

 Estd. 1962 "A++" Accredited by NAAC (2021) With CGPA 3.52	SHIVAJI UNIVERSITY, KOLHAPUR 416 004, MAHARASHTRA PHONE : EPABX - 2609000, BOS Section - 0231-2609094, 2609487 Web : www.unishivaji.ac.in Email: bos@unishivaji.ac.in शिवाजी विद्यापीठ, कोल्हापूर, ४१६ ००४, महाराष्ट्र दूरध्वनी - इपीबीएक्स - २०६०९०००, अभ्यासमंडळे विभाग : ०२३१- २६०९०९४, २६०९४८७ वेबसाईट : www.unishivaji.ac.in ईमेल : bos@unishivaji.ac.in		
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SU/BOS/Science/ 269

Date: 21 /07/2026

The Head/Co-ordinator/Director,
All concerned Department,
Shivaji University, Kolhapur.

Subject : Regarding revised syllabi of Post Gradute Diploma in Industrial Safety
under the Faculty of Inter- Disciplinary Studies

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the revised **syllabi of Post Gradute Diploma in Industrial Safety** under the Faculty of Inter- Disciplinary Studies.

This syllabus shall be implemented from the academic year **2026-2027** onwards. A soft copy containing the syllabus is attached herewith and it is also available on university website www.unishivaji.ac.in NEP-2020 (Online Syllabus)

The question papers on the pre-revised syllabi of above-mentioned course will be set for the examinations to be held in October /November 2026 & March/April 2027. These chances are available for repeater students, if any.

You are therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours faithfully,



Dy Registrar

Encl. : as above

Copy to: For information and necessary action

1	The I/C Dean, Faculty of IDS	7	Affiliation T. 1 & T. 2 Section
2	Director, Board of Examination and Evaluation	8	P.G.Admission Section
3	The Chairman, Respective Board of Studies	9	Appointment A & B Section
4	O. E. 1 Exam Section	10	P.G.Seminar Section
5	Eligibility Section	11	I. T. Cell
6	Internal Quality Assurance Cell (IQAC)		



SHIVAJI UNIVERSITY KOLHAPUR

Syllabus Structure as per
National Education Policy 2020,

**SYLLABUS FOR
PG DIPLOMA IN INDUSTRIAL SAFETY**

DURATION: ONE YEAR

PATTERN: SEMESTER

(To be implemented from the Academic Year 2026– 2027)

PG Diploma in Industrial Safety (PGD-IS)

Preamble

Industrial safety is a critical discipline aimed at ensuring the well-being of workers, safeguarding assets, and maintaining seamless operations in diverse industries. With the rapid advancement of technology, industrial processes have become increasingly complex, leading to heightened safety challenges that require specialized knowledge and skills.

The Postgraduate Diploma in Industrial Safety (PGDIS) is meticulously designed to address these challenges by equipping professionals with the theoretical foundations and practical competencies essential for effective safety management. This program integrates core principles of occupational safety, health, and environmental sustainability, emphasizing proactive strategies to prevent accidents, mitigate risks, and ensure compliance with regulatory standards.

By enrolling in this program, participants will delve into topics such as hazard identification, risk assessment, safety audits, emergency response planning, and the implementation of advanced safety management systems. The curriculum is structured to cater to the needs of industries such as manufacturing, construction, oil and gas, mining, and logistics, providing participants with a comprehensive and interdisciplinary approach to industrial safety.

This course is ideal for safety officers, engineers, supervisors, and professionals aspiring to enhance their expertise and leadership in creating safer workplaces, protecting lives, and promoting a culture of safety excellence within their organizations. The PGDIS serves as a pathway for personal growth, career advancement, and meaningful contributions to industrial safety practices globally.

Objectives of the Programme

The PG Diploma in Industrial Safety aims to provide a robust foundation and skill set to address industrial safety challenges. The specific objectives of this programme are:

1. Develop Core Knowledge of Safety Standards and Practices
2. Promote Hazard Identification and Risk Mitigation Skills
3. Enable Safety System Design and Management
4. Strengthen Emergency Preparedness and Response
5. Integrate Health, Safety, and Environmental Management
6. Encourage Compliance with Legal and Regulatory Requirements
7. Promote a Culture of Safety and Leadership
8. Prepare for Specialized Roles in Safety
9. Encourage Continuous Learning and Professional Development

By achieving these objectives, the PGDIS program prepares professionals to make a meaningful impact on workplace safety, health, and environmental sustainability.

Equivalence of the papers

The papers are equivalent to the papers in the syllabus of PG Diploma in Industrial Safety offered under Maharashtra State Board of Technical Education

Eligibility and Allied Aspects

1. **Eligibility:** Graduate of any faculty, with professional/ volunteer experience in Corporate / government agencies. Freshers will be accepted based on their interview. Aspiring candidates Should have obtained minimum Pass Class at the graduation level
2. **Duration:** One year program/two semester

3. Mode:Regular Mode

4. Fee structure : 1. Sanctioned by university authorities from time to time

2. For international students the tuition fee will be five times (As per Govt. norms)

5. Programme centre

Yashwantrao Chavan School of Social Work, Jakatwadi, Satara

6. Admission Committee:

The composition of the admission committee will be as per the rules of Shivaji University

7. Admission

Admission will be based on the personal interview

8. Reservation:

The reservation quota for admission will be as per the rules of the state government

9. Teaching Methodology: Lectures, group discussion, case analysis sessions, seminar and reflection exercises. theory (50% Lectures + 50 % Library/ Self Reading and Writing, demonstration, industrial visits)

Medium of Instruction is English, Hindi and Marathi

10. EXAM

Competency in each paper of the program will be checked through written examination.

