

SWAMI VIVEKANAND UNIVERSITY, SIRONJA, SAGAR (M.P.)



SYLLABUS

For

**B.Sc. in Fire Safety and Hazards Management
(3 Years)**

**Swami Vivekanand University, Sironja Sagar
2012-2015**

Swami Vivekanand University, Sironja Sagar (M.P.)

B.Sc. in

Fire, Safety and Hazards Management (3 YEARS)

2012-15

Course Code -BSFSHM

I Year

Sub. Code	Subject Name	Marks	
		Max	Min
101	Safety Management	100	36
102	Fire Science	100	36
103	Fire Technology	100	36
104	Industrial Safety	100	36
105	Communication & Soft Skills	100	36
106	Construction Industry Safety	100	36
107	Emergency Planning & First Aid	100	36
108	Communicative English	100	36
109	Practical	100	50
Total		900	

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II Year

Sub. Code	Subject Name	Marks	
		Max	Min
201	Security Management of Industrial Plants	100	36
202	Organization, Administration and Management Responsibility	100	36
203	Chemical and Environmental Hazards	100	36
204	Industrial Psychology, Ergonomics and Accidents	100	36
205	Industrial Noise and Noise Control	100	36
206	Industrial Safety Analysis	100	36
207	Safety In Power Plants	100	36
208	Practical	100	50
Total		800	

III Year

Sub. Code	Subject Name	Marks	
		Max	Min
301	Radiation Hazards	100	36
302	Safety Training for Employees and HRD	100	36
303	Social Security in Industries	100	36
304	Occupational Health Safety	100	36
305	Controlling Environmental Pollution	100	36
306	Disaster Management	100	36
307	Energy Conservation and Sustainable Development	100	36
308	Practical	100	50
Total		800	

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I Year

101 SAFETY MANAGEMENT

UNIT 1

- Introduction to Safety and Safety Management
- Principles & Fundamentals of Safety Management
- Definition : Accident, Near miss
- Accident Sequence : Heinrich Triangle & Domino Theory
- Causes of accidents
- Classification of accidents

UNIT 2

- Reasons for accident prevention
- Methods of accident prevention
- Responsibility of management towards Safety
- Unsafe acts and unsafe working conditions
- Cost of accidents
- Role of management, Supervisors and workers in safety
- Motivation for safety

UNIT 3

- Need for integration of Safety Health and Environment (S, H & E)
- Safety and government role
- Safety act and provisions for worker's welfare
- General Instructions for Safety
- Approaches to prevent accidents

UNIT 4

- Factory act 1948 and amendment 1987
- Planning: Types of plans, steps in planning,
- Nature of objectives, setting objectives.
- HSE Policy
- Project HSE Plan
- Statutory requirements, Rules and Regulations

UNIT 5

- Safe work place
- Objectives of Safety and Security measures
- Site Security, Fencing and gates, Security personnel their role in safety, lighting
- Objectives of Safety Management
- Record keeping

102 FIRE SCIENCE

UNIT 1

Terms and Definitions: Molecule, Atom, valency, Oxidation, Elements, Compound, Exothermic reaction, Endothermic reaction, Calorie, Specific heat, Matter, Temperature, Mixture.

UNIT 2

Basic Chemistry of fire

- Chemical reaction
- Heat formation
- Heat of combustion
- Mechanism of combustion
- Flash Point fire Point
- Spontaneous Ignition Temperature
- Fire
- Fire triangle
- Components of fire
- Fire Tetrahedron
- Chain reaction
- State of matter
- Spread of Fire
- Extinction of Fire
- Quenching of free radicals
- Back drought
- Delayed Back drought

UNIT 3

- Atomic structure
- Elements, compounds
- Pure substance and mixture
- Physical and chemical changes
- Condition for the changes
- Energy changes
- Effects of heat on matter
- Combustion
- Temperature
- Specific heat capacity
- Catalyst
- Neutralization
- Sublimation
- Heat of decomposing
- Chemical reaction
- Exothermic reaction and endothermic reaction
- Transmission of heat
- Flash and fire point
- Flammables and combustible chemicals
- Spontaneous combustion

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UNIT 4

- Classification of Fire
- Extinguishing media for various class of Fire
- Properties of solid, liquids and gas.
- Prevention of Fire
- Causes of initiation of Fires

UNIT 5

Basic physics

- Units
- Guidelines for writing the units
- Force, resultant force
- Laws of force
- Laws of motion
- Mass and weight, work, power, energy
- Law of conservation of energy
- Mechanics – rest and motion
- Distance and displacement
- Speed and velocity

