PERIYAR UNIVERSITY
SALEM – 636 011

PERIYAR INSTITUTE OF DISTANCE EDUCATION (PRIDE)
DIPLOMA IN FIRE AND SAFETY
ONE YEAR

REGULATION AND SYLLABUS
(Effective from the Academic Year 2014 - 2015)
ACADEMIC ELIGIBILITY FOR ADMISSION

Diploma in Fire and Safety: +2 (10 + 2 Stream), Diploma, Any Graduates

DURATION OF COURSE: One Year

COURSE OF STUDY AND SCHEME OF EXAMINATIONS:

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Title of the Subject</th>
<th>Duration</th>
<th>Maximum Marks</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Industrial Fire Protection System</td>
<td>3 Hours</td>
<td>100</td>
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<td>2.</td>
<td>Fire Engineering and Science</td>
<td>3 Hours</td>
<td>100</td>
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<td>3.</td>
<td>Risk Management and Hazard Control System</td>
<td>3 Hours</td>
<td>100</td>
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<td>4.</td>
<td>Industrial Safety</td>
<td>3 Hours</td>
<td>100</td>
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<td>5.</td>
<td>Environmental Safety</td>
<td>3 Hours</td>
<td>100</td>
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<td>6.</td>
<td>Construction Safety</td>
<td>3 Hours</td>
<td>100</td>
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<td>7.</td>
<td>Emergency Planning &amp; First Aid</td>
<td>3 Hours</td>
<td>100</td>
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<tr>
<td>8.</td>
<td>Project Work</td>
<td>15 Days</td>
<td>100</td>
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Total Marks 800

PASSING CRITERIA: The candidates shall be declared to have passed the examination, if they secured not less than 40 marks in each examination.

QUESTION PAPER PATTERN:

THEORY

Duration : 3 Hours

Maximum Marks : 100

Part – A (5 x 5 = 25 Marks)

Answer any 5 Questions

(Eight Questions to be asked)

1, 2, 3, ….8.

Part – B (5 x 15 = 75 Marks)

Answer any 5 Questions

(Eight Questions to be asked)

1, 2, 3, ….8.

PROJECT WORK

Project report containing 50 - 100 pages is to be submitted at the end of the course and the report to be valued for 100 Marks.
1. INDUSTRIAL FIRE PROTECTION SYSTEM

Unit I Fire Prevention and Protection


Unit II Fire Detection System and Accessories


Unit III Industrial Fire Protection Systems


Unit IV Explosion Protecting Systems

Principles of explosion - detonation and blast waves - explosion parameters – Explosion Protection, Containment, Flame Arrestors, isolation, suppression, venting, explosion relief of large enclosure - explosion venting - inert gases, plant for generation of inert gas - rupture disc in process vessels and lines explosion, suppression system based on carbon dioxide (CO2) and halons- hazards in LPG, ammonia (NH3), sulphur dioxide (SO2), chlorine (Cl2) etc

Unit V Hydraulic System

Pumps, primers, tenders and water relay, Introduction, definition, Different types of pumps, Different types of primers, Working principle of various pumps primers, Maintenance and trouble shooting, Testing of pumps, Advantages and disadvantages, Water relay system, Open circuit system, Closed circuit system.

Text Book


References

2. Dinko Tuhtar, “Fire and explosion protection”
2. FIRE ENGINEERING AND SCIENCE

Unit I Physics of Fire


Unit II Chemistry of Fire


Unit III Characteristics of Fire


Unit IV Regulations for Safety and Environment

Factories act and rules - Indian explosive act - Gas cylinder rules - SMPV Act - Indian petroleum act and rules. Environmental pollution act - Overview of OHSAS 18000 and ISO 14000

Unit V Case Studies

Flixborough - Mexico disaster - Pasadena Texas - Piper Alpha - Peterborough - Bombay Victoria dock ship explosion – Bhopal Gas Tragedy.

References

4. Dinko Tuhtar, “Fire and explosion protection”
3. RISK MANAGEMENT AND HAZARD CONTROL SYSTEM

Unit I Introduction

Introduction, hazards, hazard monitoring, different stages of process life time – Hazard reduction approaches and inherent safety review - Selection of hazard evaluation techniques - Factors influencing the selection of hazard evaluation techniques - decision making process - hazard review for management changes - combined hazard review - hazard evaluation - Risk issues.

Unit II Hazard Evaluation Techniques - Non Scenario Based

Checklist analysis, safety review, relative ranking, preliminary hazard analysis (PHA), fire explosion and toxicity index (FETI)

Unit III Hazard Evaluation Techniques - Scenario Based

Fault Tree Analysis & Event Tree Analysis – what-if analysis/checklist analysis - hazard operability studies (HAZOP) - Failure Mode and Effect Analysis (FMEA)

Unit IV Risk Management System


Unit V Instrumentation

Applications of Advanced Equipment and Instruments, Thermo Calorimetry, Differential Scanning Calorimeter (DSC), Thermo Gravimetric Analyzer (TGA), Accelerated Rate Calorimeter (ARC), Principles of operations, Controlling parameters, Applications, advantages. Explosive Testing, Deflagration Test, Detonation Test, Ignition Test, Minimum ignition energy Test, Sensitiveness Test, Impact Sensitiveness Test (BAM) and Friction Sensitiveness Test (BAM), Shock Sensitiveness Test, Card Gap Test.

