

**S.S.JAIN SUBODH P.G. (AUTONOMOUS) COLLEGE**

**(Affiliated to University of Rajasthan)**



## **Syllabus**

**Department of Environmental Science**

**P.G. DIPLOMA IN  
INDUSTRIAL SAFETY, HEALTH AND ENVIRONMENTAL MANAGEMENT  
(PGD-ISHEM)**

## **Preamble:**

Industrialization is basically considered for the comfortable living of human beings. We are getting different types of goods and luxuries due to industrial products though, these are positive aspects of industrialization, along with the development in science and technology the calamities related to industries and environmental pollution problems are increasing day by day. Bhopal Gas Tragedy, Chernobyl Accident, Three Mile Island Nuclear Accident, etc. are some of the examples of safety violation. The above mentioned incidences are to enough to understand the severity of Industrial calamities. To avoid such circumstances various laws and orders implementation is necessary but not the fact is that not only laws but proper training and education about safety rules and their implementation are prior requirements for any industry. In this ever increasing era of industrialization, accidents are becoming a part of process and therefore, there is need of qualified and experienced manpower that can handle the complex industrial situations and avoid the calamities. Nowadays, there is high demand for such safety professionals from different industries. In many nations, it has been made mandatory to appoint well trained and qualified professional for the Industry. Every year around 20 students from our college and 100s of students from other Department of Environmental Science complete M. Sc. degree and join Environmental Consultancy or Industry as an Environmental Professional. With their M. Sc. Environmental Science, if they get add-on course as a P.G.Diploma in Industrial Safety Health and Environment which is compulsory under *Factories Act, 1948* for a person joining industry as Environment and Safety Officer, these students will get immediate entry in the industry and good salary package after completion of their P.G. Considering the present scenario in mind, Department of Environmental Science, propose to start P.G. Diploma in Industrial Safety, Health and Environment Management (PGDISHEM ). The course is designed for the students and employees from industries who will be exposed to comprehensive and rigorous training covering all areas of Safety, Health and Environmental management.

## **Objectives :**

To develop highly qualified professional manpower the basic requirement lies on systematic quality based coaching and training in Advanced Science and Technologies. Therefore, the course is designed to train and provide expert human resource to safety management and expected to bring direct benefits to industry and society. The course is based on following objectives:

- ✓ To develop an expert manpower to handle the complex industrial environment.
- ✓ To give knowledge about occupational health, industrial hygiene, accidental prevention techniques to the students.
- ✓ To make the student aware about safety auditing and management systems, pollution prevention techniques etc.
- ✓ To train the students about risk assessment and management.
- ✓ M. Sc. Environmental Science students will get an add on diploma.

- ✓ It will produce well trained, qualified and expert manpower for the Industrial sector.
- ✓ Better placement opportunity for M. Sc. Environmental Science students.
- ✓ Course will be useful for in-service people from the industry.
- ✓ More interaction between Institution and Industry

### **Eligibility for Admission:**

A candidate who has secured more than 55% or CGPA of 3.5 in the UGC Seven Point scale [36% or Pass marks for SC/ST/Non-creamy layer OBC/SBC] or equivalent in the Bachelor degree in Science or Engineering or Technology or Medicine or Pharmaceutical Science shall be eligible for admission to First Semester of P.G. diploma in Industrial Safety Health and Environmental Management course. For candidates from outside state of Rajasthan 60% or CGPA of 4.0 in the UGC Seven Point Scale will be applicable irrespective of the category

### **Academic Duration of Course and Examination:**

The course will complete in one year duration having two semesters. Each Semester includes two times internal assessment/Assignments also includes lab work and Industrial training/relevant institutional training/Consultancy training in authorized consultancies etc.

### **Course structure and Scheme of Examination:**

1. Each theory paper carries 100 marks. The internal assessment will be 30 marks and EoSE shall carry 70 marks. The EoSE will be of 3 hours duration. There will be a practical examination of 100 marks in all paper based on the theory paper/industrial Training.
2. There will be two parts in EoSE theory paper. Part A of theory paper shall contain 10 Short Answer Questions of 14 marks, based on knowledge, understanding and applications of the topics/texts covered in the syllabus. Candidate has to attempt seven questions out of 10 and each question will carry two marks for correct answer.
3. Parts “B” of EoSE theory paper will consisting of four questions from each unit with internal choice of 14 mark each. The limit of answer will be five pages.
4. Each Laboratory EoSE will be of four hour durations and involve laboratory experiments/exercises/ Seminar presentation Project work or field study / Industrial Training/ consultancy training and viva-voce examination consisting of 100 Marks.
5. The aim of Project work or field study / Industrial Training/ consultancy training is to introduce students to research methodology in the subject and prepare them for pursuing research in theoretical or experimental or computational areas of the subject. The project work or Field Study is to be undertaken under guidance jointly by Head of the Department and a senior faculty or a Scientist or any other suitable person with proven research excellence in the concerned field