103 FIRE TECHNOLOGY

UNIT 1

Foam

- Definition
- Qualities of good foam
- Types of foam
- Chemical foam, mechanical foam,
- Ventury effect,

Hose

- Definition
- Types of hoses
- Delivery hose, types of delivery hose, lined hose, unlined hose,
- Characteristics of hose
- Advantages and disadvantages of lined and unlined hose
- Care and maintenance of hoses.
- Storage and use of hoses
- Couplings, Adapters, Breaching piece, Nozzles, inductors, FMB, Hose reels, Hose drill

UNIT 2

Pumps

- Definition
- Types of pumps, Centrifugal force
- Working principle of each type of pump
- Reasons for failure of pump
- Care and maintenance

Primers

- Definition,
- Necessity of primers in fire fighting
- Type of primers, Working principle of each type of primer
- Effect of atmospheric pressure on water when primer is used
- Care and maintenance

UNIT 3

Fire Fighting Clothing

- Basic Fire protective clothing
- Advantages of wool over cotton, Full fire fighting rig, Type of suits.
- Donning procedure, Washing, re-proofing, Care and maintenance
- Fire Proximity Suit
- Fire Entry Suit
- Thermal Imaging

UNIT 4

Ladders and Knots

- Introduction
- Parts of ladders
- Type of ladders
- Uses of Ladders, Ladder drill
- Different Types of Knots

Breathing Apparatus

- Introduction
- Smoke Mask
- SCBA, BASCCA, ELSA
- Donning procedures, Operating procedure
- Face seal checks, routine checks
- BA Controller, Duties of BA Controller
- Life line, Personnel line, guides line.

UNIT 5

Aircraft Crash Rescue and Fire Fighting

- Definitions
- Layout of a standard airfield
- Airfield Markings
- Runway Lighting
- Rescue Operations

Fire Fighting Vehicles and Appliances

- Domestic Fire Tenders
- Crash Fire Tenders
- Hydrants, Branch pipes

104 INDUSTRIAL SAFETY

UNIT 1

Industrial Hazards

- Physical hazards
- Chemical hazards
- Mechanical hazards
- Biological hazards
- Ergonomic hazards
- Noise hazards
- Chemical safety
- Toxicity
- IDLH (Immediate Danger to Life and Health)
- Chemicals - Storage, Handling and Transportation
- Preventive measures for chemical spillage
- Transport Emergency Card (TREM Card)

UNIT 2

Electrical Safety

- What is electricity?
- Safety in use of electricity
- Dangers from electricity
- Importance of safety equipments in design and use of switches, switch fuses, circuit breakers and isolating lines
- Over load and short circuit protection
- Earth fault protection
- Earthing of electrically driven equipments
- ELCB
- Precautions
- Static electricity
- Electrical shock treatment
- Points to be checked at the electrical system

UNIT 3

Workshop Safety

- Hand tools and Power tools
- Safety while using Grinding stone
- Welding and gas cutting safety
- Dangerous points
- Lubrication Safety

Petroleum Refineries

- Refinery Process
- Classification of Petroleum Products
- Storage Tanks

UNIT 4

Hazard Evaluation Techniques

- HAZOP Study
- Job safety analysis
- Fault tree analysis
- Event tree analysis
- Failure modes and effects analysis
- Relative ranking techniques

Monitoring of Safety Performance

- Statistics of accidents
- Frequency rate and severity rate
- Frequency severity incidence
- Safe – T – score

UNIT 5

House Keeping

- Definition
- Need for house keeping
- Importance in view of safety
- Methods

Safety Inspections

- Safety Audit
- Safety Survey
- Plant safety inspection
- Safety tour
- Safety samplings

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105 COMMUNICATION & SOFT SKILLS

UNIT 1

Essentials of Grammar:

- Parts of Speech
- Punctuation
- Vocabulary Building
- Phonetics

Office Management:

- Types of Correspondence
- Receipt and Dispatch of Mail
- Filing Systems
- Classification of Mail.
- Role & Function of Correspondence
- MIS
- Managing Computer

UNIT 2

Letter & Resume Writing:

- Types of Letters-Formal / Informal
- Importance and Function
- Drafting the Applications
- Elements of Structure
- Preparing the Resume
- Do's & Don'ts of Resume
- Helpful Hints

UNIT 3

Presentation Skills:

- Importance of Presentation Skills
- Capturing Data
- Voice & Picture Integration
- Guidelines to make Presentation Interesting
- Body Language
- Voice Modulation
- Audience Awareness
- Presentation Plan
- Visual Aid
- Forms of Layout
- Styles of Presentation.