11. Structure of the Programme and Scheme of the examination

Semester I and II

PG Diploma in Industrial Safety (PGD-IS)

Paper No.	Course Title	Teaching scheme (Hrs/week)			Hours per week	Examination Scheme		
		L	T	P		Theory	CIE	TOTAL
1	Industrial Safety Management	4	4		4	60	40	100
2	Fire Service Equipment & Appliances	4	4		4	60	40	100
3	Experiential learning/ practical	-	-	4	4		100	100
4	Safety at Workplace	2	2		3	30	20	50
5	Research Methodology	4	4		4	60	40	100
6	Term paper on safety in construction/Engineering					-	100	100
	Or							
	Case studies on industrial safety					-	100	100
	Total					210	340	550
SEMESTER II								
7	Accident Prevention Techniques	4	4		4	60	40	100
8	Industrial Safety Legislation,	4	4		4	60	40	100
9	Practical/Experiential learning	4	4		4		100	100
10	Security Management	2	2		2	30	20	50
11	Safety engineering	4	4		4	60	40	100
	Or							
	Quality control and Safety management	4	4		4	60	40	100
12	Field Project						100	100
						210	340	550

12. CREDIT STRUCTURE

Paper No.	Course Title		Credits	Theory Marks	CIE	Total
SEMESTER I						
1	Industrial Safety Management	Core course	4	60	40	100
2	Fire Service Equipment & Appliances	Core course	4	60	40	100
3	Experiential learning/ practical	Core course	4		100	100
4	Safety at Workplace	Core course	2	30	20	50
5	Research Methodology	Core course	4	60	40	100
6	Term paper on safety in construction/Engineering	Elective	4		100	100
	Or					
	Case studies on industrial safety	Elective	4		100	100
	Total		22	210	340	550
SEMESTER II						
7	Accident Prevention Techniques	Core course	4	60	40	100
8	Industrial Safety Legislation,	Core course	4	60	40	100
9	Practical/Experiential learning	Core course	4		100	100
10	Security management	Core course	2	30	20	50
11	Safety Engineering	Elective	4	60	40	100
	Or					
	Quality control and Safety management	Elective	4	60	40	100
12	Field project	Core course	4		100	100
			22	210	340	550

Structure and Credit Distribution for PG Diploma in Industrial Safety Program as per NEP -2020

Year	Level	SEM	Major		RM	OJT/FP	RP	Cum Cr.	Degree
			Mandatory	Elective					
I	6	I	ISM (4) -T FSEA (4) -T Pr- I(4) P SWP(2)- T	TP/CS- Project (Choose any one elective) (4 credit)	RM (4) T			22	PG Diploma (after 3 Yr Degree)
	6	II	APT (4)-T ISL (4)-T Pr- (4) -P SM (2) -T	SE/QCSM- T (Choose any one elective) (4 credit)		FP (4)		22	
Cum. Cr. PG Diploma			28	8	4	4		44	

Intake Capacity : 60

Abbreviations: Yr: Year; Sem: Semester; OJT: On Job Training; internship/Apprenticeship; FP: Field Projects; Practical (Pr -P), Theory (T), Industrial Safety Management (ISM), Fire Service Equipment & Appliances(FSEA), Safety at Workplace (SWP), Experiential learning/ practical(P), Term paper on safety in construction/Engineering/ Case studies on industrial safety (TP/CS)

Accident Prevention Techniques (APT), Industrial Safety Legislation (ISL), Safety Engineering (SE), Practical/Experiential learning(P), Security Management (SM), Quality control and safety management, Field project(FP)

13. SUMMARY OF CREDITS

Sr. No	Course	Credits	Total
1	6 Theory	4 per course	24
2	2 Theory	2 per course	4
2	2 Practical	4 per course	8
3	1 term paper and one field project	4 per course	8
4	Total		44

14. Scheme of Examination

1. The number of theory and practical course

1.The entire PGD-IS has 6 theory papers of 100 mark each and two theory papers of 2 credit (28 credits)

2.Two course of experiential learning/practical of 100 mark each (8 credits)

3. Two courses of term paper/ Case studies /field project of 100 mark each (8 credits)

2. Semester examination: The examination system would be semester with a credit system and continuous Internal Evaluation (CIE). The examination shall be conducted at the end of each

semester

3.CIE Component

Criteria for CIE. The total CIE component carries 20 mark for each theory paper as follows

CIE Component	CIE MARKS	
	SemI	SemII
Seminar presentation	10	10
Book / article review	10	10
Open book assignment	10	10
Group discussion	10	10
Total	40	40

14. SEMESTER-Re-Examination: If candidates fail in any course in 1st semester examination, they can appear for -examination in the subsequent semester.

1. The ATKT rules framed by the University apply to the Program.

15. STANDARD OF PASSING:

- 1) In every paper, a candidate should obtain a minimum of 40% of the total marks, i.e. 24 out of 60 marks and 12 out of 30 marks.
- 2) For every CIE component, a candidate should obtain a minimum of 40% of the total marks, i.e. 16 out of 40 marks.
- 4) A candidate must obtain minimum marks in both the Heads of Passing. In other words, they must pass both the Semester and CIE examinations.
- 5) For the practical work (80 marks) and viva voce (20 marks), a candidate should obtain 40% marks, i.e. 32 marks and 08 marks, respectively.

GRADE POINTS TABLE

Theory Paper Grade Points: Conversion: The marks obtained by a candidate in each Theory paper and CIE (out of 100) or any fractions like 80: 20 shall be converted into grades based on the following table:

Range of Marks obtained Out of 100	Grade Points	Range of Marks obtained Out of 100	Grade Points
00 to 5	0	51 to 55	5.5
6 to 10	1	56 to 60	6
11 to 15	1.5	61 to 65	6.5
16 to 20	2	65 to 70	7
21 to 25	2.5	71 to 75	7.5
26 to 30	3	76 to 80	8
30 to 35	3.5	81 to 85	8.5
36 to 40	4	86 to 90	9
41 to 45	4.5	91 to 95	9.5
46 to 50	5	95 to 100	10

LETTER GRADES AND CGPA CREDIT POINTS

GRADES	CGPA CREDIT POINTS
O	8.60 To 10
A+	7.00 To 8.59
A	6.00 To 6.99
B+	5.50 To 5.99
B	4.50 To 5.49
C	4.00 To 4.49
D	0.00 To 3.99

