ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

MANGALORE UNIVERSITY

(Accredited by NAAC Grade)

ಕ್ರಮಾಂಕ/No. : MU/ACC/CR.7/2024-25/A2

ಕುಲಸಚಿವರಕಛೇರಿ
ಮಂಗಳಗಂಗೋತ್ರಿ – 574 199
Office of the Registrar
Mangalagangothri – 574 199
ದಿನಾಂಕ/Date:31.07.2025

NOTIFICATION

Sub: Revised Syllabus for One Year (Two Semesters) Diploma Programme in Fire and Industrial Safety Programme.

Ref: Academic Council approval vide agenda No.:ಎಸಿಸಿ:ಶೈ.ಮ.ಸಾ.ಸ.1:1 (2025-26) dtd 18.07.2025.

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The revised syllabus for One Year (Two Semesters) Diploma Programme in Fire and Industrial Safety Programme which has been approved by the Academic Council at its meeting held on 18.07.2025 is hereby notified for implementation with effect from the academic year 2025-26 and onwards.

Copy of the Syllabus shall be downloaded from the University Website (www.mangaloreuniversity.ac.in)

REGISTRAR

To,

1. The Registrar (Evaluation), Mangalore University.
2. The Chairman, UG BOS in Diploma in Fire and Industrial Safety, Dept .of Chemistry, Mangalore University.
3. The Principals of the college concerned.
4. The Asst. Registrar (ACC), O/o the Registrar, Mangalore University.
5. The Director, DUIMS, Mangalore University – with a request to publish in the website.
6. Guard File.

MANGALORE UNIVERSITY

MANGALAGANGOTHRI

Diploma Programme
(CreditBased SemesterScheme)

Syllabus for One Year (Two Semesters)
Diploma Programme in
Fire and Industrial Safety

(With effect from the Academic Year 2025-26)

MANGALORE UNIVERSITY

MANGALAGANGOTHRI – 574199

One Year (Two Semesters)

Diploma Programme in

Fire and Industrial Safety

(Credit Based Semester Scheme)

(With effective from the Academic Year 2025-26)

PREAMBLE

Revision of syllabus for the one year Diploma (Credit based Semester Scheme) Programme in Fire & Industrial Safety

The Diploma in Fire & Industrial Safety is a one year (two semesters) diploma programme offered by Mangalore University. It is a specialized program aimed at providing in-depth knowledge and practical skills to manage fire and industrial safety in various sectors. The programme is designed for individuals who want to pursue careers in ensuring the safety of employees and assets in industries such as manufacturing, construction, oil and gas, chemical plants, and more.It is a valuable program for individuals aiming to pursue careers in fire safety and industrial safety management. It provides a strong foundation in managing safety risks, implementing fire safety measures, and complying with regulations in industrial settings.

Board of Studies of Diploma in Fire and Industrial Safety felt that it is better to change curriculum from annual scheme to credit based semester scheme for Diploma in Fire & Industrial Safety from 2025-2026. Therefore, BOS has revised and prepared the credit based semester scheme syllabus for the Diploma programme in Fire and Industrial Safety by offering six theory courses (4 credits each), three in each semester, one

practical course (4 credits) in I semester and one internship/project work (4 credits) in II semester. Therefore, grand total of credits for the entire programme is 32.

A detailed skeleton of the entire programme is being tabulated for the benefit of the aspiring graduates. Other important aspects such as University question paper pattern, internal assessment examinations, allotment of marks and the approximate dates of the internal examinations are being provided with a discussion in the BOS.

Course Code	Course Title	Credits	Instruction Hours	Duration of Exam. (Hours)	Maximum Marks		
					I.A.	Exam.	Total
I Semester							
DFIS 101	Fire Safety and Protection Systems	4	4	3	30	70	100
DFIS 102	Foundation to Industrial Safety	4	4	3	30	70	100
DFIS 103	Construction Safety and Management	4	4	3	30	70	100
DFIS 104	Practicals on Industrial Safety and Fire Detection Systems	4	4	3	50	50	100
Total		**16**					**400**
II Semester							
DFIS 201	Health, Safety and Environment Management	4	4	3	30	70	100
DFIS 202	Industrial Safety Acts and Laws	4	4	3	30	70	100
DFIS 203	Aeronautical and Marine Safety	4	4	3	30	70	100
DFIS 204	Internship/Project Work	4	4		50	50	100
Total		**16**					**400**
Grand Total		**32**					**800**

OBJECTIVES OF THE SYLLABUS

The Diploma in Fire and Safety programme courses focus on providing candidates with training and knowledge in the prevention of fire and safety methods through topics such as Fire Protection Systems, Industrial, Aeronautical and Marine Safety aspects, Construction Safety, Health, Safety and Management aspects. The syllabus is covered

in two semesters in one year. The revised syllabus is designed to provide both theoretical and practical knowledge in the field of Fire and Industrial Safety with a special focus on skill enhancement. The syllabus takes into account the requirements of student competency level on par with national and international standards. The syllabus is structured to ensure that the students become aware of the practical applications of knowledge gained on Safety aspects to build careers as Safety Professionals in various industries.

