STATE COUNCIL OF TECHNICAL EDUCATION & VOCATIONAL TRAINING, ODISHA

2ND SEMESTER SYLLABUS OF

18 MONTHS FULLTIME POST DIPLOMA IN INDUSTRIAL SAFETY

TEACHING & EVALUATION FOR SECOND SEMESTER COURSE OF THE POST DIPLOMA IN INDUSTRIAL SAFETY(18 MONTHS)

Sl. No	Subject Code.	Subject of Study.	Contact Periods / Week.			Examination Scheme.						Full Marks.
						Theory				Practical		
			Lecture	Tutorial	Practical	IA	End Exam.	Total	Sessional	End Exam	Total Marks.	
1	PDIS-201	SAFETY & LAW	04	01	--	30	70	100	--	--	--	100
2	PDIS-202	ENVIRONMENTAL EDUCATION & DISASTER MANAGEMENT.	04	01	--	30	70	100	--	--	--	100
3	PDIS-203	INDUSTRIAL HYGIENCE & OCCUPATIONAL HEALTH	04	01	--	30	70	100	--	--	--	100
4	PDIS-204	INDUSTRIAL SAFETY ENGINEERING-II.	04	01	--	30	70	100	--	--	--	100
5	PDIS-205	**ELECTIVE(ANY ONE)**	04	01	--	30	70	100	--	--	--	100
		E1 ADVANCED SAFETY MANAGEMENT.										
		E2 SAFETY IN CONSTRUCTION INDUSTRY.										
		E3 DOCK AND PORT SAFETY										
		E4 BEHAVIOUR BASED SAFETY MANGEMENT										
6	PDIS-206	TECHNICAL SEMINAR (PPT PRESENTATION) AND EVALUATION OF COMMUNICATION SCHEME	--	--	02	--	--	--	50	-	50	50
7.	PDIS-207	INDUSTRIAL HYGIENE AND OCCUPATIONAL HEALTH LAB			06				50	50	100	100
8.	PDIS-208	SAFETY AND ENVIRONMENTAL ENGINEERING LAB.			06				50	50	100	100
		Total	**20**	**05**	**14**	**150**	**350**	**500**	**150**	**100**	250	**750**

NOTE:	Minimum Pass Marks in Theory (External)	40%	IA – Internal Assignment
	Minimum Pass Marks Theory (Internal)	50%	
1. Effective Teaching will be at least 15 weeks per semester	Minimum Pass Marks for Project	50%	
2. Each period will be of One Hour duration..	Pass Marks for Individual Paper First Division 60% & above	50%	
	First Division with Honors 70% and above		

SAFETY AND LAW

Subject Code	Course offered	Full Marks	End Exam	IA
PDIS 201	in Second Semester	100	70	30

Chapter – 1 Safety

The Factories Act, 1948 (Amended) and Rules-Provisions under the Act and Rules made there-under with Amendments Case Laws under the Factories Act.

- The Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act.
- The Building and other Construction Workers (Regulation of Employment and Conditions of Service) Rules.

Chapter – 2 Social Security Legislation

- Workmen's Compensation Act and Rules.
- ESI Act and Rules.
- Contract Labour (Abolition and Regulation) Act.
- Public Liability Insurance Act.
- Social Accountability SA-8000.
- The Building and other Construction Worker's Welfare Cess Act and Cess Rules.

Chapter – 3 Safety, Health and Environment (SHE) related Important Legislation

Salient Feature:

- Sections pertaining to Safety Health & Environment aspects.
- Boilers Act, 1923 and Indian Boiler Regulation 1950. Indian Electricity Act, 2000 and Rules, Indian Explosives Act, 1984 and Rule. Petroleum Act and Rules. Gas Cylinder Rules. Calcium Carbide Rules. The Insecticides act and Rules
- Radiation Protection Rules, Hazardous Material Transportation Rules.
- Static and Mobile (Unfired) Pressure Vessel Rules, 1981 as amended in 2000.