OVERALL GRADING

Overall Final Grades	Class		Grade
8.60 To 10	Higher Distinction Level	Extra Ordinary	O
7.00 To 8.59	Distinction Level	Excellent	A+
6.00 To 6.99	First Class	Very Good	A
5.50 To 5.99	Higher Second Class	Good	B+
4.50 To 5.49	Second Class	Satisfactory	B
4.00 To 4.49	Pass	Fair	C
0.00 To 3.99	Fail	Unsatisfactory	D

Programme Outcome

PO1: Understand the safety measures in industrial setting

PO2; Inculcate safety management techniques

PO3. Develop ability to execute prevention measures for safe workplace

PO4: Gain employment

1. Course: Industrial Safety Management

Course Outcome:

CO 1: Understand the management principles and Techniques

CO 2: Learn Accident prevention measures

CO 3: Learn Accident investigation Techniques

CO 4: Learn to frame emergency plan

Contents Details: -

Sr. No.	Contents	Hours
Module 1	Introduction Management: Concept, definition, nature and importance evolution of management thoughts and principles, Role and functions of a manager, elements of management, functions. Management Principles: General principles of Management, managerial role authority, responsibility and power, span of management, Delegation and decentralization of authority Industrial Safety: Role of Management in Industrial Safety, Safety Management–Principles and practices.	10
Module 2	Employee Participation in Safety Employee Participation: Purpose, Nature, Scope and Methods; Safety committee and Union participation. Trade Unions: History of Trade Unions in India; Role of Trade Unions in Safety and Health; Collective Bargaining and safety. Safety Promotion & Publicity: Safety Suggestion Schemes.	10
Module 3	Planning for safety Planning: Definition, purpose, nature, scope and procedure, range of planning, variety of plans, strategic planning and process of implementation, Management by objectives and its role in safety, policy formulation. Analysis of accident data with respect to various parameters accident investigation, remedial measures, implementation of remedial measures, why analysis for accident investigation.	10
Module 4	Organizational Behaviour and Safety Human factors contributing to accidents. Human behavior: Individual differences, behavior as function of self and situation, perception of danger and acceptance of risks, knowledge and responsibility , safety performance theories of motivation and their application of safety role of department in motivation. Conflict and Frustration: Identification of situations leading to conflict and frustration and techniques of management.	10

Module 5	Organizing for Safety Organizing: Definition, need, nature and principles Organizing of Safety: Organizational structure and safety department Safety Committee: Structure and functions, line and staff functions for safety. Directing for Safety Direction: Definition, process, principles and techniques Leadership: Role, functions and attributes of a leader , leadership styles in safety management Communication: Purpose, process, types and channels, essential rules for communication, two - way communication, barriers in communication, essentials of effective communication, communication and group – dynamics. Safety Education and Training Training for Safety: Element of training, cycle, assessment of needs , techniques of training, design and development of training programme, training methods and strategies (types of training, evaluation and review of training programme)	10
Module 6	Safety Audit Statutory Requirement Internal, External, Economics of Safety. Cost of accidents: Financial costs to individual and family organisation, society completion procedure, utility and limitations of cost data, budgeting for safety. MIS: Management Information System for safety: Sources of information on safety, health and accidents, compilation and collation of information, analysis and use of modern methods of programming, storing and retrieval of MIS for safety health and environment.	10
TOTAL		60

Reference Book:

1. National Safety Council Handbook for accident prevention
2. National Safety Council Journal ‘Chronically’
3. National Fire Prevention Association (NFPA) Industrial Hazard Manual
4. Factory Act Manual
5. Industrial Safety Audit Procedure As per BSI

2. Course: Fire Service Equipment & Appliances

Course outcome

CO1: Understand fire fighting Extinguishers

CO2: Inculcate the knowledge of appliances and means to Extinguish Fire

CO3: Understand the functioning of hose, rope and fittings

CO4. Learn about foams, gears and hydrant in safety management

Contents Details:

Chapter	Contents	Hours
Module 1	Extinguishers: Various types of fire fighting extinguishers. specifications-Water type, foam, CO ₂ , DCP, HALO, Testing of extinguishers, Inspection and maintenance. Hose: Introduction- General characteristics of delivery and suction hose Study of I.S. specification on control percolating hose, Rubber line dorr-enforced fabric lined woven jacket hose and unlined hose. care and maintenance of suction and delivery hose and their testing. Fittings: Description, use & maintenance of Couplings, Adapters, Branches, Nozzles, breeching, Collecting head, Ramps, Special type of branch and nozzles, Branch holders and Radial branches, Monitor-portable and fixed. Study of Indian standard specification of fittings.	10
Module 2	Ropes: Material used, Construction, Types and testing of ropes, causes of deterioration, Terminology used in fire service, Synthetic fibers and steel wire ropes.	10
Module 3	B.A. Set: Types of set. Atmospheric and self-contained, Theory of respiration Essential features of B.A. sets, Various parts of B.A. set and their function. Sequence of wearing. Operational use. Recharging, testing, maintenance, advantages and disadvantages of different sets. Liquid air set: Working duration and principle of calculating working duration, Donning, Pre entry tests, Low- and high-pressure tests, Working in hot and humid atmosphere, Study of associated equipment.	10

Module 4	Foams Types of foam, Characteristics of fire fighting foam and its storage. Foam equipment- round the pump proportioned, inline inductor, pickup tube, and foam making branches, Knap sack tank, multiple jet inductor, and their function, operational use. Mechanical foam generator, foam making pumps, foam maker, variable induct or, high expansion foam generator.	10
Module 5	Small Gears: Introduction to small gears, lighting equipment and other tools used in fire service, its use, care and maintenance. Special gears- Study of hydraulic rescue equipment, cutting gears and other rescue apparatus. Lifting equipment-Mechanical, hydraulic, pneumatic jacks, pulley and blocks, airbags. Electric power tools and oxy-propane cutting set, protective clothing's. Blower and exhauster. Study of Indian specification of Fire man Axe and Fire hook. Demonstration of various special and small gears.	10
Module 6	Hydrant: Types of hydrants, Standard of fire hydrants, Description of Sluice valve, Pillar, Screw down type hydrant, Hydrant gears, operation, inspection and testing.8.5 Water mains. Water hammer, hydrant spacing, pressure flow test, outfit and its description, Study of Indian standard specification for stand pipe and sluice valve hydrant, Code of practice for installation of hydrants. Appliances: Construction and layout of fire fighting vehicles and appliances. Basic knowledge of appliances with reference to I.S. specification like: Hose Laying Lorry, Foam and Crash Tender, Dry Powder Tender, Emergency Tender, Mobile Control Van, Break down Van, Water Tender Type A, B, and X, Fire Boats, Trailer pump, Portable pump, Carbon dioxide Tender.	10
Total		60