BASIS FOR INTERNAL ASSESSMENT, PATTERN OF THEORY QUESTION PAPERSANDPRACTICAL EXAMINATION

1. Basis of Internal Assessment in Theory, Practical and Internship/Project Work

Internal assessment marks in theory courses shall be based on two tests conducted for 30 marks for each course. Question Papers for Internal Assessment in all the theory courses shall consist of Part A and B. Part A shall contain eight (8) very short answer objective type questions carrying 2 marks each, out of which five (5) questions are to be answered. Part B shall contain four(4) descriptive answer questions with internal choice (a or b) carrying 5 marks each. The tests shall be at least 1 hour duration each and to be conducted after 6 and 12 weeks from start of the semester. The average of the two tests shall be taken as the internal assessment marks.

The practical internal assessment marks shall be based on one test (25 marks) and continuous evaluation (25 marks) during the practical classes. The practical test shall be conducted after 10weeksafter the start of a semester. The total of the test and continuous evaluation shall be taken as the internal assessment marks in practical.

The internal assessment marks for Internship/Project Work (50 marks) shall be based on continuous evaluation (10 Marks), Presentation of the work carried out during internship/project work (20) and viva (20 marks).

2. Theory Question Paper Pattern

The Syllabus of each theory course shall be grouped into4 units of 14 teaching hours each. Question Papers in all the theory courses shall consist of Part A and B. Part A shall contain eight (8) very short answer objective type questions carrying 2 marks each drawn from all the four units of the syllabus (2 questions per unit), out of which five (5) questions are to be answered. Part B shall contain eight (8) brief and/or long answer questions carrying 12 marks each drawn from all the four units of the syllabus (2questions per unit). Five (5) out of eight (8) questions are to be answered choosing at least one question from each unit. There may be a maximum of three sub-divisions per question, carrying 3 or more marks per sub-division.

Diploma in Fire and Industrial Safety

Time: 3 Hours **Max. Marks: 70**

Answer any **Five** sub-divisions from **Question No.1** in **Part-A** and **Four** questions from **Part-B**. Figures to the right indicate marks.

Part-A

1. Answer any **Five** sub-divisions: **(5x2=10)**

a), b) } Unit-I c), d) } Unit-II e), f) } Unit-III g), h) } Unit-IV

Part-B

Answer any **Five** questions selecting minimum of **1 question** from each unit: **(5x12=60)**

Unit – I

2. a), b) } Or 2. a), b), c) } 3. a), b) } Or 3. a), b), c) }

Unit – II

4. a), b) } Or 4. a), b), c) } 5. a), b) } Or 5. a), b), c) }

Unit – III

6. a) b) Or 6. a) b) c) 7. a) b) Or 7. a) b) c)

Unit – IV

8. a) b) Or 8. a) b) c) 9. a) b) Or 9. a) b) c)

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3. Scheme of Valuation for Practical

Duration: 4 Hours **Max. Marks: 50**

a) Class Record: 10 Marks

The record certified by the teacher in charge and head of the department should be valued by the examiner/s.

i) Marks for experiments recorded: 7 Marks

Minimum ten exercises should be recorded. Marks are to be reduced proportionately for recording lower number of exercises as follows:

No. of exercises recorded	**Marks to be awarded**
10 and above	7
9	6
8	5
7	4
6	3
Less than 6	0

Repeated recording of the same experiments should not be considered.

ii) Marks for neatness: 3 Marks

b) Exercise set for procedure writing: 05 Marks

c) Viva to be conducted during practical: 05 Marks
Viva questions should be exclusively from the prescribed practical syllabus.

d) Experiment conducted by the student: 30 Marks

4. Scheme of Valuation for Internship/Project Report

Max. Marks: 50

Evaluation of the Internship/Project Report: 50 Marks

a) Work carried out: 30 Marks

b) Preparation of Report: 10 Marks

c) Presentation and Viva-Voce: 10 Marks

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FIRST SEMESTER

DFIS 101:FIRE SAFETY AND PROTECTION SYSTEMS

[Total number of Lecture Hours: 4 Hours/Week (4x14=56 Hours)]

Course Objectives: To create awareness among students about Fire safety and Fire prevention and also guide them to become safety officers with modern techniques of firefighting. This has the blending mixture of both Learning and Skills.

