

SCHEME OF EXAMINATION

FOR

POST-GRADUATE DIPLOMA

IN

FIRE AND LIFE SAFETY AUDIT

ACADEMIC SESSION 2023-24 ONWARDS



UNIVERSITY SCHOOL OF FIRE AND INDUSTRIAL SAFETY

GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY

SECTOR-16 C, DWARKA, NEW DELHI – 110078 (INDIA)

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**UNIVERSITY SCHOOL OF FIRE AND INDUSTRIAL SAFETY
GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY
NEW DELHI, INDIA**

**POST-GRADUATE DIPLOMA IN FIRE AND LIFE SAFETY AUDIT
SCHEME OF EXAMINATION
w.e.f. 2023-24 Batch**

| Semester 1 | | Credit Hours |
|-------------------|---|---------------------|
| PGDF 101 | Basics of Fire and Life Safety Audit (<i>Core</i>) | 2 |
| PGDF 103 | Fire Prevention (<i>Core</i>) | 2 |
| PGDF 105 | Life Safety (<i>Core</i>) | 2 |
| PGDF 107 | Fire Protection (<i>Core</i>) | 2 |
| PGDF 109 | State Fire Service Acts, Rules & Byelaws (<i>Core</i>) | 2 |
| PGDF 111 | Disaster : Causes Impacts and Management (<i>Core</i>) | 2 |
| | Electives (Any One) | |
| PGDF 113 | Building Codes and Standards (<i>Elective</i>) | 2 |
| PGDF 115 | Industrial Fire Safety Risk Assessment (<i>Elective</i>) | 2 |
| | Practicals | |
| PGDF 151 | Field Visits / Presentation (<i>Compulsory</i>) | 1+1 |
| PGDF 153 | Project Work (<i>Compulsory</i>) | 5 |
| | Total | 21 |
| Semester 2 | | Credit Hours |
| PGDF 102 | International Building Codes & Standards (<i>Core</i>) | 2 |
| PGDF 104 | International Fire Service Acts (<i>Core</i>) | 2 |
| PGDF 106 | Building Services Design (<i>Core</i>) | 2 |
| PGDF 108 | Performance Based Fire Design (<i>Core</i>) | 2 |
| PGDF 110 | Institutional & Legal Framework for Disaster Management (<i>Core</i>) | 2 |
| | Electives (Any Two) | |
| PGDF 112 | Fire Risk and Hazard Analysis of Cities (<i>Elective</i>) | 2 |
| PGDF 114 | Fire Risk and Hazard Analysis of Industry (<i>Elective</i>) | 2 |
| PGDF 116 | Fire Forensics (<i>Elective</i>) | 2 |
| PGDF 118 | Geoinformatics for Fire Risk Assessment (<i>Elective</i>) | 2 |
| | Practicals | |
| PGDF 152 | Field Visits / Presentation (<i>Compulsory</i>) | 1+1 |
| PGDF 154 | Dissertation (<i>Compulsory</i>) | 6 |
| | Total | 22 |

Total Credits Offered in Semester 1 & 2 = 43

Required Credits for award of One Year PG Diploma = 40

Detailed Syllabus – Semester I

Post-Graduate Diploma in Fire and Life Safety Audit

PGDF 101: Basic of Fire & Life Safety Audit (L-2 T-0 C-2)

Unit I:

Introduction to Fire and Life Safety Audit, Requirements, Role of Fire and Life Safety Auditor, Fire Officers and Consultants.

Unit II:

Fire Occupational Safety and Life Safety Audit, Statutory and Recommendatory Legal Provisions of Fire and Life Safety in India, Europe, USA and Australia, Code of Practice.

Unit – III:

Fire Safety Management Audit, Safety Management Audit Model, Audit Process, Organizational Strength, Audit Report and Action Planning, Preparing for Audit.

Unit – IV

Guidance for Auditing Management Systems in National and International Standards, Terms and Definitions, Principles of Audit, Conducting Audit Follow-Up, Competence and Evaluation of Auditors.