Reference Book:

1. Manual of Fireman ship Part-II (HMSO)
2. Manual of Fireman ship Book -V(HMSO)
3. Fire Fighting Vehicles: 1840 - 1950
4. Fire and Crash Vehicles from 1950
5. Fire Fighting Apparatus and Procedures by Erven.
6. Fire Company Apparatus & Procedures by Erven.
7. IS948, 950, 6067, 951, 942, 943, 944

3. Course : Experiential learning. Practical

Suggestive Syllabus for practical :Semester 1

Practical –I (Fire Fighting Drills)

A) Squaddrill

B) Ladder

C) Rope, line and knots

PRACTICAL 1: to study the squad drill and to verify it's application in fire services.

Study of Squad Drill, working of Squad Drill, Importance of Squad Drill. What is Squad, Procedure for Formation of Squad, File, Rank, Sizing, Fall In, Fall Out, Types of Cautions given to the Squad.

TO STUDY THE MOVEMENTS OF A SQUAD

Attention, Stand at ease, Stand easy, Mark time, Double mark time, Right dress, Left dress, Dress up, Open order march, Close order march, Forward march, Backward march, Steps to the right, Steps to the left, Directions of a Squad, Turning to the left, Turing to the right, right about turn, Retire position, Advance position, Right Incline, Left Incline, Eye sight, Eyes left, Eyes front, from the right number, as you were, Proving of Parade.

1.To study the march in go for squad

Quick march, Double March, Slow march, Right wheel, Left wheel, Right turn, Leftturn, Halt, Forward, Breakup, Change direction, Change formation, Reformation of Squad, Saluting, Reporting, Getting on Parade, Inspection Parade, Guard of honor.

B) ladder:

2.To study the fire service ladders.

Types of Ladders, their construction, Uses, Identification of parts, Care and Maintenance of ladders.

3.To study the 4 man extension ladder drill.

Equipment required, Formation of a Crew, Individual Working procedure on 'get to work command', Ladder pitching, Climbing, Rescue operation, Fire fighting, Ventilation procedure, Ladder carrying, Drill report.

4.To carry out standard tests of extension ladder

String Test, Round Test, Standing Line Test, Acceptance Test, Deflection Test extension

5.To carry out standard tests of extension ladder

String Test, Round Test, Standing Line Test, Acceptance Test, Deflection Test extension

rope, line and knots:

6.To study the use of ropes and lines in fire service.

Types and construction, Materials used in construction,

Different types of Lines used in fire service for different purposes Like Rescue, Lifting, Lowering, Care and Maintenance.

7.To carry out standard test of lines.

Test procedure by 6 fire personals.

Rescue Knots: **Bowline, Running Bowline, Bow line on the bight, Chair Knot**

Self Rescue Knots: Slippery Hitch, Draw Hitch

Other Knots, loop, bends, hitch: loop, half hitch, thumb knot, figure of eight, Clove hitch, rolling hitch, round turn two half hitch, fisherman's hitch, fisherman's knot, waterman's hitch, timber hitch, cat's paw, sheepshank, single sheet bend, double sheet bend, reef knot, Carri bend, mid shipman hitch, Construction and application

4. Course : Safety at Workplace. :

Course Outcome

CO1: Introduce the Safe use of machines and tools.

CO2: Recognize the different industrial hazards.

CO3: Identify the electrical and construction industry hazards.

CO4: Be acquainted with the use of personal protective equipment (PPE)

CO5: Monitor the fire and other hazards in industry.

Module	Contents	Hours
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Module 1	Safe use of machines and tools Safety in the use of Power Presses (all types), Shearing, Bending, Rolling, Drawing, Turning, Boring, Milling, Shaping, Planning broaching, planting, Grinding, CNCs. Preventive maintenance, periodic checks for safe operation. Associated hazards and their prevention. Need for selection and care of cutting tools, Preventive maintenance and periodic checks for safe operation. Associate hazards and their prevention, Workplace Inspection, type of workplace inspection, Importance of consultation in safety. Ergonomics Principles in machine guarding. Ergonomics of machine guarding. Indian standard and ergonomics of machine guarding. Type of guards, their design and selection. Guarding of different types of machinery including special precautions for machine, tools etc. Built-in-safety devices, maintenance and repairs of guards, incidental safety devices and tools.	10
Module 2	Industrial Hazards Radiation: 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 Noise and Vibration: Sources, and its control, Effects of noise on the auditory system and health, adverse health effects of noise, Measurement of noise, Different air pollutants in industries, Effect of different gases and particulate matter, acid fumes, smoke, fog on human health, Vibration: effects, measurement and control measures.	10
Module 3	Electrical Hazards and Hazards in Construction Industry Fire and other Hazards: Occupational Health Hazards Industrial Lighting and Illumination: Respiratory personal Protective devices Personal protective equipment (PPE)	10
Total		30

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.