UNIT-I **[14 Hours]**

Fire, change of state and latent heat, thermal expansion of solids, liquids and gases. Transmission of heat, combustion, Fire tetrahedron, and combustible solid, liquids and gases. Classification of Fire and different fire extinguishing methods, portable fire extinguishers, types and operating procedure. Fundamental Principles of Hydraulics, Atmospheric pressure and suction lift, use of Nozzle discharges. Advantages and disadvantages of Centrifugal pumps. Types of pumps and primers. Operation of pumps and primers. Types of ladders and trolleys. Pitching and climbing hints, Precautions in use of ladders, Maintenance of ladders and trolleys. Design of turntable ladders, water tender and special equipment.

UNIT-II **[14 Hours]**

Hoses and Hose fittings: Capacity of hoses, ropes, lines and knots. Hose reel and hose fittings. Types and construction and maintenance of hoses. Hose drying cabinets. Repairing of hoses. Hose fittings, Branches and nozzles. Collecting head, Suction hose fittings and standpipe. Branches, Adaptors. Miscellaneous hose fitting, Hose clamp. Strainers and maintenance of hose fitting.

Foam and foam making equipment's: Synthetic based foam concentrates, Foam concentration and induction and injection equipment's. Foam Installations - Pump operated mechanical foam installation, Self-Contained Pressurized Type, Pre-Mixed Foam Installation, Proportional-tank mechanical foam installation Fire protective clothing - technical description and specifications of protective clothing. Breathing apparatus - types of breathing apparatus, care and maintenance of breathing apparatus. Lifeline signals.

UNIT-III **[14 Hours]**

Hydrant System: Definition, operation of hydrant. Requirements regarding submission of plans, classifications of occupancies, hose reel system - light hazard, ordinary hazard, high hazard (A) and high hazard (B). water supply, electrically driven pumps, fuel system, engine starting mechanism, battery charging, standard kit of tools, engine exercising, spare parts hydrants mains, fixed monitors, hose pipes and nozzles, maintenance of pumps, hydrants hose pipes and nozzles. Firefighting personnel. Rising Mains - Meaning, types of risers- Wet Riser, Down Comer, Dry Riser.

Sprinkler System: Definitions, Regarding Submission of Plans, Installation Layout Drawings, Classification of Occupancies - Light hazard class, Ordinary hazard class, High hazard class, Storage occupancies–I, II, III,IV. Water Supply, design density and the assumed maximum area of operation for sprinklers, electrically driven pumps, compression engine driven pumps, engine fuel system, starting mechanism, battery charging, standard kit of tools, spare parts, engine exercising, sprinkler mains, piping, supports (pipes and fittings above installation valve), distribution pipes, sprinkler spacing, arrangement and location - general requirements, elevated tanks, components of sprinkler system, installation and alarm valves, installation of control valves, sprinkler heads patterns - conventional pattern; spray pattern, ceiling or flush pattern, concealed pattern, side wall pattern. temperature rating and color coding, selection of temperature rating, protection to the sprinklers, spare sprinklers to be kept in stock, drainage arrangement , maintenance of sprinkler installation , periodical testing and maintenance, periodical testing and maintenance chart, standard sprinkler system-Wet pipe, Dry pipe, Alternate wet and dry pipe, Tail-end dry pipe, Tail-end alternate, Pre-action, Deluge Systems. Sprinklers Head types-Fusible solder and Quartzoid bulb, Operation of sprinklers, Firefighting in a sprinklered building, Re-setting of sprinkler systems.

UNIT-III **[14 Hours]**

Fire Detectors: Smoke detectors-Ionization detectors, Optical detector-Light scatter type, obscuration type. Sampling detector, linear beam detector. Radiation (Flame) detector-Infra red detector-Fixed types, scanning type. Ultraviolet detector. Heat

detector-Fixed temperature detectors and 'rate-of-rise' detectors, advantages and disadvantages of detectors.

Detectors positioning-General, Smoke and heat, summary of detector positioning and requirements, High value risk-Electronic Data Processing (EDP) rooms, Manually operated fire alarms–Manual Systems, Manual/electric systems, Miscellaneous, Restricted alarms, Detectors–According to their risk coverage, Other general points about detector positioning, Manual Call Point (MCP), Control and indicating equipment and sector or zone panels, Hooters, Cables & their installation and circuit. Inspection, Testing and Maintenance-General, Initial Installation–Inspection Test, Servicing or Periodical Maintenance, Maintenance Schedule, Daily attention by the user, Weekly attention by the user, Quarter inspection and test by the user, Annual Inspection Tests, General point about detectors-Cleaning and maintenance, Tests following alarm or fire, Block diagram of fire alarm systems.

