

First Year BSc. (Fire & Safety)

IMPLEMENTATION-2015-16

Semester-I

ELECTIVE COURSE (EC-01)

Credit: 2

Paper No: EC-101 Fire Tender and Tools

Unit 1: Water tender and Foam Tender and Tools

In detail of following:

1. Tender introduction
2. Use and storage capacity
3. Pump make and capacity
4. Construction and chassis
5. Tools and tackles
6. Maintenance and checking
7. Turning radius and ground clearance

Unit 2: DCP Tender and Crash Fire Tender

In detail of following:

1. Tender introduction
2. Use and storage capacity
3. Pump make and capacity
4. Construction and chassis
5. Tools and tackles
6. Maintenance and checking
7. Turning radius and ground clearance

Unit 3: TTL and Hydraulic Platform

In detail of following:

1. Tender introduction
2. Use and storage capacity
3. Pump make and capacity
4. Construction and chassis
5. Tools and tackles
6. Maintenance and checking
7. Turning radius and ground clearance

Unit 4: Emergency Tender and PPE

In detail of following:

1. Tender introduction
2. Use and storage capacity
3. Pump make and capacity
4. Construction and chassis
5. Tools and tackles
6. Maintenance and checking
7. Turning radius and ground clearance

Paper No: EC-101 Fire Tender and Tools

Reference book list for Fire Tender and tools

- National Institute of Fire Engineering- NIFE, CCFE
- Fire Service Manual,
- Fire Service technology, Equipment and media,
- Physics and Chemistry for Fire Fighters- H M Fire Service Publications.

Paper No: EC-101 APPLIED MATHEMATICS

UNIT-1

Vectors and Solid Geometry

Vectors, Addition of vectors, subtraction of vectors multiplication of vectors by Scalars, space co-ordinates resolution of vectors, Direction cosines, Distance Between two vectors, Scalar or dot product, vector or cross product, Geometrical interpretation of vectors, Physical applications e.g. work done by force, moment of a force about a point.

UNIT-2

Statistics and Probability

Introduction; Classification of data, Graphical representation, Measures of central tendency- Mean, Median, Mode, Measures of dispersion, Probability, Addition & Multiplication law of probability.

UNIT-3

Differentiation / Expansion and Indeterminate Forms / Applications of Differentiation

Differentiation, Basic formulae, Rules for differentiation, Derivatives of a function, Derivatives of standard function, Derivatives of parametric forms, Derivatives of implicit functions logarithmic differentiation successive differentiation, Leibnitz's theorem, Cauchy's mean value theorem, Taylor's Theorem, Maclaurin's series Expansion of $\sin @$, $\cos@$, $\tan @$, increasing & decreasing function, maximum & minima, condition & procedure for finding maxima & minima.

UNIT-4

Partial Differentiation and its applications / Integration

Partial differentiation, Functions of two or more variables, Partial derivatives, Homogeneous functions, Euler's Theorem on homogeneous functions, Integration, Indefinite Integral, Integration by substitution, Integration by parts.

Paper No: EC-101 APPLIED MATHEMATICS

REFERENCE BOOK LIST FOR APPLIED MATHEMATICS

- Engineering Mathematics- K R Kachot
- Engineering Mathematics- P R Wartikar, J N Wartikar.

Paper No: EC-101 Elementary Health & Safety

Unit 1: Concept of Safety

1. Concept of safety
 - Need, nature and importance of safety
 - Different factors impending safety
2. Industrial accidents
 - Reasons for accident prevention
3. Function of safety management
4. Safety organisation
 - Objectives of safety organisation
 - Role of industrial safety organisation
5. Safety program
 - Essential requirement of safety programme
6. Plant safety rules
 - Plant safety rules and procedures
 - Formulation of rules
 - Types of rules and violation of rules

Unit 2: Safety Engineering

1. Plan Lay-out:

General principles for factory building, plant and equipment layout & fire protection

2. House Keeping:

- a. Indicators of bad house keeping
- b. Typical accidents due to bad house keeping
- c. Concept of Fire 'S'

