

MNPE-09425068494

In Collaboration with

**Karnataka State Open
University**

Manasagangotri, Mysore-6

Syllabus

Diploma in Safety Management

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Diploma in Safety Management

ELIGIBILITY - 10th Class pass under 10+2 system.

COURSE PERIOD: 1 YEAR

TOTAL MARKS: 1000

SEMESTER I

SUBJECT TITLE	SUBJECT CODE	MARKS		
		Theory	Practical	Total
INDUSTRIAL MANAGEMENT AND LEGISLATION	DSM-101	50	50	100
FUNDAMENTAL OF SAFETY MANAGEMENT	DSM-102	50	50	100
OCCUPATIONAL HEALTH AND HYGIENE	DSM-103	50	50	100
CONSTRUCTION SAFETY AND POLLUTION CONTROL	DSM-104	50	50	100
RISK MANAGEMENT AND HAZARD CONTROL SYSTEM	DSM-105	50	50	100
SAFETY IN MECHANICAL INDUSTRIES	DSM-106	50	50	100
SAFETY IN CHEMICAL INDUSTRIES	DSM-107	50	50	100
FIRE ENGINEERING AND EXPLOSION CONTROL	DSM-108	50	50	100

Program Structure (Face to Face)

CODE	COURSE TITLE	CREDITS
DSM-101	INDUSTRIAL MANAGEMENT AND LEGISLATION	4
DSM-102	FUNDAMENTAL OF SAFETY MANAGEMENT	4
DSM-103	OCCUPATIONAL HEALTH AND HYGIENE	4
DSM-104	CONSTRUCTION SAFETY AND POLLUTION CONTROL	4
DSM-105	RISK MANAGEMENT AND HAZARD CONTROL SYSTEM	4
DSM-106	SAFETY IN MECHANICAL INDUSTRIES	4
DSM-107	SAFETY IN CHEMICAL INDUSTRIES	4
DSM-108	FIRE ENGINEERING AND EXPLOSION CONTROL	4
TOTAL CREDIT		32

DETAILED SYLLABUS

DSM 101: INDUSTRIAL MANAGEMENT AND LEGISLATION

Total Credit : 4

BLOCK 1 ORGANISATION

UNIT 1

Concept of organization, Characteristics of organization, Element of organization, Principle of organization, Organization theory.

UNIT 2

Organization structure, Organization chart, Types of organization, project organization, matrix organization.

UNIT 3

Authority, delegation of authority, communication system, organization development, managerial leadership.

UNIT 4

Ownership, types of ownership, partnership, Joint Stock Company, cooperative society, public sector, private sector.

BLOCK 2 MANAGEMENT CONCEPT

UNIT 1

Management, administration and organization ; Importance and characteristics of management, managerial skills and objectives.

UNIT 2

Difference between policies, goals and objectives ; scientific management, principle of management, function of management.

UNIT 3

Industrial management, types of management, management chart, management development, project management ; management information system.

UNIT 4

Concept of personal management ; aim objectives and function of personal management ; Recruitment and selection of employees, discipline in industry.

BLOCK 3 PLANT LOCATION, LAYOUT AND MAINTENANCE

UNIT 1

Concept and factor governing plant location ; Locational economy ; Plant layout, process layout, product layout, combinational layout, fix position layout.

UNIT 2

Work station design, method of plat and factory layout, factory building, consideration of building design, types of building construction.

UNIT 3

Plant maintenance ; Objective and importance of plant maintenance ; Duties, functions and responsibilities of plant maintenance department.

UNIT 4

Types of maintenance, plant maintenance schedule, standard data for maintenance, some recent developments in plant maintenance.

BLOCK 4 INDUSTRIAL LESISLATION

UNIT 1

Importance and necessity of labour acts, principle of labour legislation, types of labour laws, worker's participation in management, Union –Management relation.

UNIT 2

Factory Act – objects and scope; Approval, licensing and registration of factories; Health and Safety : Welfare ; Working hour ; Special provision ; Penalties and procedure.

UNIT 3

Workmen's Compensation Act- Main features of the act, Employer's liabilities for compensation, Amount of compensation, Notice and claims of accident, medical examination.

UNIT 4

Industrial Dispute Act – Introduction and scope of act, Authority under this act, Strikes and Lock-out, Lay-off and retrenchment. Penalties.