Chapter – 4 Environmental Protection Legislations

- Water (Prevention & Control of Pollution) Act. 1974 and Rules, Air (Prevention & Control of Pollution) Act. 1981 and 1982 and Rules. Motor Vehicles Act. 1988 as amended in 2000. The Central Motor Vehicles Rules, 1989 as amended in 2000. Transport of Hazardous Goods Rules.
- Environmental Protection Act, 1986 and Rules. Noise Pollution Act, 1998. Bio-Medical Waste, Hazardous Waste Management Rules.
- Chemical accidents (Emergency Planning Preparedness and Response) amendment Rules, 1996.
- Manufacture storage and import of hazardous chemical Rules 1989.

Chapter – 5 ILO Convention &Recommendations

Role of ILO. Relevant ILO convention and recommendations related to Safety health & welfare issues which are binding on India.

ENVIRONMENTAL EDUCATION & DISASTER MANAGEMENT

Subject Code	Course offered	Full Marks	End Exam	IA
PDIS 202	in Second Semester	100	70	30

Chapter – 1 Introduction

Basics of ecology, ecosystem, environment, pollutant.

Chapter – 2 Types of Pollution

Types & sources of pollution

i Water Pollution

Definition and sources of Water Pollution, Type of water pollutants, Causes of water pollution and its effects on eco-system, Monitoring and analysis of water pollution. Control Measures

ii Air Pollution

Definition of Air pollution, Types of air pollutants, cause of air pollution and its effects on eco-system and human health, Basics of air pollution control equipment like ESP, Bag Filter, Cyclone, Scrubbers and dust suppression system, Monitoring and analysis of air pollution and control measures.

iii Noise Pollution

Definition, Sources & types of noise pollution, Effect on human being, Noise monitoring, analysis and remedial measures, noise induced deafness

iv Land Pollution

Definition, causes of land pollution, types of solid wastes, methods of collection, storage, discharge, treatment and disposal of municipal solid waste, concept of hygienic landfill site creation.

Chapter – 3 Legislations

Preliminary knowledge of the following Acts and Rules made there under- The Water Act - 1974, Air Act- 1981, Environment Protection Act-1986, The Manufacture , Storage & Import of Hazardous Chemical (Amendment) Rules , The Hazardous Wastes (Management and Handling) Amendment Rule ,The Bio-Medical Waste (Management and Handling) Amendment Rules, The Noise Pollution (Regulation and Control) (Amendment) Rule, Municipal Solid Wastes (Management and Handling) Rules, The Battery Management & Handling Rules.

Chapter – 4 Disaster Management

Definition of disaster – Natural, Manmade and technological disaster. Types of disaster management. How disaster occurs, Destructive power, Causes and Hazards, Case study of Tsunami Disaster and Bhopal tragedy, National policy- Its objective and main features, National Environment Policy, Need for central Govt. intervention, State Disaster Management Authority.

Chapter -5 Disaster Management Frame Work

Duties and powers, Case studies of various disasters in the country, Meaning and benefit of vulnerability reduction, factor promoting vulnerability reduction and mitigation, Emergency support function plan. Main feature and function of National Disaster Management Frame Work, Disaster mitigation and prevention, Legal Policy Frame Work, Early warning system, Human Resource Development and Function, Information dissemination and communication. Formulation of On-Site Emergency Plan & Off-Site Emergency Plan, its approval/ acceptance by competent authority, Infrastructure for disaster management, Emergency Response Centre, Hazchem vehicles, Disctrict Cris Group & State Crisis Group functioning, mock drills(On- Site & Off- Site), training programmes for sensitizing community & first responders of state.

INDUSTRIAL HYGIENE & OCCUPATIONAL HEALTH

Subject Code	Course offered	Full Marks	End Exam	IA
PDIS 203	in Second Semester	100	70	30

Chapter - 1 **Industrial Hygiene**

Chemical Hazards: Introduction to Chemical hazards, dangerous properties of Chemicals, dust, gases, fumes, mist, vapours, smoke and aerosols. Route of entry to human system, recognition, evaluation and control of basic hazards, degree of hazards, concept of dose-response relationship, bio-chemical action of toxic substance, concept of threshold limit values, air sampling strategies, personal exposure monitoring , work-environment monitoring, biological sampling and analysis. Industrial Hygiene Control Methods: Substitution, Changing the process, isolation, wet method, local exhaust ventilation, personal hygiene, housekeeping and maintenance, waste disposal, special control measures.