3. Ventilation and health---:

- a. Purpose of ventilation and heat control , Effects of ventilation

- b. Types of ventilation
 - i. Natural and Mechanical Ventilation
 - ii. Process of ventilation (Local Exhaust Ventilators)
 - iii. Control of Heat exposure
- 4. Working at different level:
 - a. Working at heights
 - i. Incidence and seriousness of fall accidents
 - ii. Safety features of stairways, working platforms, ladders and scaffolds
Boats wins chair and safety harness

Unit 3: Policy & Principles of Control for Safety

- i. Key elements of a health & safety management system.
- ii. Importance of setting policy for health & safety.
- iii. Key features and appropriate content of an effective health and safety policy.
- iv. Importance of planning.
- v. Principles of control & hierarchy of risk reduction measure.
- vi. Planning & implementation.

Unit 4: Biometry a Positive Health & Safety

- i. Direct & indirect costs.
- ii. Effective health & safety management system
- iii. Health, welfare & work environment requirement
- iv. Reasons for maintaining promoting good standards of health & safety in workplace.

Paper No: EC-101 Elementary Health & Safety

REFERENCE BOOK LIST FOR Elementary Health & Safety

- The Factories Act & Rules
- IS 3483
- Occupational Safety management and Engineering, Whillie Hammer, Prentice-Hall
- Fundamental of Industrial Safety & Health By Dr. K U Mistry
- Safety Management, Grimaldi & Simonds, All India Traveller Bookseller, Delhi-
110005

FOUNDATION COURSE (FC-01):

Paper No: FC 101

Credit: 2

➤ **GENERAL ENGLISH: (As prescribed by Gujarat University)**

CORE COURSE 1 (CC 1):

Credit: 4

Paper No: 101 APPLIED PHYSICS

UNIT- 1

- Introduction: fundamental qualities & units, Systems of units, concept of dimension, classification of physical quantities, dimensional formula, limitations of dimensional analysis.
- Vectors: kinds of vectors, linear combination of vectors, position vector.
- Properties of fluids: viscosity, Newton's law of viscosity, variation of viscosity with temperature, types of fluids, compressibility.

UNIT- 2

- **Surface tension and Viscosity:** molecular force, surface energy and surface tension, angle of contact, pressure difference across the liquid surface, excess pressure inside liquid drop, excess pressure inside the soap bubble, shape of liquid surface in a capillary tube, determination of surface tension by (1) capillary rise method ,Effect of temperature on surface tension
- Flow through open channels
- Types of flow in channels
- Steady flow and unsteady flow
- Uniform and non uniform flow
- Laminar flow and turbulent flow
- Continuity equation

UNIT-3

Thermodynamics:-

- First law of thermodynamics
- Thermodynamic process and Cycles, heat engine, thermal efficiency of heat engine
- Carnot's cycle and Carnot's engine, Efficiency of Carnot's cycle
- Concept of entropy, Heating at constant pressure and volume
- Approximation for heat absorb
- Change in entropy in reversible and ir-reversible process
- Third law of thermodynamics

Expansion and compression of gases.

- Expansion of gases, Boyle's law, Charle's law
- Isothermal expansion of gas, Adiabatic expansion of gas
- Specific heat of gases at constant volume & pressure
- Change in internal energy of gas, Derivation of adiabatic equation of a gas
- Different forms of adiabatic equation, Compressibility of gas

UNIT-4 X-rays and Radioactivity

- X-rays: discovery of x-ray, production of x-ray, origin of x-rays, properties of X-rays, practical application of x-ray.
 - Radioactivity: Radioactivity, nature of nuclear radiation, properties of α , β and γ rays, natural & artificial radioactivity, half-life periods, mean life time of radioactive elements.
-

Paper No: 101 APPLIED PHYSICS

REFERENCE BOOK LIST FOR APPLIED PHYSICS

- Principle of Fire Protection Chemistry and Physics- Raymond Friedman
- A text book for fire engineering Physics- Dr. B N Sankar, Dr. S O Pillai
- Fire Service Manual,
- Fire Service technology, Equipment and media,
- Physics and Chemistry for Fire Fighters- H M Fire Service Publications.