References

1. Fire Protection and Prevention, 1st Edition; Birendra Mohan San, UBS Publishers & Distributors Pvt. Ltd. (2008).
2. Handbook of Fire Technology, 2ndEdition; R.S. Gupta, Orient Longman Publishers (2005).
3. Handbook of Fire and Explosion Protection Engineering, 1stEdition; Dennis P. Nolan, Crest Publishing House (2007).
4. Indian Standard, code of practice for installation and maintenance of internal fire hydrants and hose reels on premises, IS 3844, 1989.
5. Tariff advisory committee Manual-TAC guidelines for Fire protection system, The Oriental Insurance Co. Ltd., Mumbai, 1993.

DFIS 102: FOUNDATION TO INDUSTRIAL SAFETY

[Total number of Lecture Hours: 4 Hours/Week (4x14=56 Hours)]

Course Objectives: Educate students about how to reduce work place hazards and to encourage the standard of Safety, Health & Environment programme, so as to aim 0% accidents and 100% safety in different industries in which Industrial Safety plays an important role. This has the blending of both Learning and Skills.

UNIT-I **[14 Hours]**

Importance of Safety, health and environment. Health safety and environmental policy, fundamentals of safety, classification of accidents, Managements responsibility, objectives of safety management, National safety council, Employees state insurance act 1948, approaches to prevent accidents, principles of safety management, safety organization, safety auditing, maintenance of safety, measurements of safety performance, industrial noise and noise control, Industrial Psychology, Industrial accidents and prevention. Basics of ISO 45001: 2018 - Occupational Health and Safety Management Systems (OH & SMS) – Requirements with guidance for use and OSHA.

UNIT-II **[14 Hours]**

Process safety management (P.S.M) as per OSHA, legal aspects of safety, safety with respect to plant and machinery, Personal protective equipment-classification, protection of respiratory system, work permit system, hazards in refineries and process plants, safety in process plants, pollution in some typical process industry. Safe working practices, housekeeping, safe working environment, safety device and tools, Electrical safety, safety in use of electricity, electric shock phenomena, Occurrence of electric shock, analysis of electric shock and its effect, safety procedures in electric plants, installation of Earthing system, case studies.

UNIT-III **[14 Hours]**

Safety in hazardous area, hazards in industrial zones, classification of industrial enclosures for gases and vapors. Mechanical, Chemical, Environmental and Radiation hazards, Machine guards and safety devices. Safety instructions during crane operation, slings, load limits, lifting tackles and lifting equipment, hydrostatic test.

UNIT-IV **[14 Hours]**

Chemical hazards, industrial toxicology, toxic chemicals and its harmful effects on humans, factors influencing the effect of toxic materials, Units of concentration, control measure, environmental hazards, devices for measuring radiation, safety analysis and risk analysis, risk management, first aid, Safety measures to avoid occupational diseases.

References

1. Industrial safety management, 1st Edition; L.M. Deshmukh, Tata McGraw Hill, New Delhi (2006)
2. Industrial safety health and environment Management system**,** 2nd Edition; R.K. Jain and Sunil S. Rao, Khanna Publishers (2008).
3. ISO–45001: 2018-Occupational Health and Safety Management Systems (OH & SMS) – Requirements with guidance for use, ISO website.
4. Industrials safety, R. S. Khurmi and J. K. Gupta, S. Chand Co. Ltd. (1991).
5. Industrial safety health and environment Management system, R. K. Jain and Sunil S. Rao, Khanna Publishers (2008).
6. Electrical Safety, Fire Safety Engineering and Safety Management, Rao S. and Salua H. L. (2006).

DFIS 103: CONSTRUCTION SAFETYMANAGEMENT

[Total number of Lecture Hours: 4 Hours/Week (4x14=56 Hours)]

Course Objectives: Construction industry in India is very large in size and the second largest sector in terms of employment. Construction is a peculiar industry and is relatively hazardous. The safety of construction workers and their protection against injuries is the most important social concern. This subject deals with how construction projects can be made reasonably safe by proper advance planning and excavation techniques. This has the blending of both Learning and Skills.

UNIT-I **[14 Hours]**

Safety during project construction. Training to project staff and operation staff, stages of project construction, safety during receiving, unloading, shifting and storage, safety guidelines for storage, general safety facilities at construction sites, interface between civil and erection works, construction safety - definition, soil classification system, general precautions, hazardous atmosphere and materials, emergency rescue equipment, exhaust gases.

UNIT-II **[14 Hours]**

Hydraulic shoring for trenches, timber shoring for trenches. Safety in cutting and brazing, gas welding, oxy acetylene equipment and use, gases-storage of cylinders, handling of cylinders, inspecting equipment, Protective measures for electric arc welding, welding and cutting in tank vessels and drums, confined spaces, personal protection, health hazards. Safety in Concrete, Concrete forms and shoring, reinforcing steel, concrete placement, general requirements for vertical and tubular welded frame shoring, tube and coupler shoring, vertical slip forms, electrical safety in constructions, work on live equipment, overhead and underground cables, safety in use of power tools, hand tools, pneumatic tools, electrically operated tools, cartridge operated tools and their related precautions.

