Post Graduate Diploma in

Fire & Life Safety Audit

(PGDFLSA)

July 2021

GSFC University
School of Science
Vadodara- 391750

Curriculum Structure

Semester – I

Sr. No.	Course Code	Course Title	Course Type	Credits				Hours
				L	T	P	C	
1.	PGDFLSA101	Fundamentals of Fire & Life Safety	Core	3	0	0	3	3
2.	PGDFLSA102	Fire Prevention & Protection	Core	3	0	0	3	3
3.	PGDFLSA103	Fire Load Calculations & Values	Core	3	0	0	3	3
4.	PGDFLSA104	Building & Fire Requirements I	Core	3	0	0	3	3
5.	PGDFLSA105	Industrial & Non-Industrial Occupancy	Core	3	0	0	3	3
6.	PGDFLSA106	Internship – I	AE*	0	0	2	2	4
						Total	**17**	**19**

Semester – II

Sr. No.	Course Code	Course Title	Course Type	Credits				Hours
				L	T	P	C	
1.	PGDFLSA106	Fire Protection for High Rise Buildings	Core	3	0	0	3	3
2.	PGDFLSA107	Legal Aspects of Fire & Life Safety	Core	3	0	0	3	3
3.	PGDFLSA108	Fire & Life Safety Audit Process	Core	3	0	0	3	3
4.	PGDFLSA109	Building & Fire Requirements II	Core	3	0	0	3	3
5.	PGDFLSA110	Internship – II	AE*	0	0	0	2	4
						Total	**14**	**16**

**AE – Ability Enhancement*

Curriculum

Semester I

PGDFLSA101	Fundamentals of Fire and Life Safety	Mode	L	T	P	C
		Full Time	3	-	-	3
Total lecture hours & practical:		Total Marks: 100				
1	Course Pre-requisites: NIL					
2	Course Category: Core Course					
3	Course Revision/ Approval Date:					
4	Course Objectives					

1. To understand the fire and life safety challenges in buildings and industries and approaches to addressing the same.
2. To become aware of important past incidents causing major loss of lives & properties and damage to environment, and their impact with respect to the legislations and environment
3. To understand the history and current role of fire & safety related legislation and role of agencies involved for implementation.
4. To understand approaches for addressing fire and safety challenges.
5. To become familiar with current fire & safety engineering and management concepts and practices followed.

Course Content	Weightage	Contact Hours	Pedagogy
Unit I: Challenges to safety in built environment, types of hazards likely to cause harm (fire, burns, electric shock, falls), natural disasters, fatalities involving hazardous environments. Important Case studies	20%	8hrs	Presentation, Video

involving major incidents and their subsequent effect on safety outlook, Approach to addressing Fire & safety challenges.			presentation, Chalk board Notes
Unit II: The concept of industrial fire & life safety - need, nature and importance. Focus on Human resource, and concept of importance of 'man' as central theme in safety. Concept of accident prevention, occupational health and environmental protection. Problems of Industrial safety and occupational health, modern concept of fire & safety.	20%	8hrs	Presentation, Video presentation, Chalk board Notes
Unit III: History and role of building codes and safety legislation, concept of safety versus risk, enforcement of codes and standards, role of government agencies and emergency services in enforcing legislation, government framework and infrastructure involved in safety legislation enforcement. Role of code enforcement, plan review and approval, record keeping, public education.	20%	10hrs	Presentation, Video presentation, Chalk board Notes
Unit IV: Industrial Fire & Safety management concepts – hazard identification and risk assessment, risk reduction and control methods. Design aspects such as segregation and separation, fire resisting construction, emergency exit arrangements, access for emergency agencies, fire protection systems, safe operational practices, maintenance and upkeep of systems, planning for emergency response. Design approaches for fire and safety, NFPA fire safety concepts tree	20%	10hrs	Presentation, Video presentation, Chalk board Notes
Unit V: Importance of inspection, testing and maintenance practices for fire protection systems & types of records, code requirements and current practices	20%	9hrs	Presentation, Video presentation, Chalk board Notes
Learning Resources			