Paper No: 101 APPLIED CHEMISTRY

UNIT-1: Anatomy of fire:

1. Triangle of fire, constituent's tetrahedron of fire. Life cycles theory of fire, chain reaction,
2. Quantity of fire, Role of oxygen in combustion, Role of fuel in combustion, Role of temperature in combustion, chain reaction & spontaneous combustion.
3. Flash point – fire point.
4. Combustion in natural fire
5. Spontaneous auto ignition temperatures
6. Self heating and spontaneous combustion between KMnO_4 and glycerin fire properties of common material.
7. Combustion
8. Combustion – Flaming and no flaming combustion – How combustion originate – How combustion spread – How combustion terminated.
9. Chemical mechanism of combustion of carbon – combustion of metals i.e. Mg, Ti , No , K , Li , Ca , Zn , Al , Hf , Zr , Th , U and its fire prevention actions.

UNIT – 2: Heat in chemical reaction.

1. TYPES OF GASEOUS FLAMES
2. PREMIXED vs. DIFFUSIONS FLAMES
3. SATIONERY vs. PROPAGATING FLAMES
4. LAMINAR vs. TURBULANT FLAMES
5. DEFLAGRATION VERSUS DETONATION
6. RADIATION FLAMES – Ignition of gases – Burning velocity.
7. Heat transfer in fire by conduction, convection and radiation.
8. Burning rates. Introduction -Maximum burning flux-energy release rate (Q.) – estimating energy release rates.
9. Measurement of heat by using Bomb calorimeter
10. Specific heat – Experiment to determine specific heat of copper and its calculation

11. latent heat – latent heat of fusion
12. latent heat of vaporization
13. calorific values
14. Dulong formula
15. Examples based on calorific value.
16. Flame arrestor - principles

UNIT-3 Basics of Explosions

1. Common ignition sources (And their heat output characteristics)
2. Ignition Hazards –
3. Combustibility limits
4. Ambient condition
5. Flame spread.
6. Unstable and explosive substance
7. Explosion, Explosive or flammable limits, Explosive range, and properties of Explosive
8. Oxidation of carbon and the combustion of metals and common materials.

UNIT-4 Kinetics of Chemistry

1. Basic chemical kinetics.
2. Chemical kinetics – Rate of a chemical reaction – Zero first and second order of a reaction – rate law and rate constant – law of mass action – Arrhenius equation and its use to calculate activation energy – equation for the rate constant of a first, second, third and n the order reaction – Equation for the half – life period of a first, second, third and n the order reaction – Kinetics of homogeneous reactions interpretations of Batch reactor data – Single ideal batch reactor.
3. Effect of temperatures, pressure, oxygen, concentration.
4. Thermal explosion theory.
5. Catalytic oxidation anti-oxidants
6. Fire retardants and its application

Paper No: 101 CHEMISTRY

REFERENCE BOOK LIST FOR CHEMISTRY

- Fire Service Manual- The Stationery Office Publication
- Fire Service Manual,
- Principle of Fire Protection Chemistry and Physics- Raymond Friedman
- Physics and Chemistry for Fire Fighters- H M Fire Service Publications.
- Principle of Fire Protection Chemistry - Raymond Friedman

CORE COURSE 3 (CC 3):

Credit: 4

Paper No: 101 Fundamental of Fire

Unit 1 : Anatomy of fire

1. Fire triangle
2. Fire tetrahedron and chain reaction
3. Classification of fire (class A, B, C, D, electrical)
4. Role and sources of Oxygen, fuel, heat.
5. Methods of extinguishment: cooling, smothering, blanketing and starving.
6. Example Of Extinguishment Cooling, Smothering, Blanketing And Starvation Theory

Fire service management

1. Intro to FSM
2. Hierarchy in industry and municipal corporation
3. Roles and responsibilities
4. Roles and responsibilities
5. Shortcomings in the present system

Unit 2 : Flame spread and fire load

1. Types of flame
 - a. Smouldering, flaming
 - b. Deep seated, surface
 - c. Diffusion and premixed flame
2. Flame spread in solid liquid and gases
 - a. Solid: thickness and object orientation
 - b. Liquid: flow
 - c. Gases
3. Fire load
 - a. Definition of fire load

