Maharashtra State Board of Technical Education, Mumbai

Teaching and Examination Scheme

Programme Name : Advanced Diploma in Industrial Safety

Programme Code : IT **With Effect From Academic Year: 2023 - 24**

Duration of Programme : One Year (Two Semesters) **Pattern : Semester (Full Time)** **Duration : 16 Weeks**

Semester : First **Scheme : I**

S. N.	Course Title	Course Abbreviation	Course Code	Teaching Scheme			Credit (L+T+P)	Examination Scheme													Grand Total
								Theory								Practical						
								Exam Duration in Hrs.	ESE		PA		Total			ESE		PA		Total		
				L	T	P			Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks		Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	
a	b	c	d	e	f	g	h(e+f+g)	i	j	k	l	m	n(j+l)	o		p	q	r	s	t(p+r)	u	v(n+t)
1	Industrial Safety Management, Quality Control in Occupational Safety and Health	ISM	28040	3	--	2	5	--	--	--	--	--	--	--		50@ $	25	50	25	100	50	100
2	Occupational Safety and Health Legislation	OSH	28126	3	2	--	5	1.5	70*#	35	30*	00	100	50		--	--	--	--	--	--	100
3	Chemical and Process Safety Management	CPS	28127	4	2	--	6	1.5	70*#	35	30*	00	100	50		--	--	--	--	--	--	100
4	Industrial Hygiene and Occupational Health	IHO	28041	3	--	4	7	--	--	--	--	--	--	--		50#$	25	50	25	100	50	100
5	Environment Management	EGE	28042	3	--	4	7	--	--	--	--	--	--	--		50@ $	25	50	25	100	50	100
			Total	**16**	**04**	**10**	**30**	--	**140**	--	**60**	--	**200**	--		**150**	--	**150**	--	**300**	--	**500**

Student Contact Hours Per Week: **30 Hrs.** **Theory and practical periods of 60 minutes each.** Medium of Instruction: **English** Total Marks : **500**

Abbreviations: ESE- End Semester Exam, PA- Progressive Assessment, L - Lectures, T - Tutorial, P - Practical

@Internal Assessment, # External Assessment, *# On Line Examination

* The average of 2 test to be taken during the semester for the assessment.

#$ External PR ESE and average of 2 Skill tests / Practicals.

@$ Internal PR ESE and average of 2 Skill tests / Practicals.

If student remaining absent in PR-ESE shall be considered as ABSENT in PR-ESE.

- **Candidates not securing minimum marks for passing the "PA" part of practical of any course is declared as "Detained" for that semester.**
- **During Internship and Project period students shall attend Institute one day in a week to meet the mentor and appraise about the progress. The log book, Project Diary and Internship performance shall be recorded by the mentor for progressive assessment.**

Maharashtra State Board of Technical Education, Mumbai

Teaching and Examination Scheme

Programme Name : Advanced Diploma in Industrial Safety

Programme Code : IT **With Effect From Academic Year: 2023 - 24**

Duration of Programme : One Year (Two Semesters) **Pattern : Semester (Full Time)** **Duration : 16 Weeks**

Semester : Second **Scheme : I**

S. N.	Course Title	Course Abbreviation	Course Code	Teaching Scheme			Credit (L+T+P)	Examination Scheme													Grand Total
								Theory							Practical						
								Exam Duration in Hrs.	ESE		PA		Total		ESE		PA		Total		
				L	T	P			Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	
a	b	c	d	e	f	g	h(e+f+g)	i	j	k	l	m	n(j+l)	o	p	q	r	s	t(p+r)	u	v(n+t)
1	Construction Safety	CTS	28214	3	2	--	5	1.5	70*#	35	30*	00	**100**	50	--	--	--	--	--	--	**100**
2	Safety in Engineering Industries	SEI	28215	3	--	4	7	1.5	70*#	35	30*	00	**100**	50	50@	25	50	25	**100**	50	**200**
3	Project	PIT	28084	--	--	8	8	--	--	--	--	--	--	--	50#	25	50	25	**100**	50	**100**
4	Industrial Training	IAI	28715	--	--	10	10	--	--	--	--	--	--	--	100#	50	100	50	**200**	100	**200**
			Total	**06**	**02**	**22**	**30**	--	**140**	--	**60**	--	**200**	--	**200**	--	**200**	--	**400**	--	**600**

Student Contact Hours Per Week: **30 Hrs.** **Theory and practical periods of 60 minutes each.** Medium of Instruction: **English** Total Marks : **600**

Abbreviations: ESE- End Semester Exam, PA- Progressive Assessment, L - Lectures, T - Tutorial, P - Practical

@Internal Assessment, # External Assessment, *# On Line Examination

* The average of 2 test to be taken during the semester for the assessment.

#$ External PR ESE and average of 2 Skill tests / Practicals.

@$ Internal PR ESE and average of 2 Skill tests / Practicals.

If student remaining absent in PR-ESE shall be considered as ABSENT in PR-ESE.

- **Candidates not securing minimum marks for passing the "PA" part of practical of any course is declared as "Detained" for that semester.**
- **During Internship and Project period students shall attend Institute one day in a week to meet the mentor and appraise about the progress. The log book, Project Diary and Internship performance shall be recorded by the mentor for progressive assessment.**

Note : The Institute is required to sign MOU with related local authories for Industrial Training/Internship

PROGRAMME NAME : **ADVANCED DIPLOMA IN INDUSTRIAL SAFETY**
PROGRAMME CODE : **IT**
SEMESTER : **FIRST**
COURSE TITLE : **INDUSTRIAL SAFETY MANAGEMENT, QUALITY CONTROL IN OCCUPATIONAL SAFETY AND HEALTH**
COURSE CODE : **28040**

1. RATIONALE

To inculcate the Management Principles and Techniques for Good Practices of Safety, Health and Environment (SHE). Aim to equip the student with skills and techniques for preventing accidents and minimising losses.

2. COMPETENCY

Equipping students with skills and techniques for:

- Accident prevention program.
- Safety Training & Behavior Based Safety.
- Learn methods of measurement of safety indices as per IS 3786.
- Develop the work permit system.
- Learn the techniques of Hazard Identifications.
- Know the process of safety audit.
- Understand Major accident hazard & its control measures

3. COURSE OUTCOMES

- Basic knowledge of Leadership
- PDCA Cycle
- Importance of reporting unsafe Act/ Unsafe Condition and Near miss. Importance of Henrich triangle and Dominos theory.
- Accident Investigation techniques
- Organization Safety performance.
- Onsite emergency plan
- Safety Audits

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme			Credit	Examination Scheme													
				Theory							Practical						
L	T	P	(L+T+P)	Paper Hrs.	ESE		PA		Total		ESE		PA		Total		
					Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	
3	-	2	5	-	-	-	-	-	-	-	50@$	25	50	25	100	50	

(*): Under the theory PA, 30 marks is the average of 2 class tests of 30 marks each to be taken during the semester for the assessment.

***(#$) or (@$)** : Under the practical ESE - 50 Marks (100%)*

1) 30 Marks (60%) - For Practical – ESE
2) 20 Marks (40%) - Average of 2 Skill tests / Practicals of 30 marks each is to be conducted during the semester, and then should be converted to 20 marks.

Note: If student Remaining absent in PR-ESE shall be considered as ABSENT in PR-ESE

***Legends: L**-Lecture, **T** – Tutorial/Teacher Guided Theory Practice, **P** –Practical, **ESE** -End Semester Examination, **PA** - Progressive Assessment*

*@Internal Assessment, #External Assessment, *#Online Examination*

5. LIST OF PRACTICALS/ EXERCISES/ ASSIGNMENTS/ CASE STUDIES

Sr. No.	Name of Practical/ Exercise/ Assignment/ Case Study
1	Safety : Education and Training
2	Write SOP on Safety Training Identification, Imparting and Evaluation. It shall include Broad annual training Calendar, training topics, target training hrs. per employees, review of training programs, methods and strategy.
3	Employees Participation in Safety
4	Describe in details various forums/ platforms for employee's participation in safety. Evaluate any two such forums for its effectiveness.
5	Prepare a check list for observer in Behavior Based Safety and explain the steps involved in BBS.
6	Design an Accident reporting and investigation format.
7	Prepare a model on Henrich Triangle and Dominos theory.
8	Prepare a broad list of Leading and Lagging indicators in Safety.
9	Prepare a Fish bone diagram for given industrial accident case study.
10	Prepare a checklist for Safety Audit based on IS14489 focusing on Safety.
11	Write in details Different types of safety audits and its applicability
12	Write in details various requirement/ provisions for Major Accident Hazard unit prescribed in MSIHC Rules, 1989.
13	Describe in details ILO Code of Practice for Major Accident Control.
14	Prepare On site Emergency plan -giving details about its contents.

6. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to attain the identified competencies.

Unit	Topic and Contents	Hours
I	**Introduction** Management Principles, Levels of Management-Lower, Middle and Top, Types of Management – Line and Staff, Authority, Accountability and Responsibility of Management. Span of Management, Delegation and decentralization of authority. **Role of Management in Industrial Safety** Planning for Safety- Definition, Purpose, Nature, Scope and Procedure. Range of planning, Types of plans, Management By Objectives (MBO), Policy formulation and implementation **Directing Safety** Definition, process, principles and techniques, Leadership – Styles, Role, functions and attributes of a good leader. **Communication** Purpose, process, types and channels of communication Process. Group-dynamics and Team building. **National Policy on Safety, Health and Environment at Workplace.**	08
II	**Safety - Education and Training** Element of training cycle, Training Need Assessment. Techniques of training, design and development of training programs/module. Training methods and strategies, Types of training. Evaluation and review of training programs. Competence Building Technique (CBT), Role of Multi-Media, Communication, Applications of Computers. **Employee Participation in Safety** Purpose, areas of participation, methods. Role of trade union in Safety Health and Environment Protection, Safety Committee - Structure and functions. Tool Box Talks, Safety Kaizen, One Point Lessons, etc.	08
III	**Behavior Based Safety (BBS)** Human behavior - Individual differences, causes of behavior changes, behavior as function of self and situation, perception of danger and acceptance of risk, knowledge, and responsibility vis-a-vis safety performance, theories of motivation and their application to safety, role of supervisors and safety departments in motivation, Protocol for usage of Mobile. **Conflict & Frustration** Identification of situations leading to conflict and frustration and techniques of management. **Management Information System (MIS)** Sources of information on Safety, Health and Environment. Compilation and collation of information, Analysis & use of modern methods of programming, storing and retrieval of information for Safety, Health and Environment. Computer utilization in Safety, Health and Environment (SHE) and SHE software development.	08