5. Course : Research Methodology

Course Outcome

CO1: Introduce the research methodology

CO2: Develop the understanding about research design

CO3: To be familiar with data collection methods and tools

CO4: Be acquainted with the use of software for data analysis

CO5: Develop report writing skills

Module	Contents	Hours
Module 1	Foundations of Research: Meaning, Objectives, Motivation, Utility. Concept of theory, empiricism, deductive and inductive theory. Characteristics of scientific method , Concept, Construct, Definition, Variable. Research Process	10
Module 2	Review of Literature: Importance Problem Identification & Formulation – Research Question – Investigation Question – Measurement Issues – Hypothesis – Qualities of a good Hypothesis –Null Hypothesis & Alternative Hypothesis. Hypothesis Testing– Logic & Importance	10
Module 3	Research Design: Concept and Importance in Research – Features of a good research design – Exploratory Research Design – concept, types and uses, Descriptive Research Designs – concept, types and uses. Experimental Design: Concept of Independent & Dependent variables	10
Module 4	Qualitative and Quantitative Research: Qualitative research – Quantitative research – Concept of measurement, causality, generalization, replication. Merging the two approaches. (10%) Measurement: Concept of measurement– what is measured? Problems in measurement in research – Validity and Reliability. Levels of measurement – Nominal, Ordinal, Interval, Ratio.	10
Module 5	Sampling: Concepts of Statistical Population, Sample, Sampling Frame, Sampling Error, Sample Size, Non Response. Characteristics of a good sample. Probability Sample – Simple Random Sample, Systematic Sample, Stratified Random Sample & Multi-stage sampling. Determining size of the sample – Practical considerations in sampling and sample size. Data Analysis: Data Preparation – Univariate analysis (frequency tables, bar charts, pie charts, percentages), Bivariate analysis – Cross tabulations and Chi-square test including testing hypothesis of association.	10

Module 6	Interpretation of Data and Paper Writing – Layout of a Research Paper, Journals in Computer Science, Impact factor of Journals, When and where to publish ? Ethical issues related to publishing, Plagiarism and Self-Plagiarism	10
Total		60

Reference Books:

1. Business Research Methods – Donald Cooper & Pamela Schindler, TMGH, 9th edition
2. Business Research Methods – Alan Bryman & Emma Bell, Oxford University Press.
3. Research Methodology – C.R.Kothari

6.Course : Case study on industrial safety or term paper on safety in construction. Manufacturing industry

Course : Term paper / Case study

Students should complete project/ term paper on any of the topic given below

- 1) Term paper/case study on security arrangement
- 2) Term paper/case study on “On Site Emergency Plan a Chemical/Explosive/Steel Industry”
- 3) Term paper/case study on study of fire hazards associated in Industrial process / activities and safety precautions taken forth ese hazards.
- 4) Term paper/case study on security arrangements of Mob Controlling
- 5) Term paper/case study on installation, servicing and maintenance of portable fire extinguisher installed in Industry.
- 6) Term paper/case study on safety and security arrangement so f Railway Station.
- 7) Term paper/case study on firefighting equipment providing an Industrial fire station.
- 8) Term paper/case study on safety arrangements in a Power Plant.
- 9) Term paper/case study on Fire Safety for storage of hazardous goods in Industry.
- 10) Term paper/case study on any one type of fire tender used in Industry.
- 11) Term paper/case study on safety arrangements in Explosive Plant/Storage.
- 12) Term paper/case study on fire safety arrangements in Highrise Building.

Semester II

7.Course :Accident Prevention Techniques in work place

Upon completion of the course, students will be able to:

CO1: Introduce the theories and principles of accident causation.

CO2: Learn principles of accidents prevention.

CO3: Identify major accident control measures in industry.

CO4: Be acquainted with the use of plant layout for safety

CO5: Understand safety management systems

Module	Contents	Hours
Module 1	Principles of accidents prevention Definition: Incident, accident, injury, dangerous occurrences, unsafe acts, unsafe conditions, hazards, error, oversight, mistakes, etc. 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.	10
Module 2	Plant safety inspection - objectives and types check procedure inspection report. Causes of accidents, Types of accidents, accident statistics, Cost of accident, Direct and indirect cost of an accident, accident/ incident reporting, accident Investigation report. Theories and principles of accident causation The effect of accident, un safe act, unsafe condition, unpredictable performance. Human factors contributing to accidents-causes for unsafe acts. Safety and psychology-Theories of motivation and their application to safety. Consequences of accident, accident prevention programmers, Role of safety.	10
Module 3	Plant and Equipment: Safety Appraisal and Control Techniques. Plant Safety Rules and Procedure, Safe Operating Systems, Safety Check List, Plant Safety Inspection. Safety Surveys. Jobs Safety Analysis. Product Safety. Safety tag system Major Accident Hazards (MAH) Control System. Major Accident Control: Definition, Major Accident, Hazards, Identification and Assessment of MAH Units. Role of Govt., Role of Management, Local Authorities and Public. Energy Management System. Safety and Environmental Assessment.	10

Module 4	Plant layout for safety Design and location, distance between hazardous units, colour coding, Lighting, ventilation, Flowcharts, pilot plant applications and machine guarding and its types, Housekeeping. Accidents related with maintenance of machines, maintenance of machines-advantages. Work permits systems - Significance of documentation.	10
Module 5	Safety and good housekeeping. Typical accidents due to poor house-keeping. Disposal of scrap and other trade wastes. Prevention of spillage. Marking of aisles space and other locations. Use of colour as an aid for good housekeeping. Housekeeping contest. Cleaning methods. Employee assignment. Inspections and checklists. Benefits of good housekeeping. Role of preventive maintenance in safety and health. Importance of standards and codes of practice for plant and equipment.	10
Module 6	First aid: 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.	10
	Total	60

Reference Books:

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

Programme Name: **PG Diploma in Industrial Safety**

8. Course: Industrial Safety Legislation

Course outcome

- CO1: Know safety statutory requirement under various legislations
CO2; know the safety related ILO Conventions and recommendation
CO3: Learn social security legislation
CO4: Understand the application of environment related legislation