DSM102: FUNDAMENTAL OF SAFETY MANAGEMENT

Total Credit : 4

BLOCK 1 : BASIC CONCEPTS AND TECHNIQUES

UNIT 1

Evolution of modern safety concept- Safety policy - Safety Organization.

UNIT 2

Line and staff functions for safety- Safety Committee- budgeting for safety.

UNIT 3

Incident Recall Technique (IRT), disaster control, Job Safety Analysis (JSA),

UNIT 4

Safety survey, safety inspection, safety sampling, Safety Audit.

BLOCK 2 : ACCIDENT INVESTIGATION AND REPORTING

UNIT 1

Concept of an accident, reportable and non reportable accidents, unsafe act and condition principles of accident prevention,

UNIT 2

Supervisory role- Role of safety committee – Accident causation models - Cost of accident.

UNIT 3

Overall accident investigation process - Response to accidents, India reporting requirement, Planning document, Planning matrix,

UNIT 4

Investigators Kit, functions of investigator, four types of evidences, Records of accidents, accident reports.

BLOCK 3 : SAFETY PERFORMANCE MONITORING

UNIT 1

Permanent total disabilities, permanent partial disabilities, temporary total disabilities.

UNIT 2

Calculation of accident indices, frequency rate, severity rate, frequency severity incidence, incident rate, accident rate, safety "t" score, safety activity rate.

UNIT 3

Information sources for safety monitoring, Procedures and Arrangements for Safety Monitoring.

UNIT 4 Safety Monitoring Methods and Programmes, Measuring the hazard burden, Measuring the health and safety culture

BLOCK 4 : SAFETY EDUCATION AND TRAINING

UNIT 1

Importance of training-identification of training needs-training methods – programme, seminars, conferences, competitions.

UNIT 2

Method of promoting safe practice - motivation –communication - role of government agencies and private consulting agencies in safety training.

UNIT 3

Creating awareness, awards, celebrations, safety posters, safety displays, safety Pledge.

UNIT 4

Safety incentive scheme, safety campaign. Domestic Safety and Training.

DSM 103: OCCUPATIONAL HEALTH AND HYGIENE

Total Credit : 4

BLOCK 1 : PHYSICAL HAZARDS

UNIT 1

Noise, compensation aspects, noise exposure regulation, properties of sound, occupational damage, risk factors, sound measuring instruments, octave band analyzer, noise networks,

UNIT 2

Noise surveys, noise control program, industrial audiometry, hearing conservation programs vibration, types, effects, instruments, surveying procedure, permissible exposure limit.

UNIT 3

Ionizing radiation, types, effects, monitoring instruments, control programs, OSHA standard on-ionizing radiations, effects, types, radar hazards, microwaves and radio-waves, lasers,

UNIT 4

TLV- cold environments, hypothermia, wind chill index, control measures- hot environments, thermal comfort, heat stress indices, acclimatization, estimation and control

BLOCK 2 : CHEMICAL HAZARDS

UNIT 1

Recognition of chemical hazards-dust, fumes, mist, vapour, fog, gases, types, concentration.

UNIT 2

TLV - Methods of Evaluation, process or operation description, Field Survey, Sampling methodology, Industrial Hygiene calculations.

UNIT 3

Air Sampling instruments, Types, Measurement Procedures, Instruments Procedures, Gas and Vapour monitors, dust sample collection devices, personal sampling

UNIT 4

Methods of Control - Engineering Control, Design maintenance considerations, design specifications - General Control Methods - training and education

BLOCK 3 : BIOLOGICAL AND ERGONOMICAL HAZARDS

UNIT 1

Classification of Biohazardous agents –bacterial agents, rickettsial and chlamydial agents, viral agents, fungal, parasitic agents,

UNIT 2

Infectious diseases - Biohazard control program, employee health program-laboratory safety program-animal care and handling-

UNIT 3

Biological safety cabinets - building design. Work Related Musculoskeletal Disorders – carpal tunnel syndrome CTS- Tendon pain/disorders of the neck- back injuries.

UNIT 4

Man as a system component – allocation of functions – efficiency – occupational work capacity – aerobic and anaerobic work – evaluation of physiological requirements of jobs, parameters of measurements – categorization of job heaviness, personal hygiene

BLOCK 4 : OCCUPATIONAL HEALTH AND TOXICOLOGY

UNIT 1

Concept and spectrum of health - functional units and activities of occupational health services, pre-employment and post-employment medical examinations –

UNIT 2

Occupational related diseases, levels of prevention of diseases, notifiable occupational diseases such as silicosis, asbestosis, pneumoconiosis, siderosis, anthracosis, aluminosis and anthrax, lead-nickel, chromium and manganese toxicity,

UNIT 3

gas poisoning (such as CO, ammonia, coal and dust etc) their effects and prevention – cardio pulmonary resuscitation, audiometric tests, eye tests, vital function tests.

