

SCHEME OF EXAMINATION
AND
COURSE OF STUDY

P.G. Diploma on Industrial Health, Safety & Environment



DEPARTMENT OF ZOOLOGY & ENVIRONMENTAL SCIENCES
GURUKULA KANGRI (Deemed to be University), HARIDWAR – 249404

September 2022

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Diploma in Industrial Health, Safety & Environment
Dept. of Zoology and Environmental Science
GURUKULA KANGRI (Deemed to be University), HARIDWAR
(A Deemed to be University U/S 3 of UGC Act, 1956)

Course Code	Course Title	Credits	Examination system		Total Marks
			T	ESE	
Semester – I					
DHS – 101	Occupational Health and Hazards	4	70	30	100
DHS – 102	Industrial Safety at Workplace	4	70	30	100
DHS – 103	Accident Prevention Techniques	4	70	30	100
DHS – 104	Safety Management System and Law	4	70	30	100
DHS – 151	Filed Report	4	-	-	100
Semester - II					
DHS – 201	Online Course	4	-	-	100
DHS – 251	Dissertation	16	-	-	400

Unit - I Safety and Health Management

- i. Occupational Health Hazards, Promoting Safety, Safety and Health training, Stress and Safety.
- ii. Ergonomics - Introduction, Definition, Objectives, Advantages. Ergonomics Hazards - Musculoskeletal Disorders and Cumulative Trauma Disorders.
- iii. Importance of Industrial safety, role of safety department, Safety committee and Function

Unit - II Radiation and Industrial Hazards

- i. Types and effects of radiation on human body, Measurement and detection of radiation intensity. Effects of radiation on human body, Measurement – disposal of radioactive waste, Control of radiation
- ii. Industrial noise -Sources, and its control, Effects of noise on the auditory system and health, Measurement of noise ,
- iii. Different air pollutants in industries, Effect of different gases and particulate matter, acid fumes, smoke, fog on human health
- iv. Vibration - effects, measurement and control measures
- v. Industrial Hygiene.

Unit -III Electrical Hazards and Hazards in Construction Industry

- i. Safe limits of amperages, voltages, distance from lines, *etc.*, Joints and connections, Overload and Short circuit protection, Earthing standards and earth fault protection, Protection against voltage fluctuations, Effects of shock on human body Hazards from Electrical equipment, Criteria in their selection, installation, maintenance and use, Control of hazards due to static electricity
- ii. Introduction of Construction industry, Scaffolding and Working plat form, Welding and Cutting, Excavation Work, Concreting and Cementing work, Transportation of men and material, Handling and Storage of compressed gas.

Unit - IV Fire and other Hazards

- i. General causes and classification of fire, Detection of fire, extinguishing methods, fire fighting installations with and without water.
- ii. Machine guards and its types, automation. High pressure hazards, safety, emptying, inspecting, repairing, hydraulic and non-destructive testing, hazards and control in mines.

Reference Books:

1. R.K. Jain and Sunil S. Rao, Industrial Safety , Health and Environment Management Systems, Khanna publishers , New Delhi (2006)
2. Slote. L., Handbook of Occupational Safety and Health, John Willey and Sons, New York

Unit I - Safe use of machines and tools

- i. Safety in the use of : 1) Grinding 2) CNC's 3) Shearing 4) Bending 5) Milling 6) Boring 7) Shaping Safe use of hand tools: Safe use of various types of hand tools used for metal cutting, torsion tools, shock tools, non sparking tools, portable power tools
- ii. Working in different areas: Working in confined spaces, Working Underground, Working at heights - use of stairways, clamps, working platforms, ladders of different types, Boatswain's chair and safety harness working on roofs, Lifting machinery lifts and hoists,
- iv. Operation, inspection and maintenance of industrial trucks, loose gears conveyors, Safe working load for mechanical material handling equipments.