Unit	Topic and Contents	Hours
IV	**Accident Prevention** Principles of Accident Prevention/Program/Plan, Theories of Accident Causation, Need of Accident Prevention, Causes of Accident, Accident Prevention Models - Heinrich Theory, Frank Bird Model, Domino Model. Motivation for Safety, Accident Proneness, Accident Cost-Direct & Indirect. Role of Supervisor in Accident Prevention, Role of Workmen, Role of Management, Role of Trade Union, Role of Factory Medical Officer, Role of Safety Officer. **Industrial Accidents & Classification of industrial accidents and special cases according to IS-3786** Classification of accidents as per IS-3786:1983, Assessment of special cases: Inguinal hernia, Back injury, Aggravation of pre-existing condition, Aggravation of a minor injury, Cardio-vascular diseases, Miscellaneous, Other disabilities **Accident/incident analysis** Methods of collating and tabulating data, Record-keeping, Accident/ incident/ occupational illness trend analysis/ Fish Bone diagram **Safety performance indicators** Frequency Rate (FR), weighted frequency rate, Severity Rate (SR), incidence rate, Frequency-Severity Index (FSI), Safe-T-Score, cost factor, cost severity rate, activity rate, Fatal Accident Frequency Rate (FAFR), time charges in the Employee's Compensation Act, 1923, Leading & Lagging indicators.	**08**
V	**Occupational Health and Safety Audits** Occupational health and safety audits IS-14489: 1998, Different types of audits: Internal, External audits and Integrated Management System (IMS) ISO 45001:2018	**08**
VI	**Major Accident Hazards (MAH) Control System** Major Accident Control, Definition of major accident hazards, Identification and assessment of MAH installations, Roles of Government, Management, Local Authorities and Public, ILO Code of Practice for major accident control. **Emergency Preparedness and response plans** On-site emergency response plan, Off-site emergency response plan Mutual Accident Response Group (MARG), Major accident control system at local, state, national and international levels. Table talk exercise on Mock Drills on topics viz. Fire / Electrical Shock / Structural Collapse / Fall from Height / Sand Storm / Earthquake / Snakebite / Terrorist Attack / Reactor Blast / Boiler Blast / Road Safety / CPR / Any other related to industries.	**08**
Total		**48**

7. SUGGESTED LEARNING RESOURCES

Sr. No.	Title	Author	Publication
1	Industrial Accident Prevention	H.W. Heinrich, Dan Petersen, and Nestor Roos	McGraw-Hill Book Company, New York / New Delhi
2	Accident Prevention Manual for Industrial Operations (ISBN: 978-08-7-912024-5)	---	National Safety Council 1121, Spring Lake Drive, Itasca, Illinois 60143 (USA)
3	Prevention of Major Industrial Accidents (ISBN: 92-2-107101-4)	---	International Labour Office (ILO), Geneva (Switzerland)
4	Loss Control Management (ISBN: 0-8247-8479-0)	Frank E. Bird, Jr. & Robert G. Loftus	Institute Press, Loganville, Georgia (USA)
5	Management Guide to Loss Control	Frank E. Bird, Jr.	Institute Press, Loganville, Georgia (USA)
6	Techniques of Safety Management (ISBN: *978-18-8-558139-6)*	Dan Petersen	McGraw-Hill Book Co. Ltd., New York, N.Y. (USA)
7	A Course in Industrial Safety	K.U. Mistry	NKM Publishers, Ahmedabad

PROGRAMME NAME : ADVANCED DIPLOMA IN INDUSTRIAL SAFETY
PROGRAMME CODE : IT
SEMESTER : FIRST
COURSE TITLE : OCCUPATIONAL SAFETY AND HEALTH LEGISLATION
COURSE CODE : 28126

1. RATIONALE

To acquaint the student with National and International Acts, Rules, Conventions pertaining to Safety, Health and Environment.

2. COMPETENCY

The student will be able to:

- Know various safety statutory requirements under Factories Act and its rules.
- Learn safety provisions under BOCW Act & Rules.
- Know safety statutory requirements under various SHE Legislations.
- Know the important measures in Social Security Legislations.
- Know the safety related ILO conventions & recommendations.

3. COURSE OUTCOMES

- Basic Understanding of Factories Act / Maharashtra Factory Rules/ Fire Prevention Act. Difference between Acts and Rules
- Understanding of Labor laws such as ESIC/ Work Man Compensation Acts
- Understanding of various act on engineering safety such as Boilers law, Gas Cylinder rules, Indian Electricity Act.
- Understanding on ILO (International Labor Organization).

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme			Credit	Examination Scheme											
				Theory							Practical				
L	T	P	(L+T+P)	Paper Hrs.	ESE		PA		Total		ESE		PA		Total	
					Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
3	2	-	5	1.5	70*#	35	30*	00	100	50	-	-	-	-	-	-

(*): Under the theory PA, 30 marks is the average of 2 class tests of 30 marks each to be taken during the semester for the assessment.

***(#$) or (@$)** : Under the practical ESE - 50 Marks (100%)*
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Note: If student Remaining absent in PR-ESE shall be considered as ABSENT in PR-ESE

***Legends:** L-Lecture, T – Tutorial/Teacher Guided Theory Practice, P –Practical, ESE -End Semester Examination, PA - Progressive Assessment*

*@Internal Assessment, #External Assessment, *#Online Examination*

5. TUTORIAL ASSIGNMENTS

Tutorials should be planned to enhance learning. The faculty shall decide suitable assignments minimum one per unit based on the curriculum.

Sr. No.	Name of Assignment
1	List out the Occupational Health Provision under FA 1948/MFR 1963
2	Identify the duties of Occupier under FA 1948
3	List out the key statutory provisions under BOCW Act/ Rule
4	Duties of Safety officer
5	Provisions of Boilers Act
6	Provisions on ESIC / Workman Compensation Act
7	Provisions on Petroleum Act and Rules

6. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to attain the identified competencies.

Unit	Topic and Contents	Hours	Marks
I	**The Factories Act, 1948** and the rules made under it, The Building and Other Construction Workers (BOCW) (Regulation of Employment and Conditions of Service) Act, 1996, Construction and Demolition Rule 2016 & as amended The Dock Workers (Safety, Health and Welfare) Act, 1986; The Mines Act, 1952; Maharashtra Fire Prevention and Life Saving Act, 2007; Registration, license, Occupational safety, health provisions in all above acts with punitive provisions. All the rules made there under at center and state level for all above acts	08	10
II	**The Contract Labour** (Regulation and Abolition) Act, 1970; The Inter-State Migrant Workmen (Regulation of Employment and Conditions of Service) Act, 1979; and the rules made there under at center and state level for all above acts. The importance, merits and demerits of Occupational Safety, Health and Working Conditions Code, 2020. Post enforcement importance of the code in relation to previous acts in OSH sector of industry	08	12
III	**Social Security Legislations** The Employee's Compensation Act, 1923; The Employees' State Insurance Act, 1948; The Employees' Provident Funds and Miscellaneous Provisions Act, 1952; The Maternity Benefit Act, 1961; The Payment of Gratuity Act, 1972; Public Liability Insurance Act, 1991 and the rules made there under at center and state level for all above acts. The importance, merits and demerits of the Social Security code 2020 Post enforcement impot of the code in relation to previous acts in Social Security sector of industry	08	12
IV	**Occupational, Safety & Health (OSH) related Important Legislation: Provisions pertaining to SHE** Indian Boilers Act, 1923 with allied Regulations, 1961, Indian Electricity Act, 2003 and Rules, latest CEA guidelines, Indian	08	12

Unit	Topic and Contents	Hours	Marks
	Explosives Act, 1984 and Rules. Petroleum Act and Rules, Gas Cylinders Rules. Calcium Carbide Rules, The Insecticides Act and Rules. Radiation Protection Rules, Hazardous Materials Transportation Rules, Static and Mobile (Unfired) Pressure Vessel Rules, 1981 as amended in 2000, Dock Safety Rules as amended		
V	**Motor Vehicles Act, 1988 and Rules** The Central Motor Vehicles Rules, 1989, The Maharashtra Motor Vehicles Rules, 1989, Transport of Hazardous Goods by Road Rules. Brief on IMDG and IATA rules as amended	08	12
VI	**ILO Convention and Recommendation concerning Occupational Health & Safety** Relevant Conventions and Recommendation of ILO in the furtherance of Safety, Health and Environment (SHE). SHE a human right issue. Trade Policy affecting OHS.	08	12
Total		**48**	**70**

7. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Factories Act/ MFR / Fire Prevention etc.	08	03	04	03	10
II	Contract Labor / Interstate Migrant Worker	08	03	06	03	12
III	Social Security Legislations	08	03	06	03	12
IV	OSH Related Various Statutory Requirements	08	03	06	03	12
V	Motor Vehicle Act	08	03	06	03	12
VI	ILO	08	03	06	03	12
Total		**48**	**18**	**34**	**18**	**70**

Legends: *R-Remember, U-Understand, A-Apply and above (Bloom's Revised taxonomy)*
Note*: The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary from above table.*

8. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

The latest amendments to the Sections and Rules pertaining to the Safety and Health legislation shall be considered as a part of curriculum.

9. SUGGESTED LEARNING RESOURCES

Sr. No.	Title	Author	Publication
1	The Factories Act, 1948 & Factories Rules	--	Labour Law Agency
2	The Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996, and Central Rules, 1998 and State Rules	--	Labour Law Agency
3	Employees Compensation Act, 1923 and Rules	--	Bare Act
4	Indian Electricity Act, 2003 and Rules CEA guidelines, Indian Explosives Act, 1984 and Rules.	--	Bare Act
5	The Petroleum Act & Rules	--	Bare Act
6	The Dock Workers (Safety, Health & Welfare) Act 1996 and Rules and Regulations.	--	Bare Act
7	Indian Boilers Act, 1923 with allied Regulations, 1961.	--	Bare Act
8	The Maharashtra Fire Prevention and life Safety Measures Act 2006 and Rules	--	Labour Law Agency

PROGRAMME NAME : ADVANCED DIPLOMA IN INDUSTRIAL SAFETY
PROGRAMME CODE : IT
SEMESTER : FIRST
COURSE TITLE : CHEMICAL AND PROCESS SAFETY MANAGEMENT
COURSE CODE : 28127

1. RATIONALE

Study the nature and functions of chemicals, chemical processes, receiving, storage and handling of chemicals and study and understand the process safety requirement to carry out the unit process & operations safely and implement the layers of protection to prevent catastrophic disaster.

2. COMPETENCY

Once person studies the subject, he will be competent enough to have a basic knowledge on Chemical process, hazardous goods and Safety precautions on its storage, transport and disposal etc.

He will have a basic knowledge about TWA, STEL, HAZCEM, TREM CARD, MSDS etc.