of study. Project work or field study / Industrial Training/ consultancy training can also be taken up in an outside institution of repute Department. The guide will make continuous internal assessment of the Project work or field study / Industrial Training/ Consultancy training. EoSE for Project work or field study / Industrial Training/ consultancy training and seminar will be held at department of the college by a board of three examiners consisting of HoD, two senior faculty of the department or expert from interdisciplinary department of the institution.

6. Supplementary/ due paper/ special examinations will be resolute as per the institutions autonomous rules

7. Grade/CGPA/percentage/division will be decided as per the autonomous guidelines of the institution.

**Proposed course for P.G.D. in L.S.H.E.M\***

S.No.	Code	Paper Title	Theory Hours	Practical Hours	Marks		Total
					External	Internal	
1.	ISHEM 1	Safety, Health and Environmental Management	4	2	70	30	100
2.	ISHEM 2	Legislation on Safety, Health and Environment	4	2	70	30	100
3.	ISHEM 3	Safety Engineering	4	2	70	30	100
4.	ISHEM 4	Environmental Impact assessment and monitoring	4	2	70	30	100
5.	ISHEM 5	Environmental Management System and ISO 14000	4	2	70	30	100
6.	ISHEMPBT6	Practical Based on Theory Paper /In-plant Training and Visits Project			120	80	200

# **PAPER -I SAFETY, HEALTH AND ENVIRONMENTAL MANAGEMENT**

**Duration : 3 hrs.**

**Max. Marks : 70**

**Note: There will be two parts in theory paper.**

**Part A of the paper shall contain seven short answer questions of 14 marks. Each question will carry two marks for correct answer.**

**Part B of the paper will consist four questions one question from each unit with internal choice. Each question will carry 14 marks.**

## **UNIT- I**

**Occupation, Safety And Management;** Occupational Safety, Health and Environmental Safety, Management – Principles & practices, Role of Management in Industrial Safety, Organization Behavior Human factors contributing to accident. Planning for Safety: Planning: Definition, purpose, nature, scope and procedure. Management by objectives and its role in Safety, Health and Management (SHE)

## **UNIT-II**

**Monitoring for Safety, Health & Environment:** Occupational Safety, Health and Environment Management System, Bureau of Indian Standards on Safety and Health: 14489 – 1998 and 15001 – 2000, ILO and EPA Standards. Principles of Accident Prevention: Definition: Incident, accident, injury, dangerous, occurrences, unsafe acts, unsafe conditions, hazards, error, oversight, mistakes etc.

## **UNIT-III**

**Education, Training and Employee Participation in Safety:** Element of training cycle, Assessment of needs. Techniques of training, design and development of training programs. Training methods and strategies types of training. Evaluation and review of training programs. Competence Building Techniques (CBT), Concept for training, safety as a on-line function. Employee Participation: Purpose, areas of participation, methods, Role of trade union in Safety, Health and Environment Protection.

## **UNIT-IV**

**Management Information System:** Sources of information on Safety, Health and Environment Protection. Compilation and collation of information, Analysis & use of modern methods of programming, storing and retrieval of MIS for Safety, Health and Environment. QCC HS Computer Software Application and Limitations.

### **Reference book:**

1. Industrial Safety, Health And Environment Management Systems, R. K. Jain and Sunil S. Rao, Khanna Publishers, 2000
2. Safety Management System And Documentation, Training Programme Handbook, Parul Sv, Cloudtail India , 2019
3. Electrical Safety, Fire Safety Engineering And Safety Management, Sunil S. Rao, R. K. Jain, H. L. Saluja, Khanna Publishers, 1997
4. Industrial Safety and Maintenance Engineering, Parth b Shah, Technical Publications, 2021

## **Paper -II LEGISLATION ON SAFETY, HEALTH AND ENVIRONMENT**

**Duration : 3 hrs.**

**Max. Marks: 70**

**Note: There will be two parts in theory paper.**

**Part A of the paper shall contain seven short answer questions of 14 marks. Each question will carry two marks for correct answer.**

**Part B of the paper will consist four questions one question from each unit with internal choice. Each question will carry 14 marks.**

### **UNIT-I**

**Background and Scope:** 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

### **UNIT-II**

**Important Safety related Legislation :** Overview of Indian legislation pertaining to SHE. The Factories Act, 1948 (Amended) and Rules: Provisions under the Act and Rules made there-under with Amendments Case Laws under the Factories Act. Contract Labour (Abolition and Regulation) Act, Public Liability Insurance Act, Social Accountability 8000 SA-8000

### **UNIT-III**

**Outline of other related important Legislation:** Indian Boilers Act, 1923 with allied Regulations, 1961, Indian Explosives Act, 1984 and Rules. Hazardous Material Transportation Rules. The Dock Workers (Safety, Health & Welfare) Act, 1996 and Rules and Regulations The Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and Cess Act.