Chapter	Contents	Hours
Module 1	ILO Convention and Recommendation: Role of ILO, relevant conventions and recommendations in the furtherance of safety, health and welfare	10
Module 2	New Labour Codes Overview of the four labour codes with specific emphasis on the OSH Code. Definitions of key terms under the new code: Factory, Manufacturing Process, Worker, Employer, and Hazardous Process. Administrative setup: Powers of Chief Inspector-cum-Facilitators, Inspectors, and Certifying Surgeons.	
Module 3	The OSH Code, 2020 (General Safety & Health Provisions) General duties of employers, employees, manufacturers, and designers. Health, safety, and working condition provisions (ventilation, lighting, drinking water, cleanliness, and overcrowding). Welfare measures: Canteens, first-aid, shelters, and crèches. Provisions for hazardous establishments: Specific safety committees, safety officers (Section 40-B equivalent), and occupational health centers.	10
Module 4	Workplace Hazards and Special Provisions Safety regulations for handling, storing, and transporting hazardous materials. Specific regulations for Women's employment (conditions for night shifts and hazardous operations). Provisions for Contract Labour and Inter-State Migrant workers regarding safety and welfare.	10
Module 5	Allied Industrial Safety Legislations The Environment (Protection) Act, 1986: Rules relating to hazardous waste management and environmental clearances for industries. The Public Liability Insurance Act, 1991: Rules mandating insurance for industries handling hazardous substances. The Manufacture, Storage and Import of Hazardous Chemical (MSIHC) Rules: Requirements for on-site and off-site emergency plans. The Indian Electricity Act, 2003: Key electrical safety rules and regulations for industrial plants. The Explosives Act, 1984 & Gas Cylinder Rules: Guidelines for the storage and use of flammable gases and explosives	10

Module 6	Implementation and Penalties Procedures for maintaining registers, records, and filing annual returns under the OSH Code. Inspection, compliance, and "Improvement Notice" / "Prohibition Order" mechanisms. Penalties for offenses (including provisions for accidents causing death or serious bodily injury)	10
TOTAL		60

Reference Book:

1. **New industrial code Ministry of labour Gazette**
2. **Recommendation Handbook of ILO**
3. **Compassion Act as per IPC**
4. **Instruction Format for ISO**
5. **Petroleum Act 1939.**

9 Course : Practical –II (Fire Service Equipment) Semester II

List of Practical:

Group: a) Hose and hose fittings

B) Extinguishers

C) Pump and appliances

A) Hose and hose fittings

To study fire fighting hoses

A) Hose Drill Actions : Lifting hose, Lowering hose, Carrying hose, Laying hose, Connect hose, Disconnect hose, Under running, Remove the kink, Rolling. Identification of different types of hose fittings and their uses.

Top perform hydrant drills

B) 3–man Hydrant Drill: Drill procedure with application of Hose and Hydrant Fittings: Add one length of hose, Remove one length of hose, Replace the burst Hose, Divide one line into two line using Dividing Breeching, Collect two line into one line using Collecting Breeching, Hydrant Gears and its operation

C) 4–man Hydrant Drill: Drill procedure with application of Hose and Hydrant Fittings: Add one length

of hose, Remove one length of hose, Replace the burst Hose, Divide one line into two line using Dividing Breeching, Collect two line into one line using Collecting Breeching, Hydrant Gears and its operation,

D) To carry out standard tests of fire fighting hoses.

E) b) Extinguishers

To study selection, operation and maintenance of fire extinguishers.

Study of different types of Fire Extinguishers (Water Expelling type, Foam type, DCP type, CO₂ type)

With respect to constructional feature, capacity operation and use. in fires, It's effective application in extinguishments, Recharging procedure, Care and Maintenance, Performance test, Hydraulic test, Inspection procedure – Weekly, monthly, quarterly, half yearly, yearly

B) Pump and appliances to perform pump drill and fire tender drill

6 – man Trailer Pump Drill: Study, Workings, Importance, Equipment, Drill Procedure. Individual working of No.1 to No.6, Application of different types of signals applied during pump operation.

6 – man Water Tender Drill: Mounting procedure, Dismounting procedure, Individual working procedure like – working with ladder, working with B.A. set, Soft suction, Hard suction

Study of centrifugal pump and its operation:

Operational procedure of centrifugal pump, Priming system, Reading of gauges – Vacuum gauge, Pressure gauge, Compound gauge, Operator's fault, Cooling system, Water relay and its types.

Study of foam & foam making branch pipes

Protein Foam, Aqueous Film Forming Foam (AFFF), Foam Making Branch 5X (FB5X), Foam Making Branch 10 X (FB10X), Inline inductor, Pick-up tube.

Practical –III (Rescue Technique)

List of practical:

group: a) breathing apparatus set

B) small gears

C) first aid

A) breathing apparatus set

Study, Working, Identification of different parts of BA, Donning Procedure, Pre-Entry, Test, BACO, Tally, Searching operation procedure with Guide Line and Personnel Line, Entrapped Procedure, Use of Ymani fold.

Small gears study of small gears used in fire service

B) Grouping of Small Gears with examples – Fireman Axe, Ceiling Hook, Drag Hook, Fire Beater, Door Breaker, Steel Shod Lever, Pad Lock Remover, Persuader, Spreader, Cutter, Bending Bar, Quick Release Knife, Shears, Bolt Cutter, Search Light, and Focusing Light. Study of hydraulically operated small gears and their use in Rescue Operation. Care and Maintenance of Small Gears.

C) FIRST-AID

Bandages and the irrespctive uses

Rolling Bandages: width of roller bandage, Application: Simple spiral, Reverse spiral Figure of Eight, Triangular Bandages: For the Scalp, for the forehead, Eye, cheek or any part which is round in shape, Front or back of the chest, For the shoulder, for the elbow, for the hand, for the hip and groin, For the knee, for the foot, Stump, Types of Slings and its application: Arm Sling, Collar and Cuff Sling, Triangular Sling. Improvised Sling.

Resuscitation procedures

Methods of artificial Respiration like: Holger Nielson Method, Schaefer's Method, Silvestor's Method, Mouth to Mouth, Eve's Rocking stretcher Method, Emerson Method.

To perform drill for transportation of casualties

4 – man stretcher drill: Aim, Objectives, Equipment, Drill procedure by individual No.1 to No.4 Rescuer, Loading Casual ties to the Ambulance.