Reading List:

1. Fire Safety Management Audit, Specification August 2017 or as amended, Published by British Safety Council.
2. Code of Practice on Occupational Safety and Health Audit, IS 14489:1998 Published by Bureau of Indian Standards.
3. Guidelines for Auditing Management System, ISO 19011, Published by International Standard Organization.
4. NFPA 921 Guide for Fire and Explosion Investigation 2014, Published by National Fire Protection Association, USA.
5. Fire and Life Safety Codes of Europe, USA and Australia Published by National Fire Protection Association, USA, British Council and Australian Standards.

PGDF 103: Fire Prevention (L-2 T-0 C-2)

Unit I:

Principles of Fire Science, Classification of Fire, Spread of Fire, Sources of Ignition, Products of Combustion, Electricity and Fire Risks, Fire Load

Unit II:

Classification of Occupancy, Hazards of Contents, Fire Resistance Rating of Various Building Materials.

Unit III:

Building Rehabilitation, Historic Buildings, Repairs, Renovations, Modification, Reconstruction, Change of Occupancy

Unit IV:

Fire Drills, Emergency Plans, Fire Command Centre, Fire Prevention and Fire Protection Programme.

Reading List:

1. SP7:2016 National Building Code of India Volume 1 & 2 (Published by Bureau of Indian Standards)
2. NFPA 101 Life Safety Code (Published by National Fire Protection Association, USA).
3. Fire Protection Handbook Volume – I & II (Published by National Fire Protection Association, USA)
4. International Fire Code (Published by International Code Council, INC.)
5. Fire Fighting The Essential Handbook by Barendra Mohan Sen (Published by UBS Publishers' Distributors Pvt. Ltd, New Delhi)
6. IS codes on 'Fire and Life Safety' published by Bureau of Indian Standards, India
7. NFPA 551 'Guide for the Evaluation of Fire Risk Assessments (Published by National Fire Protection Association, USA)

PGDF 105: Life Safety (L-2 T-0 C-2)

Unit I:

General Definitions, Construction and Compartmentation, Fire Barriers; Smoke Partitions; Smoke Barriers; Vertical Openings, Special Hazard Protection.

Unit II:

High Rise Buildings; Egress and Occupation Strategy; Fire Safety Requirement for Lifts; Horizontal Exits.

Unit III:

Occupancy Wise Life Safety Requirements; Atrium Protection; Commercial kitchen; Car Parking Facilities; Metro Stations.

Unit IV:

Building Materials, Glazing Interior Surface Finishes, Facade

Reading List:

1. SP7:2016 National Building Code of India Volume 1 & 2 (Published by Bureau of Indian Standards)
2. NFPA 101 Life Safety Code (Published by National Fire Protection Association, USA).
3. Fire Protection Handbook Volume – I & II (Published by National Fire Protection Association, USA)
4. International Fire Code (Published by International Code Council, INC.)
5. Fire Fighting Operations in High-Rise and Standpipe-Equipped Buildings by David M. McGrail (Published by PennWell Corporation, USA)
6. IS codes on 'Fire and Life Safety' published by Bureau of Indian Standards, India

PGDF 107: Fire Protection (L-2 T-0 C-2)

Unit I:

Objectives, Fundamental Requirements, Minimum Requirements Based on Building Occupancy Classification.

Unit II:

Fire Detection and Alarm Systems, Voice Evacuation and Public Address System, Electrical Installations, Emergency Power Supply, Lightning Protection, Escape Lighting and Exist Signages.

Unit III:

Fire Fighting System, Wet Riser, Down-Corner, Dry Riser, Static Water Storage Tanks, Fire Pumps and Appurtenances, Fire Extinguishers, Automatic High Velocity and Medium Velocity Water Spray Systems, Fixed Foam Installations, Gas Based Suppression Systems, Automatic Water Mist Systems, Special Provision for High Rise Buildings.

Unit IV:

Heating, Ventilation, Air Conditioning and Refrigeration Systems; Mechanical Smoke Exhaust systems, Pressurization of staircase and protection of escape routes, arrangements for Smoke Exhaust and Pressurization of Areas Below Ground, Smoke management in Atrium and High Rise Buildings.