UNIT 4

Industrial toxicology, local, systemic and chronic effects, temporary and cumulative effects, carcinogens entry into human systems

DSM 104: CONSTRUCTION SAFETY AND POLLUTION CONTROL**Total Credit : 4****BLOCK 1 Safety at construction site****UNIT 1**

Scaffolding and working platform, Welding and cutting, Rigging and hoisting, Handling and storage of compressed gas, Excavation work, Concreting and cementing work.

UNIT 2

Transportation of men and material, Lock out and tag out, Shoring, Waste control disposal.

UNIT 3

Building construction, TAC and NBC rules, Inspection of site, high rise building, Fire protection introduction to TAC norms, Earth quake, Lightning and electrical hazard protection,

UNIT 4

Personal hazards, Fire escape structural precaution, Floor openings, staircase, escalators etc ; Fire hazard in a building; Building collapse and symptoms.

BLOCK 2 Safety in Material Handling**UNIT 1**

General safety consideration in material handling - Ropes, Chains, Sling, Hoops, Clamps, Arresting gears – Prime movers.

UNIT 2

Ergonomic consideration in material handling, design, installation, operation and maintenance of Conveying equipments,

UNIT 3

Hoisting, traveling and slewing mechanisms; Design, installation, operation and maintenance of driving gear for hoisting mechanism – Traveling mechanism

UNIT 4

Selection, operation and maintenance of Industrial Trucks – Mobile Cranes – Tower crane – Checklist - Competent persons. Storage and Retrieval of common goods of various shapes and sizes in a general store of a big industry.

BLOCK 3 - Electrical Safety

UNIT 1

Review of Electrical concept, Electrostatic – Electro magnetism – Stored energy Working principle of major electrical equipment – Typical supply situation.

UNIT 2

Electrical Hazards – Energy leakage – Clearance and insulation – Excess energy – Current, Indian electricity rule.

UNIT 3

Surges – Electrical causes of fire and explosion – National electrical Safety code. Selection of Environment, Protection and Interlock – Discharge rods and earthing device.

UNIT 4

Safety in the use of portable tools - Preventive maintenance Hazardous area classification and classification of electrical equipments for hazardous areas (IS, API and OSHA standards).

BLOCK 4 – Pollution Control

UNIT 1

Air pollution– Classification and properties of Air pollutants-Pollution sources- Control of air pollution – Gravitational settling chambers-Cyclone separators, ESP, Wet scrubber.

UNIT 2

Dispersion of Air pollutants-Plume behavior-Control of gaseous pollutants, sulphur dioxides, nitrogen oxides, Carbon monoxide and Hydrocarbons. Air pollution laws and Standards.

UNIT 3

Water pollution- Classification of water pollutant and their effects on receiving bodies. Advanced wastewater treatments by physical, chemical, biological and thermal methods- Effluent quality standards.

UNIT 4

Solid waste management- methods of collection – Disposal of solid waste, land filling, Handling of toxic and radio active wastes –Incineration and vitrification. Pollution control in process industries – Cement, paper, petroleum, fertilizer and petrochemical.

DSM105: RISK MANAGEMENT AND HAZARD CONTROL SYSTEM

Total Credit : 4

BLOCK 1 Hazards

UNIT 1

Definition, Glossary of Terms, Risk Management, Hazards Control System, System safety.

UNIT 2

Job Hazard analysis, Hazop, Fault tree Analysis, Failure mode and effect Analysis.

UNIT 3

Hazard monitoring-risk issue - Hazard assessment, procedure, methodology.

UNIT 4

Safety audit, checklist analysis, safety review, preliminary, hazard analysis (PHA), hazard operability studies (HAZOP).

BLOCK 2 Hazardous properties

UNIT 1

Introduction, Major industrial hazards, Types and consequences of major industrial hazard.

UNIT 2

Effects on human body, Precautions while fire fighting, Stages of combustion, Hazards of combustion, Stability and inflammability.

UNIT 3

Harmful contamination of air and water, Toxicity, Corrosiveness.

UNIT 4

Radioactive hazards, Special precaution for handling, Emergency preparedness, Pesticides, Explosion.