3. COURSE OUTCOMES

Prevention and control of fire, explosion, unintended release of flammable/toxic gases and imminent harm to health, community, property and environment.

The student will be able to:

- Perform his duties effectively as a Safety Professional
- Understand the Chemical Hazards and its control measures and understand Risk Based PSM elements. Learn hazards & safety measures in Unit Process & operations.
- Learn the techniques of HAZOP Study, What if analysis & QRA, Process Safety Study- ARC, DSC, Dust Hazard Analysis, SIL, SIF, Pressure Safety and LOPA
- Learn from Major Industrial disasters- case studies, Fire Safety management, Pressure hazards & controls and the safe chemical handling & its management techniques.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme			Credit	Examination Scheme											
				Theory						Practical					
L	T	P	(L+T+P)	Paper Hrs.	ESE		PA		Total		ESE		PA		Total	
					Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
4	2	-	6	1.5	70*#	35	30*	00	100	50	-	-	-	-	-	-

(*): Under the theory PA, 30 marks is the average of 2 class tests of 30 marks each to be taken during the semester for the assessment.

***(#$) or (@$)** : Under the practical ESE - 50 Marks (100%)*
1) 30 Marks (60%) - For Practical – ESE
2) 20 Marks (40%) - Average of 2 Skill tests / Practicals of 30 marks each is to be conducted during the semester, and then should be converted to 20 marks.

Note: If student Remaining absent in PR-ESE shall be considered as ABSENT in PR-ESE

Legends: ***L****-Lecture,* ***T*** *– Tutorial/Teacher Guided Theory Practice,* ***P*** *–Practical,* ***ESE*** *-End Semester Examination,* ***PA*** *- Progressive Assessment*

*@Internal Assessment, #External Assessment, *#Online Examination*

5. TUTORIAL ASSIGNMENTS

Tutorials should be planned to enhance learning. The faculty shall decide suitable assignments minimum one per unit based on the curriculum.

Sr. No.	Name of Assignment
1	List the precautions of Sampling of liquefied flammable gas
2	Make a checklist for Safe unloading of a flammable liquid tank-lorry with respect to Regulatory requirement into CMVR 1989 (Sec 129 to Sec 137)
3	Explain the different types of pressure relief systems provided in your plant
4	Explain the fire-fighting systems provided in your plant
5	Statutory requirements for pressure vessels
6	Zone and Division concept with respect to Hazardous Area Classification.
7	Fire Fighting system for a flammable hydrocarbon storage tank
8	Safety precautions for storage and transportation of LPG
9	Safety precautions to prevent static generation and preventive measures to be adopted
10	Preparing a reactor for confined space entry for repair work

6. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to attain the identified competencies.

Unit	Topic and Contents	Hours	Marks
I	**Emergency Preparedness and Response (EPR) Plan**- Type of Emergencies, On Site EPR and Off Site EPR and Business Continuity Plan (BCP).	08	10
II	**Safe Storage & Handling of Chemicals, Loading-unloading and Transportation of Chemicals.** Safety in receiving, storage and handling of chemicals, Nitrogen blanketing of flammable liquid storage tanks, Use of Safety Data Sheets (SDS) and understanding the terminology used in SDS and IS-17889:2022 guidelines to be followed, Chemical compatibility considerations Transportation of hazardous materials, Safety Precautions for transporting hazardous / toxic/ flammable/ explosive/ radioactive substances by all modes, U.N. classification of dangerous goods, HAZCHEM Code, Class Labels, Emergency Information Panel, TREM Cards, Off Site Emergency handling etc, Hazards in Loading & Unloading of Chemicals and Safety Measures. Transfer of chemicals by pipelines within and outside the installation (aboveground, underground and submarine), Pigging operation of pipelines including intelligent pigging.	08	12
III	**Process Safety Management (PSM)** Purpose of PSM, its elements and Risk-Based Process Safety Management (RBPSM): Process safety culture, Compliance with standards, Process safety competency, Workforce involvement,	16	12

Unit	Topic and Contents	Hours	Marks
	Stakeholder outreach, Process knowledge management, Hazard Identification and Risk Assessment (HIRA), Operating procedures, Safe work practices, Asset integrity and reliability, Contractor Management, Training and Performance Assurance, Management Of Change (MOC), Operational readiness, Conduct of operations, Emergency management, Incident investigation, Measurement and metrics, Auditing, Management review and continuous improvement. **Major Industrial Disasters (Case Studies)** Flixborough disaster (1974), Seveso dioxin disaster (1976), Mexico LPG tank farm fire and explosion (1984), Bhopal disaster (1984), Piper alpha disaster, LG Polymer (2020) etc. **Enhancing safety in chemical industry** Introduction to Concept : Criteria for siting and layout of chemical plants, Hazardous Area Classification (HAC), Layers Of Protection Analysis (LOPA), Instrumentation for safe and efficient operation of plants, Safety Integrity Level (SIL) & Safety Instrumented Function(SIF) etc **Unit operations and process hazards** Various unit operations and their associated hazards, Control, precautions and prevention, specific safety measures for certain Process industries like fertilizers, insecticides/ pesticides, petroleum refineries, pharmaceuticals, dusts, gases, vapor cloud formations and combating etc. Sampling techniques for toxic and flammable chemicals. Significance of Piping and Instrumentation Diagrams (P&ID) in Chemical Industry, Risk Assessment techniques- HIRAOC, JSA, HAZOP & What if etc Basic Concept of Chemical reactions/ Process Safety Studies- Accelerating Rate Calorimetry (ARC), Differential scanning calorimeter (DSC), Maximum Temperature of Synthetic Reaction(MTSR), and Dust hazard Analysis / Powder Safety Study- Minimum Ignition Energy (MIE), minimum ignition temperature (MIT), minimum explosive concentration (MEC), and limiting oxygen concentration (LOC) etc.		
IV	**Safety in plant operation and maintenance** Safe procedures for plant start-up and shut-down, Pipeline colour coding for identification of contents, Safety precautions for working on pipelines, Safety in preventive and emergency maintenance work, Pressure relief systems and breather valves, Flare system, Flame arrester, Mechanism of Mechanical Failure that lead to a Loss of containment. Prevention strategy. Safety in Start-up and Shutdown of Plant.	**08**	**12**
V	**Fire and Explosion :Safety Measures** Industrial fires, Dispersion modelling, Chemistry of fire (Fire Triangle and tetrahedron), Classification of fires, Deflagration and detonation, Unconfined Vapour Cloud Explosion (UVCE), Runaway reaction and control methods, Boiling-Liquid Expanding Vapour Explosion (BLEVE), Common causes of	**12**	**12**

Unit	Topic and Contents	Hours	Marks
	industrial fires, Dust explosion, factors of pentagon, causes of dust explosions and controls **Fire protection:** Design of building, plant, exits, etc. for fire safety, Fire-resistance of building materials, Fire-doors and firewalls, Determination of fire load, Dow Fire and Explosion Index, Salient features of fire, explosion and toxicity index **Fire detection and alarm system:** Various types of fire detection and alarm system, Special safety measures for control of fire and explosion in handling / processing of flammable gases, liquids, vapours, mists, solids, dusts and flying. **Fire-fighting systems:** Different types of portable fire extinguishers, their installation, periodic inspection and operation as per IS 2190/ IS 15683. Replacement of Halon with safer substitutes, Fire hydrant system, Fire monitors, sprinkler system and deluge system, Carbon-dioxide flooding system, Foam Pourer system		
VI	**Pressure System Hazards and Controls** Pressure vessels (unfired) codes of practices governing their safety, Assessment of reliability of pressure vessels and their testing, Inspection techniques for plants, reaction vessels, Checklist for routine inspection; checklist for specific maintenance. **Pressure System Hazards and Controls :** Principle of pressure system, Pressure, Hazards of steam, Mechanism of Steam explosion, Properties of Liquid Petroleum Gas, Liquefaction of gases for bulk storage under pressure, Pressure system, meaning of relevant fluids, key components and safety features of pressure system, Failure of pressure system, Hazards of overpressure and over temperature in pressure system, **Corrosion causes and protection** Corrosion and erosion, location, causes inspection and prevention, Cathodic protection of underground tanks/pipelines, Sacrificial anode, Protective cladding and lining	**12**	**12**
Total		**64**	**70**

7. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Emergency Preparedness and Response (EPR)Plan	08	03	03	04	10
II	Safe Storage & Handling of Chemicals, Loading-unloading and Transportation of Chemicals	08	04	04	04	12
III	Process Safety Management (PSM) And Safety In Chemical Industries	16	03	06	03	12
IV	Safety in plant operation and maintenance	08	03	03	06	12

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
V	Fire & Explosion –Safety Measures	12	06	03	03	12
VI	Pressure System Hazards and Controls	12	04	04	04	12
Total		**64**	**23**	**23**	**24**	**70**

Legends: *R-Remember, U-Understand, A-Apply and above (Bloom's Revised taxonomy)*
Note*: The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary from above table.*

8. SUGGESTED LEARNING RESOURCES

Sr. No.	Title	Author	Publication
1	Risk Based Process Safety By Center for Chemical Process Safety (CCPS), American Institute of Chemical Engineers (AIChE) (ISBN: 978-0-470-16569-0)	--	John Wiley & Sons Inc., Somerset, NJ (USA)
2	Loss Prevention in the Process Industries (Vol. 1, 2 & 3) (*ISBN:* 0-7506-1547-8)	--	Frank Lee (Vol 1,2,3)
3	Accident Prevention Manual (Vol. 1 & 2) (*ISBN*: 978-08-7-912135-8)	--	National Safety Council 1121, Spring Lake Drive, Itasca, Illinois 60143 (USA)
4	Accident Prevention Manual for Industrial Operations (ISBN: 978-08-7-912024-5)	--	National Safety Council 1121, Spring Lake Drive, Itasca, Illinois 60143 (USA)
5	Supervisors' Safety Manual (ISBN: 978-08-7-912288-1)	--	National Safety Council 1121, Spring Lake Drive, Itasca, Illinois 60143 (USA)
6	Prevention of Major Industrial Accidents (ISBN: 92-2-107101-4)	--	International Labour Office (ILO), Geneva (Switzerland)
7	Loss Prevention in the Process Industries (Vol. 1, 2 & 3) (*ISBN:* 0-7506-1547-8)	Frank P. Lees	Butterworth-Heinemann Waltham, Massachusetts (USA)
8	Chemical Process Quantitative Risk Analysis (*ISBN*-13: 978-08-1-690720-5)	--	Center for Chemical Process Safety, American Institute of Chemical Engineers, New York, N.Y. (USA)