Unit II - Plant design and Housekeeping

- i. Plant layout, design and safe distance, Ventilation and heat stress, Significance of ventilation, Natural ventilation, Mechanical ventilation Air conditioning
- ii. National Building code part VIII and Building service, Thermal comfort, Indices of heat stress, Physiology of heat regulation,
- iii. Safety and good housekeeping, Disposal of scrap and other trade wastes, Spillage prevention ,Use of colour as an aid of housekeeping, Cleaning methods, Inspection and Checklists, Advantages of good housekeeping

Unit III - Industrial Lighting

Purpose of lighting, Uses of good illumination, Recommended optimum standards of illumination, Design of lighting installation, Standards for lighting and colour.

Unit IV - Vibration and Noise

Activities related to vibrations, its impact on human health, abatement Sources, effects of noise on man, Measurement and evaluation of noise, Silencers, Practical aspects of control of noise

Reference Books :

1. Frank P Lees - Loss of prevention in Process Industries , Vol. 1 and 2, Butterworth-Heinemann Ltd., London (1991).
2. Industrial Safety -National Safety Council Of India.

Unit - I Principles of accidents prevention

- i. Definition: Incident, accident, injury, dangerous occurrences, unsafe acts, unsafe conditions, hazards, error, oversight, mistakes, etc.
- ii. Accident Prevention : Theories / Models of accident occurrences, Principles of accident prevention, Accident and Financial implications, Hazard identification and analysis, fault tree analysis, Event tree analysis, failure modes and effects analysis, Hazop studies, Job safety analysis - examples ,Plant safety inspection - objectives and types check procedure inspection report.

Unit - II Theories and principles of accident causation

- i. The effect of accident, unsafe act, unsafe condition, unpredictable performance, Human factors contributing to accidents - causes for unsafe acts,
- ii. Safety and psychology -Theories of motivation and their application to safety. Consequences of accident, accident prevention programmers, Role of safety,

Unit - III First aid

- i. Body structure and Functions, Position of causality, the unconscious casualty, fracture and dislocation, Injuries in muscles and joints, Bleeding, Burns, Scalds and accidents caused by electricity, Respiratory problems, Rescue and Transport of Casualty. Cardiac massage, poisoning, wounds.
- ii. Personal Protective Equipments: Need, selection, supply, use, care and maintenance, Personal protective devices for head, ear, face, eye, foot, knee and body protection, Respiratory personal protective devices.

Unit IV - Plant layout for safety

- i. Design and location, distance between hazardous units, colour coding, Lighting, ventilation, Flow charts, pilot plant applications and machine guarding and it's types, Housekeeping.
- ii. Accidents related with maintenance of machines, maintenance of machines-advantages.
- iii. Work permit systems - Significance of documentation.

Reference Books:

1. Frank P Lees – Loss of prevention in Process Industries, Vol. 1 and 2, Butterworth-Heinemann Ltd., London (1991).
2. R. K. Jain and Sunil S. Rao, Industrial Safety , Health and Environment Management Systems, Khanna publishers , New Delhi (2006)

Unit - I Legislative measures in industrial safety

- i. Factories Act, 1948, Workman's Compensation Act, 1948, Employees State Insurance Act, 1948.
- ii. Mines Act, Air (Prevention and Control) Pollution Act, 1981,
- iii. Water (Prevention and Control) Pollution Act, 1974, Boiler Vessels Act. Child Labour and Women Employee Act.
- iv. The factories rules, History, Provisions under the factories Act and rules made there under with amendments, Functions of safety management.

Unit – II Occupational Safety, Health and Environment Management

- i. Bureau of Indian standards on safety and health 14489 - 1998 and 15001 - 2000
- ii. OSHA, Process Safety Management (PSM) as per OSHA, PSM principles,
- iii. OHSAS – 18001, EPA Standards,
- iv. Performance measurements to determine effectiveness of PSM

Unit – III Safety Management

- i. Organising for safety, Health and Environment.
- ii. Organisation : Structure, Function and responsibilities
- iii. Safety Committee : Structure and function
- iv. The competent person in relation to safety legislation - duties and responsibilities. Competence Building Technique (CBT)
- v. Concept for training, application of computer, multimedia, communication. Relevance of WTO regarding safety, Health and environment.
- vi. Employee participation in safety - Role of Trade union in safety, health and environment. Safety promotion and safety awards, safety, competitions, audio visual publication.