BLOCK 3 Flammable Solids, Liquids and Gas

UNIT 1

Petrochemicals and other hydrocarbons, Tank fire – storage tank, trucks, service stations

UNIT 2

High pressure pipe lines, Pressurized and liquefied gases, Natural gas, Petroleum gases

UNIT 3

Refrigerants , Acetylene, Metals, Non metals

UNIT 4

Deflagration and detonation of gas, Dust explosion, Confined and unconfined vapor cloud explosion

BLOCK 4 Consequences Analysis**UNIT 1**

Logics of consequences analysis- Estimation- Hazard identification based on the properties of chemicals.

UNIT 2

Chemical inventory analysis- identification of hazardous processes- Estimation of source term.

UNIT 3

Gas or vapour release, liquid release, two phase release- Heat radiation effects, BLEVE, Pool fires and Jet fire- Gas/vapour dispersion- Explosion, UVCE and Flash fire,

UNIT 4

Explosion effects and confined explosion- Toxic effects- Plotting the damage distances on plot plant/layout.

DSM 106: SAFETY IN MECHANICAL INDUSTRIES

Total Credit : 4

BLOCK 1 : SAFETY IN MACHINERY , INSPECTION AND TESTING**Unit 1**

General safety rules, principles, maintenance and inspection of turning machines, boring machines, milling machine, planing machine and grinding machines, CNC machines.

UNIT 2

Wood working machinery, types, safety principles, electrical guards, work area, material handling, inspection, standards and codes- saws, types, hazards.

UNIT 3

Safety in inspection and testing, dynamic balancing, hydro testing, valves, boiler drums and headers, pressure vessels, air leak test, steam testing.

UNIT 4

Safety in radiography, personal monitoring devices, radiation hazard, engineering and administrative controls.

BLOCK 2 : PRINCIPLES OF MACHINE GUARDING

UNIT 1

Guarding during maintenance, Zero Mechanical State (ZMS), Definition, Policy for ZMS guarding of hazards - point of operation

UNIT 2

Protective devices, machine guarding, types, fixed guard, interlock guard, automatic guard, trip guard, electron eye, positional control guard, fixed guard fencing- guard construction- guard opening.

UNIT 3

Selection and suitability: lathe-drilling-boring-milling-grinding-shaping-sawing-shearing presses- forge hammer

UNIT 4

Flywheels-shafts-couplings-gears-sprockets wheels and chains-pulleys and belts- authorized entry to hazardous installations-benefits of good guarding systems.

BLOCK 3 : SAFETY IN WELDING AND GAS CUTTING

UNIT 1

Gas welding and oxygen cutting, resistance welding, arc welding and cutting, common hazards.

UNIT 2

Personal protective equipment, training, safety precautions in brazing, soldering and metalizing – explosive welding,

UNIT 3

Selection, care and maintenance of the associated equipment and instruments.

UNIT 4

Safety in generation, distribution and handling of industrial gases-colour coding, flashback arrestor, leak detection-pipe line safety-storage and handling of gas cylinders.

BLOCK 4 : SAFETY IN COLD FORMING AND HOT WORKING OF METALS

UNIT 1

Cold working, power presses, point of operation safe guarding, auxiliary mechanisms, feeding and cutting mechanism.

UNIT 2

Hand or foot-operated presses, power press electric controls, power press set up and die removal, inspection and maintenance-metal sheers-press brakes.

UNIT 3

Hot working safety in forging, hot rolling mill operation, safe guards in hot rolling mills – hot bending of pipes, hazards and control measures.

UNIT 4

Safety in gas furnace operation, cupola, crucibles, ovens, foundry health hazards, work environment, material handling in foundries, foundry production cleaning and finishing.

DSM107: SAFETY IN CHEMICAL INDUSTRIES**Total Credit : 4****BLOCK 1 : SAFETY IN PROCESS DESIGN AND PRESSURE SYSTEM DESIGN****UNIT 1**

Design process, conceptual design and detail design, assessment, inherently safer design chemical reactor, types, batch reactors, reaction hazard evaluation, assessment.

UNIT 2

Reactor safety, operating conditions, unit operations and equipments, utilities. Pressure system, pressure vessel design, standards and codes-

UNIT 3

Pipe works and valves- heat exchangers- process machinery- over pressure protection, pressure relief devices and design,

UNIT 4

Fire relief, vacuum and thermal relief, special situations, disposal- flare and vent systems failures in pressure system.