Sr. No.	Title	Author	Publication
9	Loss Control Management (ISBN: 0824784790)	Frank E. Bird, Jr. & Robert G. Loftus	Institute Press, Loganville, Georgia (USA)
10	Management Guide to Loss Control (ISBN: *978-09-0-912600-1*)	Frank E. Bird, Jr.	Institute Press, Loganville, Georgia (USA)
11	Techniques of Safety Management (ISBN: *978-18-8-558139-6)*	Dan Petersen	McGraw-Hill Book Co. Ltd., New York, N.Y. (USA)
12	Transport of Dangerous Goods – Recommendations of the Committee of Experts of Transportation of Dangerous Goods (*ISBN:* 978-92-1-139136-7)	--	United Nations, New York, N.Y. (USA) National Safety Council
13	Agrochemicals Handbook (ISBN:978-08-5-186416-7)	Douglas Hartley and Hamish Kidd	Royal Society of Chemistry, University of Nottingham (U.K.)
14	The Merck Index – An Encyclopedia of Chemicals (ISBN:978-1-84973-670-1)	--	Merck & Company, Rahway, New Jersey, N.Y. (USA)
15	Hazardous Chemical Data Book (ISBN:081-551072-1)	G. Weiss	Noyes Data Corporation, Park Ridge, New Jersey, N.Y. (USA)
16	Threshold Limit Values for Chemical Substances in Work Environment Adopted by ACGIH (Published every year)	--	American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio (USA)
17	NIOSH Pocket Guide to Chemical Hazards By National Institute of Occupational Safety & Health (ISBN: 978-15-9-042586-2)	--	NIOSH publications
18	Industrial Safety and Environment (ISBN: 978-81-3-180454-4)	A.K. Gupta	Laxmi Publications, New Delhi

9. SOFTWARE/LEARNING WEBSITES

- https://www.aiche.org/
- https://www.csb.gov/investigations/completed-investigations/
- https://chemicalsafety.com/sds-search/
- https://jr.chemwatch.net/

PROGRAMME NAME : ADVANCED DIPLOMA IN INDUSTRIAL SAFETY
PROGRAMME CODE : IT
SEMESTER : FIRST
COURSE TITLE : INDUSTRIAL HYGIENE AND OCCUPATIONAL HEALTH
COURSE CODE : 28041

1. RATIONALE

The students get the knowledge of the health hazards and risk related to the occupational diseases and develop awareness in industrial health aspects.

2. COMPETENCY

The students will achieve the knowledge, skills and ability to understand and be aware of the industrial health aspects and management.

3. COURSE OUTCOMES

The student will be able

- To understand and recognize the health hazards and the risks of developing occupational diseases and prevention control against them.
- To bridge the gap between environment and safety while working in an industrial setup.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme			Credit	Examination Scheme													
				Theory							Practical						
L	T	P	(L+T+P)	Paper Hrs.	ESE		PA		Total		ESE		PA		Total		
					Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	
3	-	4	7	-	-	-	-	-	-	-	50#$	25	50	25	100	50	

(*): Under the theory PA, 30 marks is the average of 2 class tests of 30 marks each to be taken during the semester for the assessment.

***(#$) or (@$)** : Under the practical ESE - 50 Marks (100%)*
1) 30 Marks (60%) - For Practical – ESE
2) 20 Marks (40%) - Average of 2 Skill tests / Practicals of 30 marks each is to be conducted during the semester, and then should be converted to 20 marks.

Note: If student Remaining absent in PR-ESE shall be considered as ABSENT in PR-ESE

***Legends: L**-Lecture, **T** – Tutorial/Teacher Guided Theory Practice, **P** –Practical, **ESE** -End Semester Examination, **PA** - Progressive Assessment*

*@Internal Assessment, #External Assessment, *#Online Examination*

5. LIST OF PRACTICALS/ EXERCISES/ ASSIGNMENTS/ CASE STUDIES

Sr. No.	Name of Practical/ Exercise/ Assignment/ Case Study
1	To measure lungs capacity by Spirometer (PFT Test)
2	To measure the hearing loss by Audiometer
3	To measure vision testing by Snellen's chart
4	To measure the human stress by measuring Blood Pressure by BP Apparatus
5	Use of PPE – Respiratory and non-respiratory (Head to Toe)

Sr. No.	Name of Practical/ Exercise/ Assignment/ Case Study
6	Technique of applying CPR using Manikin
7	To identify the Chemical and Physical Hazards by Chart
8	To determine the toxic gases and hydrocarbon concentration by using Gas monitors or Gas Detector Tubes Eg. NH_3, SO_2, Cl_2, H_2S, Benzene and O_2 levels
9	Calibration of Air Sampling Equipment such as Rotameter / Personal Sampler / High Volume Sampler
10	To measure the Noise level by Sound level meter or Dosimeter
11	To measure the illumination level by Lux meter
12	To measure the Heat Stress by Dry bulb and Wet bulb temperature
13	To observe the radiation effect on human body after exposing the radiation by model / chart
14	To study the lungs respiratory system and heart blood circulation system
15	To study the Hazards controlled system and its identification by different controlled measures – model
16	To observe the ergonomical effect in human body by different types of jobs

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of experiments, as well as aid to procure equipment by authorities concerned.

Sr. No.	Equipment Name with Broad Specifications
1	Spirometer
2	Audiometer
3	Self-Contained Breathing Apparatus (SCBA)
4	CPR Manikin
5	Rotameter / Personal Sampler / High Volume Sampler
6	Sound level meter or Dosimeter
7	Lux Meter
8	Respiratory System and Circulatory System Charts or Models

7. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to attain the identified competencies.

Unit	Topic and Contents	Hours
I	**Ventilation and Heat Stress** Purpose of ventilation. Physiology of heat regulation. Thermal environment and its measurement. Indices of heat stress. Thermal limits for comfort, efficiency and freedom from health risk. Natural ventilation. Mechanical ventilation. Air conditioning. Control of heat exposures at source, dilution and local ventilation. Recommended values for air changes required for various areas as per Factories Act, 1948 and National Standards. **Industrial Lighting & Illumination** Purpose of lighting. Benefits of good illumination. Phenomenon of lighting and safety. Lighting and the work. Sources and types of artificial lighting. Principles of good illumination. Recommended optimum	08

Unit	Topic and Contents	Hours
	standards of illumination. Stroboscopic Effect, Design of lighting installation. Maintenance. IS Standards relating to lighting and color. **Noise and Vibration** Noise and ill-effect of noise on human health- Auditory & non-auditory, Measurement and evaluation of noise. Control of Noise Hazards- Noise absorption techniques, silencers. Permissible level of exposure to noise in Industry. Ill effects of vibration, White Fingers (Reynolds's phenomenon), and control measures of vibration.	
II	**Industrial Hygiene** Definition of Industrial Hygiene, Industrial Hygiene: Control Methods, Substitution, Changing the process, isolation, wet method, local exhaust ventilation, personal hygiene, housekeeping and maintenance, waste disposal, special control measures. Introduction to chemical hazards, dangerous properties of chemical, dust, gases, fumes, mist, vapours, smoke and aerosols. Effects of hazardous gases in various operations like confined space, fire, welding etc. on the body. Route of entry to human system, recognition, evaluation and control of basic hazards, concepts of dose response relationship, bio-chemical action of toxic substances. Concept of threshold, limit values TLV-TWA/ PEL /OEL, STEL, IDLH, LC_{50}, LD_{50} and air sampling strategies, personal exposure monitoring.	**08**
III	**Personal Protective Equipment** Need for personal protection equipment, selection, applicable standards, supply, use, care & maintenance respiratory and non-respiratory personal protective equipment. Non-respiratory personal protective devices: Head protection, Ear protection. Face and Eye protection. Hand protection, Foot protection, body protection. Respiratory personal protective devices : Classification of hazards: Classification of respiratory personal protective devices. Selection of respiratory personal protective devices. Instructions and training in the use, maintenance and care of self-containing breathing apparatus. Training in the use of breathing apparatus (opens circuits and close unit). Testing Procedures and Standards.	**08**
IV	**Occupational Health** Definition: As per WHO, Common Occupational Diseases, Occupations involving risk of contracting these disease - mode of causation of the diseases and its effects - diagnostic methods. Biological monitoring - Method of prevention Compensation for occupational diseases. List of notifiable diseases Third Schedule of Factories Act, 1948. Occupational Health Surveillance-Pre employment, Periodical, Post employment Medical examination. Specific Medical examinations for critical activities like working at Height, Confined space. **Occupational Health Hazards & Occupational Diseases** Adverse health effects of noise, vibration, cold, heat stress, improper illumination, thermal radiation, ionizing and non-lionizing radiations. Common Occupational Diseases as per the Third Schedule of the Factories Act, 1948 Preventive and control measures.	**08**

Unit	Topic and Contents	Hours
V	**First Aid** Define First Aid, Purpose, Principles of First aid, First Aider-Role & Responsibilities and Qualities. Fundamentals of First-Aid- for thermal burns & chemical burns, Fractures, Fainting, Shock, insects and animal bites, Suffocation, Toxic Ingestion - Bleeding Wounds and Bandaging, Artificial Respiratory, Cardiopulmonary Resuscitation (CPR), Techniques. Victim transportation, Rescue Techniques. First Aid Box and its contents.	08
VI	**Introduction to Ergonomics** Definition, Aims and Scope, Man-machine (Job), Environment System, Constituents of Ergonomics, Application of Ergonomics in industry for Safety, Health and Environment. Ergonomics of Automation/Assembly, Visual Fatigue and Ergonomics of Rehabilitation while assigning alternate jobs. Working postures Its effect on cardio-vascular and musculoskeletal system and implications on health, Anthropometry and fundamental of bio-mechanics. Concept of workstation and its design. Improving safety and productivity through work station design. Assessment of Work Capacity Fatigue and Rest Allowances. Physiological Test for Assessment of Occupational Health. Work and Physical Fitness Aerobic work capacity (physical work capacity), methods of its determination (use of bicycle, ergometer, treadmill, step-stool ergometer). Factors affecting aerobic capacity and work performance.	08
Total		**48**

8. SUGGESTED LEARNING RESOURCES

Sr. No.	Title	Author	Publication
1	AHA first aid and emergency management manual	--	--
2	Industrial Hygiene Simplified	Frank R. Spellman	Bernan press

9. SOFTWARE/LEARNING WEBSITES

- http://www.freesunpower.com
- https://www.instructables.com
- https://learn.adafruit.com/collins-lab-solar
- https://www.sciencedirect.com/
- https://www.energy.gov/energysaver/water-heating/solar-water-heaters

PROGRAMME NAME : ADVANCED DIPLOMA IN INDUSTRIAL SAFETY
PROGRAMME CODE : IT
SEMESTER : FIRST
COURSE TITLE : ENVIRONMENT MANAGEMENT
COURSE CODE : 28042

1. RATIONALE

Understand elements of Environment management system. Conceptual Learning technique and method of Abetment & Monitoring of Environment aspects. Application of Control measures keeping global perspective in consideration to Climate change.