Textbooks: 1. Cote, Arthur, Section 1, Fire protection Handbook, 20th Edition, NFPA 2. Handbook of Industrial Safety by K.U. Mistry, Siddharth Prakashan, Gujarat 3. Fire Service Manual Volume 3 Fire Safety, Fire Protection of Buildings, HMSO Publications 4. Dr. Than Singh Sharma, Fundamentals in building design. 5. National Building code of India 2016, Part-4, BIS		
Reference Books: 1. Barendra Mohan Sen, Fire protection and prevention the essential handbook, UBS publishers. 2. Lon H. Ferguson, Fundamentals of Fire Protection for the Safety professional, The scarecrow Press, Inc. 3. Hurley, Morgan, Section 1, SFPE Handbook, SFPE/NFPA, USA		
Journals & Periodicals: Nil		
Other Electronic Resources: Nil		
Evaluation Scheme	**Total Marks 100**	
Mid semester Marks	30 marks	
End Semester Marks	50 marks	
Continuous Evaluation	**Category**	**Marks**
	Attendance	5 MARKS
	Quiz	5 MARKS

	Skill enhancement activities / case study	5 MARKS
	Presentation/ miscellaneous activities	5 MARKS

PGDFLSA102	Fire Prevention and Protection	Mode	L	T	P	C
		Full Time	3	-	-	3
Total lecture hours & practical:		Total Marks:100				
1	Course Pre-requisites: NIL					
2	Course Category: Core Course					
3	Course Revision/ Approval Date:					

4. Course Objectives

1. To learn about principles of fire extinguishers & their applicability
2. To gain knowledge on industrial fire protection systems.
3. To learn about the fire protection and fire safety equipment.
4. To learn about active & passive fire protection & their applicability

Course Content	Weightage	Contact Hours	Pedagogy
Unit I: Fire properties of solid, liquid and gases - fire spread - toxicity of products of combustion - theory of combustion and explosion – vapour clouds – flash fire – jet fires – pool fires – unconfined	20%	9hrs	Presentation, Video

vapour cloud explosion (UVCE), shock waves - auto-ignition – boiling liquid expanding vapour explosion, Confined Vapor Cloud Explosion (CVCE)			presentation, Chalk board, Notes
Unit II: Sources of ignition – fire triangle, Fire Tetrahedron, principles of fire extinguishing – active and passive fire protection systems – various classes of fires – Fire extinguishing agents- dry powders – types of fire extinguishers – fire stoppers – hydrant pipes – hoses – monitors – fire watchers – lay out of stand pipes – fire station-fire alarms and sirens – maintenance of fire vehicles – foam generators – escape from fire rescue operations – fire drills – first aid techniques.	20%	9hrs	Presentation, Video presentation, Chalk board, Notes
Unit III: Water Sprinkler-hydrants-stand pipes – special fire suppression systems like deluge and emulsifier, CO2 flooding system, selection criteria of the above installations, reliability, maintenance, evaluation and standards – alarm and detection systems. Other suppression systems. Portable extinguishers – flammable liquids – tank farms – indices of inflammability-firefighting systems.	20%	9hrs	Presentation, Video presentation, Chalk board Notes
Unit IV: Objectives of fire safe building design, Fire load, fire resistant material and fire testing – structural fire protection – structural integrity – concept of egress design - exit – width calculations – fire NOC certificates – fire safety requirements for high rise buildings.	20%	9hrs	Presentation, Video presentation, Chalk board Notes
Unit V: 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 gases rupture disc in process vessels and lines explosion, suppression system.	20%	9hrs	Presentation, Video presentation, Chalk board Notes
Learning Resources			

