Branches and Monitors, Stand-pipes, Collecting heads and Suction-Hose Fittings, Breechings, Asaptors, Miscellaneous, Hose Fittings and Ramps. With reference to Indian Standard Specifications.
20. **HYDRANTS & WATER SUPPLY**
Determination technique of 'Fire flow' in accordance to fire load, Distribution of water supplies, Water resources for Fire-Fighting, Code of practice in respect of requirements and Standardisation of Hydrants, Hydrant Gear, Use of Flow-Motor, Marking, Testing, Care & Maintenance.
21. **HYDRAULICS**
Characteristics of Suction Lift and Atmospheric pressure, Pump-power and efficiency, Characteristics of flow in Hose and Nozzle discharge, Friction Loss, Jet-reaction and Water Hammer, Formulae and problems of the above.
22. **INTERNAL COMBUSTION ENGINES**
Introduction, Principles of Internal Combustion Engine, Terminology used in this connection, description of power Units and the systems in relation to Petrol and Diesel Engines.
23. **INVESTIGATION OF FIRE**
Introduction, Procedure of detection to the causes of fire-point of Ignition, Time of Ignition and cause of Ignition, Circumstances leading to suspicion and motives leading to Arson, Fire-fighting Techniques in case of Arson and guarding of evidence.
24. **LADDERS**
Introduction of sophisticated aerial ladder, construction, use, Testing and Maintenance of TTL & Hydraulic platform Method of practical Operation and technique and safety requirement.
25. **PUMPS**
Introduction-Centrifugal Pumps and its characteristics, different types of Primers, design parameters of Pumping Appliances and their characteristics.
26. **PLAN READING**
Importance of plan reading, its requirements and preparation of standard symbols, Introduction to the reading of Building plan.
27. **PRACTICAL FIREMANSHIP**
Principles to be followed at Fire Ground viz. Survey and reeve and sizing up, Methods of Entry, Methods of Search and Rescue, Working in Smoke and Darkness, hot atmosphere, central at a Fire Ventilation and Procedure after fire/incidents, Fire-fighting strategy and tactics.
28. **RESCUE DRILLS**
Fireman's Lift and picking up Practical drill, Rescue by various methods using fire equipment.
29. **RESUSCITATION**
Different methods of manual resuscitation, their advantages and disadvantages, Classification of Resuscitation sets, their construction and descriptions. Signs and symptoms of Asphyxiated persons in same special case, cases where artificial respiration not recommended.
30. **RURAL & FOREST FIRE**
Causes of rural fires, specification, difficulties encountered in rural fires, normal methods and special technique employed in rural fire-fighting.
31. **SALVAGE**
Introduction, Importance of Salvage, various factors of damage and their remedy pre-planning and procedure for salvage work before, during and after the fire.
32. **SHIP FIRES**
Structural terminology of a ship-Causes of fires in ship, Authorities and their responsibilities in case of ship fires. Fires on ships in Dry-Dock, Fire-fighting Procedures, considerations and problems while fighting fire in ship. Fire prevention in ships-Fire Protection in Docks.

33. SMALL GEARS

Function and construction of various sophisticated small gears used in fire services including powered operated gears, Description and Operational use of Oxy-Acetylene cutting sets, Oxy-Propane cutting sets, Pneumatic Jacks, Jumping Cushions, Blower exhauster and various types of Protective Clothing. Powered spreader, Lifting bag, powered saw and cutting tools.

34. SPECIAL APPLIANCES

Emergency Tender, Crash fire, Tender, T.T.L. Hydraulic Platform, Hose Laying Lorry, Break-down Van, Control Units, Canteen Vans, DCP Tender, Foam Tender, as per Standard specifications.

35. SPECIAL SERVICES

Rescue by ordinary Means, Rescue by Fire Service Appliances and Equipment, Rescue from Lift, Rescue from Sewers and Wells, ponds, rivers, Rescue during earthquake and flood, rescue from nuclear Radiation Incident, Rescue Procedure in the presence of poisonous gases, Rescue problems and Rescue procedure in case of Highway accident Water rescue.

36. STORAGE OF HAZARDOUS GOODS

Classification and study of conditions essential for storage of hazardous goods Standard requirements for Transportation of Hazardous goods. Fire Service Authority seizure. Action by Operational Officer at accident of hazchem on road control of Hazchem movement through city during daytime.

37. SQUAD DRILL & P.T.

Physical Training as per Standard Table Demonstration and Practice of all movements of Squad Drill. Word of Command & Instructional practice of all movements including Ceremonial Parade practice.

38. WATER & WATER RELAY

Water requirements with reference to IS. Principles and Practical consideration of various methods of Water Relay and operational hints.