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UNIT 4

Interview Preparation:

- Types of Interview
- Preparing for the Interviews
- Attending the Interview
- Interview Process
- Employers Expectations
- General Etiquette
- Dressing Sense
- Postures & Gestures

UNIT 5

Group Discussion & Presentation:

- Definition
- Process
- Guidelines
- Helpful Expressions
- Evaluation

(**Note:** Every student shall be given 15 minutes. of presentation time & 45 minutes of discussion on his/ her presentation.)

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106 CONSTRUCTION INDUSTRY SAFETY

UNIT 1

Safe Work Place

- Safe means of access
- Fall Protection
- Safety while working on Roofs
- PFASS (Personal Fall Arrest Safety System)

Scaffolding

- Parts of Scaffold
- Ladder Access
- Working on Scaffold
- Basic requirements of Scaffolding
- Erection of Scaffolding
- Scaffolding Safety
- Scaffold Inspection

UNIT 2

Ladders

- Types of Ladders
- Selection of Ladder
- Positioning ladders
- Safety Precautions

Permit To Work System (PTW)

- Definition
- Hot Work Permit
- Cold Work Permit
- Responsibilities relating with PTW
- Circumstances when Permit is required
- Confined Space entry

Personal Protective Equipment (PPE)

- Need and importance of PPE
- Employer's responsibilities
- Employees responsibilities
- Types of PPE
- Head Protection
- Eye and Face Protection
- Ear Protection
- Hand Protection
- Leg Protection
- Skin Protection
- Respiratory protection

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HSE Training

- Importance of Safety Education
- Safety Training
- Objectives of HSE training and education
- Induction Training
- In-house Training
- Specialized Training
- Tool Box Meeting (TBM)

UNIT 3

Safe Use of Hand Tools and Portable Power Tools

- Hand Tools
- Ten Commandments for personnel using hand tools
- Portable Electric Power Tools
- Pneumatic Tools
- Lone Working

Safe Operation of Vehicles, Equipment and Machinery

- Workplace Transport
- Hazards
- Pedestrian routes
- Vehicular routes
- Reversing operations (Safety guidelines)
- Instructions for drivers
- Hand held Power circular Saws
- Chain Saws
- Abrasive Wheels

UNIT 4

Safe Material Handling Operations

- Safe Handling of materials
- Major injuries
- Lifting appliances
- Safe operations of Cranes
- Pilings, Rigs, Side Booms
- General Safety Requirements for Lifting operations

Accident Reporting, Investigation and Analysis

- Definitions
- Lost Time Injury (LTI)
- Multiple LTI
- Lost Time Injury Frequency Rate (LTIFR)
- Lost time Injury Severity Rate (LTISR)
- Reporting near misses
- Reporting Accidents

UNIT 5

Major activities of Construction Project

- Definitions
- Excavation Hazards & precautions
- Methods of Excavation
- Welding and Cutting Operations
- Types of Welding
- Hazards and precautions for welding
- Confined Space entry precautions
- Painting operations - Hazards and precautions
- Sand Blasting - Hazards and precautions
- Demolition - Hazards and precautions

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107 Emergency Planning & First Aid

UNIT 1

On site Emergency Planning

- On-site Emergency Plan
- Emergency Alarm System
- Emergency Control Room
- Key personnel
- Emergency Control Program

UNIT 2

Off site Emergency Planning

- Off-site Emergency Plan
- Mutual Aid Scheme
- Emergency Evacuation
- Security and Media management

UNIT 3

Hazard Communication

- Safe Handling of hazardous substance
- Material Safety Data Sheet (MSDS)
- Use of hazardous and Toxic substance
- Storage and Handling
- Transportation of Hazardous substance

UNIT 4

First Aid

- Introduction
- Principles of First Aid
- Training in First Aid
- General rules of First Aid
- Shocks
- Electrical Shock
- Artificial Respiration
- Cardio Pulmonary Resuscitation

UNIT 5

- Chocking
- Fainting
- Poisoning
- Open Wounds
- Control of bleeding
- Burns and Scalds
- Heart Attack

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108 Communicative English

UNIT 1

Vocabulary Development

- Reading (English Novels & News Papers)
- Dictation
- New Words finding
- Word Quiz

UNIT 2

Grammar Development

- The Tenses
- Subject and Predicate
- The Phrase and The Clause
- Parts of Speech
- Noun : Gender, Number, Case
- Adjectives
- Position of the Adjectives
- Articles
- Personal Pronouns
- Relative Pronouns

UNIT 3

- The Verb
- Subject Verb Agreement
- Active and Passive Voice
- Uses of the Tenses
- The Infinitive
- The auxiliaries
- Adverb
- Preposition
- Conjunction