Chapter - 2 Personal Protective Equipment:

Need for personal protection equipment, selection, applicable standards, supply, use, care and maintenance of respiratory and non-respiratory personal protective equipment.

a) Non-respiratory personal protective devices: Head, Ear, Face, Eye, Hand, Foot and Body protection.
b) Respiratory personal protective devices: Classification of hazards. Classification of respiratory personal protective devices. Selection of respirators. Instruction and hints in use of breathing apparatus. Training for correct use of breathing apparatus.

Chapter - 3 Occupational Health

a) Common occupational diseases – occupation involving risk of contraction of these diseases –mode of causation of the diseases and their effects- Diagnostic methods – Biological monitoring – methods of prevention – compensation for occupational diseases- Evaluation of injuries – occupational Health services at the place of employment.

b) Occupational physical Health Hazards- Adverse health effects of noise, vibration, improper illumination, thermal radiation, X-ray, ultra-violet radiation, lionizing and non- ionizing radiations. Permissible industrial exposure limits – short term and long term effects of exposure-preventive and control measures, Supervision of working environment, health education & Counseling - various aspect of the working environment such as temperature, lighting, ventilation, humidity, noise, cubic space, air pollution and sanitation.

c) Occupational dermatitis, occupational cancer, medical surveillance for control of occupational diseases – health records. Fundamentals of first- aid, burns, fractures suffocation, toxic ingestion- bleeding wounds – artificial respiratory techniques.

Chapter - 4 Work physiology

Physiology of respiration, cardiac cycle, muscle contraction, nerve conduction system etc. Anthropometry & fundamentals of bio-mechanics, assessment of workload based on human physiological reaction – energy cost of work, assessment of work capacity, physical fitness, physiological fatigue and reset allowance, physiological test for assessment of occupational health, nutritional values of diets for exercise and work. Nutrition and physical fitness relationship. Environmental physiology.

Chapter – 5 Ergonomics

Introduction to Ergonomics, Constituents of Ergonomics.Application of Ergonomics in industry for Safety & Health- Environment Ergonomics, Ergonomics of Automation / Assembly, Visual Fatigue, Ergonomics of Rehabilitation while assigning alternate jobs.

INDUSTRIAL SAFETY ENGINEERING – II

Subject Code	Course offered	Full Marks	End Exam	IA
PDIS 204	in Second Semester	100	70	30

Chapter – 1 Plant Design and Housekeeping

Plant Layout and design. Study of engineering drawing, Need for planning and follow-up. Safety and good housekeeping. Typical accidents due to poor 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. Housekeeping contests. Cleaning methods. Employee assignment, Inspections and check-lists. Benefits of good housekeeping.

Chapter – 2 Light, Heat & Ventilation

Purpose of lighting. Design of lighting installation. Maintenance, Standards relating to lighting Sources and types of artificial lighting. Principles of good illumination, Benefits of good illumination. Recommended optimum standards of illumination. Physiology of heat regulation. Thermal environment and its measurement, Thermal comfort. Indices of heat stress. Control of heat exposures, control at source, insulation, Thermal limits for comfort, efficiency and freedom from health risk. Purpose of ventilation. Natural ventilation. Mechanical ventilation. Air conditioning. Process ventilation, local exhaust ventilation.

Chapter – 3 Electrical Hazards

Hazards of electrical energy. Safe limits of amperages, voltages. Safe distance from lines, Capacity and protection of conductors. Joints and connections. Means of cutting protection. Earth fault protection. Earth insulation and continuity tests. Earthing standards. Protection against surges and voltage fluctuation. Hazards arising out of 'borrowed' neutrals.

Other precaution, Types of protection for electrical equipment in hazardous atmosphere. Criteria in their selection, installation, maintenance and use. Control of hazards due to static electricity.

Chapter – 4 Noise and Vibration

Continuous and impact noise. Effect of noise on man. Measurement and evolution of noise, Noise isolation. Noise absorption techniques. Silencers. Practical aspects of control of noise, Case studies on impact of noise from compressors, generators and other sources.

Vibration : Effects, measurement and control measures such as vibration damping.