39. WATER TENDER

Study of various Indian Specification of conventional Fire Tenders and appliance as per Indian Standard.

40. FIRE EQUIPMENTS AND APPLIANCES

Hydraulic platform, Advance Rescue Tender, Water Bouser, Water Tender and Foam Crash Tender.

41. FIRE PREVENTION & FIRE PROTECTION

42. KNOWLEDGE OF NATIONAL BUILDING CODE PART-III & IV.

APPENDIX G*(see rule 12)***Syllabus for examination for promotion to the post of Leading Fireman:-****Time: 3 Hours****Total Marks = 100**

1. **Breathing Apparatus and Resuscitation**
Types and Uses with their limitation, standard test, care and maintenance
2. **Chemical Extinguishers**
Types of extinguishers, uses and maintenance, Advantages and disadvantages, standard test.
3. **Hose and Hose drills**
Description and type of hose, Method of manufacturing, Silver yarn, strand or ply thread, warp and weft, plain and twill weave material used characteristic of hose, care and maintenance, standard tests, Causes of decay.
4. **Hydrants and Hose fitting**
Types of hydrants and its uses, Delivery hose couplings, instantaneous, suction hose coupling, threaded, branch holders and monitors, stand pipe, collecting heads, suction strainers, breeching, adopters, blank caps, hose ramps.
5. **Foam and Foam Equipment**
Description of foam, types of foam compound, requirements for the production of mechanical foam, Foam making equipment (FMBP No- 02, FMBP No- 10, FMBP 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.
6. **Small Gears**
 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 gears- Shovels, spades, fork, drag hook, ceiling hook, plus key tools
 6. Transport gears- Life jacket, starting handle, cutting 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 stretcher, automatic escape, fire beaters, Resuscitation Apparatus.
7. **Pump and Priming**
Description of pumps, type of pumps (force pump, lift pump, bucket and plunger pump, rotary pump and centrifugal pump)
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) Cooling (Direct and Indirect)- Care, maintenance, and different tests (monthly output test, six months vacuum test and suction inspection, weekly pressure test, six monthly deep lift test, gauges and their functions, practical pump, operation hint)
8. **Escape Ladders, Extension Ladder and Hook Ladders with Drills**
Types and uses of ladders with their limitations, care and maintenance, standard tests of ladder and standard drills.
9. **Practical Fireman ship**
Qualities of Firemen and his
 - (a) Duties at Station turn out
 - (b) Way to fire (traffic regulation, fire bell, road accident)

- (c) Duties on reaching the spot (quick survey and reporting to the control point or O/C 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
 - (d) After the fire (making up duties on return to Station.
- 10. 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 spreads of the fire hazards in the area served by the fire station concerned.
- 11. Watch Room Procedure**
Definition and requirements of watch room and control room, receiving and transmitting of telephone calls, keeping of all records and its importance, standard message.
- 12. Water Problem**
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.
- 13. Water Relay**
Definition, Types (Open, Closed and Collector pumping) named 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.
- 14. First Aid**
Method of approach and subsequent treatment in cases of shock, wound, burn, bleeding, fractures and respiration failures.
- 15. Knots and lines**
Types of lines in use, Names with qualities of material used for construction, names, length, size, use of the lines used in fire service, mechanical and chemical deterioration, care, maintenance and standard test.

APPENDIX F*(see rule 11 and 12)***Syllabus for examination for direct recruitment/promotion to the post of Sub Fire Officer:-****Time: 3 Hours****Total Marks = 100**