Reading List:

1. SP7:2016 National Building Code of India Volume 1 & 2 (Published by Bureau of Indian Standards)
2. NFPA 101 Life Safety Code (Published by National Fire Protection Association, USA).
3. Fire Protection Handbook Volume – I & II (Published by National Fire Protection Association, USA)
4. International Fire Code (Published by International Code Council, INC.)
5. IS codes on 'Fire and Life Safety' published by Bureau of Indian Standards, India
6. NFPA 13 Automatic Sprinkler Systems Handbook (Published by National Fire Protection Association, USA)
7. NFPA70 'National Fire Alarm and Signaling Code (Published by National Fire Protection Association, USA)
8. NFPA92 'Standard for Smoke Control System (Published by National Fire Protection Association, USA)
9. CPWD General Specifications for Electrical Works Part V-(Wet Riser & Sprinkler System) (Published by Central Public Works Department, Govt. of India)

PGDF 109: State Fire Safety Act, Rule and Bye - Laws (L-2 T-0 C-2)

Unit I:

Importance of Fire Service Act, Model Fire Force Bill and Rules, Indian Constitution Provisions on Subject “Fire”.

Unit II:

Fire and Life Safety Act and Rules of Delhi, Maharashtra, Gujarat, Karnataka, Odisha and West Bengal.

Unit III:

Local Bye-Laws of Delhi, Maharashtra, Gujarat, Karnataka, Odisha and West Bengal

Reading List:

1. Model Fire Service Bill & Rules of 1958 and as amended from time to time, Published by DG FS CD & HG, MHA, GOI
2. Fire and Life Safety Acts, Rules, Local Building Bye Laws published by Government of Delhi, Maharashtra, Gujarat, Karnataka, Odisha and West Bengal.
3. Provision of Indian Constitution on Subject Fire, Indian Constitution

PGDF 111: Causes, Impacts and Management (L-2 T-0 C-2)

Unit I:

Concepts of Disasters, Hazard, Vulnerability, Risk Capacity, Resilience, Natural and Human Induced Disasters; Disaster Profile of India; Types of Disasters; Incidents of Mega Disasters in India.

Unit II: Causes and Impacts of Natural Disasters

Earthquakes

Causes and Effects of Earthquakes, Seismic Zones, Seismic Waves, Epi-Centre, Magnitude, Richter Scale, Intensity, Vulnerability and Damage Potential, Quake Resistant Buildings & Infrastructure.

Volcano

Causes, Impacts and Distribution of Volcanoes.

Climate Change & Disasters

Floods

Causes and Impact of Flood; River and Coastal Floods, Flash Floods, Lake Outburst; Cloud Burst; Urban Floods; Major Flood Incidents in India; Flood Mitigation and Management.

Landslides & Avalanches

Landslides: Types & Causes, Landslide Prevention, Mitigation and Management.

Avalanches: Formulation, Types and Hazard Mitigation.

Cyclones and Tsunami: Differences Between Cyclone, Typhoon, Hurricanes, Tsunami: Causes and Impact; Mitigation of Cyclone & Tsunami.

Drought

Causes, Impact, Affected Areas, Drought Monitoring and Management

Heatwave

Concept of Climate Change and Heatwave; Urban Heat Island; Major Incidents related to Heatwave.

Coldwave

Concept of Coldwave, Formation and Impact, Major incidents related to Coldwave.

Unit III: Technological Disasters

Chemical, Biological, Radiological and Nuclear (CBRN) Disasters, Cyber Disaster.

Unit IV: Causes & Impact of Other Disasters

Industrial Hazards; Road, Rail, Air and Boat Capsize, Urban Fires, Forest Fires, Coal Mine Fires, Oil Spills, Building Collapse and Stampede.

Lightning: Causes and Impact; Safety Measures for human beings and buildings.

Unit V: Guidelines

Guidelines on State Disaster Management Plan, Management of Cyclone, Drought, Earthquake, Flood, Land Slide, Avalanches, Urban Flooding and Heat Wave.