2. COMPETENCY

Study of various Environmental Aspects as per various environmental laws such as EPA, Land Act, Water Act and Air Act.

3. COURSE OUTCOMES

Effective Management of Environmental system to protect & improve the Environment.

- Concept of Industrial Environment
- Learn tools methods of Environmental monitoring
- Acquire knowledge of data collection, presentation of data,
- Data analysis and presentation of samples.
- Learn sampling techniques, instrumental operations and trouble shooting
- Acquire techniques of waste management.
- Study techniques of Energy Conservation.
- MIS on Sustainability Reporting
- Understand global warming issue & its control measures

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme			Credit	Examination Scheme													
				Theory						Practical							
L	T	P	(L+T+P)	Paper Hrs.	ESE		PA		Total		ESE		PA		Total		
					Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	
3	-	4	7	-	-	-	-	-	-	-	50@$	25	50	25	100	50	

(*): Under the theory PA, 30 marks is the average of 2 class tests of 30 marks each to be taken during the semester for the assessment.

***(#$) or (@$)** : Under the practical ESE - 50 Marks (100%)*
1) 30 Marks (60%) - For Practical – ESE
2) 20 Marks (40%) - Average of 2 Skill tests / Practicals of 30 marks each is to be conducted during the semester, and then should be converted to 20 marks.

Note: If student Remaining absent in PR-ESE shall be considered as ABSENT in PR-ESE

***Legends:** L-Lecture, **T** – Tutorial/Teacher Guided Theory Practice, **P** –Practical, **ESE** -End Semester Examination, **PA** - Progressive Assessment*

*@Internal Assessment, #External Assessment, *#Online Examination*

5. LIST OF PRACTICALS/ EXERCISES/ ASSIGNMENTS/ CASE STUDIES

Sr. No.	Name of Practical/ Exercise/ Assignment/ Case Study
1	Methods for the Determination of Hazardous Characteristics of Wastes.
2	Determination of Environmental Pollution Index (EPI).
3	Determination of Air Pollution Index.
4	Determination of Soil Pollution Index.
5	To determine density of Stack emission gases / Stack height measurement
6	Treatability studies of Industrial waste effluents.
7	Monitoring of Air, Water and Soil Pollution,
8	Designing of Manual for Stack Monitoring System
9	Study Carbon Footprint of Product
10	Estimation of DO, BOD and COD from waste water.
11	Measurement of RSPM by using Respirable Dust Sampler.
12	Determination of SOx, NOx in ambient air by high volume sampler (HVS).

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of experiments, as well as aid to procure equipment by authorities concerned.

Sr. No.	Equipment Name with Broad Specifications
1	High Volume Sampler
2	Stack Monitoring Kit
3	Noise Level Meter
4	BOD Digester
5	COD Analyzer
6	Multi Gas Analyzer

7. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to attain the identified competencies.

Unit	Topic and Contents	Hours
I	**Environmental Impact Assessment & Environmental Audit** **Introduction to EIA** Concept of EIA within the frameworks of sustainable development. Process and Methodologies. The Eight Guiding Principles of EIA. Key elements of EIA: Screening, scoping identifying and evaluating impacts, mitigations. Detailed Procedure for conducts of public hearing Final Appraisal of project. Documentation of EIA **Environment Audit** Definition of environmental audit and its importance for industries. Environment Compliance Audit. Basic structure of audit. Elements of an audit process and its importance with respect to Form-V. Environment Audit in India – Development of environmental auditing in India, Requirements of Rule 14 for environmental audit under Environmental Protection Act, 1986.	08

Unit	Topic and Contents	Hours
II	**Environmental Management: EMS & LCA** Background and development of the ISO 14000 series of standards. International standards in environmental management. EMAS- European Union. Aspects and Impact of Environment Management, Environmental Policy, and Environment Management Programs EMS Audit- ISO 14001: 2015. Definition and scope, Goals and purposes of EMS, Planning, Implementation, Review and Improvement (Plan, Do, Check, Act model), Benefits of EMS- Environmental benefits, economic benefits, Costs associated with EMS. Life Cycle Analysis Definition, Goals and purpose, Stages in product LCA, Procedure for LCA, LCA uses and tools, Cradle to grave concept	08
III	**Solid & Hazardous Waste Management** **Municipal Solid Waste management in India:** Generation, Collection, segregation, Transportation, Transfer stations, processing and disposal. Assessment of existing situation & possible areas for improvement **Industrial solid waste management:** Pulp and paper, Sugar, thermal power station, textile, food processing, chemical industry etc. **Treatments and disposal:** Waste processing, Recovery of biological and chemical conversion products, composting, bio-methanation, incineration, sanitary landfills. **Biomedical waste management:** Define, scope, categorization, segregation, packaging/color coding and container used, treatment, transport and disposal, status in India. **Hazardous waste management:** Identification and sources, characteristics and categorization, Collection, segregation, packaging, labelling, transportation, risk assessment and waste management treatment and disposal, storage, Site selection criteria, manifest system and records, Indian scenario, Responsibilities of various authorities Six R-Concept: Rethink, Refuse, Reduce, Recycle, Reuse & Reprocessing/Co-processing of Waste. **E-waste management:** A growing problem, sources, segregation, collection, recovery of valuable materials, treatment and disposal methods. E Waste related regulatory requirements. **Plastic waste management-** types of plastic, sources, the problem of plastic waste, degradation of plastics, recycling & alternatives to plastic, Maharashtra Plastic Ban notification 2018 **Construction and demolition waste management**	08
IV	**Environment Acts And Rules** General: Need of laws, Importance of environmental legislation, National Environmental Policy Act (NEPA), Evolution of environmental laws in India • Water (Prevention and Control of Pollution) Act, 1974 • Air (Prevention and Control of Pollution) Act 1981 • Environment (Protection) Act, 1986 • Public Liability InsuranceAct,1991 • Bio-Medical Waste (Management & Handling) Rules,1998 • Recycled Plastics Manufacture and Usage Rules, 1999	08

Unit	Topic and Contents	Hours
	• Noise Pollution (Regulation and Control) Rules, 2000 • Municipal Solid Waste (Management and Handling Rules) 2000 • Biodiversity Act 2000 • The Hazardous Wastes (Management, Handling and Transboundary Movement) Rules,2008 as amended • Wetland Rules 2009 • National Green Tribunal Act 2010 • Coastal Regulation Zones (CRZ) Rules 2011. • E-waste Management and Handling Rules 2011 • Plastics Manufacture, Sale and Usage Rules, 2011 • Plastics Manufacture, Sale and Usage Rules, 2011 • Batteries Waste Management handling rules as amended.	
V	**Renewable & Non Renewable Energy** **Energy and Environment** Energy indicator for development: human development index, UN definitions. Comparison of energy consumption by different nations. Human energy requirement, Energy use pattern in different parts of the world and its impact on the environment; Energy use pattern in India. Sources of energy and their classification; Energy forms and transformation. Impact of Energy Systems on environment. **Fossil Fuels** Classification, composition, physiochemical characteristics; Energy content of coal, petroleum and natural gas; Formation, reserves, exploration/ mining and uses of Coal, Oil and Natural gas; Environmental problems associated with exploration / mining, processing, transportation and uses **Solar Energy Concept** Renewable Energy Integration and Decentralized Generation Systems. Harnessing of solar energy, Solar collectors and concentrators, Solar thermal energy, Solar electricity generation, Solar heaters, dryers, and cookers; Energy Storage Systems and Fuel Cells, Energy in Buildings, Energy Planning and Economics **Wind energy** Wind power, Harnessing of wind energy, Power generation – wind mills, concentrators, Wind energy potential in India. Numerical Methods and Computational Techniques, Wind Energy Conversion. Impact of wind energy system on environment. **Hydroelectricity** Principles of generation of hydroelectric power, hazard related to hydropower generation and distribution, environmental impact	08

Unit	Topic and Contents	Hours
VI	**Climate Change, Policy & Sustainability Understanding Climate Dynamics** Climate Change impacts and Protection policies Sectorial impacts of climate change: Impacts of Climate Change on Health, Agriculture, Water Resources, Biodiversity, Coastal Areas Regional Vs. Global changes Sector-wise Adaptation & Mitigation Measures **Climate Economics:** Carbon Sequestration; Role of agricultural land in carbon sequestration; Concept of Carbon footprint, carbon credits and carbon trading Concept of water footprint, water trading and its relationship to climate change India's take on Climate Change; Stakes of Developing and Developed Nations Mitigation measures at different scales – global, National, organizational, Individual **Sustainability Reporting:** Elements of Sustainability Reports, Purpose & advantages of Sustainability Reporting. Global Reporting Initiative (GRI) G 4 guidelines, Eco system, concept and structure, Monitoring and analysis of industrial effluents, Green Building Concept (GBC).	08
Total		**48**

8. SUGGESTED LEARNING RESOURCES

Sr. No.	Title	Author	Publication
1	Environmental Impact Assessment,	--	Canter R.L., McGraw Hill International Edition.
2	Preventive Environmental Management: An Indian Perspective	Dr. Shyam R. Asolekar & Dr. R. Gopichandran	--
3	Solid Waste Management: An Indian Perspective	M.S. Bhatt and AsherefIlliyan. 2012.	--
4	Renewable Energy – Environment and Development	M. Dayal	Konark Pub. Pvt. Ltd.
5	Solar Energy: Fundamentals and Applications	Garg & Prakash,	Tata McGraw-Hill Education, 2000

9. SOFTWARE/LEARNING WEBSITES

- http://www.envis.nic.in/
- https://www.unep.org/
- http://environmentclearance.nic.in/
- http://www.unfccc.int

PROGRAMME NAME : ADVANCED DIPLOMA IN INDUSTRIAL SAFETY
PROGRAMME CODE : IT
SEMESTER : SECOND
COURSE TITLE : CONSTRUCTION SAFETY
COURSE CODE : 28214

1. RATIONALE

Acquire knowledge of interaction of Man and Machine to maintain Hygiene and Health while working to prevent exposure to dangers.

2. COMPETENCY

Acquiring basic knowledge about safety process to be followed in Construction industries with accordance with BOCW Act and Rules & Labor laws.