UNIT 4

Fluency development

- Story Telling
- Narration
- Group Discussion
- Dialogue
- Presentation

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UNIT 5

Written

- Lay out of Business letters
- Lay out of Reports
- Lay out of Agenda and Minutes of Meeting

109 PRACTICAL

201 Security Management of Industrial Plants

UNIT 1

- Introduction
- Need of Security Arrangements in Industrial Plants
- Security Programme
- Fencing and Walls
- External Landscape
- Lighting

UNIT 2

- Alarm System
- Visitor Entry Pass
- Employee entry Pass
- Communication
- Safe Keys and Locks

UNIT 3

- Security Guard Force
- Check List for Plant Security
- Security Staff Parade Drills
- Discipline
- Record Keeping

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202 Organizations, Administration and Management Responsibility

UNIT 1

- Introduction
- Objectives
- Basic Safety Programming
- Safety Department

UNIT 2

- Management Responsibility for Safety
- Safeguarding Public
- General Safety Rules
- Responsibilities of Government
- Responsibilities of Social Organizations
- Responsibilities of Public Authorities

UNIT 3

- Safety Activities of ILO
- Maintenance and Safety
- Factories Act – 1948
- Inspection and certifying

203 Chemical and Environmental Hazards

UNIT 1

- Introduction
- Multiple effects of Chemicals
- Industrial Toxicology
- Toxic Chemicals and its harmful effects on Humans
- Harmful effects of Chemicals
- Factors influencing the effects of Toxic Materials
- Units of concentration

UNIT 2

- Chemical Hazards Exposures
- Safety Analysis
- Control Measures
- Management of Workplace Exposure
- Plant Operations
- Dust Explosions

UNIT 3

- Introduction to Environmental Hazards
- Terms and Definitions
- Pollution
- Environment Pollutants
- Energy, Man and Environment
- Law of Conservation of Energy
- Thermodynamics

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204 Industrial Psychology, Ergonomics and Accidents

UNIT 1

- Introduction
- Industrial Psychology
- Scope of Industrial Psychology
- Concepts of Industrial Psychology
- Principles of Industrial Psychology
- Applications of Industrial Psychology
- Industrial Accidents
- Human Carelessness
- Accident Proneness
- Physical Factors

UNIT 2

- Vision
- Reaction Time
- Relationship between Perception and muscular responses and injuries
- Relationship between Intelligence and Injury Experience
- Hearing
- Emotional Instability
- Fatigue
- Illumination
- Noise

UNIT 3

- Vision
- Atmospheric conditions
- Job stress and its effect
- Coping with stress
- Bio Mechanics and Ergonomics
- Industrial Ergonomics and Measurements

UNIT 4

- Physiology
- Psychology
- Working Environment

205 Industrial Noise and Noise Control

UNIT 1

- Introduction
- Effect of noise on the auditory system
- Electrical noise and interferences
- Audible Noise
- Acoustics
- Fundamentals of sound
- Measurement of audible noise

UNIT 2

- Attenuation of Sound Pressure Levels
- Acceptable levels of noise
- Criteria for Hearing Loss
- Control of noise
- Noise Abatement
- Vibration
- Galloping

UNIT 3

- Corona vibrations
- Vibration Dampers
- Audiometric Testing
- Hearing Protectors
- Record Keeping

206 Industrial Safety Analyses

UNIT 1

- Introduction
- Homogeneity in system analysis
- Locating and defining injury sources
- Sources of Data
- Identify causes of Injury
- Information for identification
- Subsidiary facts
- Injury Investigation

UNIT 2

- Evolution of Methodical Analysis
- Binary Number System
- Computer Logic
- Safety Analysis Technique
- Fault Tree Calculations
- Fault Tree Limitations

UNIT 3

- Failure Modes and Effect Analysis
- Other systems analysis Techniques
- Risk Tolerability

207 Safety in Power Plants

UNIT 1

- Responsibilities of Employees
- General Safety Requirement/guidelines
- Boilers
- Structure and Buildings
- Control of Fluid systems safety
- Safety guidelines for high speed rotary equipment
- Gas Turbine
- Fuel Pipe Line

UNIT 2

- Safety of Diesel Stations
- Electrical quality associated with Human Injury
- Safety Precautions for electrical workers
- Safety Rules for Line Men
- Authorization
- Care and storage of live line tools

UNIT 3

- HT and EHT Cables
- Precautions in respect of Storage Batteries
- Electrical Maintenance
- Ear thing

208 PRACTICAL

III Year

301 Radiation Hazards

UNIT 1

- Definitions
- Nuclear Energy
- Nuclear Fission
- Nuclear Cycle
- Enrichment
- Fabrication
- Nuclear Fission Chain Reaction
- Nuclear Cycle Re processing
- Nuclear Power Plant

