S.S.JAINSUBODHP.G.(AUTONOMOUS)COLLEGE

(AffiliatedtoUniversityofRajasthan)

Syllabus

Department of Environmental Science

P.G.DIPLOMAIN
INDUSTRIAL SAFETY, HEALTH AND ENVIRONMENTAL MANAGEMNT

(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 abovementioned incidences are to enough to understand the severity of Industrial calamities.Toavoidsuchcircumstancesvariouslawsandordersimplementationisnecessarybut not thefactisthatnot onlylawsbutpropertrainingandeducationaboutsafetyrulesand 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 situationsand 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 theyget 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, DepartmentofEnvironmentalScience,proposetostartP.G.Diplomain IndustrialSafety, 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:

- ✓ Todevelopanexpertmanpowertohandlethe complexindustrial environment.
- ✓ Togiveknowledgeaboutoccupationalhealth,industrialhygiene,accidentalprevention techniques to the students.
- ✓ Tomakethestudentawareaboutsafetyauditingandmanagementsystems,pollution prevention techniques etc.
- ✓ Totrain thestudents about riskassessment and management.
- ✓ M.Sc.EnvironmentalSciencestudentswillgetanaddon diploma.

- ✓ Itwillproducewelltrained,qualifiedandexpertmanpowerfortheIndustrial sector.
- ✓ BetterplacementopportunityforM.Sc.EnvironmentalSciencestudents.
- ✓ Coursewill beuseful for in-servicepeoplefrom theindustry.
- ✓ MoreinteractionbetweenInstitutionandIndustry

Eligibilityfor 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 Technologyor 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

AcademicDurationofCourseandExamination:

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

CoursestructureandSchemeofExamination:

1. Eachtheorypapercarries100marks.Theinternalassessmentwillbe30marksandEoSEshall carry 70 marks. The EoSE will be of 3 hours duration. There will be a practical examination of 100 marks in all Semester 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 introducestudentsto researchmethodologyin thesubjectandpreparethemforpursuingresearch in theoretical or experimental or computational areas of the subject. The project work or Field Studyis to be undertaken under guidance jointly byHead of the Department and a senior faculty or a Scientist or anyother 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/duepaper/specialexaminationswillberesoluteaspertheinstitutionsautonomous rules

7. Grade/CGPA/percentage/divisionwillbedecidedaspertheautonomousguidelinesofthe institution.

ProposedcourseforP.G.D.in*I.S.H.E.M**

Semester-I

S.No.	Code	PaperTitle	Theory Hours	Practical Hours	Marks		Total
					External	Internal	
1.	ISHEM1	Safety, Health and Environmental Management			70	30	100
2.	ISHEM2	Legislation on Safety, Healthand Environment			70	30	100
3.	ISHEM3	SafetyinIndustries			70	30	100
4.	ISHEM4	Environmental Impact Assessment and Monitoring					
5.	ISHEMPBT5	Practical Based on TheoryPaper/In-plant Training and Visits Project			60	40	100

Semester-II

1.	ISHEM1	Hazard Identification, AssessmentandControl Techniques			70	30	100
2.	ISHEM2	SafetyEngineering			70	30	100
3.	ISHEM3	Environmental Management System andISO14000			70	30	100
4.	ISHEM4	Natural Disasters and Industries			70	30	100
5.	ISHEMPBT5	PracticalBasedonTheory Paper /In-plant Training andVisitsProject			60	40	100

Semester-I

PAPER-ISAFETY,HEALTHANDENVIRONMENTALMANAGEMENT

Duration:3hrs. **Max.Marks:70**

Note:Therewillbetwopartsinendsemestertheorypaper.
PartAofthepapershallcontainsevenshortanswerquestionsof14marks.Eachquestionwillcarrytwo 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, SafetyAndManagement; Occupational Safety, Health and Environmental Safety, Management – Principles & practices, Role of Management in Industrial Safety, Organization Behaviaraion 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 andEnvironment 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.