Chapter – 5 Fire Safety

Chemistry of fire & fire triangle. Classification of fires. Common causes of Industrial fires. Determination of fire load. Fire resistant building materials. Design of building, plant, exits, etc. for fire safety. Prevention of fire. Portable fire extinguishers. Water systems, Carbon-dioxide systems. Foam extinguisher system. Dry chemical extinguisher system, Industrial fire detection and alarms. Sprinkler systems. Special precautionary measures for control of fire and explosion in course of handling & processing of flammable liquids, gases, vapors, mists and dusts etc. BLEVE (Boiling liquid expanding vapour explosion), Confined and unconfined vapour cloud explosion, Fire emergency action plan.

ADVANCED SAFETY MANAGEMENT (ELECTIVE)

Subject Code	Course offered	Full Marks	End Exam	IA
PDIS 205(E_1)	in Second Semester	100	70	30

Chapter - 1 Process Control & System

- The Components involved in design process.

- General considerations of design Emergency Shutdown.

- Pressure and Control System Characteristics.

-Instrument systems for safety and safety features of instruments.

Chapter – 2 Plant Sitting & Bulk Storage

- Pressure system components

- Fundamentals of pressure vessels design.

- Standards and Codes.

- Over pressure protection.

- Pressure relief and blow down.

- Basic requirements of protection and their practical application. Flare Systems.

- Sitting Criteria and its evaluation

- Separation, distance, relevant, statute requirements.

- General considerations.

- Types of storages, layout of storages with specific reference to LPG, Chlorines, Ammonia, EO Oleurn.

Chapter – 3 Risk& Reliability Engineering

- Pressure and Control System Characteristics.

-Instrument systems for safety and safety features of instruments.

- Acceptable Risk

- Individual and Average Risk

- Computation of Risk.

- Risk Assessment Techniques(detailed and quick)

- Engg. Feasibility

-Work Permit: Definition, Types, etc.

Chapter – 4 Emissions and Dispersion Modelling

- Principles of Reliability Engineering

- Application of Reliability

- Engineering, Concepts of critical equipments and devices.

- Major Industrial Disasters - Case Studies.

Chapter – 5 Status Assessment

Safety Audit, Safety Report: Preparation and Assessment. EIA, Environment Statement : Definition- Inventory, Preparation and Submission of Report to Competent Authority. Safety Check list for Preventive and Emergency Maintenance.

SAFETY IN CONSTRUCTION INDUSTRY (ELECTIVE)

Subject Code	Course offered	Full Marks	End Exam	IA
PDIS 205(E_2)	in Second Semester	100	70	30

Chapter – 1 Meaning and Scope of Safety in Construction

- Basic philosophy peculiarities and parameters governing safety in construction such as site planning and layout, safe access, good housekeeping.
- Safety in use of construction machinery.
- Seismic structural soundness, structural safety, accident and hazards, their causes and effects.

Chapter – 2 Safety in Construction Operations

a) Underground Works: Excavation, drilling and blasting prematic, trenching, shorting porklain type of shorting, strutting, tunneling, piling and safety in using and operating machinery and equipment relating to the above works. Foundations: Plant & Machinery and Structure.

b) Above Ground Works: Scaffolding, shuttering / form work, ladders, concrete, cofferdams and special operation connected with irrigation work. Safety in use and operation of related machinery and equipments. Safety while working on fragile roof. Working at Heights.

c) Underwater portions: Well sinking, caissons underwater concreting, cofferdams and special operations connected with irrigation work. Safety in use of machinery and equipments related to underwater operations.

d) Movements of Construction Machinery: Heavy /Long Items, Earth Movers equipments Railway wagons, motor trucks. Materials Vehicles etc. Hazardous Materials, Material handling equipments.

e) Special Works: High rise buildings, bridges and tunnels, roads, railways, asphalting, pneumatic caissons, electrical installations.

f) Safety for Protection of work Site including prevention of collapsing of the structure.

g) Safety in use of explosives: Open cast machinery quarrying.

h) Project Management and Construction in Safety: Introduction, Manpower utilization, utilization of material, equipment and tools. Temporary installation and structures.