- b. Calculation of fire load
- c. Classification of fire load by values
- d. Classification of occupancies by fire load

Unit 3 : Building Construction

1. Main structural elements and parts of building
2. Material and fire resistance of construction materials
 - a. Stone
 - b. Brick
 - c. Concrete
 - d. Steel
 - e. Glass
 - f. Timber
 - g. Cast iron and wrought iron
 - h. Asbestos cement
 - i. Aluminium
 - j. Plaster and mortar
 - k. Textile fibres and other house hold materials
3. Classification of buildings based on occupancy as per NBC
4. Fire safety of building
5. Fire resisting construction
 - a. Walls and columns
 - b. Floors and roofs
 - c. Wall and floor openings
 - d. Escape elements
6. Study of high rise building and fire risk to life safety
 - a. concept of high rise building
 - b. fire risk in building
 - c. basic list of terms of NBC guideline

Unit 4: Fire detection & alarm system and Ventilation

1. Types of detectors
 - a. Use and operation
2. Types of alarm system

3. Basic theory on Construction of Detectors and Alarm
4. Ventilation in high rise building
 - a. Introduction to ventilation
 - b. Natural and artificial ventilation
 - c. Horizontal and vertical ventilation
 - d. Tactical ventilation
 - e. Offensive and defensive ventilation
 - f. Different equipment use in ventilation
 - g. Benefits to do ventilation in fire fighting

Paper No: 101 Fundamental of Fire

REFERENCE BOOK LIST FOR FUNDAMENTAL OF FIRE

- National Institute of Fire Engineering- NIFE, CCFE
- Fire Service Manual,
- Fire Service technology, Equipment and media,
- Physics and Chemistry for Fire Fighters- H M Fire Service Publications.

Practical: - F.Y. B.Sc. (Fire & Safety)

SEMESTER 1

CORE COURSE-1 (CC 1):

Credit: 3

Paper No: CC-1-Prac.-102

PRAC. Applied Physics

- 1.Moment of inertia of flywheel.
- 2.Temperatures coefficient of resistance of metallic wire.
- 3.Newton's ring.
- 4.Refractive index of liquid with the help of a convex lens
- 5.To determine the capacitance of a Capacitor
- 6.Decay of potential for capacitor
- 7.Co-axial viscometer
- 8.Wavelength of light using Hartman Formula

CORE COURSE-2 (CC 2):

Credit: 3

Paper No: CC-2-Prac.-102

PRAC. Applied Chemistry

1. Determination of flash point of unknown liquid.
2. Determination of melting point of unknown substance.
3. To separate organic liquids by Simple Distillation Method.
4. Perform the Kinetic (Chemical) experiment.
5. To determine the distribution co-efficient of acetic acid (CH_3COOH) between water (H_2O) AND benzene (C_6H_6).
6. Determination of fire point of unknown liquid.
7. Surfactant analysis and density determination of foam liquid.
8. Study the analysis of Phenol.

CORE COURSE-3 (CC 3):

Credit: 3

Paper No: CC-3-Prac.-102

PRAC. Fundamental of Fire

1. Practical on flame spread as per flow of liquid as per thickness and object orientation.
2. Practical on Fire load calculation of allotted area.
3. Practical on various ventilation techniques.
4. Practical on smothering, starving, cooling and blanketing to extinguish fire.
5. Table top exercise for study of fire triangle and sources of fuel heat and oxygen in allotted area.
6. Table top exercise for installation of fire resistance in building structure.
7. Study and performance of squad drill.
8. Study and performance of hose drill.