Text Books: 1. "Fire safety management", 3rd edition – Danial E.Della Giustina – 2014. 2. "Manual of fire safety ", N.Segha prakash – 2011. 3. "A hand book of fire technology", R. S. Gupta – 2010. 4. "Dust explosion and fire prevention handbook", Nicholas P. Cheremisinoff – 2014. 5. "Industrial Fire Protection Handbook", R.Craig Schrool – 2002. **6.** National Building code of India 2016, Part-4, BIS		
Reference Books: Nil		
Journals & Periodicals: Nil		
Other Electronic Resources: Nil		
Evaluation Scheme	**Total Marks 100**	
Mid semester Marks	30 marks	
End Semester Marks	50 marks	
Continuous Evaluation	**Category**	**Marks**
	Attendance	5 MARKS
	Quiz	5 MARKS
	Skill enhancement activities / case study	5 MARKS
	Presentation/ miscellaneous activities	5 MARKS

PGDFLSA103	Fire Load Calculations & Values	Mode	L	T	P	C
		Full Time	3	-	-	3
Total lecture hours & practical:		Total Marks:100				
1	Course Pre-requisites: NIL					
2	Course Category: Core Course					
3	Course Revision/ Approval Date:					

4. Course Objectives

1. To gain knowledge on fire load and its calculations
2. To understand the concept involved in standards to determine fire load
3. To analyse the calorific values of different fuels using various methods
4. To design fire protection measures on the basis of total fire load

Course Content	Weightage	Contact Hours	Pedagogy
Unit I: Fire – Fire triangle – classes of fire – fire load – fire growth calculations – behaviour of fire – fire severity – NFPA 557 standard for determination of fire load for use in structural fire protection design - fire load density – distributed fire loads – localized fire loads	20%	9hrs	Presentation, Video presentation, Chalk board Notes
Unit II: Determination of calorific value by Bomb calorimeter - calorific value of solid & liquid fuels – Dulong's formula - Calorific value of gaseous fuel by Junker gas calorimeter, Oil burners, vaporization burners - Wick Burners, Carburetor Pot Burner, Atomizing burners - Pressure jet, two fluid air or	20%	10hrs	Presentation, Video presentation, Chalk board Notes

steam, Mechanical assisted by air or steam			
Unit III: Calorific values of common materials - **s**olid fuels, hydrocarbons, polymers, common solids, foodstuffs, properties, higher & lower calorific values - fire load density of various types of buildings, fire load calculations for different types of buildings and its applicability	20%	9hrs	Presentation, Video presentation, Chalk board Notes
Unit IV: Comparison of calorific values of various solid, liquid and gaseous fuels – analysis of calorific values – role of calorific values in fire load calculation. To design & install fire protection measures on the basis of total fire load.	20%	8hrs	Presentation, Video presentation, Chalk board Notes
Unit V: Evaluation of fire load survey methodologies – fire load calculation backup requirement – sequence, fire load and fire demand - uses of fire load calculations, calorific values of gaseous fuel, liquid fuel and its method of determination – proximate analysis of solid fuels – oxygen bomb calorimeter	20%	9hrs	Presentation, Video presentation, Chalk board Notes
Text books: 1. National Building code of India 2016, Part-4, 2. Gujarat Factories Rules – 1963 3. Handbook of Industrial Safety by K.U. Mistry, Siddharth Prakashan, Gujarat			
Reference Books: 1. NFPA 557 Standard for Determination of Fire Load for Use in Structural Fire Protection Design			
Journals & Periodicals: Nil			
Other Electronic Resources: Nil			
Evaluation Scheme	**Total Marks 100**		

Mid semester Marks	30 marks	
End Semester Marks	50 marks	
Continuous Evaluation	**Category**	**Marks**
	Attendance	5 MARKS
	Quiz	5 MARKS
	Skill enhancement activities / case study	5 MARKS
	Presentation/ miscellaneous activities	5 MARKS

PGDFLSA104	**Building and Fire Requirements I**	**Mode**	**L**	**T**	**P**	**C**
		Full Time	3	-	-	3
Total lecture hours & practical:		Total Marks: 100				
1	Course Pre-requisites: NIL					
2	Course Category: Core Course					
3	Course Revision/ Approval Date:					