Chapter – 3 Safety in Stacking, Storage and Transport of Construction Materials

- Reinforcements
- Cement
- Sand
- Aggregates
- Chemicals
- Organic binders
- Gas Cylinders
- Others

Chapter – 4 Safety in use of construction machinery & equipment

Hazards involved and safety precautions to be taken for:

- Batching plant
- Mixers
- Earth Moving equipment
- Cranes
- Pile driving equipment
- Excavators
- Drilling equipment
- Welding equipment
- Gas cutting equipment
- Grinding equipment
- Derricks
- Compressors
- Crushers
- Layers

Chapter – 5 Special construction operations (Special Operations)

- Transmission Towers
- Railways
- Power Plants
- Transformer Installations

DOCK & PORT SAFETY (ELECTIVE)

Subject Code	Course offered	Full Marks	End Exam	IA
PDIS 205(E_3)	in Second Semester	100	70	30

Chapter – 1 Safety Legislation:

i History

Conventions and recommendations relating to safety, health and welfare of dock workers.

ii Dock Safety Statutes in India

History of Dock Safety Statutes in India, background of present Dock Safety Statutes-Dock Workers (Safety, Health and Welfare) Act. 1986 and the Rules and Regulations framed there under.

iii Responsibilities of different agencies for safety, health and welfare involved in dock work ,Responsibilities of port authorities, Dock Labor Board, Owner of Ship, Master and agent of ship, owner of lifting appliances and loose gear, et., employers of dock workers like stevedores, clearing and forwarding agents, competent persons and dock workers.

Chapter – 2 Working on Board the Ship.

Types of cargo ships, working on board ships, safety in handling of batch beams, hatch covers including its marking. Mechanically operated hatch covers of different types and its safety features. Safety in chipping and painting operations on board ships, safe means of accesses, safety in storage etc. illumination on decks and in holds and other working places, various hazards of working inside the holds of the ship and on decks and safety precaution needed, safety in use of transport equipment with internal combustible engines like fork-lift trucks, pay-loaders etc. in the holds. Storage and transportation of containers inside the port, safety in freight container terminals, inland containers depots, safety in stuffing and de-stuffing of containers, examination and inspection of containers, carriage of dangerous goods in containers and maintenance and certification of containers for safe operations.

Chapter –3 Material Handling Appliances:

i Lifting Appliances

Different types of lifting appliances, its construction, maintenance and use, various methods of rigging of derricks, safety in use of container handling/ lifting appliances, like portainer, transtainer, top lift trucks and other container handling crane, use of spreaders for handling containers, Testing and examination of lifting appliances, portainers, transtainers, top lift trucks derricks in different rigging etc.

ii Loose gears, rope and chains

Use and care of synthetic and natural fiber ropes, wire rope chains, different types of slings and loose gear. Methods of testing examination and certification of hooks, shackles, blocks container spreaders, magnetic lifting devices, grabs, wire ropes and chains.

iii Handling of Cargo

Handling of different types of cargo, stacking and un-stacking both on board the ship and shore, loading and unloading of cargo from ship to shore and vice-versa, restrictions on loading and unloading operations covered under regulations and Port by-laws, modern methods of handling bulk cargo like mechanical handling plants, pneumatic suction methods continuous loaders, etc. The different types of equipment for transporting containers safety in their use, safety in their use, safety in the use of self loading container vehicles like container side lifter, forklift trucks, pay loads, etc., dock railways, conveyors and road safety in sports.

Chapter – 4 Major Accident Hazards Control in Ports

Occupier's responsibilities, inspection of hazardous installations in ports, like isolated storages and pipelines. Preparation of on-site emergency plan and Safety Report. Reporting of accidents and dangerous occurrences and their system of investigation and classification. Few case studies of accidents and dangerous occurrences.

Chapter – 5 Health and Welfare

Occupational diseases, personal protective equipment, health and welfare measures, first-aid facilities and other appropriate measures, hospitals, medical examination of dock workers, clinics, special precautions for specific work environment, canteen facilities.

Forums for promoting safety and health in port – Safety Committees and Advisor / Committees, their functions, training of dock workers, responsible persons, authorized persons, etc., Emergency Action plans for fire and Explosion, collapse of lifting appliances and buildings, sheds, etc; gas leakages and precautions concerning spillage of dangerous goods etc.