First Year BSc. (Fire & Safety)

IMPLEMENTATION-2015-16

Semester-2

ELECTIVE COURSE (EC-II)

Credit: 2

Paper No: EC-102 Industrial Safety Management

Unit 1: Material Handling

- Manual handling hazards
- Risk & Control Measures
- Storage methods and quantities
- Suggest ways of minimising manual handling risk

Unit 2: Safety in Small industries

1. Fertilizer Industry:
 - a. Types of Fertilizer and flowchart of their, manufacture and safety measures
 - b. Hazards due to bulk storage of chemical and their transfer and safety measures
2. Cement Industry:
 - a. Types of Cements and manufacturing flowchart and safety aspects of process
 - b. Safety for dust, Noise and material handling hazards
3. Pesticide Industry:
 - a. Types of Pesticide and their lethal dosages.
 - b. Manipulation of pesticides, their hazards and controls
 - c. Marking, labeling and safe disposal of containers
 - d. Medical treatment in case of exposure, Antidotes
4. Textile Industry:
 - a. Flowchart of cotton and synthetic textile processing
 - b. Machine guarding of machines used in the textile processing
 - c. Fire, Explosion and health hazards and their control measure
5. Oil and Refinery:
 - a. Petroleum Classification and Hazards due to Petroleum Products
 - b. Storage of Naphtha, Propylene, ethylene, xylene, benzene, LPG, Petrol, Diesel, Kerosene, etc. and control measures
 - c. Testing of storage vessel and their fittings
 - d. Filling road tankers and rail tanks & safety measures
 - e. OISD norms for Petroleum Products
6. Metallurgical Industry:
 - a. Hazards and controls in steel Industry

b. Hazards of foundry industry and control measures

c. Welding and cutting Hazards

Unit 3: Electrical safety

- Introduction
- Basic principles & measurement of electricity
- Conductors & Insulators
- Short Circuit
- Earthing
- Some definitions
 - Low Voltage
 - Main Voltage
 - Maintenance
 - Testing
 - Inspection
 - Examination
 - Isolation
 - Competent Electrical Person
- Hazards & Injuries
- Electrical Shock & Burns and its Treatments
- Electrical Fire & Explosion
- Electric Arching
- Static Electricity
- General Control Measures

Unit 4: Transport Safety

- Introduction
- Define:
 - Slip
 - Trip
 - Fall
- Safe movement of vehicle in worksite
- Transport of dangerous substance
- Labeling of vehicles and packing of substances
- Driving at work
- General Preventive measure for pedestrian hazards
- Hazards in vehicle operations
- Control strategies for safe vehicle operations
- Managing work related road risk
- Factors that increase risk of a road traffic incidents
- Over turning of vehicles

Paper No: EC-102 Industrial Safety Management

Reference Book List For Industrial Safety Management

- Fundamental of Industrial Safety and health- K U Mistry
- Hazard of electricity and static electricity, 6th edition- institute of chemical engineering.

Paper No: EC-102 Applied Electrical

Unit-1 introduction

Electric charge, coulomb's law, electric field, electric dipole, electrostatic potential, relation between electric field & electric potential, energy and power, combinations of capacitors, electric current, ohm's law, kichhorff's law, ammeter, volt meter. (examples of each topics)

Unit -2 Electromagnetic induction and current

Faraday's law, lenz's law, fleming's right hand's rule, A.C voltage & D.C current, A.C circuit with series combination of resistor, inductor ,capacitors, some important definitions

(amplitude, cycle, time period, frequency), r.m.s value of voltage & current, L.C oscillations

(example of each topics)

Unit-3 semiconductor electronics

A band theory of solids, classifications of solids into metal, semiconductor & insulator on the basis of band theory, P-N junction diode, zener diode, LED, photo diode, transistors, oscillators, amplifier, digital electronics & Logic gates.

Unit-4 communication system

Introductions, types of communication system, modulation, line communications, optical fiber communication, advantage of optical fiber communication, ground wave propagation

sky wave propagation, space wave propagation. (example of each topics)

Paper No: EC-102 Applied Electrical

Reference Book List For Applied Electrical

- Basics of electrical engineering, 5th edition- A E Fitzgerald, David E.
- Fire service operations, electricity-HM Fire.

FOUNDATION COURSE (FC-II):

Paper No: FC 102

Credit: 2

➤ **GENERAL ENGLISH: (As prescribed by Gujarat University)**

CORE COURSE 1 (CC 1):

Credit:4

Paper No: 103 FIRE FIGHTING EQUIPMENT

Unit 1

Types of fire fighting systems: water based, powder and gas based.

Active and passive systems.