4. Course Objectives

1. To gain detailed knowledge of fire behavior of important building materials such as concrete, steel, wood, glass and masonry.
2. To recognize the importance of fire prevention in buildings and how this is achieved in practice.
3. Become familiar with life safety and fire protection arrangements in buildings and their design aspects.
4. Types of buildings & their specific requirements as per NBC

Course Content	Weightage	Contact Hours	Pedagogy
Unit I: General Principles of Fire Prevention and Protection: Occupancy classification of buildings and their characteristics. Zoning of city areas. Site requirements, type of construction required with respect to fire resistance, fire separation, compartmentation, isolation.	20%	9hrs	Presentation, Video presentation, Chalk board Notes
Unit II: Internal Planning and layout of Building Services and systems, hazardous areas and pipelines, vessels and equipment, and fire prevention measures provided. Fire prevention measures for different building systems i.e., electrical, HVAC, service ducts, fuel gas supply. Structural fire safety, compartmentation and segregation of hazardous areas.	20%	10hrs	Presentation, Video presentation, Chalk board Notes
Unit III: Different factors affecting safe egress from buildings in an emergency and how building codes address these factors. Code requirements for safe egress design, including associated systems such as emergency lighting, signage, smoke control, etc. Design of egress components i.e., doors, stairs, ramps and code requirements	20%	9hrs	Presentation, Video presentation, Chalk board Notes
Unit IV: Common fire protection systems for buildings: Portable extinguishers, Rising mains-wet & dry, sprinkler systems, drenchers, etc. – their applicability and requirement as per building codes. Special systems such as water spray systems, clean agent, foam systems, water mist, etc.	20%	9hrs	Presentation, Video presentation, Chalk board Notes
Unit V: Fire Safety management and emergency response organization for buildings. Importance of Emergency plans, roles and responsibilities of various teams, drills and evaluation, etc.	20%	8hrs	Presentation, Video presentation, Chalk board

			Notes
Text books: 1. Fire Service Manual Volume 3 Fire Safety, Fire Protection of Buildings, HMSO Publications 2. Dr. Than Singh Sharma, Fundamentals in building design. 3. National Building code of India 2016, Part-4,			
Reference Books: 1. Barendra Mohan Sen, Fire protection and prevention the essential handbook, UBS publishers. 2. Lon H. Ferguson, Fundamentals of Fire Protection for the Safety professional, The scarecrow Press, Inc.			
Journals & Periodicals: IFP (IFE(UK) Journal), Fire Engineer (IFE (India) Journal), Fire Protection Engineering (SFPE)			
Other Electronic Resources: Nil			
Evaluation Scheme	**Total Marks 100**		
Mid semester Marks	30 marks		
End Semester Marks	50 marks		
Continuous Evaluation	**Category**	**Marks**	
	Attendance	5 MARKS	
	Quiz	5 MARKS	
	Skill enhancement activities / case study	5 MARKS	
	Presentation/ miscellaneous activities	5 MARKS	

PGDFLSA105	Industrial and Non-Industrial Occupancy	Mode	L	T	P	C
		Full Time	3	-	-	3
Total lecture hours & practical:		Total Marks: 100				
1	Course Pre-requisites: NIL					
2	Course Category: Core Course					
3	Course Revision/ Approval Date:					

4. Course Objectives

1. To gain knowledge on industrial & non industrial occupancy
2. To get deeper insight on fire protection for different occupancies
3. To get in-depth knowledge on fire protection systems
4. To know about hazards & risk involved in industrial & non-industrial installations & their mitigating measures.