BEHAVIOUR BASED SAFETY MANAGEMENT (ELECTIVE)

Subject Code	Course offered	Full Marks	End Exam	IA
PDIS 205(E_4)	in Second Semester	100	70	30

Chapter – 1 Introduction:

Definition of Behaviour, Attitude, Need for BBS in Industrial scenario and Objective, Behaviour Based Safety Management System.

Chapter – 2 Safety Culture:

Accidents and their causes, Accident Pyramid, Comparison between Traditional Safety & Behavior based Safety.

Chapter – 3 ABC Model:

Antecedent-Behaviour- Consequence trail, types of consequences, motivation model.

Chapter – 4 Task Observation:

Procedure & observing task, Monitoring and analysis of observation using checklist, Results and Recommendations.

Chapter – 5 Safety Coaching:

Procedures and Records

TECHNICAL SEMINAR

Subject Code	Course offered	Full Marks	Sessional
PDIS-206	in Second Semester	50	50

1. Power Point (PPT) Presentation before faculty & experts.

2. Group Discussion before faculty & experts

3. Evaluation of Communication Skill

a. The students should demonstrate effective verbal communication one to one and group situation.

b. Present written information in different formats as prescribed.

c. Outline/ acquire the skills needed to effectively organize, condu control both formal & informal meeting.

INDUSTRIAL HYGIENE & OCCUPATIONAL HEALTH LAB

Subject Code	Course offered	Full Marks	Sessional	End Exam
PDIS-207	in Second Semester	100	50	50

1. Lung function test on medsprior.
2. Ear testing by audio meter & demonstration of various models of audio meter.
3. Study of notified diseases by use of models.
4. Study of various models of lungs (section of lungs)
5. Demonstration of Personal Protective Equipment such as Nose Mask. various types of Safety goggles etc.
6. Explanation on the charts of industrial Noise, Notifiable diseases, Physical health hazards, chemical health hazards, industrial dermatitis, prevention & control.
7. Explanation of charts on control of noise in industry, noise levels in some industry and permissible levels of exposure to noise in industry.

SAFETY & ENVIRONMENT ENGINEERING LAB

Subject Code	Course offered	Full Marks	Sessional	End Exam
PDIS-208	in Second Semester	100	50	50

1. Learn Water Analysis & its interpretation.

2. Demonstration & Calibration of Air Sampling equipment.

3. Sampling & estimation of gases in (High volume sampler & personal sampler) work environment monitoring by colorimetric methods for.

   a) NO_x
   b) SO_x
   C) NH_3
   D) Cl_2

4. Sampling & Estimation of Dust Gravimetric method.

5. Personal Protective Equipments.

   a) Respiratory & Non respiratory (Demonstration & use)

   b) Fall arrestor & Full body harness (Demonstration & use)

   c) For Hot Work

   d) For toxic work environment

   e) For High noise work environment.

6. Noise Level Measurements

   a) Measurements of sound level.

   b) Frequency analysis of noise. (Sound level meter)

7. Measurement of illumination in work environment by photo meter.

EQUIPMENTS FOR INDUSTRIAL HYGIENE AND OCCUPATIONAL HEALTH LABORATORY

Sl. No.	Name of Equipment	Qty.
1.	Sound Level Meter	1
2.	Illumination Level Meter	2
3.	Globe Thermometer	5
4.	Kata Thermometer	5
5.	Detector tubes – Instruments for Assessment of Toxic	1 set
6.	Battery Operated Personal Sampler.	1
7.	Explosimeter	1
8.	Flammable Gas Detector	1
9.	Thermal Precipitator Air Sampler.	1
10.	Velometer	1
11.	Spectrophometer – Visible Range	1
12.	PH Meter	1
13.	Colorimeter	1
14.	Magnetic stirrer	1
15.	Distilled water facility	1
16.	Laboratory Microscope	1
17.	WBGT Meter	1