Types of extinguishers: water CO₂, CO₂, Foam, DCP, Halon, Soda Acid

Detailed study of body construction, operation, maintenance, testing & recharging.

Unit 2

Detailed Study of Valves, Ladders and BA Set

Valves: types of valves, use & selection of valves, construction, operation, advantages and disadvantages, Ladders, BA Set.

Unit 3

Detailed study of all fire tenders and heavy vehicles used by fire & rescue services

Water tender and foam tender and tools

DCP Tender and Crash Fire Tender

TTL and hydraulic platform

Emergency RESCUE Tender

Unit 4

Detail study of small equipments used in fire fighting and hose and hose fittings

Paper No: 103 FIRE FIGHTING EQUIPMENT

Reference Book List For Fire Fighting Equipment

- Manual of fire mane ship- Stationery office publication
- National Institute of Fire Engineering- NIFE, CCFE
- Fire Service Manual,
- Fire Service technology, Equipment and media,
- Physics and Chemistry for Fire Fighters- H M Fire Service Publications.

Paper No: 103 MECHANICS OF STRUCTURES & TOWN PLANNING

UNIT-1 INTRODUCTION

- Introduction to mechanics.
- Force, Effects of force,
- Characteristics of force, Types of forces,
- Resultant of several forces
- Parallelogram law
- Lami's theorem
- Types of support and support reaction
- Equation of equilibrium
- Moment of force
- Free body diagram
- Centroid, centre of mass and centre of gravity for standard types of section.
- Friction and types of friction
- Shear force and bending moment diagram for simply supported and cantilever beams

UNIT-2 BENDING MOMENT & STRESS

- Simple stresses & strains
- Resistances to deformation, types of stresses & strains elasticity, elastic limit, Hook's law, Young's modulus,
- Stress in bars of varying sections, extension of uniformly tapering sections, stresses in composite bars.
- Simple statically indeterminate problem. Equivalent area of compound section.
- Thermal stresses & strains, thermal stresses in bars of tapering section, thermal stresses in bars of varying sections, thermal stresses in composite bars, hoop stress.
- Principal stresses & strains, principal planes, analytical method of stresses oblique sections, preparation of Mohr's circle.

UNIT-3 Building construction

Building construction
Parts of building constructions
Foundation of building
Wall and types of wall
Floor and types of floor
Roof and types of roof
Doors and window and its parts
Stair and types of stairs
Arches and lintel
Lifts and elevator and service shafts in buildings

UNIT-4 Town planning and Water supply

- Planning surveys, selection of site for urban development, consideration climate, Topography, Drainage & water supply. Types of road in urban areas communication system and its relationship to the cities.
- Multi-story flats, group housing, commercial complexes, detached or semi-detached housing relation to fire risks, Types of housing units, Lay outs of housing areas with consideration of site orientation, views and architectural aesthetics. Techniques of sub-division of land for residential areas, site orientation in regard to exposure hazards.
- Water Supply
- Demand for water, estimate quantity of water on the basis of residential , industrial and fire demand, fluctuations, populations present and future, increase in per capital consumption continuous or intermittent supply.
- Sources of water: Surface water, stream and lakes, impounding reservoirs selecting catchments, estimation of stoppage capacity, intake and tunnels, quantity of water, use of ground water.
- Conveyance: Types and capacity of pumps, Types of Pipes for water conveyance, their protection, pipe joints special fittings and valves hydrant.
- Distribution of water : Distribution system , Zones of distribution, capacity and types of elevated tanks and reservoirs, fire hydrant and fire leakage , corrosion
- Water requirement for fire fighting for various types of risk.

Paper No: 103 MECHANICS OF STRUCTURES & TOWN PLANNING

Reference Book List For Mechanics of Structure and Town Planning.

- Strength of Material – R K Rajput.
- Town planning – Rangwala
- Strength of Material – S Ramamtuthan.