Course Content	Weightage	Contact Hours	Pedagogy
Unit I: Classification of building based on occupancy – Educational – residential – institutional – assembly – business – mercantile – industrial – storage – hazardous -subdivisions as per NBC (part 4), Fire zones – demarcation – number and designation of fire zones, change in fire zone boundary, overlapping fire zones, temporary buildings, restrictions on existing buildings.	20%	9hrs	Presentation, Video presentation, Chalk board Notes
Unit II: Classification of industrial & non industrial occupancies into different degree of hazards- Types of constructions, Fire resistance ratings – structural and non-structural elements, types of construction materials and its specification used for fire resistance, steel	20%	9hrs	Presentation, Video presentation, Chalk board

construction, comparative study on fire in concrete and steel.			Notes
Unit III: General requirements of all individual occupancies – maximum height, floor area ratio, open spaces, mixed occupancy, openings in separating walls and floors, vertical opening, enclosure of openings, electrical installations, air conditioning and ventilation, smoke venting, surface interior finishes, glazing, skylights, louvers	20%	9hrs	Presentation, Video presentation, Chalk board Notes
Unit IV: Life safety – general exit requirements, occupant loads, capacities of exists – horizontal exit allowance, arrangement of exit, number of exits, doorways, corridors and passageways, internal staircase, protected escape routes, external stairs, horizontal exits, fire tower, fire lifts, emergency and escape lighting, fire detection and warning.	20%	9hrs	Presentation, Video presentation, Chalk board Notes
Unit V: Fire protection – fixed firefighting installations and its minimum requirement, static storage water tanks, automatic sprinklers, size of rising mains/risers, emulsifying system, fixed foam installation, carbon dioxide fire extinguishing system, fire detection/extinguishing system, additional occupancy wise requirements – requirements of different types of buildings – fire detection – exit facilities & additional precautions.	20%	9hrs	Presentation, Video presentation, Chalk board Notes
Learning Resources			
Text Books: 1. “Fire safety management”, 3rd edition – Danial E.Della Giustina – 2014. 2. “Manual of fire safety “, N.Segha prakash – 2011. 3. “A hand book of fire technology”, R. S. Gupta – 2010.			
Reference Books: National Building Code, 2016			

Journals & Periodicals: Nil		
Other Electronic Resources: Nil		
Evaluation Scheme	**Total Marks 100**	
Mid semester Marks	30 marks	
End Semester Marks	50 marks	
Continuous Evaluation	**Category**	**Marks**
	Attendance	5 MARKS
	Quiz	5 MARKS
	Skill enhancement activities / case study	5 MARKS
	Presentation/ miscellaneous activities	5 MARKS

Semester II

PGDFLSA106	Fire Protection for High Rise Buildings	Mode	L	T	P	C
		Full Time	3	-	-	3
Total lecture hours & practical:		Total Marks: 100				
1	Course Pre-requisites: NIL					
2	Course Category: Core Course					
3	Course Revision/ Approval Date:					

4. Course Objectives

1. To know about high rise buildings & their requirements
2. To understand the principles of various fire protection system for high rise buildings
2. To learn the design standards/codes for fire protection systems for high rise buildings
3. To apply the guidelines provided in the standards for proper design and installation for high rise buildings
4. To learn about disaster risk management plan & rescue equipment required.

Course Content	Weightage	Contact Hours	Pedagogy
Unit I: Classification of buildings, Importance of water as an extinguishing agent - physical properties, Different categories and suitability of water-based fire protection systems - Fire water hydrant system, rising mains, sprinkler systems, high & medium velocity water spray systems, water mist systems and foam systems, Fire & gas detection system.	20%	8hrs	Presentation, Video presentation Chalk board