UNIT 2

- Natural Gas
- Thermal Neutrons
- Enrichment Process
- Chain Reaction
- Ionizing and non ionizing radiation
- Particulate and electromagnetic radiation
- Radiation Dose
- Alpha Radiation
- Gamma Radiation
- Cosmic Radiation

UNIT 3

- Ionizing Radiation Controls
- Devices for measuring Radiation
- Controlling Radiation Hazards
- Controlling Radiation Exposure
- Non ionizing Radiation
- Disposal of Radioactive wastes

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302 Safety Training for employees and Human Resource Development (HRD)

UNIT 1

- Definitions
- Methods of Training to Industrial Employees
- Discussion Groups
- Continued Training
- Training Facilities
- Benefits of Training to Employees
- Specialized Training for Safety
- Positive Instructions

UNIT 2

- Human Resource Development (HRD)
- HRD Concept
- Nature of HRD
- Objectives of HRD
- Benefits of HRD
- Concept of HRD
- HRD Matrix
- HRD Process
- Challenges and Tasks
- Emerging Horizons
- HR Managers

303 Social Security in Industries

UNIT 1

- Definitions
- Scope of Social Security
- Social Security in India
- Administration
- Working of ESI
- Benefits of Workers

UNIT 2

- Group Life Insurance
- Workman's Compensation Act
- Maternity Benefit Act
- Employees Provident Fund Act
- Right to Payment for Maternity

UNIT 3

- Insurance Policies
- Taking Policy
- Transit Insurance
- Employees State Insurance
- Inspection/ Safety Audit
- After Fire incident
- After Theft
- After Accident

304 Occupational Health Safety

UNIT 1

- Introduction
- Occupational Health Risks
- Ways to reduce occupational Risks
- Excerpts from ILO Convention
- Measures for Occupational Health and Safety
- Compensation and Rehabilitation

UNIT 2

- Working Women
- Working Children
- Insurance Schemes
- Tips to improve Occupational Health
- Community Health
- Health services

UNIT 3

- Preventive medicines
- Illness and Healing
- Degenerative Illness
- Common Diseases
- Care of ENT
- Diseases: Causes and cures

305 Controlling Environmental Pollution

UNIT 1

- Introduction
- Survival of the environment
- Conflict between North and South
- Endangered Earth
- Environmental Control Regulations
- Control through education
- Impact Assessment
- Prevention and control of pollution
- Central Pollution Control Board

UNIT 2

- Approaches to environmental Regulation
- Concept of Industrial Ecology
- Environmental Management System
- Compliance to Legislations
- Environmental Standards
- ISO 14000
- International Environmental guiding Principles

UNIT 3

- Environment Management
- Integrated approach in managing Safety & Environment
- Development process towards sustainability
- Management and waste disposal system
- Hazardous Waste Management

306 Disaster Management

UNIT 1

- Introduction
- Disaster Management Plan
- Disaster Zoning for natural calamities
- Important consideration in Disaster Management
- Structure
- Constitution
- Needs and resources to tackle disaster

UNIT 2

- Pre-Disaster preparedness
- Post disaster response and recovery
- Control of emergencies
- Organization consideration
- Concept of communication

UNIT 3

- Pre-Disaster preparedness
- Disaster Management Plan
- Fire : Disaster

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307 Energy Conservation and Sustainable Development

UNIT 1

- Energy Conservation Act
- Bureau of Energy Efficiency
- Energy Management
- Energy Conservation
- Energy Audits
- Indian Renewable Energy Development Agency (IREDA)
- Sustainable energy development

UNIT 2

- Introduction to sustainable development
- Issue of achieving sustainable development
- Optimal resource utilization
- Sustainable cities
- Sustainable Transportation system

UNIT 3

- Sustainable mining Technology
- Energy conservation
- Sustainable Future
- Efficient energy management
- Bio-Methnation
- Bio filtration
- Sustainable development
- Protection of atmosphere

308 PRACTICAL

REFERENCE BOOKS:

1. Construction Safety Hand Book – Muraleedharan Pillai
2. Industrial Safety Management – NK Tarasdar, KJ Tarasdar
3. Industrial Safety, Health and Environment Management Systems – RK Jain
4. Principles of Physical Chemistry –Dr. BR Puri, Dr. LR Shama, Mr.Patania
5. Thermodynamics – Dr. JC Kuriakose, Dr. J Raja Ram
6. Construction Safety Hand Book – Muraleedharan Pillai.
7. High School English Grammar and Composition – Wren & Martin