UNIT-III **[14 Hours]**

Form works-Types, assembling and dismantling and their safety. Scaffolding, Types of scaffold, design and inspection of scaffold, terminology of scaffold, scaffold construction materials, scaffold erection procedure, safety precaution while erecting scaffold,

dismantling of scaffold, material handling, investigation of scaffold accident, causes of hazards in scaffold, safety in scaffold, provision of scaffold for the building and other construction. Study of safety standards and ILO (International Labor Organization) recommendation. Case studies (Accidents in different construction sites).

UNIT-IV **[14 Hours]**

Toolbox Meetings: Definition, Objective, Features, Benefits, List and few Samples.

Confined Space Safety: Introduction, Definition, some example, generals Atmospheric Hazards levels, Air testing methods before entry, Measures to prevent entry, Equipment Requirements for entry. Contents of the Entry Permit, Duties of Authorized Entrants, Duties of Attendants, Duties of Entry Supervisor, Summon emergency services, Rescue and Emergency Services during confined space.

References

1. Safety Management in The Construction Industry, 2nd edition; A Guide Published by National Institute of Construction (2005).
2. Construction Technology, 1st Edition; Grundy J., Viva Books Pvt. Ltd. (2006).
3. Electrical Safety, Fire Safety Engineering and Safety Management, 1st Edition; Sunil S. Rao, R. K. Jain and H. L. Saluja, Khanna Publishers (1998).
4. Construction Technology, Grundy J., Viva Books Pvt. Ltd. (2006).

DFIS 104: PRACTICALS ON INDUSTRIAL SAFETY AND FIRE DETECTION SYSTEMS

[Total number of Practical Hours: 4 Hours/Week (4x14=56 Hours)]

Demonstration and Hands on training are compulsory.

Experiments to be conducted to enlighten the following areas:

- Conducting wet and dry drills using various Nozzles (8 hours).
- Identification Rehearsals of Portable extinguishers, Filling of DCP powder in Portable Extinguisher and wearing Protective clothing, Mock drills, Positioning of ladder and Demonstration of Ropes and lines (4 hours).
- Mockup drills positioning of ladder and demonstration of ropes and lines (8 hours)
- Site visit. Demonstration and training the students regarding use breathing apparatus, Emergency evacuation drill, Train students regarding the use of emergency rescue equipment inside confined space (4 hours).
- Train the students to measure the level of oxygen and other Gases in industries, Training of students regarding the use of window meter to measure speed level of wind, Train students regarding the use of noise level meter and find out different levels of noise at the worksites (8 hours).
- Train the students regarding the use of personal protective equipment, First Aid training and demonstration (8 hours).
- Visit to construction site, Erecting and dismantling scaffolding for single storied, Multi storied buildings, Demonstration of Safety harness and ladders (8 hours).
- Demonstration and use of power tools and hand tools safely, Conducting Toolbox meeting, Mock drill (Falling from height), Awareness about site evacuation plan, Emergency Response Accident Reporting, Emergency Contact numbers, Committees. Safe way of material handling (8 hours).

List of Experiments to be conducted (Ten or more experiments shall be conducted)