Unit II: Type of construction, minimum requirements - basement, staircase, lifts, service ducts, refuge area, gas supply, illumination of means of exit, fire alarm system, fire control room, lightning protection of buildings, fire officers, fire drills, compartmentation, helipad, materials for interior decoration, housekeeping. Assembly points, Emergency escape signs & symbols.	20%	9hrs	Presentation, Video presentation, Chalk board Notes
Unit III: Fire drill and evacuation procedures – alarms, drills, sign at lift landings, floor numbering signs, stair and elevator identification signs, stair re-entry signs, fire safety plan, fire command station, communication and fire alarm. Fire safety plan format – Public Address System, fire & gas detector, appointment of fire safety coordinators, fire wardens, auxiliary emergency response team. building evacuation supervisor, occupants' instructions, evacuation drills, fire command station, fire prevention and protection program, fail safe communication system, building information form.	20%	10hrs	Presentation, Video presentation, Chalk board Notes
Unit IV: Fire Hydrant systems - categorization as per codes, Water Supply & Pumping arrangements: Assessing firewater requirements based on code and design guidelines (NBC Part 4, IS:13039, OISD standards). Types of firewater storage arrangements. Firewater Pumps, types and arrangements commonly applied in the buildings/industries. Wet / dry riser arrangement, external fire hydrant system, ring main piping and layout, provision of isolation valves, hydrants, monitors, fire brigade inlets and other accessories based on hazard category and design codes and guidelines.	20%	8hrs	Presentation, Video presentation Chalk board
Unit V: Different factors affecting safe egress from buildings in an emergency, role of building codes to address these factors. Code requirements for safe egress design, including associated systems such as emergency lighting, signage, smoke control, etc. Design of egress components i.e., doors, stairs, ramps and code requirements. Fire Safety management and emergency response for	20%	10hrs	Presentation, Video presentation Chalk board

buildings. Importance of Emergency plans, roles and responsibilities of various teams, drills and evaluation.			

Learning Resources

Textbooks:

1. Fire Service Manual, Volume 3, Fire Safety, Fire Protection of Buildings, HMSO Books
2. Fire Service Manual, Volume 1, Firefighting foam - Technical, HMSO Books
3. Relevant codes: IS:13039 -Fire Hydrant System, IS:15105 – Sprinkler Systems, IS:15301 – Fire Pumps, IS:15325 – Water Spray Systems, OISD-116, 117
4. NFPA codes - 11-Foam systems, 13-Sprinkler Systems, 14-Standpipe systems, 15-Water spray systems, 20-Fire Pumps, 22-Water Tanks for Fire Protection, 24-Private Fire Service Mains, 25-ITM of Water based Fire Protection systems
5. Robert M Gagnon, Designer's Guide to Automatic Sprinkler Systems

Reference Books: NFPA codes - 11-Foam systems, 13-Sprinkler Systems, 14-Standpipe systems, 15-Water spray systems, 20-Fire Pumps, 22-Water Tanks for Fire Protection, 24-Private Fire Service Mains, 25-ITM of Water based Fire Protection systems

Journals & Periodicals: Nil

Other Electronic Resources: Nil

Evaluation Scheme	**Total Marks 100**	
Mid semester Marks	30 marks	
End Semester Marks	50 marks	
Continuous Evaluation	**Category**	**Marks**

	Attendance	5 MARKS
	Quiz	5 MARKS
	Skill enhancement activities / case study	5 MARKS
	Presentation/ miscellaneous activities	5 MARKS

PGDFLSA107	**Legal Aspects of Fire and Life Safety**	**Mode**	**L**	**T**	**P**	**C**
		Full Time	3	0	0	3
Total lecture hours & practical:		Total Marks: 100				
1	Course Pre-requisites: NIL					
2	Course Category: Core Course					
3	Course Revision/ Approval Date:					

4. Course Objectives

1. To learn about all applicable legislations in fire and life safety
2. To understand the applicability of statutory requirements to different type of buildings & industries.

Course Content	**Weightage**	**Contact Hours**	**Pedagogy**
Unit I: The Factories Act, 1948 and the Gujarat Factories Rules, 1963, OISD, Petroleum Act & Rules	20%	10hrs	Presentation, Video presentation

