

**NCEES Principles and Practice of Engineering Examination
 FIRE PROTECTION Exam Specifications**

Effective Beginning with the October 2012 Examinations

- The exam is an 8-hour open-book exam. It contains 40 multiple-choice questions in the 4-hour morning session, and 40 multiple-choice questions in the 4-hour afternoon session. Examinee works all questions.
- The exam uses both the International System of units (SI) and the US Customary System (USCS).
- The exam is developed with questions that will require a variety of approaches and methodologies, including design, analysis, and application.
- The knowledge areas specified as examples of kinds of knowledge are not exclusive or exhaustive categories.
- Codes and standards applicable to the exam will be those effective December 31 of the year preceding the exam.

	Approximate Number of Questions
I. Fire Protection Analysis	16
A. Types of Analysis	6
1. Hazard analysis (e.g., flammable liquids, high-piled storage, electrical)	
2. Risk analysis (e.g., likelihood, severity, impact)	
3. Limitations of analyses	
4. Data interpretation	
B. Information Sources for Analysis	10
1. Uncertainty and safety factors	
2. Functional use and operation of facility (e.g., industrial processes, occupancy, facility contents)	
3. Acceptable thresholds (e.g., maximal temperature, heat flux, gas concentration)	
4. Codes and standards	
5. Occupancy, hazard, and commodity classifications	
6. Fire test methods (e.g., classification, product or material characteristics)	
7. Fire test data (e.g., sources, interpretation)	
8. Exposures (e.g., proximal distance from hazards)	
9. Technical drawings, schematics, and plans (e.g., contract documents, shop drawings, riser diagrams)	
II. Fire Protection Management	4
A. Risk management	
B. Inspection, testing, and maintenance procedures and frequencies	
III. Fire Dynamics	10
A. Fire and smoke behavior	
B. Fire growth	
C. Combustion	
D. Plume entrainment (e.g., axisymmetric, balcony spill, window, corner, wall)	
E. Material properties (e.g., heat of combustion, ignitability, thermal, mechanical, flammable and explosive limits)	
F. Material compatibility (e.g., storage arrangements, water reactives)	
G. Heat transfer from fire and smoke	

IV. Active and Passive Systems	40
A. Water-Based Fire Suppression Systems	12
1. Design criteria (e.g., water supply, densities, pressure requirements, design areas, capabilities and limitations)	
2. Hydraulic calculations (e.g., new and existing systems validation, including pipe schedule systems)	
3. System types (e.g., wet and dry pipe, pre-action)	
4. System components (e.g., sprinkler types, valves, flow detection, pipe and fitting material selection, cross-connection control, hanging and bracing)	
5. Placement (e.g., obstructions, ambient conditions)	
6. Water supply and distribution (e.g., public, private, storage tanks)	
7. Fire pumps and controllers	
8. Testing protocol (e.g., hydrostatic, pneumatic, duration, environmental considerations, water supply)	
B. Special Hazard Systems	8
1. Design criteria (e.g., capabilities and limitations of the design)	
2. Design method (e.g., total flooding, local application, or coverage area)	
3. Pipe sizing (calculation input and output)	
4. System types (e.g., low-pressure and high-pressure CO ₂ , chemical and inert clean agents, wet and dry chemical, water mist, foam)	
5. System components (e.g., valves, nozzles, pipe and fitting selection, hanging and bracing)	
6. Agent storage	
7. Personnel safety	
8. Controls (e.g., actuation, pre-alarm, release, detection)	
9. Collateral damage (e.g., toxic or acid byproducts, positive and negative pressure effects, environmental considerations)	
10. System interlocks (e.g., damper, process shutdown)	
11. Test methods (e.g., enclosure integrity test, pipe integrity test)	
C. Fire Detection and Alarm Systems	6
1. Design criteria (e.g., sequence of operation, full versus partial detection, capabilities and limitations of the design)	
2. System types (e.g., addressable, conventional, emergency communication system, combination)	
3. Control equipment	
4. Initiating devices (e.g., type, placement, performance, ambient conditions)	
5. Notification appliances (e.g., type, placement, performance, voice communication, intelligibility)	
6. Circuit classification and wiring methods	
7. Survivability	
8. Power supplies	
9. Building control functions and system interfaces (e.g., elevator recall, HVAC, smoke control, door releases)	
10. Monitoring (e.g., central station, proprietary)	
11. Test methods (e.g., verify sequence of operation)	
D. Smoke Management Systems	4
1. Design criteria (e.g., objectives, equipment survivability, pressure limits, air leakage, door opening force, capabilities and limitations of the design)	
2. System types (e.g., pressurized stairwells, zone smoke control, natural and mechanical venting, exhaust)	
3. System components (e.g., control equipment, fans, dampers, ductwork)	

4.	Fluid mechanics (e.g., vent flows, plugholing, make-up air velocity)	
5.	Smoke movement (e.g., stack effect, wind, buoyancy)	
6.	Initiating mechanisms	
7.	Power supplies	
8.	System interfaces (e.g., fire alarm, HVAC)	
9.	Test methods (e.g., model code requirements, verification of sequence of operation, component performance, safety)	
E.	Explosion Protection and Prevention Systems	2
1.	Design criteria (e.g., protected hazard, maximum pressure, oven ventilation and explosion venting, agent considerations, capabilities and limitations of the design)	
2.	Design method (e.g., suppression, inerting, isolation, venting, containment, damage-limiting construction)	
3.	Prevention methods (e.g., ignition prevention, humidity control, fuel control [dust layers, vapor concentration])	
4.	Personnel safety (e.g., vent discharge, proximity)	
5.	Collateral damage (e.g., adjacent structures or exposures)	
6.	System interlocks (e.g., dampers, process shutdown)	
7.	Test methods (e.g., other system survivability)	
F.	Passive Building Systems	8
1.	Construction types (e.g., combustible, noncombustible, fire resistive, frame)	
2.	Construction materials (e.g., roofing, sheathing, insulation)	
3.	Height and area limits	
4.	Building separation distance	
5.	Interior finish (e.g., flame-spread rating, critical radiant flux)	
6.	Structural fire resistance (e.g., calculation methods, substitution rules)	
7.	Compartmentalization/barrier (e.g., fire, smoke)	
8.	Protection of openings (e.g., penetration seals, joint systems, dampers, doors, vertical openings)	
V.	Egress and Occupant Movement	10
A.	Means of Egress	7
1.	Design criteria	
2.	Exits (e.g., types, remoteness, travel distances, number, capacity)	
3.	Means of egress components (e.g., exit access, exit, exit discharge)	
4.	Component details (e.g., stairwells, corridors, doors, hardware, elevators)	
5.	Occupancy types (e.g., assembly, detention, business)	
6.	Occupant load	
7.	Emergency lighting	
8.	Marking of the means of egress	
B.	Human Behavior	3
1.	Evacuation movement (e.g., timed egress analysis, egress width, travel time, travel distance, flow rate)	
2.	Human performance capabilities	
3.	Human response to fire cues (e.g., alarm, smoke, and heat)	
4.	Occupant pre-movement	
5.	Toxicology of smoke and heat	