1. Training students to rescue employees using emergency rescue equipment in confined space.

2. Demonstration and training of the usage of breathing apparatus.

3. First aid training and demonstration in different situations.

4. Mock drill on handling toxic gas leak.

5. Conduction of tool box meeting.

6. Toxic material handling safety measures.

7. Demonstration of the usage of gas detectors to check the level of oxygen and other gases in the industries.

8. Training the students on the use of noise level meters & window meters and teach them how to be safe.

9. Hydrant fire drills, study, operation and maintenance.

10. Conduction of wet and dry drills using various nozzles.

11. Emergency evacuation mock up drills

12. Practical explanation by showing circuit and fire alarm.

13. Mockup drills, positioning of ladder and demonstration of ropes and lines.

14. Visit to nearby industries like BASF, MRPL etc. to visualize the installation of fire extinguishing appliances.

15. Demonstration of Vortex and other latest portable fire extinguishing systems.

16. Demonstration of use of power tools and hand safety tools.

17. Awareness about site evacuation plan.

18. Demonstration of safety harness and ladders.

19. Training on Industrial and Chemical disasters.

20. Training on Industrial noise and Vibration control.

21. Demonstration of Electrical safety in Industries.

References

1. Industrials safety, R.S. Khurmiand J.K. Gupta,S.Chandand Co. Ltd. (2019).

2. Industrials Safety, Health and Environment management systems, R.K.Jainand Sunil S. Rao, Khanna Publishers (2018).
3. The Factory Act 1948 and The Karnataka factories rules 1969, 1st Edition, Leela Krishnan, Sun Publishing House, Bangalore.
4. Environment and Public Health, Nandini, Sapna Book House, 1st Edition,2018.
5. Disaster Management Guidelines, GOI-UNDP Disaster Risk Reduction Programme 2009-2012.
6. Psychosocial care in Disaster management, A training of trainers manual (ToT), Satpathy H., NIDM Publication (2008).
7. Vulnerability in Disaster Discourse, JTCDM-Tata Institute of Social Sciences Working Paper No. 8, Andhria J. (2008).
8. Indian Red Cross Society Publication, Narayanan (2019).
9. Relevant case studies.

II SEMESTER

DFIS 201: HEALTH, SAFETY AND ENVIRONMENT MANAGEMENT

[Total number of Lecture Hours: 4 Hours/Week (4x14=56 Hours)]

Course Objectives: Educate students about how to reduce workplace hazards and to encourage the standards of safety, health & environment program, so as to aim 0% accidents and 100% safety in different industries in which Safety Management plays an important role. This has the blending of both Learning and Skills.

UNIT-I **[14 Hours]**

Key elements of a safety and Health Management System-Policy & commitment, Planning, Implementation and Operation, Measuring Performance, Auditing and Reviewing performance.

Initial Safety and health Management System Review, Safety and health Management System model, safety and Health policy-Developing a workplace Safety and Health Policy, Planning–Safety and Health objectives and Targets, performance standards, Implementation and Operation–structure and responsibilities-management responsibilities, individual responsibilities, Safety Consultation.

UNIT-II **[14 Hours]**

Participation and Representation, Training, Awareness and competence, Communication-Information coming into the organization, Information Flow within the Organization, Information Flow from the Organization, Document Control-Safety and Health Management System records-Operational Control–Workplace Precautions, Safety and Health training and Competence-Training for Safety and Health, Identification of Training Needs–Organizational Needs, job-related Needs, Individual Needs: Identification of Training Objectives and Methods, Training Delivery, Evaluation and feedback, specialist advices and Services–Access to Specialist advices and services, relationships within the Organization, relationships outside the organization, external specialist safety and safety support.

UNIT-III **[14 Hours]**

Risk assessment and control-the legal Basis for risk Assessment, key stages of Risk assessment and control-Trained Risk assessors, Preparation and Inventory,

Identification of hazards, risk assessment, Appropriate Action, Risk assessment records and control. A simple Risk estimation example–Hazards, Remedial measures, Motivation of employees, Insurance coverage of Industrial plant and personnel.

UNIT-IV **[14 Hours]**

Stages in plant life and unsafe condition in factories, maintenance & safety, basic safety programming, safety department, Rules and regulation of safety department, Responsibility of management for safety in plant, safeguarding the public, Responsibility of government, social organization and public authorities. Basics of ISO–14001: 2015 - Environmental management systems (EMS) - Requirements with guidance for use.

References

1. Health and safety in construction, Stephen Williams, Crown (1996).
2. Handbook on Construction Safety Practices, Bureau of Indian Standards, 2001.
3. J. J. Keller's Official OSHA Construction Safety Handbook, J. J. Keller and Associates (2005).
4. Risk assessment-A Practical Guide, Institution of Occupational Safety and Health, United Kingdom,1993.
5. ISO–14001:2015 - Environmental management systems (EMS)-Requirements with guidance for use: ISO website.
6. Environment and Public Health, Nandini, Sapna Book House (2018).
7. Psychosocial care in Disaster management-A training of trainers manual (ToT), Satapathy S., NIDM Publication (2009).
8. Vulnerability in Disaster Discourse, JTCDM-Tata Institute of Social Sciences Working Paper No. 8, Andharia J. (2008).
9. Disaster Management Guidelines, GOI-UNDP Disaster Risk Reduction Programme, (2012).

DFIS 202: INDUSTRIAL SAFETY ACTS AND LAWS

[Total number of Lecture Hours: 4 Hours/Week (4x14=56 Hours)]

Course Objectives: Enable the students to understand the legal frameworks, principles, and best practices in industrial safety.