			Chalk board
Unit II: Glossary of terms associated with fire safety (IS 8757:1999), Code of practice for fire safety of buildings (general): General principles of fire grading and classification (IS 1641-1988), Fire Prevention & Life Safety Measures Act 2013 and Rules 2016	20%	9 hrs	Presentation, Video presentation Chalk board
Unit III: Fire protection safety signs (IS 12349-1988), Indian Standard – Codes of Practices for Occupational Safety & Health Audit – IS 14489:1998,	20%	8 hrs	Presentation, Video presentation Chalk board
Unit IV: Code of safe practice for industrial plant layout (IS 8091-1976), Code of practice for fire safety in educational institutions (IS 14435:1997), Code of practice for fire safety in petroleum refineries and fertilizer plants (IS 15394-2003)	20%	8hrs	Presentation, Video presentation Chalk board
Unit V: Code of practice for fire safety of buildings (General): Electrical installations (IS 1646-1997), Code of practice for fire safety of industrial buildings: Electrical generating and distribution stations (IS 3034-1993) – General storage and warehouse including cold storage (IS 3594-1991) – Paint and varnish sectors (IS 9109-2000)	20%	10hrs	Presentation, Video presentation Chalk board
Learning Resources			
Textbooks: 1. Factories Act – 1948 & Gujarat Factories Rules – 1963 with latest amendment 2. Relevant Indian Standard Code of Practices as mentioned in the course content 3. OISD Guidelines			

4. Petroleum Act & Rules with latest amendments		
Reference Books: Nil		
Journals & Periodicals: Nil		
Other Electronic Resources: Nil		
Evaluation Scheme	**Total Marks 100**	
Mid semester Marks	30 marks	
End Semester Marks	50 marks	
Continuous Evaluation	**Category**	**Marks**
	Attendance	5 MARKS
	Quiz	5 MARKS
	Skill enhancement activities / case study	5 MARKS
	Presentation/ miscellaneous activities	5 MARKS

PGDFLSA108	**Fire and Life Safety Audit Process**	**Mode**	**L**	**T**	**P**	**C**
		Full Time	3	0	0	3
Total lecture hours & practical:		Total Marks: 100				
1	Course Pre-requisites: NIL					
2	Course Category: Core Course					
3	Course Revision/ Approval Date:					

4. Course Objectives			
1. To gain knowledge on process of fire & Life Safety audit			
2. To gain knowledge on methodology of conducting Fire & Life Safety Audit			
3. To design the Fire & Life audit check list			
Course Content	**Weightage**	**Contact Hours**	**Pedagogy**
Unit I: Fire & Life Safety audit – need for the audit, types of inspection, standard activities for audit, procedures – pre-audit preparation & meeting – opening meeting, verification of information – cross verification at site, writing audit report – report content – submission of report – advantages, specific limitations, closing meeting	20%	9hrs	Presentation, Video presentation Chalk board
Unit II: Components of fire & life safety audit: types of audits, audit methodology, non-conformity reporting (NCR), audit checklist and report - Reports from government agencies, consultants, experts - perusal of fire & property damage records, formats, implementation of audit recommendations.	15%	8hrs	Presentation, Video presentation Chalk board
Unit III: Fire safety management audit model, audit process, organisational strength and recommendations for improvement, audit report and action planning, Standardization & quality assurance.	15%	8hrs	Presentation, Video presentation Chalk board
Unit IV: Fire Safety Planning - Fire safety policy - scope, nature and scale, Structure - roles, responsibilities, accountabilities & authorities, Stakeholder consultation and participation, Legislative (and other requirements) compliance, Provision of resources and support, Leadership	20%	9hrs	Presentation, Video presentation Chalk board

and commitment, Management of change, Competence and fire safety training requirements, Emergency incident and post event planning.			
Unit V: Implementation & operation - Fire risk assessment process, Fire detection & alarm systems (including planned maintenance), Firefighting equipment and fixed Installations, Fire evacuation procedures, occupancy levels and means of escape routes, Fire safety training, Evaluation and Review - Workplace fire safety inspection, Evaluation of fire safety legislative (and other) requirements, Fire incident and near miss reporting & investigation, Fire loss/damage analysis, Continual improvement (evaluation and planning), Management review and internal performance monitoring.	30%	11hrs	Presentation, Video presentation Chalk board

Learning Resources		
Textbooks: 1. Chales D. Reese (2017) Occupational Health and Safety management. 2. L M Deshmukh (2007) 'Industrial Safety management'.		
Reference Books: Fire safety management audit, British safety council – specification August 2017		
Journals & Periodicals: Nil		
Other Electronic Resources: Nil		
Evaluation Scheme	**Total Marks 100**	
Mid semester Marks	30 marks	
End Semester Marks	50 marks	
Continuous Evaluation	**Category**	**Marks**