BLOCK 2 : PLANT COMMISSIONING, MAINTENANCE AND INSPECTION**UNIT 1**

Commissioning phases and organization, pre-commissioning documents, process commissioning, commissioning problems, post commissioning documentation

UNIT 2

Plant inspection, pressure vessel, pressure piping system, non destructive testing, pressure testing, leak testing and monitoring- plant monitoring, performance monitoring, condition, vibration, corrosion, acoustic emission-pipe line inspection.

UNIT 3

Management of maintenance, hazards- preparation for maintenance, isolation, purging, cleaning, confined spaces, permit system- maintenance equipment- hot works- tank cleaning, repair and demolition- online repairs-

UNIT 4

Maintenance of protective devices- modification of plant, problems- controls of modifications. Emergency planning, disaster planning, onsite emergency- offsite emergency, APELL

BLOCK 3 : STORAGES AND TRASPORTATION

UNIT 1

General consideration, petroleum product storages, storage tanks and vessel- storages layout segregation, separating distance, secondary containment- venting and relief, atmospheric vent, pressure, vacuum valves, flame arrestors, fire relief- fire prevention and protection-

UNIT 2

LPG storages, pressure storages, layout, instrumentation, vaporizer, refrigerated storages.

UNIT 3

LNG storages, hydrogen storages, toxic storages, chlorine storages, ammonia storages, other chemical storages- underground storages-

UNIT 4

Loading and unloading facilities- drum and cylinder storage- ware house, storage hazard assessment of LPG and LNG Hazards during transportation – pipeline transport

BLOCK 4 : PLANT OPERATIONS

UNIT 1

Operating discipline, operating procedure and inspection, format, emergency procedures hand over and permit system- start up and shut down operation,

UNIT 2

Refinery units- operation of fired heaters, driers, storage- operating activities and hazards- trip systems- exposure of personnel.

UNIT 3

Specific safety consideration for Cement, paper, rubber and pharmaceutical.

UNIT 4

Specific safety consideration for petroleum, petro- chemical, fertilizer and distilleries.

DSM 108: FIRE ENGINEERING AND EXPLOSION CONTROL

Total Credit : 4

BLOCK 1 Introduction of Fire Engineering

UNIT 1

Classification of fire; General Causes of fire; Detection of fire, Dynamics of fire behavior – Fire properties of solid, liquid and gas – Fire spread – Toxicity of products of combustion.

UNIT 2

Extinguishing methods; First aid fire fighting equipments Fire bucket; Fire beater; hose reel hose;

UNIT 3

Portable extinguisher; depends on weight ; depends on operating method; depends on content ; depends on position of nozzle

UNIT 4

Statutory Rules and Techniques of fire fighting - Indian Explosive acts and rules
Techniques of fire fighting and demonstration.

BLOCK 2 Fixed fire fighting installations

UNIT 1

Hydrant or fire water system, Classification of hydrant system, Sprinkling system, Major foam pourer system, Steam drenching system.

UNIT 2

Emulsification, Special fires and fire fighting, Air craft fire, Ships fire.

UNIT 3

Complete CO₂ flooding system, Complete DCP spraying system, Complete Halon flooding system.

UNIT 4

Investigation of fire, Point, Time and cause of ignition, Arson and detection of fires.

BLOCK 3 Fire Control Technology

UNIT 1

Types of hose, Characteristic, Types of hose fittings, Maintenance of hose fittings, Couplings, Component parts of inter locking couplings

UNIT 2

Rope, Lines, knots and ladders ; Types of ropes and size, Cordage ;Causes of deterioration of ropes and lines, Different type of knots; Different type of line, Purpose of knots ;Ladders

UNIT 3

Pumps, primers, tenders and water relays: Deferent types of pumps and primers, Water relay system, Different type of tenders.

UNIT 4

Fire alarm, Parts of fire alarm unit, Type of detectors, Automatic fire detection, Classification of detector,.

BLOCK 4 Fire and Explosion Protection**UNIT 1**

Industrial fire protection systems – Sprinkler – Hydrants- Stand pipe- Special fire suppression system like deluge and emulsifier.

UNIT 2

Building evaluation for fire safety – Fire load –Fire resistance materials and fire testing.

UNIT 3

Structural Fire protection – Exits and egress, Control and indicating equipment.

UNIT 4

Explosion protection systems – Explosion parameters – Explosion suppression system based on CO₂ and Halon – Hazards in L.P.G handling.