UNIT-I [14 Hours]

Introduction to Industrial Safety Laws-Importance of Industrial Safety and Legal Frameworks, Introduction to workplace safety and health, Historical evolution of safety laws in industrial sectors, Objectives and importance of safety laws, Overview of Key Industrial Safety Acts, Understanding Legal Definitions: accident, hazard, risk, employer's liability, employee's rights, safety audit. **Key Provisions of Factories Act, 1948 -**Overview, objectives, and historical background, Major provisions: workplace health, safety, and welfare requirements, Regulations on machinery, working hours, overtime, and worker rights, Duties and responsibilities of employers and employees. **Key Provisions of Mines Act, 1952-**Scope, objectives, and purpose for mining safety, Key provisions for mine health and safety standards: ventilation, equipment handling, worker accommodations, Responsibilities of mine owners and managers. Indian Standard Code of Practice for Fire and Safety of Buildings IS:1644 of 1988.

UNIT-II [14 Hours]

The Occupational Safety, Health and Working Conditions Code, 2020 (OSHWC Code): Introduction to the Code and its significance, General health and safety provisions applicable across industries, Welfare provisions, risk assessments, and worker accommodations, Employer and employee responsibilities for a safe working environment, Obligation to provide a safe working environment, Reporting of hazards and training requirements, Compliance and Enforcement, Role of safety officers, inspectors, and penalties for violations.

Environmental Protection Act, 1986: Objectives and importance of environmental protection in industrial safety, Key provisions: hazardous substance handling, waste disposal, and emission control, Legal consequences for non-compliance and environmental accidents.

Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996: Importance for construction site safety. Safety equipment standards, worker welfare and emergency provisions, Compliance requirements for construction managers and contractors.

UNIT-III **[14 Hours]**

The Explosives Act, 1884: Scope and purpose of the Act for handling explosives safely, Licensing, storage and transportation requirements. Legal compliance for industries handling explosive materials, Petroleum Act, 1934 and Petroleum Rules, Importance of safety in industries handling petroleum, Key provisions for the storage, handling and transportation of petroleum. Role of the Petroleum and Explosives Safety Organization (PESO), Fire Safety Regulations in India, Karnataka Fire Force Act -1964.

The National Building Code (NBC) 2016: Part 4 Fire & Life Safety-Introduction, guidelines for fire safety, Fire prevention, firefighting equipment and evacuation plans, Importance of mock drills, fire audits and compliance with fire safety norms.

UNIT-IV **[14 Hours]**

The Employee's Compensation Act, 1923: Purpose and Scope, Objective of the Employee's Compensation Act, Employees covered under the Act, Types of Compensable Injuries, and injury categories eligible for compensation. Permanent vs. temporary disability, death, and medical expenses, Employer's Liability and Compensation Calculations based on injury and wages, Procedures for filing claims and receiving compensation, Legal Procedures and Case studies illustrating compensation claims and legal outcomes.

The Dangerous Machines (Regulation) Act, 1983: Scope and Purpose of the Act, Definition and regulation of "dangerous machines". Industries covered under this Act, Safety Standards and Provisions, Installation and operation standards for machinery, Maintenance requirements and emergency shut-off mechanisms, Employer and Manufacturer Obligations, Safety protocols for machine handling and employee training, Inspection and Compliance, Role of inspectors and legal ramifications of non-compliance.

References

1. The Factories Act, 1948: Ministry of Labor& Employment- https://labour.gov.in › sites.
2. The Mines Act 1952: Ministry of Labor& Employment- https://labour.gov.in › sites.
3. The Occupational Safety, Health and Working Conditions Code, 2020 (OSHWC Code) - https://labour.gov.in › sites.

4. The Environment (Protection) Act: Central Pollution Control Board (CPCB)-https://cpcb.nic.in › env-protection-act.
5. The Buildings and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 - Chief Labor Commissioner: https://clc.gov.in › clock › acts-rules › building-and-other-c
6. Petroleum and Explosives Safety Organization (PESO)-https://peso.gov.in › web › explosives-act-1884.
7. National Building Code of India 2016 (NBC 2016)-Bureau of Indian Standards: https://www.bis.gov.in › ... › Technical Department.
8. The Employee's Compensation Act, 1923-Ministry of Labor& Employment: https://labour.gov.in › sites › default › files › etchant
9. Dangerous Machines (Regulation) Act, 1983-International Labor Organization: https://natlex.ilo.org › din › natlex2 › natal › details.
10. The Factory Act, 1948 and The Karnataka factories rules 1969, Leela Krishnan, Sun Publishing House, Bangalore (2019).

DFIS 203: AERONAUTICAL AND MARINE SAFETY

[Total number of Lecture Hours: 4 Hours/Week (4x14=56 Hours)]

Course Objectives: Educate students about how to reduce workplace hazards and to encourage the standard of safety in Aeronautical and Marine Sector with a focus on regulations, aerodynamics, human factors, navigation, environmental safety and incident investigation.