Reading List:

1. Murk, B. W., Skinner, B.J. and Porter, S.C. (1996) Environmental Geology. Wiley, New York.
2. Bohle, H. G., Downing, T. E. and Watts, M. J. (1994) Climate change and social vulnerability: Towards a sociology and geography of food insecurity, Global Environmental Change. No. 4, 37-48.
3. Bocker, E. And Grondille, R. V. (1999) Environmental Physics, John Wiley & Sons Ltd.
4. Khanna, B. K. (2005) All you wanted to learn about disasters, New India Publishing Agencies, New Delhi.
5. Khanna, B. K. (2014) Perils of under preparedness in Sikkim earthquake, IDSA, New Delhi.
6. Wallace, J. M. and Hobbs, P. V. (1977) Atmospheric Science: An Introductory Survey, Academic Press, New York.

PGDF 113: Building Codes and Standards (L-2 T-0 C-2)

Unit I:

Introduction to Codes, Standards, Good Practice, Handbook and Special Publications, Aspect of Applicability at Local Jurisdiction, Requirements and Regulations of Authority Having Jurisdiction.

Unit II:

National Building Code of India – Changes and revision from Inception to 2016, Aspect of IS Codes – Revision and Referencing in NBC, Interrelation of Part and Sections of NBC.

Unit III:

Local Building Code, Regulations, Act and Bye-Laws, Changes and Amendments of above by Authority Having Jurisdiction, Gazette Notifications and Adoption of Local Code, Issue of NOC, Occupancy Certificate and Renewals, Adoption of NBC by Authority Having Jurisdiction.

Unit IV:

Cinematography Act State wise aspect of Applicable Act wide Rules and Bye-Laws, Reference and alignment to NBC under Special Occupancy.

Reading List:

1. Model Fire Service Bill & Rules of 1958 and as amended from time to time, Published by DG FS CD & HG, MHA, GOI
2. Fire and Life Safety Acts, Rules, Local Building Bye Laws published by Government of Delhi, Maharashtra, Gujarat, Karnataka, Odisha and West Bengal.
3. NBC 1997, 2005 and 2016.
4. IS Codes and Standards – Various.
5. Development Control Regulation – Greater Mumbai
6. The Cinematography Act, 1952 and Rules (with further Amendments)

PGDF 115: Industrial Fire Safety Risk Assessment (L-2 T-0 C-2)

Unit I:

National and International Statutory Provisions of Industrial Fire Safety and Risk Assessment.

Unit II:

Factory Acts, Provisions of Fire Safety arrangements in Factory.

Unit III:

Implementation of Fire Safety and Risk Assessment in Accordance with the OISD Standards, Provisions of Fire safety arrangements.

Unit IV:

PESSO Act and Rules and Provisions of Fire Safety arrangements.

Unit V:

Explosive Act and Rules, Provisions of Fire Safety arrangements.

Reading List:

1. OISD Standards Published by OISD, Ministry of Petroleum
2. Factory Act Published by GOI
3. PESSO Acts and Rules, Published by Ministry of Petroleum

PGDF 151: Field Visits/ Presentation (L-0 P-1 T-1 C-2)

PGDF 153: Project Work (L-0 P-5 T-0 C-5)

Detailed Syllabus – Semester II

One Year Post Graduate Diploma in Fire & Life Safety Audit

PGDF 102: International Building Codes and Standards (L-2 T-0 C-2)

Unit I:

Introduction to International Building Code, International Fire Code, International mechanical Code published by Research Society and Associations International Societies and Associations in US, UK, EU, South East Asia and ME. Region wise acceptance and applicability of the Standard Body Codes in the Local Jurisdiction.

Unit II:

Issue of Draft for Wide Circulation and Comments Information in Public Domain and not classified by the ISO organization.

Unit III:

Global impact and acceptance of International Building Code and Standards

Reference of International Building Code and Standards by Companies operating outside their Parent Location and in Regional Offices.

Reading List:

1. International Building Code by ICC
2. International Fire Code by ICC
3. NFPA 101 – Life Safety Code
4. NFPA 5000 – Building Construction and Safety Code
5. CIBSE Guide E – Fire Safety Engineering
6. UAE Fire and Life Safety Code of Practice – 2018

PGDF 104: International Fire Service Acts (L-2 T-0 C-2)

Unit I:

Institutional and Legal framework in certain developed and developing countries such as USA, UK Australia, Hong Kong, Bangladesh etc.