LIST OF EQUIPMENT FOR SAFETY AND ENVIRONMENT ENGINEERING LABORATORY

Sl. No.	Name of Equipment	Qty.
1.	Models of Safety guards such as fixed, automatic, interlock, photo-electric and two hand control device for demonstrating the principles of machine guarding.	1
2.	Models of drilling machine, lathe, milling machine, shaper and grinding machines showing the various safety guards used on them.	1
3.	A set of guards to be used on various working machines, such as circular saw, planner, spindle moulder, thicker mortising chisel etc.	1
4.	Type inflating device,	1
5.	Pipe welding guard.	1
6.	A set of common lifting tackles, used in materials handling with view to highlight their correct usage.	1
7.	Samples of ropes, fiber ropes, chains etc. showing their construction.	1
8.	A working model to show the load on sling legs due to variation of angle of lift.	1
9.	Working model of conveyer belt safety device.	1
10	A model demonstrating the principles of manual handling.	1
11.	A set of anti-slip devices used for ladder safety.	1
12.	A set of different types extinguishers.	1
13.	Panels depicting the various principles of safety in the use of electricity.	1
14.	Electric safety devices with shock control leakage indicator etc.	1
15.	Models demonstrating importance of earthing and time delay mechanism.	1
16.	A set of models of various exhaust hoods.	1
17.	Models of emergency safety shower.	1
18.	A set of panels highlighting the recognition, evaluation and control of environmental hazards.	1
19.	A set of panels sand exhibits demonstrating the principles of lighting such as age and need for light, effect and contrasts, light and shape, speed and light, fundamental ways of lighting etc.	1
20.	A set of panels on colour in industry.	1
21.	A full range of personal protective equipment for head, eye, ear, hand, foot, leg, respiratory protection and safety belts.	1

LIST OF AUDIO VISUAL EQUIPMENTS

Sl. No.	Name of Equipment	Qty.
1.	Overhead Projector	1
2.	A set of flip charts produced by National Safety Council, U.S.A.	1
3.	Films on various aspects of Safety and Occupational Health	50

MEDICAL/ PHYSIOLOGICAL EQUIPMENTS:

1.	B.P. Equipment	1
2.	Clinical Thermometer	1
3.	Spiro meter	1
4.	Computer facility	1

REFERENCE BOOKS

1	Douglas McGregor	The human side of enterprise Mc Grow Hill
2	H.W.Henrich	Industrial Accident Prevention Engineering Mc Graw Hill
3	Willi Hammer	Occupational Safety Management &EngineeringPrentice Hall
4	Simonds & Gribaldi	Safety Management Richard D.Irwin
5	Handley	Industrial Safety Handbook Mc Graw Hill
6	Frank Bird	Management Guide to loss Control International Institute of Loss Control
7	Will Hammer	Handbook of System & Product Safety Prentice Hall.
8	National Safety Council, Chicago.	Accident Prevention Manual for Industrial Operation, Vol-I & II.
9	Singleton.	Introduction to ergonomics World Health Organization.
10	ACGIH	Industrial Noise Control Manual.
11	Hopkinson.	Lighting, HMSO London.
12	HMSO	Principles of Exhaust Ventilation.
13	ACGIH	Industrial Ventilation- Manual of Recommended Practices.
14	D.Hunter.	Diseases of occupation English University Press.
15	SAX IRWIN.	Dangerous Properties of Industrial Materials Van Nostrand Reinbold.
16	Schilling.	Occupational Health Practice Butter Worth.
17	ACGIH, USA.	Encyclopedia of Industrial Hygiene Instrument.
18	Redgrave.	Heal & Safety in factories Butterworth.
19	Srivastava K.D.	Commentaries of Factories Act Eastern Book Company.
20	Illuminating Engineering Society of North America.	IES Lighting Handbook: Reference Vol-I & II.
21	Frank P.Lees.	Loss Prevention in ProcessIndustries Vol-I & II Butterworths.
22	National Fire Protection Association USA.	Industrial Fire Hazards Handbook.
23	I.L.O. Geneva.	Encyclopedia of Occupational Health & Safety.
24	Barbara A Plog.	Fundamentals of Industrial Hygiene National Safety Council, Chicago.
25	Dan Peterson.	Industrial Safety Management.
26		Industrial Safety Manual, Chicago.
27	Dr. K.U.Mistry, 2012 Edition	Fundamental of Industrial Safety & Health.

NOTE:

Revision of curriculum does not create any new need for running the course. Existing Staff, space and other resources- Building, Lab equipments, books, staff etc. as mentioned here are already existing with the institute, soas additional facility wanted for running the course.