### **UNIT-IV**

**Environment Protection Legislations:** Water (Prevention & Control of Pollution) Act 1974 and Rules. Air (Prevention & Control of Pollution) Act 1981 and 1982 and Rules. Environment Protection Act 1986 (Amended) and Rules. MSIHC Rules. Noise Pollution Act, 1998, Bio-Medical Waste. Hazardous Waste Management Rules. Chemical accident (Emergency preparedness, planning and response) Rule 1986.

### **Reference Book**

1. Handbook of Occupational Safety and Health, S. Z. Mansdorf, Wiley; 3rd edition 2019
2. Health, Safety and Environment Legislation: A Pocket Guide, John A Reader, Edward Rowland, Bob Day, Royal Society of Chemistry; Poc edition, 2003.
3. Fundamentals of Occupational Safety and Health, Mark A. Friend, James P. Kohn. Bernan Press; Sixth edition, 2014.
4. Safety Law Legal Aspects in Occupational Safety and Health, Thomas D. Schneid CSR press, 2018

## **Paper-III SAFETY IN ENGINEERING**

**Duration : 3 hrs.**

**Max. Marks : 70**

**Note: There will be two parts in theory paper.**

**Part A of the paper shall contain seven short answer questions of 14 marks. Each question will carry two marks for correct answer.**

**Part B of the paper will consist four questions one question from each unit with internal choice.**

**Each question will carry 14 marks.**

### **UNIT-I**

**Plant Design and Layout AND Citing criteria:** General and Environmental guidelines, Plant layout and Design, General principles for factory building, Plant and equipment layout and fire protection. Indian Standard and national building code. Fire phenomena: Classification of fire, Common cause of industrial fires. Fire prevention and protection system, Special safety precaution, Control of fire, Fire emergency action plan and control room. NFPA code and standard, on-site emergency plan, off-site emergency plan.

### **UNIT-II**

**Electricity safety, lighting (illumination) and colour:** Electricity, its usefulness and hazards, statutory provisions, Indian standard, Effect of Electrical parameters on human body, safety measures for electric work, over load and other protection, Lighting (illumination) and colour : Principles of illumination, Types of Light: Natural and artificial, direct and indirect, and types of installation, Effects of colour on safety.

### **UNIT-III**

**Machine Guarding, Noise and Vibration:** Requirement of machine guarding, Indian standard, Principles of machine Guarding, Types and selection of guard, Mechanical Tool, Inspection, testing & Maintenance. Noise and Vibration : Generation, Perception, Nature & Types of noise, Effect & Hazards of noise and vibration, Statutory provisions, control Method.

### **UNIT -IV**

**Industrial Health and Hygiene:** Occupational health hazard, Introduction & classification of health hazards. Dangerous properties of chemicals, dust, gases, fume, mists, vapors, smoke and aerosols and their health effects. Routes of human entry system, recognition, evolution and control basic hazards, and bio chemical action of toxic substance and toxicity, type and degrees of toxic effects, threshold limits of exposure (TLV), STEL, IDLH, Ld/LC etc. Physiology of work and occupational diseases.

### **Reference Book:**

1. Safety Engineering, John W. Mroszczyk, American Society of Safety Engineers; 4th edition, 2012.
2. System Safety Engineering and Risk Assessment, A Practical Approach, Second Edition, Nicholas J. Bahr, CRC Press, 2015
3. Industrial Safety And Health Management, C. Asfahl, David Rieske , Pearson publisher house , 2018.
4. Principles of Industrial Safety Management, Das Akhil Kumar, PHI Learning Pvt Ltd, 2020

## **PAPER-IV ENVIRONMENTAL IMPACT ASSESSMENT AND MONITORING**

**Duration : 3 hrs.**

**Max. Marks : 70**

**Note: There will be two parts in theory paper.**

**Part A of the paper shall contain seven short answer questions of 14 marks. Each question will carry two marks for correct answer.**

**Part B of the paper will consist four questions one question from each unit with internal choice. Each question will carry 14 marks.**

### **UNIT-I**

**Overview of EIA;** Objectives and development of EIA. Benefits of EIA, Indian directions of EIA. Rapid and comprehensive EIA perspectives. Sources and collection of data for EIA. **EIA Notifications:** EIA in Indian context, EIA Notification 2006, Prior environmental clearance requirements, EIA authority - State and Central government, Committees for Environmental Clearance, Application for EC, Form 1- contents. Categorization of projects, list of projects, activity, financial overlays, conditions and specifications.