Unit II:

Global Practices and Regulations of International Fire Services Act. Applicability of International Fire Services Act in other regions and geographic locations.

Unit III:

Aspect of Insurance review and coverage for projects based on International Fire Services Act.

Unit IV:

Local Codes and Act alignment and conflict with International Fire Services Act
Roles of Code Consultant in establishing aspect of Local Codes and Act and comparative analysis with International Fire Services Act

Reading List:

1. International Building Codes
2. International Fire Code published by Research Society and Associations
3. International Research Society and Associations US, UK and EU
4. Act of USA, UK, Australia, Hong Kong, Bangladesh
5. Federal Fire Prevention and Control Act of 1974
6. Insurance Act, 1938

PGDF 106: Building Services Design (L-2 T-0 C-2)

Unit I:

Basics of Electrical and definition, Design and Planning of Safe Electrical Services, distribution of electric supply, safety devices in electrical circuits, Emergency Lighting Design to meet egress and Evacuation requirements, Electrical Load Estimation & Lighting Design, Transformer & DG Selection & Sizing, Switchgears Selection & Sizing, Panel & Distribution Board Types & Designing, Cables, Wires & Conduit Selection & Sizing, Introduction to Codes & Standards, Exit and Emergency Lighting Design to meet egress and Evacuation requirements, Lightning and Earthing Systems.

Unit II:

Heating, ventilation and Air conditioning systems: Introduction, Refrigeration Cycle and Types of Air-Conditioning System, General Heat Load Calculation, Psychrometric Chart, Chillers/ DX Systems, Cooling Towers, VRF System, District Cooling and Coil Selection Air Distribution System, Ventilation System, Heating System, Hydronic System, Fire Protection, Case Study and Project Discussion.

Unit III:

Water supply system in the buildings: Drainage Systems, Water Supply Systems, Pipe Material & Insulation of Piping Systems, Energy Conservation, Introduction to Codes & Standards, Case Study & Project Discussion.

Unit IV:

Fuel gas systems: Codes and Practice for household and Industries.

Unit V:

Elementary Building Management System – Basics of BMS, Studying BMS Architecture, Input Output Summary, DDC controllers & Field Devices, Understanding cause and effect matrix, Graphical representation, Maintenance and regular building services health check. Vital measurements and record keeping (log books).

Unit VI:

Mechanical Services – Aspect of Smoke Mitigation approach from pressurization and Ventilation consideration. Control and Logic of Smoke Mitigation System, Aligning Mechanical Design Systems and Services to Compartmentation Design to avoid spread of fire with Passive Fire Rating over Duct Work, Duct Work Construction, Dampers and their controls.

Unit VII:

Fire Protection and Fire Fighting – Design and Planning of Water Storage, Fire Pumps, Hydrants, Sprinkler System, Selection and location planning of Fire Extinguishers, Aspect of Kitchen Hood, Server, IT Rooms and Helipads Fire Protection System, Design and Planning of Fire Alarm System with PA System including Cause and Effect Integration.

Reading List:

1. NBC 2016
2. IS 15105, 2189, 2190 & 3844
3. ASHRAE fundamentals of HVAC 2017
4. ISHRE HVAC Data Book 2017
5. ASHRAE Design Guide for Tall Buildings 2018
6. FSAI Suraksha Index (FSI) – Building Rating System Published by FSAI

PGDF 108: Performance Based Fire Design (L-2 T-0 C-2)

Unit I:

An Introduction to Prescriptive and Performance based Design Approach

Criteria for Prescriptive and performance based Design for fire and life safety systems in buildings. Specific aspect of Performance based design of Fire and Life Safety Services for Large and Mixed-use Projects.

Assessing on aspect of Prescriptive Design and Results as obtained as so compared with Performance based design Special Considerations on Performance Based Design on Evacuation Simulation, Smoke Mitigation and Control, Building Structural Fire Rating, Passive Fire Rating System on L and T Rating, Façade Design, Building Separation and Setbacks, Elevator Evacuation, Public Address System and Campus Fire Strategy.