	Attendance	5 MARKS
	Quiz	5 MARKS
	Skill enhancement activities / case study	5 MARKS
	Presentation/ miscellaneous activities	5 MARKS

PGDFLSA109	**Building and Fire Requirements II**	**Mode**	**L**	**T**	**P**	**C**
		Full Time	3	0	0	3
Total lecture hours & practical:		Total Marks: 100				

1	Course Pre-requisites: NIL
2	Course Category: Core Course
3	Course Revision/ Approval Date:

4. Course Objectives

1. To understand the effect of fire on building elements and building structure, and its influence on building design and firefighting strategy.
2. To understand the role and importance of compartmentation in building fire safety and application of different passive fire protection methods
3. To understand design aspects of buildings with reference to Fire & Life Safety.
4. To understand active & passive fire protection system for buildings

Course Content	**Weightage**	**Contact Hours**	**Pedagogy**
Unit I: Introduction to main elements of structure - load bearing and non-load bearing, their function and design principles. Behavior of structural elements at elevated temperature, and effect on overall	20%	8hrs	Presentation, Video presentation

structure. Importance and contribution of structural fire resistance to overall fire safety and code requirements related to fire resistance of building structure (NBC part 4).			Chalk board
Unit II: Behavior of different construction materials under fire. Concrete spalling and related factors - methods for improvement. Loss of strength in steel with temperature and methods for protection of steel members. Masonry behavior in fire and improvement. Behavior of different woods under influence of fire; process of charring. Different methods used for improving fire resistance of steel and wood. Behavior of other building materials; glass, polymers, cladding materials. Test methods applied for assessing fire performance of materials.	20%	9hrs	Presentation, Video presentation Chalk board
Unit III: Compartmentation and its importance in building fire and life safety. Code requirements for compartmentation based on occupancy i.e., separation of occupancies, maximum compartment sizes depending on occupancies, fire protection of exits, compartmentation of hazardous areas. Code guidelines for concrete/masonry wall dimensions for specific fire resistance. Requirements for doors/windows and other openings in compartments, and test methods for assessment of performance.	20%	9hrs	Presentation, Video presentation Chalk board
Unit IV: Types of Sprinklers system and their application and characteristics. Design guidelines for sprinkler systems including pumping systems, alarm valves and sprinkler types and rating. Medium and High velocity water spray systems, their suitability, design guidelines and installation requirements as per relevant design and installation codes. Use and function of deluge valves in HVWS & MVWS systems. Water mist systems - categories, application and limitations. Understanding on the functioning and effectiveness of water mist for specified fire hazards,	20%	10hrs	Presentation, Video presentation Chalk board

methods of generating mist, system hardware, installation practices and current codes.			
Unit V: The need and effectiveness of firefighting foam, Categorization of firefighting foams based on expansion ratio, their application and effectiveness based on hazards. Different type of foam concentrates and their suitability. Design guidelines for standard foam systems for different types of storage tanks as per OISD and NFPA standards, including basic calculations and system specifications. Other types of foam application, their uses and limitations.	20%	9hrs	Presentation, Video presentation Chalk board
Learning Resources			

Textbooks:

1. Buchanan A.H, Structural Design for Fire Safety
2. Fire Service Manual, Volume 3 Fire Safety, Basic Principles of Building Construction, HMSO Books
3. NFPA Fire protection Handbook, Section 18 &1 9, Vol. 2, 20th Edition.
4. National Building code of India 2016, Part-4, BIS

Reference Books: Nil

Journals & Periodicals: Nil

Other Electronic Resources: Nil

Evaluation Scheme	**Total Marks 100**	
Mid semester Marks	30 marks	
End Semester Marks	50 marks	
Continuous Evaluation	**Category**	**Marks**
	Attendance	5 MARKS

	Quiz	5 MARKS
	Skill enhancement activities / case study	5 MARKS
	Presentation/ miscellaneous activities	5 MARKS