### **UNIT-II**

**EIA Notifications:** EIA in Indian context, EIA Notification 2006, Prior environmental clearance requirements, EIA authority - State and Central government, Committees for Environmental Clearance, Application for EC, Form 1- contents. Categorization of projects, list of projects, activity, financial overlays, conditions and specifications.

### **UNIT-III**

**Introduction to Environmental Audit:** Introduction to environmental audit, objectives, Types of environmental audits: based and client driven types, methodology and audit process, Benefits of environmental auditing; environmental audit programme in India.

### **UNIT-IV**

**Reports for Environmental Clearance:** Generic structure of environmental impact assessment document – Executive summary of Project, Introduction, Project description, Project benefits, Policy legal and administrative framework, EIA methodology, Description of Environment, prediction of environmental impacts, evaluation of impacts, Environmental impact statement (EIS), Impact evaluation, Environmental Management Plan (EMP).

#### **Reference book:**

1. Introduction To Environmental Impact Assessment, John Glasson, Riki Therivel, Routledge ( Taylor & Francis eBooks), 2019.
2. Environmental Impact Assessment Methodologies, Y. Anjaneyulu, BS publication house, 2010.
3. Environmental and Social Impact Assessment, Barrow C, Taylor & Francis Ltd, 2021.
4. Principles and Application of Environmental Impact Assessment (EIA), Olabinjo Clement Adeofun, Benard a Omoyeni; ISBN:978-978-948-354-9 edition, 2015

## **Paper -V ENVIRONMENTAL MANAGEMENT SYSTEM AND ISO 14000**

**Duration : 3 hrs.**

**Max. Marks : 70**

**Note: There will be two parts in theory paper.**

**Part A of the paper shall contain seven short answer questions of 14 marks. Each question will carry two marks for correct answer.**

**Part B of the paper will consist four questions one question from each unit with internal choice. Each question will carry 14 marks.**

### **UNIT I: Introduction to Environmental Management Systems (EMS)**

Introduction to Environmental Management System basic definitions and terms, Framework for Environmental Management Systems, Approach for developing an Environmental Management System, Plan -Do-Check-Act Cycle, EMS Certification, ISO 9000, 14000 and 14001 quality and environmental management, social responsibility 26000.

### **UNIT-II**

**Environmental Pollution & Control Techniques:** Definition of pollution, pollutant and significance of pollution of pollution control. Types of environment pollution: air, water and land pollution and control. Hazardous waste management system : landfill as incineration, environment problems and solution Concept of Restoration Ecology and Reclamation of degraded land.

### **UNIT-III**

**Disasters and their management:** Introduction of disasters, Classification and sub types of disasters. Industrial disasters and related case studies. Precautions of SHE in disaster management. Role of SHE in disaster management.

### **UNIT IV**

**OHSAS 18001 and CSR:** Structure and responsibility, training, awareness, competence, communication environmental management system documentation, operational control, monitoring and management, Overview of CSR, Green Marketing, Emergence of new Environmental market, Green supply Chain Management, Eco Designing, Global Reporting Initiative Guideline G-3

### **Reference Book:**

1. ISO 14000 Environmental Management Standards: Engineering and Financial Aspects  
Alan S. Morris, wiley, 2004.
2. Environmental Management, John Pallister, Oxford University Press, 2017.
3. Environmental & Pollution Laws In India (Set Of 2 Volumes), Justice T S Doabia, Lexis  
Nexis publication, 2017.
4. Environmental Management Systems and Sustainability, Saha Polin Kumar, LAP Lambert  
Academic Publishing, ISBN: 9783838375243, 3838375246, 202

**Paper VI : PRACTICAL BASED ON THEORY PAPER /IN-PLANT TRAINING AND VISITS PROJECT**

Laboratory Work /Industrial Visits and Project Report: Candidates are required to work for the Project work or for an Industrial Training or Internship related to the subject at least for 8 weeks and submit the report to the Department. The report will be evaluated by the panel of examiners in the final examination where the candidate shall present their work by Power Point Presentation followed by Vivavoce.