Unit II: FIRE Evacuation Modeling

Principles and Practice of Evacuation Modeling (PPEM)

- Introduction
- Scope
- Building Evacuation Models
- Theory of Occupant Behavior during Building Fires
- Explain RSET – models that are commonly used in guidelines and regulations
- Describe different theories of human behavior in fire (e.g. role-rule model, affiliation, social influence, affordances, help in emergencies, panic, etc.)
- Understand the representation of evacuation movement
- Explain the basic assumptions behind evacuation models (space representation, modeling methods, uncertainties, verification and validation) and understand their main strengths and limitations.
- Apply evacuation models for the simulation of evacuation scenarios.

Unit III: Fire Dynamic Simulation

Fundamental Processes

- Physical concepts
- Fuel and combustion processes and fundamentals
- Limits of flammability
- Heat transfer: Conduction and convection

Radiation, ignition and flame spread

- Radiation from fires
- Ignition – general, gaseous/ liquid fuels and solids
- Spread of flame
- Fire behavior and modern buildings

Pool fires, jet fires and cloud fires

- Steady burning diffusion fires
- Pool fires in the open
- Jet fires
- Radiation from flames
- Example calculations: radiation flux from flare on escape route
- Pool and jet fires, large-scale tests
- Cloud fires
- Pool and jet fires in compartments.

Compartment fires

- The growth period
- Flashover
- The post-flashover period and back draughts
- Fire performance of structures
- Smoke movement
- Fire combustion products and toxicity as a function of ventilation conditions

Compartment fire modeling

- Overview of fire models
- A zone model in detail – CFAST
- Using CFD models
- Hands on experience with a zone model

Reading List:

1. Performance – based fire safety design by Morgan J Hurley and Eric R. Rosenbaum (Published by CRC Press)
2. SFPE Engineering guide to Performance – based fire protection, 2nd Edition
3. CFAST of NIST USA
4. FDS of NIST USA

PGDF 110: Institutional and Legal Framework for Disaster Management (L-2 T-0 C-2)

Unit I: Disaster Management Framework in India

Constitution of India, Prime Minister Agenda of 10 Points, NPDRR; Disaster Management Act 2005, Environment Protection Act, 1986, Section 135 of Company Act 2013, India – Corporate Social Responsibility, National Disaster Management Policy 2009, National Disaster Management Plan 2016.

Judicial Case Studies Related to Disaster Management.

Unit II: International Framework for Disaster Management

International Initiatives by UN – UNDRR, ARISE, Yokohama Strategy, Hyogo Framework for Disaster Risk Reduction (2005-2013), Sendai Framework (2013-2030), Sustainable Development Goals, COP21 – Paris Agreement 2015, Its Scope, Utility and Initiative Taken for DRR; Human Rights and Humanitarian Laws.

Unit III: Role of National and International Agencies

National Disaster Management Authority (NDMA), Disaster Management Framework at National, State, District and Local Level, Constitution of DDMA's and Roles and Responsibilities; Armed Forces, CAPF and State Police, Medical Services, Civil Defence, Home Guards, NCC, NYK, NSS, Volunteers and Fire Services, etc. – Role of Each Stakeholder; UN Agencies, IFRC & National Red Cross Society.

Unit IV: Disaster Management Framework in Select Countries.

Institutional and Legal Framework in Certain Developed and Developing Countries, such as USA, Japan, Singapore, South Africa and Bangladesh.

Reading List:

1. Arnold, M. and Kreimer, A. (2000) Managing Disaster Risk in Emerging Economies”, Disaster Risk Management Series No. 2, World Bank, Washington, D.C.
2. Collins, L. R. and Schneid, T. D. (2000) Disaster Management and Preparedness, Taylor and Francis.
3. Disaster Management Act (2005).
4. Goel, S. L. and K. Ram (2001) Disaster Management, Deep and Deep Publications.
5. Hyogo Framework for Action (2005-2015).
6. National Disaster Management Plan (2016).
7. National Disaster Management Policy (2009).
8. Parasuraman, S. (2004) India Disaster Report: Towards a Policy Initiatives, Oxford University Press.