Reference Books

1. Methodologies for Risk and Safety Assessment in Chemical Process Industries, Commonwealth Science Council, UK
2. Hazop and Hazon, by Trevor A Klett, Institute of Chemical Engineering.
4. INDUSTRIAL SAFETY

Unit I Electrical Hazards

Primary and secondary hazards-shocks, burns, scalds, falls-human safety in the use of electricity. Energy leakage-clearances and insulation-classes of insulation-voltage classifications of excess energy-current surges-over current and short circuit current-heating effects of current-electromagnetic forces-corona effect-static electricity—definition, sources, hazardous conditions, control, electrical causes of fire and explosion-ionization, spark and arc-ignition energy-Lightning, hazards, lightning arrestor, installation—earthing, Specifications, earth resistance, earth pit maintenance.

Unit II Building Fire Safety

Objectives of fire safe building design, Fire load, fire resistant material and fire testing—structural fire protection—structural integrity—concept of exit design—exists width calculations—fire certificates—fire safety requirements for high rise buildings—snookers.

Unit III Storages and Transportation

General consideration, petroleum product storages, storage tanks and vessel-storages layout segregation, separating distance, secondary containment-venting and relief, atmospheric vent, pressure, vacuum valves, flame arrestors, fire relief-fire prevention and protection-LPG storages, pressure storages, layout, instrumentation, vaporizer, refrigerated storages-LNG storages, hydrogen storages, toxic storages, chlorine storages, ammonia storages, other chemical storages-underground storages-loading and unloading facilities-drum and cylinder storage-ware house, storage hazard assessment of LPG and LNG Hazards during transportation—pipeline transport

Unit IV Workshop Safety


Unit V Safety Inspections

Safety Audit—Safety Survey—Plant safety inspection—Safety tour—Safety sampling—What is 5s—How to implement 5s—Benefits of implementing 5s standard—What is safety budget—Direct cost—indirect cost—Safety Equipment’s & their budget preparation

Reference Books

1. Methodologies for Risk and Safety Assessment in Chemical Process Industries, Commonwealth Science Council, UK

2. Hazop and Hazon, by Trevor A Klett, Institute of Chemical Engineering.


5. ENVIRONMENTAL SAFETY

Unit I Air Pollution


Unit II Water Pollution


Unit III Hazardous Waste Management


Unit IV Environmental Measurement and Control


Unit V Pollution Control in process Industries


References

6. CONSTRUCTION SAFETY

Unit I Accidents Causes and Management Systems

Problems impeding safety in construction industry-causes of fatal accidents, types and causes of accidents related to various construction activities, human factors associated with these accident -construction regulations, contractual clauses -Pre contract activities, preconstruction meeting - design aids for safe construction –permits to work –quality assurance in construction - compensation –Recording of accidents and safety measures –Education and training

Unit II Hazards of Construction and Prevention


Unit III Working at Heights

Fall protection in construction OSHA 3146 –OSHA requirement for working at heights, Safe access and egress –safe use of ladders-Scaffoldings , requirement for safe work platforms, stairways, gangways and ramps –fall prevention and fall protection , safety belts, safety nets, fall arrestors, controlled access zones, safety monitoring systems –working on fragile roofs, work permit systems, height pass –accident case studies.

Unit IV Construction Machinery


Unit V Safety in Demolition Work

Safety in demolition work, manual, mechanical, using explosive -keys to safe demolition, pre survey inspection, method statement, site supervision, safe clearance zone, health hazards from demolition.

References

4. Handbook of OSHA Construction safety and health charles D. Reese and James V. Edison
7. EMERGENCY PLANNING & FIRST AID

Unit I On site Emergency Planning

On-site Emergency Plan - Emergency Alarm System - Emergency Control Room - Key personnel
Emergency Control Program

Unit II Off-site Emergency Plan

Mutual Aid Scheme Emergency Evacuation - Security and Media management

Unit III Hazard Communication

Safe Handling of hazardous substance - Material Safety Data Sheet (MSDS) - Use of hazardous and
Toxic substance - Storage and Handling - Transportation of Hazardous substance

Unit IV First Aid

Respiration - Cardio Pulmonary Resuscitation - Choking Fainting - Poisoning - Open Wounds -
Control of bleeding - Burns and Scalds - Heart Attack - Resuscitation. Disorder of respiratory
system. Disorder of Circulation.

Unit V Wound & Bleeding.

Disorders of consciousness - Bone, Joint & Muscle injury - Burns & Scalds - Effect of heat & cold -
Foreign bodies - Poisoning - Dressing & Bandages - Handling & transport of injured - Emergency
First Aid.

Reference Books

1. Methodologies for Risk and Safety Assessment in Chemical Process Industries, Commonwealth Science Council, UK

2. Hazop and Hazon, by Trevor A Klett, Institute of Chemical Engineering.

3. “Guidelines for Chemical Process Quantitative Risk Analysis”, second edition, Centre for
Chemical Process safety, AICHE, 2000

safety, AICHE 2008