UNIT-I [14 Hours]

Introduction to Aeronautical and Marine Safety, Overview of Aeronautical and Marine Safety, Importance of safety in aviation and maritime industries**,** Key differences in safety protocols between aeronautical and marine environments**,** Understanding the roles of safety officers in aviation and marine sectors**,** History and Evolution of Safety Standards, Milestones in aviation and marine safety history**,** Theory of Flight Archimedes, Evolution of safety protocols due to significant incidents and accidents**,** Influence of regulatory bodies in shaping the current safety practices**.**

Safety Regulations and Standards, Regulatory Bodies and Safety Frameworks- International Civil Aviation Organization (ICAO), Federal Aviation Administration (FAA), and International Maritime Organization (IMO), Overview of important regulations: SOLAS (Safety of Life at Sea), MARPOL, ISPS, ICAO Standards, Legal Requirements and Compliance.

Safety regulations for operators, crew, and maintenance personnel, Importance of compliance and consequences of non-compliance in aeronautical and marine industries, the role of audits, inspections, and safety certifications.

UNIT-II [14 Hours]

Fire Safety and Emergency Response in Aeronautical and Marine Environments: Fire Hazards in Aviation and Marine Settings, technical aspects about Aeroplane and Ship, Types of fire risks specific to aircraft and ships (fuel, electrical systems, cargo, etc.), Fire classifications and sources in aviation and marine settings, Fire Prevention and Firefighting Techniques, Equipment and systems for fire prevention: smoke detectors, sprinklers, extinguishers, Specific firefighting techniques for confined spaces on ships and in aircraft, Use of personal protective equipment (PPE) and safety protocols for firefighting crew and safety officers, Emergency Evacuation Procedures, Evacuation strategies and challenges in aviation and marine settings, Role of crew

members in facilitating safe evacuation, Safe egress techniques and lifesaving appliances.

Safety Equipment and Lifesaving Appliances, Safety Equipment in Aviation-Types and maintenance of emergency equipment: life vests, oxygen masks, escape slides**,** Inspection and maintenance protocols. Marine Safety Equipment: Life-saving appliances, life rafts, lifeboats, immersion suits, EPIRBs (Emergency Position Indicating Radio Beacons), Firefighting and containment equipment on vessels, Regular inspection and drills for life-saving equipment, Equipment Standards and Certification, International standards for safety equipment certification and maintenance, Training crew in the use of emergency and lifesaving equipment.

UNIT-III **[14 Hours]**

Human Factors and Emergency Preparedness, Understanding Human Factors in Safety, Role of human behavior in aeronautical and marine safety, Importance of crew training, fatigue management, and situational awareness.

Human error as a factor in accidents and ways to mitigate it, Emergency Preparedness and Response Planning, Creating and implementing emergency response plans, Regular drills and simulations for aviation and marine crew members, Coordination with on-ground and coast-based emergency services, Psychological Preparedness and Crisis Management, Preparing mentally for high-stress situations, Managing passenger panic during emergencies, Leadership in crisis situations: delegation, communication and decision-making.

UNIT-IV **[14 Hours]**

Case Studies and Lessons Learned from Incidents. In-depth analysis of selected aviation incidents (e.g., Tenerife, Air India Express, Malaysia Airlines incidents), Causes, safety failures and how they shaped modern safety practices, Preventive measures and improvements after incidents. Examination of Maritime Accidents, Study of significant maritime accidents (e.g., Titanic, Costa Concordia and Deep-water Horizon), Identification of root causes and contributory factors, Safety enhancements and protocol updates post-accidents, Lessons Learned and Best Practices.

References

1. Advances in marine navigation and safety of sea Transportation, 13th Edition; Adam Weintrit and Tomasz Neumann, Taylor& Francis (2023).
2. Safety of Marine Transport, 1st Edition; Adam Weiner & Thomas Neumann, Taylor & Francis (2019).
3. Aviation safe tyandsecurity, 1st Edition; Stephen J. Wright, CRC Press (2021).
4. SOLAS: Consolidated Text of the International Convention for the Safety of Life at Sea, 1974, and Its Protocol of 1988 Articles, Annexes from 1 July 2009, IMO,(2006).

DFIS-204: INTERNSHIP/PROJECT WORK

[Total number of Internship/Project Work Hours: 4 Hours/Week (4x14=56 Hours)]

Internship/Project Work (Field Work, Case Studies) has to be compulsorily carried out in an industry/organization in the second semester of the programme with a workload of 4 hours per week under the supervision of a teacher. Report on the internship/Project Work has to be submitted for evaluation. It is meant for students to understand hazards/vulnerabilities and to work on health, safety and environmental risks and to build a culture of safety. Projects are conceived creatively based on the geographic location and hazard profile of given region.

This is full credit course being evaluated for 100 marks. The student should select a topic in consultation with the Faculty Guide. The student shall submit Internship/Project Report at the end of second semester for evaluation.

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