9. Sendai Framework for DRR (2015-2030).
10. UNISDR – ARISE (2015).
11. Vision, United Nations (2004).

PGDF 112: Fire Risk and Hazard Analysis of Cities (L-2 T-0 C-2)

Unit I:

Fire Hazard and Risk Analysis, Methods and Procedures for conducting Fire Hazard and Risk Analysis of the City

Unit II:

The recommended guidelines and scale for setting up fire services in India as per SFAC

Unit III:

Requirements of Number of Fire Stations, Firemen, Fire Fighting Equipment and Appliances as per guidelines of SFAC

Unit IV:

Hazard Mapping of Cities Based on SFAC Scale and Other Standards

Unit V:

Use of GIS in Establishing the Requirement of Fire Services i.e. Fire Station etc.

Reading List:

1. Compendium of Instruction of Standing Fire Advisory Council (SFAC) and Minutes for SFAC, Published by DG FS CD & HG, MHA, GOI.
2. RMSI report on Fire Hazards and Risk Analysis conducted by GOI and published by GOI, MHA, DG FS CD & HG.
3. British Standard BS: IEC61882: 2002 Hazard and operability studies (HAZOP studies) – Application Guide British Standards Institution.
4. Swann, C. D., & Preston, M. L., (1995) Journal of Loss Prevention in the Process Industries, vol 8, no 6, pp 349-353 “Twenty-five years of HAZOPs.
5. Kietz, T. A., (1983) HAZOP & HAZAN Notes on the Identification and Assessment of Hazards IChemeE Rugby
6. Kietz, T., (2000) By Accident – a life preventing them in industry PVF Publications ISBN 0-9538440-0-5.
7. Kietz, Trevor (2006). Hazop and Hazan (45h ed.). Taylor & Francis. ISBN 0852955065.
8. Gould, J., (2000) Review of Hazard Identification Techniques, HSE
9. Hazard and Operability Studies Explanation by a software supplier

PGDF 114: Fire Risk and Hazard Analysis of Industries (L-2 T-0 C-2)

Unit I:

Fire Risk and Hazard Analysis of Industries.

Unit II:

Provisions under the Various Statutory Acts and Rules

Unit III:

Fire Risk and Hazard Analysis of Industries Using Latest Software

Unit IV:

Audit of Industries, Methodology, Report Preparation and Implementations.

Unit V:

Calculation of Fire Fighting Equipments, Extinguishing Media, Manpower and Response Time in the Industries.

Reading List:

1. Compendium of Instruction of Standing Fire Advisory Council (SFAC) and Minutes for SFAC, Published by DG FS CD & HG, MHA, GOI.
2. RMSI report on Fire Hazards and Risk Analysis conducted by GOI and published by GOI, MHA, DG FS CD & HG.
3. British Standard BS: IEC61882: 2002 Hazard and operability studies (HAZOP studies) – Application Guide British Standards Institution.
4. Swann, C. D., & Preston, M. L., (1995) Journal of Loss Prevention in the Process Industries, vol 8, no 6, pp 349-353 “Twenty-five years of HAZOPs.
5. Nolan, D. P. (1994) Application of HAZOP and What-If Safety Reviews to the Petroleum, Petrochemical and Chemical Industries.
6. Kietz, T. A., (1983) HAZOP & HAZAN Notes on the Identification and Assessment of Hazards IChemeE Rugby
7. Kietz, T., (2000) By Accident – a life preventing them in industry PVF Publications ISBN 0-9538440-0-5.
8. Chemical Industries Association (1977) A Guide to Hazard and Operability Studies.
9. Kietz, Trevor (2006). Hazop and Hazan (45h ed.). Taylor & Francis. ISBN 0852955065.
10. Gould, J., (2000) Review of Hazard Identification Techniques, HSE
11. Hazard and Operability Studies Explanation by a software supplier
12. OISD Standards Published by OISD, Ministry of Petroleum
13. Factory Act Published by GOI
14. PESSO Acts and Rules, Published by Ministry of Petroleum.

PGDF 116: Fire Forensics (L-2 T-0 C-2)

Unit I:

Introduction to Fire Forensic Science, Terminologies, Fire and Arson Investigation etc.