1. **Building Construction**
Introduction, Importance of Subject, Definition of Some Terms, Classification of Building, Building Material & their behavior in fire, Importance of fire escape with respect to their positioning, construction and provisioning of fire fighting measures, Fire Zones, Temporary Buildings,
2. **Fixed Fire Fighting Installation**
Introduction, Type of sprinklers, Type of installation, Principal of Automatic sprinkler, Testing and Maintenance, Drenchers System, Rising Mains, Hose reel, Down Comer, High Expansion foam, CO₂, Halons, Automatic Fire Alarm System
3. **Rural Fire**
Introduction, Type of Fires, Characteristic Features, Cause of Fires in Rural Areas, Hay Stacks, Factors effecting fire fighting, Appliances and Equipments, Survey
4. **Aircraft Fire and Rescue**
Introduction, General information required in EVE Crash, General Principal of Rescue Operation, Quickest means of entrance to aircraft, After Entry in Aircraft, General principles or Fire Fighting.
5. **Ship Fires**
Introduction, Glossary of Shipping Terms, Passenger Ship, Cargo Ship, Large Tanker and Combination Carriers
6. **Escapes**
Introduction, Elements of Escape routes, External Staircase or Fire Escapes, Spiral Fire Escape, Roof Exit, Fire Tower, Ramps, Doorways, Revolving Doors, Corridors and Passageways, Horizontal Exits, Exit Requirements, Horizontal Exit Allowance.
7. **Foam and Foam Making Equipments**
Introduction, Area of Application, Chemical Foam, Mechanical Foam, Foam Concentrate, Types of Foam Concentrates, Storage of Foam Concentrates, Action of Work, Properties of Foam, Foam Making Equipments
8. **Hose**
Introduction, Types of Hoses, Material Used, Non- Percolating Hose, Hose reel Hose, General Operational Misuse of Hose, Cleaning and Drying, Standard Test
9. **Small Gear**
Introduction, Conventional Tools, Specialized Equipments, Miscellaneous Special Tools and Equipment, Lifting Equipment, Lamps and Lighting Sets.
10. **Ladders**
Introduction, Construction, Precautions, Maintenance, Terminology, Standard Test, Care and Maintenance, Safety Devices, Acceptance Test, Round Test.
11. **Pump & Pump Operation**
Introduction, Classification of Common Types in Use, Construction, Disadvantages, Advantages, Method of Priming, Testing and Fault Finding, Care and Maintenance, Standard Tests.
12. **Water Tender**
Introduction, Types of Water Tender, Use of Water Tender, Fire Pumps, Hose reel and Hose and its Function, Provision of a Fire way Valve and its Operation, Ladder, Sparage Pipe, Fabrication of Water Tender as per ISS 950 and Its Important features.
13. **Practical Firemanship**
Introduction, Qualification of a Good Fireman, Duty at Station Level, On way to Fire, On Reaching Fire Ground, Bringing the Fire Under Control, Ventilation, On return to station from a Fire, At Fire Ground-Practical-Fire Fighting, Finding the Fire, Signs of Building Collapse, Method of Entry, Resque, Working in darkness, Working in Smoke, Working in an Atmosphere of inflammable gas leaking, Recueing a man caught in electric wires.

14. **Hose Fittings**
Introduction, Couplings, Branches and Nozzles, Collecting Heads and Suction Hose fittings, Breechings, Adaptors, Miscellaneous Hose fitting, Hose ramps.
15. **Basic Physics and Chemistry**
Introduction, Combustion, Heat, Fuels, Acid, Explosion,
16. **Electricity**
Introduction, Fundamentals of Electricity, Generation and Distribution of Electricity, Common Causes of Electrical Fires and Remedial Measures, Static Electricity and its Hazardous.
17. **Hydraulics**
Introduction, Pressure and Head, Pressure and Flow, Menstruation, Nozzle Discharge, Water Requirement.
18. **Hydrant and Fittings**
Introduction, Water Distribution System, Type and Construction of Hydrants, Parts of Hydrants, Hydrant Gear and Equipments, Marking, Testing, Care and Maintenance, Operation of Hydrants, Flow Gauges
19. **Water Relay**
Introduction, Method, Standard Distance between Pump and Relay, Operation, Hose laying lorry, Communication.
20. **Breathing Apparatus**
Introduction, Types and Parts of Breathing Apparatus, Testing and Maintenance Procedure, Care and Maintenance of Cylinder
21. **Chemical Extinguishers**
Introduction, Classification of Fires, Suitability of Extinguishers for Different types of fire, Type of Fire Extinguishers, Uses, Testing, Safety Devices, Discharge Performance, Advantage and Disadvantages, Types of Dry Powder.
22. **First Aid & Resuscitation**
Method of approach and subsequent treatment in cases of shock, wound, burn, bleeding, fractures and respiration failures.
23. **Introduction, Qualities of First-Aid, Duties of First Aider, Body Parts and Systems, Injuries Encountered in Fire Incidents, Burns and Scalds, Signs and Symptoms, Management, Wounds and Hemorrhage, Bleeding and infection, Management, Fractures, Observation of Patient, Foost Bite, Snake Bite, Resuscitation.**
24. **Watch Room Procedure**
Introduction, Constituents of Communication, Watch Room, Control Room, General Requirements, Equipments, Station Ground, Turn Out Ground, Telephone Call area, Mobilizing Boards, The Log or Occurrence Book, Fireless Apparatus, Handling of a Fire Call.
25. **Salvage**
Introduction, Equipment for Salvage Work, Method of Use, Salvage work at Fire.
26. **Station Administration**
Introduction, Executive Duties, Administrative Duties, Station Discipline.
27. **Special Services**
Introduction, Lift Rescue, Rescue from Sewers, Road and Highway Accidents, Operational Procedure, Rescue from Collapsed building, Survey, Stages of Rescue, Rescue from Well, Rescue of Animals.
28. **Discipline**
Introduction, Importance of Discipline, General Principle, Essentials of Disciplination, Outward Signs.