Paper-IILEGISLATIONONSAFETY,HEALTHANDENVIRONMENT

Duration:3hrs. **Max.Marks:70**

Note:Therewillbetwopartsinendsemestertheorypaper.

PartAofthepapershallcontainsevenshortanswerquestionsof14marks.Eachquestionwillcarrytwo 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 underthe Act and Rulesmadethere-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 ofService) Act, 1996 and Cess Act.

UNIT-IV

EnvironmentProtectionLegislations: Water(Prevention&ControlofPollution)Act1974and 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.

Paper-IIISAFETYININDUSTRIES

Duration:3hrs. **Max.Marks:70**

Note:Therewillbetwopartsinendsemestertheorypaper.
PartAofthepapershallcontainsevenshortanswerquestionsof14marks.Eachquestionwillcarrytwo 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

Safety in Chemical Industries; Need of Safety in Chemical Industries, Types of chemical industries, Indian Standards. Types of Chemical Hazards & Controls, Storage Hazards & controls, Material (Property) Hazards & Controls, Process Hazards and Control, Pollution Hazards & Control, Safe Transfer of chemical. Safe Transportation of Chemicals, Instrumentation for safe plant Operation, Inspection, Testing & Maintenance, Work permit for Chemical hazard work

UNIT-II

Safety in Petroleum Refinery, Mining and Petrochemical Industry: OISD norms for petroleum industry, Petroleum classification and hazards due to petroleum product. Hazards of bulk storages, and their control measures. Storage of manufacturing process. Hazard and control during manufacturing process.

UNIT-III

Safety in Construction and Cement Industry : Basic Parameters governing the safety in construction suchas siteplanningand layout, safe access, safetyworkpermit and checklist, good housekeeping.Safetyintheuseofconstructionmachineryandequipment.Healthandwelfareof construction workers dust, noise, vibration, heat, humidity, and other hazard. First aid, medical examinations and health records.

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.

Paper –IV ENVIRONMENTAL IMPACT ASSESSMENT AND MONITORING

Duration:3hrs. **Max.Marks:70**

Note:Therewillbetwopartsinendsemestertheorypaper.
PartAofthepapershallcontainsevenshortanswerquestionsof14marks.Eachquestionwillcarrytwo 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.

UNIT-II

EIA Notifications: EIA in Indian context, EIA Notification 2006, Priorenvironmental 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

EIA Methodology: Outline of EIA process, Screening, Scoping, Purpose of scoping, impact implications, Baseline studies and superimposition of projected plant emission impacts,checklist, matrices, Overlays and Geographical Information System, Impact analysis and Predictions, Environmental Impact Statement [EIS]; Public hearing as part of EIA.

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).

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

Laboratory Work /Industrial Visits and Project Report : Laboratorywork and a Compulsory project on Industrial training/ relevant institutional training/Consultancy training in authorized consultancies etc is to be completed and a report is to be Submitted to the department.

Semester-II

Paper –I HAZARD IDENTIFICATION, ASSESSMENT AND CONTROL TECHNIQUES

Duration:3hrs. **Max.Marks:70**

Note:Therewillbetwopartsinendsemestertheorypaper.
PartAofthepapershallcontainsevenshortanswerquestionsof14marks.Eachquestionwillcarrytwo 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

Safety Appraisal, Analysis and control Techniques: Safety Appraisal System, Damagecontrol, Total Loss Control (TLC), Job Safety Analysis (JSA)Product Safety, Standard (Safe) Operating Procedure (SOP) Incident Recall Techniques, Procedures Analysis, Methodical Analysis Technique for Human Error rate Prediction (THERP)

UNIT-II

Hazard and Risk assessment Techniques : Definition , Hazards and risk assessment, Hazards, Risk & detection techniques, Hazards and risk progression chart. Risk analysis assessment and management, Preliminary Hazard Analysis (PHA) and hazard analysis (HAZAN), Failure mode and effect analysis (FMEA), Hazards and operatility (HZOP) study, Fault tree analysis (FTA), Event tree analysis (ETA).