Unit II:

Understanding physics and Chemistry of Fire, Fire Ignition and Fire Dynamics, Types of Fires, Methods of Heat Transfer, Premixed and diffusion flames, Properties of building construction Materials

Unit III:

Fire Development, Factors Affecting Fire Growth, Compartment Fires, fire Spread, Human Behaviour in fire

Unit IV:

Fire Analysis and Investigation, Evidence Collection and Preservation, Fundamentals of Fire Investigation, Examining and Securing the Fire Scene, Safety at fire scene.

Unit V:

Electrical Fire Investigation, Motor Vehicle Fire Investigation, Modern Laboratory Techniques Involved in the Analysis of Fire Debris Samples, Reporting, Reconstructions.

Unit VI:

Fire Investigation methodology, Role of Fire Investigator, Arson Motives and Pathology, Fire Problems and Precautions, Determining Origin and Cause, Eliminating Accidental Causes, Documenting the Fire/ Scene, Surveillance.

Reading List:

1. NFPA 921 Guide for Fire and Explosion Investigation 2014, Published by National Fire Protection Association, USA.
2. Fire Investigation published by HMSO publication UK
3. Kirks Fire Investigation
4. Forensic Fire Science Reconstruction, By David J Icove, John D DeHaan, Gerald a Haynes Published by Pearson/ Prentice Hall
5. Principal of Fire Behavior by James G Quintiere, Published by Delmer

PGDF 118: Geinformatics for Fire Risk Assessment (L-2 T-0 C-2)

Unit I: Introduction to Remote Sensing (RS), GIS

Basic and Principles of Remote Sensing, Electromagnetic Spectrum, Resolution Types, EMR Interaction, Spectral Signatures of Different Objects, Platforms and Sensors. Digital Image Processing (DIP) Techniques. Visual Image Interpretation Tools and Techniques; Basic, Principles and Components of GIS, Spatial Information and Spatial Data Types; Geographic Phenomena, Geographic Field, Geographic Objects and Boundaries; Raster- Based GIS data Processing with Both Regular and Irregular Tessellations, Vector-Based GIS Data Processing and Topology, Spatial Relations, Spatial Analysis.

Unit II: Global Positioning Systems (GPS)

Basic Principles of GPS, Functions and Positioning Services. Map Projections and Coordinate Systems. Types of Survey of India (SOI) Topographical Maps. Numbering Systems and Interpretation of SOI Topographical Maps.

Unit III: Spatial Information Technologies and Disaster Management

Concepts of Spatial Information and Data; Spatial Data Platforms for Disaster Information: Government, Private & Community Sourced; Spatial Digital Data Collection and Processing: Pre-Disaster, During Disaster and Post-Disaster Phase; Spatial Information Accessibility and Authorization Issues in Disaster Management; Real time Spatial Data Availability: Requirements for Emergencies.

Unit IV: Applications

Geospatial Urban Planning and Fire Risk Resilience; GIS based Fire Response Planning, Remote Sensing for Fire Risk Potential Mapping; Unmanned Aerial Vehicle (UAV) for 3-D based Fire Detection and Monitoring. Spatial Decision Support System (SDSS) for Fire Risk Assessment and Management; Fire Risk Modeling. GIS based On-Site and Off-Site Plans. Map creation for action plan identification of risk and planning needs.

Reading List:

1. Janssen, Lucas L.F. and Grit C. H. (2001) Principle of Remote Sensing. ITC Educational Text Book series 2. International Institute of Geo information Science and Earth Observation (ITC). Enschede.
2. Jensen, J. R. (2004) Introductory Digital Image Processing: A Remote Sensing Perspective Prentice Hall.
3. Jensen, J. R. (2009) Remote Sensing of the Environment: An Earth Resource Perspective, 2nd Edition, Dorling Kindersley.
4. Joseph and George. (2005) Fundamentals of Remote Sensing, 2nd Edition. University press India.

PGDF 152: Field Visits/ Presentation (L-0 P-1 T-1 C-2)

PGDF 154: Dissertation (L-0 P-6 T-0 C-6)