Paper No: 103 Search and Rescue Techniques and Paramedics

Unit 1: Introduction

1. Introduction to search techniques
2. Factors influencing search and rescue
 - a. Primary search
 - b. Secondary search
 - c. Factors while searching
3. Rescue techniques
 - a. Shelter in place
 - b. Exit assist
 - c. Rescue by Fireman and fire equipment
4. Qualities of rescue
5. Recue scenarios
6. Fire men carry and drag rescue techniques

Unit 2: Confined Space Rescue & Use of Rope

1. Introduction to confined space.
 - a. Hazard recognition: Atmospheric hazard, physical hazard
2. Permit requirements
 - a. Entry Permit
 - b. Work permit
3. Equipments needed for confined space entry
 - a. Gas monitoring and venting equipment
 - b. PPE
 - c. Hoisting Equipment
 - d. Communication equipments
 - e. Non sparking tools
4. Different types of Knots, Hitches and their Application in Rescue

Unit 3: Rescue Operation in Various Scenarios & use of technology in rescue operations

1. Rescue in mines
2. Road accident rescue
3. Rescue from high rise building
4. Rescue in case of poisonous gas leak
5. Rescue in sewer line
6. Rescue from electrical appliance
7. Rescue from fire incidents
8. Rescue from major disaster – earthquake, flood, tsunami etc.

Use of technology

- Hydraulic and pneumatically operated tools and equipment introduction
- Hydraulic jack, hydraulic cutter, hydraulic expander, air lifting bags
- Electric power tools-electric cutter, electric saw, chain saw etc

Unit 4: Paramedics

1. Human Anatomy
2. First aid
 - a. Importance of first aid
 - b. Principle of first aid
 - c. ABC rules for first aid
3. Types of wounds
 - a. Incised wounds
 - b. Contused wounds
 - c. Lacerated wounds
 - d. Punctured wounds
 - e. Internal and external bleeding
4. Dressing and bandages
5. Types of Injuries
 - a. Fractures
 - b. Electric shock
 - c. Electric burn
 - d. Asphyxiation

- e. Cardiac arrest and CPR
 - f. Burns: Classification, first aid and treatment
6. 9 % rule for calculation of body burns.

Paper No: 103 Search and rescue techniques and Paramedics

Reference Book List For Search and rescue Techniques and Paramedics

- Rope rescue procedure and equipment- HMSO publication
- Fire Service manual – H M Fire service publication
- Confined space rescue – George J Browne and Gus S crust.

Practical: - F.Y. B.Sc. (Fire & Safety)

SEMESTER 2

CORE COURSE-1 (CC 1):

Credit: 3

Paper No: CC-1-Prac.-104

PRAC. Fire Fighting Equipment

1. Maintenance & drill of dry chemical powder type fire extinguisher.
2. Maintenance & drill of CO₂ type fire extinguishers.
3. Assemble, disassemble & maintenance of water CO₂ type extinguisher.
4. Maintenance & Drill of foam type fire extinguisher.
5. Drill of various type of delivery hose, suction hose & related fittings.
6. Study of various types of foam and foam making equipments.
7. Study and performance of hydrant drill dry and wet.
8. Study & performance of various equipment used in fire tender (Small Gears)

Paper No: CC-2-Prac.-104

PRAC. Mechanics of Structure and Town Planning

1. Verification of the law of polygon forces.
2. Reactions at the supported of simple Beams.
3. Study Tutorial based on syllabus containing minimum 10 problems.
4. Study the different types of support and its reaction.
5. Find out the center of gravity for a uniform load, rectangle, triangle, circle, and semi-circle.
6. Understanding of load bearing wall and non load bearing wall based on tutorial.
7. Study and understanding of hook's law (young's modulus) based on various types of stress, strain and it's constant.
8. Study of water supply system in medium sized town.

Paper No: CC-3-Prac.-104

PRAC. Search & Rescue Techniques and Paramedics

1. Study and drill of latest small gears used in fire fighting and rescue operations.
2. Study and performance of 2, 3 and 4 handed seat for rescue.
3. Study and performance of toe drag, knee drag, carry chair and fire men crawl rescue techniques.
4. Study and performance of rope rescues. Tunnel rescue and confined space rescue.
5. Study and performance of various types of ladders.
6. Drill and study of an open circuit type breathing apparatus.
7. Study and use of various bandages.
8. Classification, first aid and treatment of various degrees of burns.