Unit IV Directing safety

- i. Definition, process, principles and techniques. Leadership - role, function and attribution of a leader.
- ii. Essential rules in communication with employees with conducting training, team building and group dynamics.

Reference Books

1. The Factories Act with amendments 1987, Govt. of India Publications DGFASLI, Mumbai
2. Grimaldi and Simonds, Safety Management, AITBS Publishers, New Delhi (2001)
3. Industrial Safety – National Safety Council of India

Course Code

DHS – 151

Filed Report

Credit

4

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M.M.

100

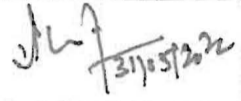
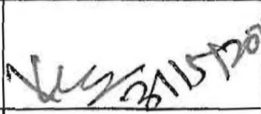


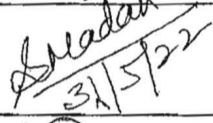

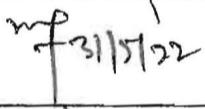
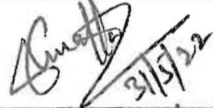
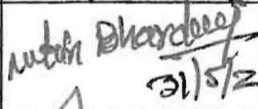
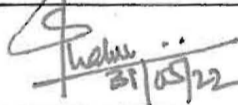
<u>Course Code</u>		<u>Credit</u>			<u>M.M.</u>
DHS – 201	Online Course	4	-	-	100

Note: Online Course should be passed either from any one SWAYAM/NPTEL/COURSERA.

<u>Course Code</u>		<u>Credit</u>			<u>M.M.</u>
DHS – 251	Dissertation	16	-	-	400
	Dissertation	300			
	Presentation	50			
	Viva Voce	50			
	Total	400			

Subject Expert Committee Members actively participated in the preparation of curriculum for One year's P.G. Diploma on Industrial Health, Safety and Environment. BOS meetings conducted physically with subject committee experts; and the curriculum is approved by the Chairpersons, External subject experts and committee members of Department of Zoology and Environmental Science.

NEP-2020- SUBJECT EXPERT COMMITTEE

Name	Designation and address	Position	Signature
Prof. A.K. Chaubey	Professor, Department of Zoology, Chaudhary Charan Singh University, Meerut	Subject expert	 31/5/22
Prof. Kusum Arunachalam	School of Environment and Natural Resources, Doon University, Dehradun	Subject expert	 31/5/22
Prof. Namita Joshi	Department of Environmental Science, Kanya Gurukul Campus, Gurukula Kangri (DU), Haridwar	Member	 31/5/22
Dr. Rakesh Bhutiani	Assistant Professor, Department of Zoology and Environmental science, Gurukula Kangri (DU), Haridwar	Member	 31/5/22
Dr. Sangeeta Madan	Department of Environmental Science, Kanya Gurukul Campus, Gurukula Kangri (DU), Haridwar	Member	 31/5/22
Dr. Nitin Kamboj	Assistant Professor, Department of Zoology and Environmental science, Gurukula Kangri (DU), Haridwar	Member	 31/5/22
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Dr. Gagan Matta	Assistant Professor, Department of Zoology and Environmental science, Gurukula Kangri (DU), Haridwar	Member	 31/5/22
Dr. Nitin Bhardwaj	Assistant Professor, Department of Zoology and Environmental science, Gurukula Kangri (DU), Haridwar	Member	 31/5/22
Prof. D.S. Malik	Head, Department of Zoology and Environmental science, Gurukula Kangri (DU), Haridwar	Convener	 31/5/22