3. COURSE OUTCOMES

- Pros and cons of interstate migrant labor in construction industries and impact on Deployment of safety culture in construction industry.
- Understanding of Safety Plan, HIRA, Work Permits, TBT, Work Method Statements, Flowcharts, Assembly points, emergency plans, Firefighting equipment's,
- Understanding on BOCW Act and rules.
- Understanding of various construction Activities such as demolition, Excavation, Shoring and Shuttering, piling , Confined space entry, Working at heights, scaffolds , Bending, Drilling, Cutting , Grinding, welding etc.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme			Credit	Examination Scheme											
				Theory						Practical					
L	T	P	(L+T+P)	Paper Hrs.	ESE		PA		Total		ESE		PA		Total	
					Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
3	2	-	5	1.5	70*#	35	30*	00	100	50	-	-	-	-	-	-

(*): Under the theory PA, 30 marks is the average of 2 class tests of 30 marks each to be taken during the semester for the assessment.

***(#$) or (@$)** : Under the practical ESE - 50 Marks (100%)*
1) 30 Marks (60%) - For Practical – ESE
2) 20 Marks (40%) - Average of 2 Skill tests / Practicals of 30 marks each is to be conducted during the semester, and then should be converted to 20 marks.

Note: If student Remaining absent in PR-ESE shall be considered as ABSENT in PR-ESE

***Legends: L**-Lecture, **T** – Tutorial/Teacher Guided Theory Practice, **P** –Practical, **ESE** -End Semester Examination, **PA** - Progressive Assessment*

*@Internal Assessment, #External Assessment, *#Online Examination*

5. TUTORIAL ASSIGNMENTS

Tutorials should be planned to enhance learning. The faculty shall decide suitable assignments minimum one per unit based on the curriculum.

Sr. No.	Name of Assignment
1	Ventilation design in tunneling.
2	Point and indicator diagram for construction power supply.
3	Flow chart of any construction activity.
4	HIRA of any sequential construction activity.
5	Procedures to obtain BOCW Registration in flow chart.
6	Applicable laws in building construction activity
7	Study-1- Accident due to collapse of scaffold- factor of safety and load calculation method.
8	Study-2: Accident due to failure of crane- crane load calculations and FS(factor of safety)
9	Study-3: Accident due to Electrical Failure.

6. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to attain the identified competencies.

Unit	Topic and Contents	Hours	Marks
I	**Socio-economic challenge of labor in Construction Industry** National Data of accidents in construction industry. Socio-economic challenges in construction industry due to accidents. Pros and cons of interstate migrant labor in construction industries and impact on Deployment of safety culture in construction industry. **Construction Management systems** Understanding main content of Construction Safety Manual, Safety Plan, Emergency preparedness plan and Traffic management plan. Method Statement contents – construction Activity Flow charts (diagram), Projections of HIRA with activities and Construction Training Matrix, etc Procedures to obtain Registration/Licensees under CLRA, ISMW and BOCW act under central and State.	08	10
II	**Construction safety a quantitative approach** Lift Plan with safe load Calculations, Scaffold erection and factor of safety calculation (dead weight and Live load calculation). H-Form Work (DOKA System), Scaffold types, IS 3696, IS 2750 Codes and TAG systems in scaffolds Construction power supply and single line diagram with load distribution.	08	12
III	**Construction Equipment** Safety in the use of construction machinery. Equipment inspection certificate and checklist, importance of third party certification and applicability. Competency of Driver of Equipment operator of various equipment like Earth Moving equipment, Railway wagons, motor trucks, Materials Vehicles, Hazardous Materials, Material handling equipment and Portable Electrical Equipment's etc.	08	12

Unit	Topic and Contents	Hours	Marks
IV	**Constriction Activity** Safety in Demolition and Excavation: Demolition- Planning, Permit and sequence of demolition. Impact of Demolition and danger to adjacent building, safety in Demolition using explosives and Implosion. Excavation and Trenching – Excavation and Trenching Procedures, underground utility identification procedures and technique, Types of underground utilities and utility detectors and associated hazards of excavation. Drill and Blast Method: safety in drill and blast method. License and authorization for explosive blasters. Shoring and shuttering: safety measure in Shoring and shuttering. Confined Space and Tunneling- confine space safety, tunneling for underground sections for metros and savage lines. Ventilation provisions safety measures in tunneling and confine space. Piling and Safety in using and operating machinery and equipment relating to the above works. Foundations: Plant & Machinery and Structure	08	12
V	**Vital Aspects of Construction Engineering** Working at height: Scaffolding, shuttering / form work, ladders, concrete, cofferdams and special operation connected with irrigation work. Safety on working on fragile roof. Precautions on Tower Cranes, Temporary installation and structures (such as Scaffolds and Ladders) Work Permit types, authority, responsibility and accountability procedures in construction Height Pass System, vertigo test acceptance and rejection parameters. Safety in Ladder, material types and Erection of Structures Safety in Welding & Gas Cutting, use FBA and safety measure in welding and cutting. Electrical work Permits/ LOTO system	08	12
VI	**Construction accidents reporting and investigation system** Define – Reportable accidents/ injury, Near miss incident reporting and investigation system. Reporting to enforcement authority and insurance formalities. Approach of Accident investigation in construction Industry through use of any tool of investigation techniques / Root Cause analysis. For example Why-Why analysis, fish bone, FTA etc. Importance of various training i.e. Tool box training (TBT), induction, on the job training etc, Safety Park, Visual controls etc.	08	12
Total		**48**	**70**

7. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Construction Management System	08	03	04	03	10
II	Construction Safety a Quantitative Approach	08	03	06	03	12
III	Construction Equipment	08	04	04	04	12
IV	Construction Activity	08	04	04	04	12
V	Vital Aspects of Construction Industries	08	03	06	03	12
VI	Approach of Accident Case study in Construction	08	04	04	04	12
Total		**48**	**21**	**28**	**21**	**70**

Legends: *R-Remember, U-Understand, A-Apply and above (Bloom's Revised taxonomy)*

Note*: The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary from above table.*

8. SUGGESTED LEARNING RESOURCES

Sr. No.	Title	Author	Publication
1	Construction Safety Handbook	V.J. Davies, K.Tomasin. Thomas Telford, London	--
2	Health And Safety Hazards In The Construction Industry	James L. Weeks	--
3	BOCW Act and Rules	--	Labour Law Agency

PROGRAMME NAME : ADVANCED DIPLOMA IN INDUSTRIAL SAFETY
PROGRAMME CODE : IT
SEMESTER : SECOND
COURSE TITLE : SAFETY IN ENGINEERING INDUSTRIES
COURSE CODE : 28215

1. RATIONALE

To study, understand and utilize knowledge pertaining to safe operations of different machineries & tools, Hot & cold process, Material handling, electrical energy & fire safety.

2. COMPETENCY

Engineering Safety Control measures at site with respect to various laws such as Factories Act/ MFR 1963. Safety precautions on various equipment's and tools.

3. COURSE OUTCOMES

- The learner shall identify hazards in machineries, tools, other process, and activities. He will be able to take corrective action to prevent accident.
- The learner will be able to achieve best safety performance by achieving Zero accident, incident with safe practices at work place.
- Basic knowledge about safety precautions needed while operating machineries, tools and various equipment's.
- How to maintain good housekeeping at site.
- Safety precaution while doing hot work.
- Safety precautions needed on DOCKS.
- Information about Destructive and Non-Destructive test.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme			Credit	Examination Scheme											
				Theory						Practical					
L	T	P	(L+T+P)	Paper Hrs.	ESE		PA		Total		ESE		PA		Total	
					Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
3	-	4	7	1.5	70*#	35	30*	00	100	50	50@	25	50	25	100	50

(*): Under the theory PA, 30 marks is the average of 2 class tests of 30 marks each to be taken during the semester for the assessment.

***(#$) or (@$)** : Under the practical ESE - 50 Marks (100%)*
1) 30 Marks (60%) - For Practical – ESE
2) 20 Marks (40%) - Average of 2 Skill tests / Practicals of 30 marks each is to be conducted during the semester, and then should be converted to 20 marks.

Note: If student Remaining absent in PR-ESE shall be considered as ABSENT in PR-ESE

***Legends: L**-Lecture, **T** – Tutorial/Teacher Guided Theory Practice, **P** –Practical, **ESE**,-End Semester Examination, **PA** - Progressive Assessment*

*@Internal Assessment, #External Assessment, *#Online Examination*

5. LIST OF PRACTICALS/ EXERCISES/ ASSIGNMENTS/ CASE STUDIES

Sr. No.	Name of Practical/ Exercise/ Assignment/ Case Study
1	Prepare a List of Hazards and Accident Control measures in Steel Industry.
2	Prepare a List of Hazards and Accident control measures in Automobile industry.
3	State and Justify how Housekeeping plays an important role in hot rolling mill Industry.
4	List complete setup of Fire Protection System in Malls and Cinema hall.
5	State different types of Occupational health hazards and safety measures in Sugar Industry.
6	Prepare a list of Housekeeping in Textile industry. Justify Housekeeping and Safety move hand to hand.
7	List out lifting tackles and lifting machines. Define hazards and preventive measures of each.
8	Define Standard Operating Procedure. Prepare SOP for Gas cutting, welding and Soldering operation.
9	Define Permit to Work system. List hazards and preventive measures for maintenance of CNC machine with Permit.
10	Define Heat Treatment process. Explain Angling and quenching process and list various hazards and preventive measures.
11	Prepare a List and state various Hazards and Safety measures at Dock.
12	Define Fire. Give classification of fire. State causes of fire in Engineering industry.
13	Define tool box meeting. Prepare a list of safety instructions while working at height for gas-cutting work.
14	Prepare a list for workplace safety In Engineering Industry with respect to activities performed. Define hazards and state preventive measures for following critical activities carried out in Engineering industries a. Shot blasting. b. Grinding c. ND Tests.
15	Give classification of Electrical areas. List criteria for selection, installation and maintenance
16	Define Static Electricity. Prepare list of associated hazards and state preventive measures.

6. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to attain the identified competencies.