10.Course : Security Management

Course outcome:

- CO1. Understand the security requirements of the industry**
- CO2. Develop the logical strategies to be adopted for security**
- CO2. Understand preventive measures to deal with security**

Module	Contents	Hours
Module 1	Types of Security Personal Security, Security of personnel – Subversion-Subversive, Security of information, Security of material – Sabotage – Saboteur their plan and action, Physical and Non-Physical Security.	10
Module 2	Industrial Security- Factory internal and external security, Inflammable tankers/trucks checking procedure, materials/goods- Inward and outward, patrolling duty, communication and liaison with concerned departments, housekeeping check, Industrial safety procedure, work permit system, Unsafe act and unsafe conditions, Industrial Accidents, Disaster Management, Responsibility in case of Emergencies (Fire, Explosion, Toxic or Poison gas release), Emergency plan and mock drill, Chemical material	10

	safety data sheet, Security arrangement for Factory VIP visits,	
Module 3	modern electronic devices for bugging and debugging, Building Security, Campus Security, Security of Vulnerable Area/Vulnerable Point (VA/VPs), Security of Installations, Security of VIP/ VIPs, Security of Operation, Office Security	10
TOTAL		30

Reference Books:

Reference Book:

1. Factory Act 1948.
2. Security Management and Services.
3. Hand Book of Industrial Fire Protection and Security.
4. Code of Practice for Hazardous Goods by NFPA.
5. Hand Book of Fire Protection by NFPA.

11Course : Safety Engineering

CO1: Know the Safe use of machines and tools.

CO2: Be acquainted with the use of plant layout for safety

CO3: Hazard and Risk Identification Techniques

CO4: Environment Impact Assessment

Module	Content	Hour
Module 1	Introduction Introduction and need of Safety engineering. Man, Material and Machine Safety, Safety plans and engineering. Safety engineering and Construction safety	10
Module 2	Safe use of machines and tools Ergonomics of machine guarding guards, Guarding of different types of machinery including special precautions for paper, rubber and printing machinery, wood working. 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 lift sand hoists, Operation, inspection and maintenance of industrial trucks,	10

	loose gears conveyors, Safe working load for mechanical material handling equipment.	
Module 3	Plant design and Housekeeping Plant layout, design and safe distance, Ventilation and heat stress, Significance of ventilation, Natural ventilation, Mechanical ventilation Air conditioning National Building code part VIII and Building service, Thermal comfort Indices of heat stress, Physiology of heat regulation, 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.	10
Module 4	Safety performance monitoring and its techniques, Recommended practices for compiling and measuring work injury experience – permanent total disabilities, permanent partial disabilities, temporary total disabilities-Calculation of accident indices, frequency rate, severity rate, frequency severity incidence, incident rate, accident rate, safety “t” score, safety activity rate – problems.	10
Module 5	Industrial Lighting: Purpose of lighting, Uses of good illumination, Recommended optimum standards of illumination, Design of lighting installation, Standards for lighting and colour.	10
Module 6	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.	10
TOTAL		60

1. Heinrich H.W Safety code for Scaffolds and Ladders Ladders IS: 3696
2. Ghiselli, F. E The Myth of Accident Proneness The British Journal of Industrial Safety, Vol.6, No.71, 1963
3. Accident Prevention Manual for Industrial Operations”, N.S.C. Chicago, 1982
3. Heinrich H. W. “Industrial Accident Prevention” Mc Graw-Hill Company, New York, 1980.
4. Krishnan N.V. “Safety Management in Industry ”Jaico Publishing House, Bombay, 1997.
5. John Ridley, “Safety at Work”, Butterworth and Co., London, 1983.
- 6.Blake R.B., “Industrial Safety” Prentice Hall, Inc., New Jersey, 19738.
- Heinrich H. W Safety code for Scaffold sand Ladders Ladders IS:3696
7. hiselli,F.ETheMythofAccidentPronenessTheBritishJournalofIndustrialSafety, Vol. 6, No. 71,1963.

OR

11. Course :Quality Control and Safety Management Systems

CO1: Recognize Quality Control and Safety Standards.

CO2: Be familiar with Structure and features of OSHAS 18001.

CO3: Understand the preparation and assessment of safety audit

CO4: Be acquainted Environment Impact Assessment (EIA).

CO5: Analyze the Hazard and Risk Identification Techniques

Module	Contents	Hours
Module 1	Quality Control and Safety Standards Quality objectives– Quality control–Quality Assurance– Process variability ISO9000 and TQM concepts- Quality circles, tools–Zero defect management, 6 sigma– Quality Function Deployment (QFD).,Components and benefits of safety management system.	10
Module 2	Quality Control and Safety Standards Quality objectives–Quality control–Quality Assurance–Process variability ISO9000 and TQM concepts-Quality circles, tools–Zero defect management, 6 sigma–Quality Function Deployment(QFD). Components and benefits of safety management system.	10
Module 3	OHSAS standard Introduction – Development of OHSAS standard – Structure and features of OSHAS18001 Benefits of certification-certification procedure – OH and S management system element, specification and scope - correspondence between OHSAS18001, ISO 14001:1996 and ISO 9001:1994 – Guidelines (18002:2000) for implementing OHSAS18001	10
Module 4	Developing OH and S policy– Guidelines – Developments - procedure - Content of OH and S policy – General principle, strategy and planning, specific goals, compliance –methodology Planning – Guidelines, methodology steps developing action plan – Analysis and identify the priorities, objective and Targets, short term action plan, benefits and cost of each option, Development of action plan.	10
Module 5	Environment Impact Assessment ISO 14040(LCA), General principles of LCA, Stages of LCA, Report and Review. ISO 14020 (Eco labeling) – History, 14021, 14024, Type I labels, Type II labels, ISO 14024, principles, rules for eco labeling before company attempts for it. Advantages. EIA in EMS, Types of EIA, EIA methodology EIS, Scope, Benefits. Audit-methodology, Auditors Audit results management review-Continual improvement.	10

Module 6	Hazard and Risk Identification Techniques.	10
	Hazard and Risk Analysis: Quantitative and Qualitative: Failure, Mode and Effect Analysis (FMEA) and Maximum Credible Accident Analysis (MCAA). Fault Tree Analysis, event tree Analysis. Example of each. HAZAN, HAZOP, Managerial Technique etc.	
	Total	60

Reference Books:

1. Albert R. Wilson Environmental Risk: Identification and Management, CRC
2. Kletz Hazop and Hazan-Reftocheme, Macmillan Education Australia
3. KU Mistry, A course in Industrial Safety, NKM Publishers, Ahmedabad
4. Dan Petersen, Techniques of safety Management, Mc Graw- Hill Book Co. Ltd, Newyork, N.Y (USA)

12: Course: Field project Experiential Learning

1. Objectives and Goals

- **Skill Development:** Identification of key skills and competencies to be developed, such as risk assessment, safety audits, and compliance management.
- **Application of Knowledge:** Opportunities for students to apply theoretical knowledge to practical scenarios in industrial safety.