UNIT-III

Accident and Incident Investigation, Reporting and Analysis: Accident and Incident Investigation : Philosophy, Purpose, Process and types of investigation, identifying the key factors and the immediate and basic causes, corrective action, Ag, accident investigation form. Standard classification of factors associated with accident, Methods of collecting and tabulating data, Record keeping.

UNIT-IV

Major Accident Hazard (MAH) Controls: Concept of MAH, Definition of "Major Accident Hazard", Identification and assessment of MAH units, criteria and classification of threshold quantities of Hazardous materials, Types and consequences of Major Accident Hazards : Fire, Explosion and Toxic Release. Types and Effects of Gas Dispersion, Types of Toxic Spills, Meaning of Dispersion and Effects. Safety Report, Safety audit Report and Risk Assessment Report.

Paper-IISAFETYENGINEERING

Duration:3hrs. **Max.Marks:70**

Note:Therewillbetwopartsinendsemestertheorypaper.
PartAofthepapershallcontainsevenshortanswerquestionsof14marks.Eachquestionwillcarrytwo 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, Meteorological aspect, and Separation distances. Need for planning and Follow-up, Plant layout and Design, Generals principles for factory building, Plant and equipment layout and fire protection. Statutory provisions under the factories Act 1948 and rules, Indian Standard and national building code.

UNIT-II

Fire and Explosion. Fire phenomena : Chemistry of fire, Stage of fire, Factors contributing to fire, Classification of fire, Common cause of industrial fires. Fire prevention and protection system, Special safety precaution, Control of fire and explosion in handling / processing flammable liquids, gases, vapors, mists, dusts etc. Fire emergency action plan and control room. NFPA code and standard, on-site emergency plan, off-site emergency plan.

UNIT-III

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-IV

Machine Guarding, Noise and Vibration: Requirement of machine guarding, Indian standard, Principals 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.

Paper-IIIENVIRONMENTALMANAGEMENTSYSTEMANDISO14000

Duration:3hrs. **Max.Marks:70**

Note:Therewillbetwopartsinendsemestertheorypaper.
PartAofthepapershallcontainsevenshortanswerquestionsof14marks.Eachquestionwillcarrytwo 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

Environmental Management System in Industry : Quality of environment. ISO 14000 Environment standards, EMS model. Policy planning process, implementation and operation in industry.

UNIT-II

Environmental Pollution & Control Techniques: Definition of pollution, pollutant and significanceofpollutionofpollutioncontrol.Typesofenvironmentpollution:air,waterandland 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

Environment Impact Assessment and Audits : Basic concept of EIA, Needs for EIA and Methods. Introduction and Significance of Environment Audit. Audit regulations, standards and protocols.Setting up EIA and Audit Division in Industry.

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.

Paper IV: NATURAL DISASTERS AND INDUSTRIES

Duration:3hrs. **Max.Marks:70**

Note:Therewillbetwopartsinendsemestertheorypaper.
PartAofthepapershallcontainsevenshortanswerquestionsof14marks.Eachquestionwillcarrytwo 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

Definition,ClassificationandtypesofDisasters.NaturalDisasterstheirprobablecauseand types. Impacts of Natural Disasters on Man and Materials.

UNIT-II

DisasterManagementinIndustries. Terminologyusedindisastermanagement.StateDisaster management policies and rules. Natural disasters and their impacts on Industry

UNIT-III

Roleofsafetyofficerindisastermanagementinindustry.Economicalimpactsofnatural disasters on industry and role of EHS officer.

UNIT-IV

Mitigation efforts: UN draft resolution on Strengthening of Coordination of Humanitarian Emergency Assistance, International Decade for Natural Disaster Reduction (IDNDR), Policyfor disaster reduction, problems of financing and insurance.

Paper V: 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 PointPresentation followed by Vivavoce.