Unit	Topic and Contents	Hours	Marks
I	**Machine Guarding** Principles in machine guarding. Ergonomics of machine guarding. Type of guards, their design and selection. Built-in-safety devices, maintenance and repairs of guards, incidental safety devices and tools. Concept of zero access guarding. **Safety in the use of Machines** Safety in the use of power presses (all types), shearing, bending, rolling, drawing, turning, boring, milling, shaping, planning,	08	10

Unit	Topic and Contents	Hours	Marks
	broaching, plating, grinding, CNC machine, robotics, wood working. Printing, rubber and printing machinery. **Safety in use of Hand tools and Power tools** Main Causes and Control of accidents in the use of hand tools and power tools. Centralized and personal tool issues System. Portable power tools and their selection, inspection, maintenance, repair and safe use. Non-sparking tool.		
II	**Material Handling and Storage** **Manual:** Kinetics of manual handling. Maximum loads that could be carried by an individual. Lifting and carrying of objects of different shapes, size and weight. Safe use of accessories for manual handling & Storage of materials. Safety in stacking and un-stacking, floor loading conditions. Layout condition for safety in storage, ergonomics of manual handling and storage. **Mechanical:** Lifting machinery, lifts and hoists. Design, use and care, signaling, inspection and maintenance. Safety in design and construction, operation, Inspection and maintenance of industrial trucks, lifting tackles and loose gears, conveyors. Safety features, safe working load for all mechanical material handling equipment. The competent persons in relation to safety legislation - duties and responsibilities.	**08**	**12**
III	**Plant Layout Design and Housekeeping** Plant layout, design, and safe distance. Need for planning and follow-up. **Safety and Good Housekeeping** 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. Benefits of good housekeeping. Inspection's checklists. Safety Check list for buying new machinery for the plant. Role of preventive maintenance in safety and health. **Boiler Operations** Hazards in boiler operations and safety measures for its operations. **Thermic Fluid Heaters Operations** Hazards in thermic fluid heaters operations and safety measures for its operations.	**08**	**12**
IV	**Electrical Hazards At Workplace** Hazards of electrical energy. Safe limits of amperages, voltages. Safe distance from lines. Capacity and protection of conductor. Joints and connections. Means of cutting off power. Overload and short circuit protection. No load protection. Earth fault protection. Earth insulation and continuity tests. Earthing Standards. Protection against voltage fluctuation. Types of protection for electrical equipment in hazardous atmosphere. Hazardous area classification. Criteria for selection, installation, maintenance and use of electrical equipment in hazardous area. **Static Electricity**	**08**	**12**

Unit	Topic and Contents	Hours	Marks
	Introduction, Electro-Static charge. Electrostatic dissipaters. Electrostatic hazards and their control. Earthing and bonding. Recommended earthling resistance. **Lightning Arrestors** Definition, lightning splash, lightning strokes, lightning protection systems. Characterization of health effects of lightening stroke (electrical effects, side flashers, thermal effects, mechanical effects. Function of lightning arrestors.		
V	**Introduction to Safety Aspects in Engineering Industries** Automobile Manufacturing activity like pattern making, melting, molding, machining, forging, chipping, grinding, Metallurgy. Ferrous and Non-Ferrous Industry Foundry, Steel Plant. Hazards associated with Process of melting (furnaces), casting, foundry, forging Hot & cold rolling operations, hazards and their control measures **Safety aspects in Hot work process** Welding, Gas Cutting, Brazing, Soldering, buffing, hazards and their preventive measures **Safety in Textile Industry** Processes and Various hazards in textile industries and their control measures. **Safety in Agro-Industry / Sugar Industry** Processes and Various hazards in agro/sugar industries and their control measures. **Safety in Docks Operations** Hazards in Handling of cargo – On Board Operations, On Shore and along Shore Operations, Warehouse Operations, Dangerous Goods, Container operations, lifting appliance, Loose Gears and wire ropes, Responsibility of different agencies for safety and health involved in dock work.	**08**	**12**
VI	**Destructive Testing, Non Destructive Testing and Heat Treatment** Break load test, Tensile Stress Load testing, etc. NDT-testing, significance and limitations. Types of NDT – Die Penetration Radiography, Ultrasound, Magnetic Particle Methods, Eddy-Current Method, Thermography and Heat Treatment: Hazards and preventive measures, Annealing, Normalizing and Quenching. **Safety in IT and Electronic Industry and Service Sector** Various hazards in IT, Electronic, related Service sectors and their control measures. **Various hazards in Malls, Cinema Halls, Parking Lots and Commercial Sectors, etc. - Preventive and Control measures.**	**08**	**12**
Total		**48**	**70**

7. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Machine's, Equipment, Tool Safety	08	02	04	04	10
II	Mechanical & Manual Material Handling	08	04	04	04	12
III	Safety in a Boiler industry and importance of Housekeeping	08	03	06	03	12
IV	Electrical Hazards At Workplace	08	03	06	03	12
V	Introduction to Safety Aspects in Engineering Industries	08	03	06	03	12
VI	Destructive Testing, Non Destructive Testing and Heat Treatment	08	04	04	04	12
Total		**48**	**19**	**30**	**21**	**70**

Legends: *R-Remember, U-Understand, A-Apply and above (Bloom's Revised taxonomy)*
Note*: The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary from above table.*

8. SUGGESTED LEARNING RESOURCES

Sr. No.	Title	Author	Publication
1	Safety in Engineering industry	A.K. Kulkarni	-
2	Factories Act 1948	--	Labour Law Agency, 49 and 58, Tardeo Air-conditioned market, Mumbai-400034
3	Occupational Safety, Health and Working conditions code 2020	--	--
4	Industrial Safety and Environment (ISBN: 978-81-3-180454-4)	A.K. Gupta	Laxmi Publications, New Delhi
5	Supervisors' Safety Manual (ISBN: 978-08-7-912288-1)	--	National Safety Council 1121, Spring Lake Drive, Itasca, Illinois 60143 (USA)
6	Prevention of Major Industrial Accidents (ISBN: 92-2-107101-4)	--	International Labour Office (ILO), Geneva (Switzerland)

PROGRAMME NAME : ADVANCED DIPLOMA IN INDUSTRIAL SAFETY
PROGRAMME CODE : IT
SEMESTER : SECOND
COURSE TITLE : PROJECT
COURSE CODE : 28084

1. RATIONALE

The main aim of the preparation of project on industrial safety is to judge the knowledge gained by the students during their tenure of the industrial safety programme, the transfer of learning that has taken place as well as their exposure to industrial environment and its safety; so that many faceted development of the students can be achieved under various skills of domains such as Personal, social, professional & lifelong learning. The students will be benefited lot by this exercise of preparation of project on their safety experiences which will certainly add values in their attitudes such as value for health, work commitment, hardworking, honesty, problem solving, punctuality, loyalty and independent study. The Student should also make a brief presentation about the project and the salient observations and findings.

2. COMPETENCY

Equipping students with skills and techniques for:

- Accident prevention program.

3. COURSE OUTCOMES

- Basic knowledge of Leadership

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme			Credit	Examination Scheme													
				Theory							Practical						
L	T	P	(L+T+P)	Paper Hrs.	ESE		PA		Total		ESE		PA		Total		
					Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	
-	-	8	8	-	-	-	-	-	-	-	50#	25	50	25	100	50	

(*): Under the theory PA, 30 marks is the average of 2 class tests of 30 marks each to be taken during the semester for the assessment.

***(#$) or (@$)** : Under the practical ESE - 50 Marks (100%)*
1) 30 Marks (60%) - For Practical – ESE
2) 20 Marks (40%) - Average of 2 Skill tests / Practicals of 30 marks each is to be conducted during the semester, and then should be converted to 20 marks.

Note: If student Remaining absent in PR-ESE shall be considered as ABSENT in PR-ESE

***Legends: L**-Lecture, **T** – Tutorial/Teacher Guided Theory Practice, **P** –Practical, **ESE** -End Semester Examination, **PA** - Progressive Assessment*

*@Internal Assessment, #External Assessment, *#Online Examination*

5. IMPLEMENTATION STRATEGY

Candidate should be assigned Project preferably individually or if at all not possible can form a group of maximum 3 members. Every candidate must maintain the weekly progress diary and the guide should review the progress and sign the diary regularly.

Every candidate has to submit **Synopsis Report** (of pages not more than 10) and deliver Two Presentations for the completion of the Project.

First Presentation of Synopsis - to the Internal Guide tentatively during Third Week of the Academic Term.

Second Presentation on complete Project - to be given to the Internal Guide during Second Class Test schedule.

Contents of the Synopsis - It should include the following points

1. Cover Page of the Synopsis (Title of the Project, Student and Guide Details, Institute Name, Academic Year, Maharashtra State Board of Technical Education, Mumbai)
2. Index
3. Introduction
4. Need of the Project and Objectives
5. Problem Definition
6. Methodology
7. Action Plan

Evaluation of Practical-PA will be the average of two presentations, synopsis report and weekly progress diary maintained by the candidate.

There should not be any sort of typographical, diagrammatic and any other mistake/s in the final bound copy of the project report submitted by the candidate.

PROJECT REPORT CONTENTS

The Project report should essentially consists of the following details.

- COVER PAGE OF THE PROJECT
- CERTIFICATE FROM THE INSTITUTE
- ACKNOWLEDGEMENT
- TABLE OF CONTENTS
- ABSTRACT
- INTRODUCTION
- METHODOLOGY OF PROJECT
- RESULTS
- CONCLUSION AND FUTURE SCOPE
- ABOUT THE ORGANISATION / COMPANY (IN CASE OF INDUSTRY BASED PROJECTS)
- REFERENCES / BIBLIOGRAPHY

GUIDELINES FOR PREPARING THE PROJECT REPORT

Project work is a basic requirement for the award of Advance Diploma. Project should be prepared based on any one of the subjects of the Programme. The project work should be

comprehensive and cover all aspects of the management of occupational health and Industrial Safety.

COVER PAGE OF THE PROJECT

The Cover Page of the Project Report must include Title of the Project, Student and Guide Details, Institute Name, Academic Year, Maharashtra State Board of Technical Education, Mumbai.

CERTIFICATE FROM THE INSTITUTE

Certification from Project Guide, HOD, Principal and final signature of External Examiner during final examination.

ACKNOWLEDGEMENT

It should appear on the third page and the report writer should acknowledge the guidance provided by the project guide. Here the author may also acknowledge other persons who might have rendered help or supplied the required data or information for completion of the project. It should be brief and crisp. Generally, one page should suffice for acknowledgement.

TABLE OF CONTENTS

It must consist column heading as Chapter No., Name of the Chapter and Page Number.

ABSTRACT

Abstract should describe the entire project work with its aim, objectives and methodology and conclusion. The abstract should be limited to one or two pages.

INTRODUCTION

Give brief description of need, significance and applications of the Project. It is recommended to limit the description to about 2 to 5 pages.

METHODOLOGY OF PROJECT

This is the most important part of the project report and forms the main body of the project report. It needs very comprehensive coverage of all aspects of safety in the plant, industrial hygiene, environmental conservation, safety in storage and transportation, etc. It will usually require about 60 to 100 pages. Write-up should include the details of following areas applicable to the topic of your project:

- Occupational health, safety and environment policy of the company and its implementation
- Safety organization
- Role of management in promoting safety and striving for continual improvement
- Accident and near-miss incidents reporting system
- Accident and near-miss incident investigation system
- Accident/incident analysis (using data of previous five years at least)
- Case-studies (discuss at least five cases of different types of accidents/near-misses)
- Selection and training of employees

- Safety induction and safety training of employees and contractor personnel
- Health and hygiene (including pre-employment and periodic medical examinations)
- Environmental conservation
- Safety in transportation and training of drivers
- Trade union and its role in promoting safety
- Plant layout
- Facilities and services
- Storage and handling of chemicals
- Built-in safety measures
- Instrumentation for safety of plant and personnel
- Fire prevention and fire-fighting measures
- Housekeeping
- Personal protective equipment (PPE)
- Pollution control measures
- Various safety procedures (e.g., work permit system, working at height, etc.)
- Job safety analysis (JSA)
- Preventive maintenance
- Safe operating procedures (SOPs) and operating manuals
- Safety manual, material safety data sheets (MSDS), Tremcards, etc.
- Health, safety and environment audits.