2. Preparation and Planning

- Pre-Internship Training: Orientation sessions covering company policies, safety protocols, and internship expectations.
- Project Assignment: Assigning specific pr tasks related to industrial safety that students will work on during their internship.
- Mentorship: Introduction to the assigned mentor or supervisor who will guide the student throughout the internship.
- Accident prevention Programme
- Methods of measurement of Safety Indices as per IS 3786
- Development of the work permit system
- Techniques of hazard Identification, Understand major accident hazard and its control measures, Reporting of unsafe act/ unsafe condition, Accident investigation techniques
- Prepare model on Henrich Triangle and Dominos theory
- List of leading and lagging indicators in safety

- Fish bone diagram for industrial accident case study
- Checklist for safety audit based on ISI4489 focusing on safety
- Different types safety audits and its applicability
- Various requirement / provisions for major accident hazards unit prescribed in MSIHC rules 1989
- ILO CODE of practice for major accident Control
- Compliances under safety and social security related legislations
- Duties of safety officer
- Major equipment's in use like spiro meter, audiometer, self contained breathing apparatus , CPR Manikin, rota meter/personal sampler/high volume sampler, sound level meter or Dosimeter
- Lux Meter, respiratory system and circulatory system charts or models
Construction: Ventilation design in tunneling
- Point and indicator diagram for construction power supply
- Flow chart of any construction activity'
- HIRA of any sequential construction activity
- Procedures to obtain BOCW REGISTRATION IN FLOW CHART
- Applicable laws in building construction activity
- Maintenance of housekeeping in work site

Field project / Experiential Learning :

1. Objectives and Goals

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- **Application of Knowledge:** Opportunities for students to apply theoretical knowledge to practical scenarios in industrial safety.

2. Preparation and Planning

- **Pre-Internship Training:** Orientation sessions covering company policies, safety protocols, and internship expectations.
- **Project Assignment:** Assigning specific pr tasks related to industrial safety that students will work on during their internship.
- **Mentorship:** Introduction to the assigned mentor or supervisor who will guide the student throughout the internship.

3. Core Activities

- **Safety Audits and Inspections:** Participation in safety audits and inspections, including preparation, execution, and reporting.

- **Risk Assessment:** Conducting risk assessments for different work processes and environments, identifying hazards, and suggesting control measures.
- **Compliance Checks:** Assisting with the review and ensuring compliance with safety regulations, standards, and company policies.
- **Emergency Response:** Involvement in emergency preparedness and response activities, including drills and simulations.
- **Safety Training:** Assisting in the development and delivery of safety training programs for employees.
- **Documentation and Reporting:** Preparing and reviewing safety documentation, incident reports, and compliance records.
- **Safety Projects:** Working on specific safety projects or initiatives, such as safety improvement plans or new safety protocols.

4. Weekly/Monthly Reports

- **Reports:** Regular submission of reports detailing activities undertaken, insights gained, and challenges faced.
- **Reflection:** Reflecting on learning experiences and how they relate to academic concepts and industrial practices.

5. Mentorship and Supervision

- **Regular Meetings:** Scheduled meetings with the mentor or supervisor to discuss progress, address issues, and receive feedback.
- **Performance Evaluation:** Ongoing evaluation of the student's performance, including adherence to safety protocols, quality of work, and professional behavior.

6. Practical Exposure

- **Site Visits:** Exposure to different industrial environments, safety practices, and safety equipment.
- **Case Studies:** Analysis of real-world case studies involving safety incidents and the application of corrective measures.

7. Final Report and Presentation

- **Final Report:** Completion of a final report related to industrial safety, such as a comprehensive safety audit, risk assessment report, or safety improvement proposal.
- **Presentation:** Presentation of the final project to supervisors, mentors, and possibly other stakeholders, including a Q&A session.

8. Assessment and Evaluation

- **Performance Evaluation:** Formal evaluation of the student's performance based on their work, participation, and learning outcomes.
- **Feedback:** Collection of feedback from the mentor or supervisor on the student's strengths and areas for improvement.
- **Internship Report:** Submission of a detailed internship report summarizing the experience, tasks completed, and key learnings.

9. Certification and Documentation

- **Completion Certificate:** Issuance of an internship completion certificate by the host organization.
- **Documentation:** Compilation of all relevant documents, including the internship report, project findings, and feedback received.

10. Post-Internship Reflection

- **Reflection Session:** A session to reflect on the overall internship experience, including what was learned, how it applies to future career goals, and areas of interest for further development.

This syllabus ensures that students gain practical experience in industrial safety, applying their knowledge in real-world settings while developing essential skills for their professional careers.

Format of question paper with marking scheme
PG Diploma in Industrial Safety,
Examination Semester
(Paper-No.)

Time:

Total Marks: 60

Instructions:

- 1.All questions are compulsory
2.Marks in the bracket indicate full mark

Write Short Notes on (Any 4) 4*5 (20)

- (5)
- (5)
- (5)
- (5)
- (5)
- (5)

Q.2 Write Short Essay on any two	10*2	(20)
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- a) (10)
b) (10)
c) (10)

Q3,. Write long essay on any one 20*1 20

- a) (20)
- b) (20)