Relevant information and data presented in the form of tables and graphs (e.g., graphs for injury frequency rates, severity rates, frequency-severity indices, incident rates, fire statistics, etc.), accident/incident analysis, work permit form, accident/near-miss incident report form, medical attention form, block diagrams, plant layout, relevant photographs, MSDS, etc., which are required to supplement your project report, should be included at the end as annexures with appropriate references in the main text of the project report. If an annexure is of more than one page, it should be provided with page numbering. Page numbering should be done individually for each annexure.

RESULTS

It should contain experimentation result of the Project.

CONCLUSION AND FUTURE SCOPE

Based on the project work, draw inferences and mention future scope. The future scope should be specific, relevant and practically implementable.

ABOUT THE ORGANISATION / COMPANY (IN CASE OF INDUSTRY BASED PROJECTS)

Should mention Organizational Structure, Product / Services (Limit to one or two pages)

REFERENCES / BIBLIOGRAPHY

Mention books, research papers, websites referred in the report in this section.

PROJECT REPORT FORMAT

Paper Size	-	A4
Printing	-	Only on one side of the sheet
Line Spacing of Paragraph	-	1 ½
Font Face	-	Times New Roman
Font Size	-	12 for Normal text, 14 for Sub-headings and 16 for Headings
No of Project Report copies	-	Two
Binding	-	Hard bound copies with Black cover (Golden Embossing)

PROGRAMME NAME : ADVANCED DIPLOMA IN INDUSTRIAL SAFETY
PROGRAMME CODE : IT
SEMESTER : SECOND
COURSE TITLE : INDUSTRIAL TRAINING
COURSE CODE : 28715

1. RATIONALE

Industrial training course is introduced to Advanced Diploma in Industrial Safety programme with the aim to imbibe the industry culture and professional practices in the students before they enter into world of work. By exposing and interacting with the real life industrial setting, student will appreciate and understand the actual working of an industry, best practices adopted in industry and other requirements in the industry or their chosen field of training. The industrial needs such as the soft skills, life skills and hands-on practices are intended to be inculcated in the students through this training. This short association with the industry will be instrumental in orienting the students in transforming them to be industry ready after completion of diploma programme.

2. COMPETENCY

This course is intended to develop the following competencies:

- Soft Skills i.e. Communication, Presentation and others.
- Life Skills i.e. Time management, Safety, Innovation, Entrepreneurship, Team building and others
- Hands-on Practices i.e. Shop floor Implementation and Quality Assurance aspects.

3. COURSE OUTCOMES

The industrial training is intended to acquire the competencies as mentioned above to supplement those attained through several courses up to fourth semester of the program:

- Communicate effectively (verbal as well as written) to execute the work.
- Prepare the industry report of the executed work.
- Exercise time management and safety in the work environment.
- Work in teams for successful completion of projects assuring quality.
- Best Safety Practices in Industries & Conclusions and Recommendations.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme			Credit	Examination Scheme													
				Theory							Practical						
L	T	P	(L+T+P)	Paper Hrs.	ESE		PA		Total		ESE		PA		Total		
					Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	
-	-	10	10	-	-	-	-	-	-	-	100#	50	100	50	200	100	

(*): Under the theory PA, 30 marks is the average of 2 class tests of 30 marks each to be taken during the semester for the assessment.

***(#$) or (@$)** : Under the practical ESE - 50 Marks (100%)*
1) 30 Marks (60%) - For Practical – ESE

2) 20 Marks (40%) - Average of 2 Skill tests / Practicals of 30 marks each is to be conducted during the semester, and then should be converted to 20 marks.

Note: If student Remaining absent in PR-ESE shall be considered as ABSENT in PR-ESE

***Legends: L**-Lecture, **T** – Tutorial/Teacher Guided Theory Practice, **P** –Practical, **ESE** -End Semester Examination, **PA** - Progressive Assessment*

*@Internal Assessment, #External Assessment, *#Online Examination*

5. GENERAL GUIDELINES FOR INDUSTRIAL TRAINING

The Industries/Organizations can be Government/Public limited/Hospital/or Private family enterprises.

- **Duration of Industrial Training:** 8 weeks in Final Semester as per the credits of the programme
- **Training Area:** Students should be trained in large and medium scale Industry / Organization. However, despite the best efforts by the institute, if large and medium scale Industry / Organization are not available to all students then, students can also be placed in small scale Industry / Organization.
- **Skill Knowledge Partner**: Students should identify one of the following sector from mentioned below list of industries to carry out Industrial Training.
  1. Chemical / Pharma/ Petro Chemicals
  2. FMCG – Fast Moving Consumable Goods
  3. Engineering
  4. Construction
  5. Food Industry
  6. Agriculture / Sugar
  7. Fertilizer
  8. Oil & Gas
  9. Dock
  10. Automobile
  11. Power Sector

Note: If Student is employed in any of the above sector, he shall opt for training in his own organization.

6. EXPECTATIONS FROM SKILL KNOWLEDGE PARTNER (SKP)

Helping institute in developing the following competencies among students

- Soft Skills i.e. Communication, Presentation and others.
- Life Skills i.e. Time management, Safety, Innovation, Entrepreneurship, Team building and others
- Hands-on Practices i.e. Shop floor Implementation and Quality Assurance aspects.

7. ROLE OF PARENT DEPARTMENT OF THE INSTITUTE

- Collecting information about Industry / Organization available for training along with capacity.
- Institutions have to enter into MOU with number of SKPs(Industries/ Organizations) for accommodating all the enrolled students for the mandatory

- Student and mentor allocation as per the slots available for in-.plant training (Desirable mentor- student ratio is 1:15).
- Communication with Industry / Organization available for training along with capacity and its confirmation
- Student enrollment for training.
- Issuing letter to the Industry / Organization for the training along with details of students and mentors.
- Principal/ HOD/ Faculty should address students about industrial safety norms, rules and discipline to be maintained in the Industry/ Organization during the training before relieving students for training.
- The faculty member during the visit to Industry/ Organization will check the progress of the student in the training, his/ her attendance, discipline and project report preparation.
- Mentors to carry out progressive assessment of the students during the training through Progressive Assessment (PA).
- End Semester Examination(ESE) assessment by mentor along with Industry / Organization expert as external examiner.

8. ROLES AND RESPONSIBILITIES OF THE STUDENTS

Following should be informed to students in the letter deputing them for the training, an undertaking for this should also be taken from them

- Students would interact with the mentor to suggest choices for suitable Industry / Organization. If students have any contact in Industry / Organization (through their parents, relatives or friends) then same may be utilized for securing placement for themselves and their peers.
- Students have to fill the forms duly signed by authorities along with training letter and submit it to training officer in the industry on the first day of training. Student should also carry with him/her the Identity card issued by institute during training period.
- He/she will have to get all the necessary information from the training officer regarding schedule of the training, rules and regulations of the Industry / Organization and safety procedures to be followed. Student is expected to observe these rules, regulations, procedures.
- Students should know that if they break any rule of industry or do not follow the discipline then industry can terminate the training and send back the student.
- It is the responsibility of the student to collect information from Industry / Organization about quality assurance methods/specifications of machines and raw materials/maintenance procedures/ production planning/work ethics/professional practices/organizational structure etc.
- During the training period students have to keep daily record of all the useful information in Log book
- Maintain the Diary/Logbook and get it signed from mentor as well as Industry / Organization Training in-charge.

- In case they face any major problem in industry such as an accident or any disciplinary issue then they should immediately report the same to the institute.
- Prepare final report about the training for submitting to the department at the time of presentation and viva-voce and get it signed from mentor as well as Industry / Organization training in-charge.

9. FORMAT FOR TRAINING REPORT

Following is the suggestive format for the training report, actual format may differ slightly depending upon the nature of Industry / Organisation. The training report may contain the following

- Title page
- Certificate
- Abstract
- Acknowledgement
- Content Page

Chapter 1. Organizational structure of Industry / Organisation and General Lay Out
Chapter 2. Introduction of Industry / Organisation (Type of products and services, history, turn over and number of employees etc.)
Chapter 3. Types of major equipment/instruments/ machines used in Industry/Orgainzation with their specification, approximate cost and specific use and their routine maintenance.
Chapter 4. Manufacturing Processes along with production planning and control methods and standard Operating procedures.
Chapter 5. Testing of raw materials, components and finished products along with quality assurance procedures.
Chapter 6. Major material handling product and procedures.
Chapter 7. Safety procedures followed
Chapter 8. Particulars of Practical Experiences in Industry / Organisation if any in Production/ Assembly/ Testing/Maintenance.
Chapter 9. Short report/description of the project (if any done during the training)
Chapter 10. Special/challenging experiences encountered during training if any (may include students liking & disliking of work places)

- References /Bibliography

10. SUGGESTED LEARNING STRATEGIES

Students should visit the website of the industry where they are undergoing training to collect information about products, processes, capacity, number of employees, turnover etc. They should also refer the handbooks of the major machines and operation, testing, quality control and standard operating procedures and practices used in the industry. Students may also visit websites related to other similar industries as their learning resource.

11. TENTATIVE WEEK-WISE SCHEDULE OF INDUSTRIAL TRAINING

The industrial training is a common course to all programmes; therefore the industry / Organization selection will depend upon the nature of programme and its related industry. The training activity may vary according to nature and size of Industry / Organization. The details of activities to be completed during 8 week wise Industrial Training schedule should be planned by the Industry. The evaluation of Industrial training will be done on the basis of skills acquired by the student during this 8 weeks period.

EVALUATION SHEET FOR PA OF INDUSTRIAL TRAINING

Sr. No.	Enrollment Number	Name of Student	Marks by Mentor & Industry Supervisor jointly	Marks by Industry Supervisor	Marks by Mentor Faculty	Total Marks
			Out of 40 (A)	Out of 30 (B)	Out of 30 (C)	Out of 100 (A+B+C)

DISTRIBUTION OF END-SEMESTER-EXAMINATION (ESE) MARKS OF INDUSTRIAL TRAINING

Marks for Industrial Training Report	Marks for Seminar/ Presentation	Marks for Oral/Viva-voce	Total ESE Marks
25	25	50	100