

State final exam questions for study program HSE Professional

Risk assessment

1. Risk analysis terminology, general risk management standard.
Basic principles and tools of Hazardous Chemicals Management.
2. Types of hazard - physical, chemical, biological.
Definition of risk management goals in various conditions as social decision.
3. Hazard identification, scenario creation.
Decision making in HSE management process and their strategies.
4. ISO 31 010 - deterministic and probabilistic approach, qualitative, semi quantitative and quantitative methods of risk analysis.
Life cycle of chemicals as a part of risk management.
5. Comparison of selected analytical methods used in Europe and the world.
International organizations and Conventions; stakeholders and their roles.
6. Process risk analysis methods FTA, ETA, HAZOP, etc.
Risk trade-off, concepts ALARP and ALARA, ethical aspects of HSE, risk and communication.
7. Accidental consequence modelling, computer programs ALOHA, EFFECTS, etc.
Classification of Hazardous Chemicals, the Globally Harmonized System, REACH, CLP.
8. The transition between analysis and risk assessment. Risk Acceptability.
Handling hazardous chemicals in a company.
9. Organizational and technical barriers for risk reduction, their effectiveness.
Transport of hazardous chemicals (ADR, RID).
10. Reliability of human factor and its evaluation.
Hazardous properties of wastes, classification, handling and transporting of hazardous wastes.
11. Procedure of Quantitative Risk Assessment by CPR 18E Purple Book.
Requirements of the SEVESO directive or other Major Accident Prevention programs for operators.
12. Risk analysis links to major accident prevention, occupational risks, environmental protection, etc.
Selected dangerous substances and their categories. Safety Data Sheet.
13. Hazard and risk as an inherent part of the life of an individual, company and society.
Description of the safety management system – PDCA scheme, policy and objectives, training and audit.
14. Process of origin and flux spread of hazard, model MADS.
Manifestations of hazardous properties of chemical substances during an accident.
15. Uncertainty problems in the process of hazard/risk identification: known/known threats, known/unknown threats, unknown/unknown threats. “Black swam” concept by Taleb.
Definition of a major accident, criteria for reporting an accident, report on the occurrence of major accidents.

Occupational safety

1. OSH field, focus and importance.
Importance and focus of occupational hygiene and Ergonomics, occupational hygienist, ergonomist.
2. Global strategy on OSH, fundamental OSH principles.
Assessment of health risks, occupational exposure monitoring, occupational exposure limits, biological monitoring.
3. National OSH policies, systems and programmes.
General approaches to the control of risks to health in the workplace, ventilation.
4. OSH law and regulation, role of standardization.
Safety hazards in the workplace.
5. Roles, rights and obligations of key stakeholders in OSH.
Dust in the workplace, asbestos.
6. Workplace hazards, occupational accidents and diseases.
Chemical hazards in the workplace.
7. OSH risk assessment methodologies.
Occupational carcinogens.
8. Management of OSH risks, hierarchy of controls.
Noise in the workplace.
9. Emergency preparedness and first aid.
Vibration in the workplace.
10. Workplace health surveillance, rehabilitation and return to work.
Lasers and non-ionizing radiation in the workplace.
11. Workplace inspections.
Thermal environment, heat and cold stress in the workplace.
12. OSH education and training.
Lightening, visual stress, working with display-screen equipment.
13. OSH management systems.
Biological hazards in the workplace.
14. Preventive OSH culture.
Ergonomic hazards in the workplace, manual handling, musculoskeletal disorders.
15. Current trends and future challenges in OSH, emerging risks.
Psychosocial risks and stress at work.

Fire Protection

1. Fire dynamics – definition of combustion, combustion phases, combustible substances, oxidizing agent division of combustion, types of flames, flame height.
Fires and their impact on society.
2. Fire dynamics – burning rate, heat of combustion, combustion efficiency, heat release rate, measure, and calculation heat release rate.
Statistics, its evaluation.
3. Fire dynamics (Enclosure fire dynamics) – fire stages, development of fire with limited oxygen supply, flashover, backdraft, rollover.
New trends in fire protection.
4. Fire dynamics (Enclosure fire dynamics) - fire development in the building, post-flashover fire, energy balance, temperature-time curves.
Fire hazards - division.
5. Fire dynamics (Flammable liquids and gases) – definition of flammable liquids, Pool Fire, Jet Fire, flammable liquid tanks (Boilover), flammable gases (LPG, acetylene), gas cylinders, BLEVE.
Reducing impacts of fires on people and property.
6. Explosion – terminology, principle of explosion (deflagration, detonation), explosive limits and condition, principles of explosion management, classification of zones.
Status of the state, citizen, owner, operator and insurance companies.
7. Fire safety concept – fire safety design, performance-based design, fire safety design assessment, fire safety of buildings (objectives, basic requirements, fire compartment).
Regulatory and control activities of the state.
8. Passive fire protection – fire classification of materials, fire classification of structures (fire resistance of building construction).
Influence of insurance companies on fire protection.
9. Passive fire protection – fire spread in the buildings (internal and external fire spread), Eurocodes – fire design (EC1, EC2, EC3 and EC5).
The role of the owner and operator in the security of fire protection.
10. Active fire protection – fire detection and alarm systems – basic components, principles of fire detection, residential fire alarms systems, control panels, fire alarm annunciation systems, fire department notification.
The role of the citizen in the security of fire protection.
11. Active fire protection – fire suppression systems – fire sprinkler systems, residential sprinkler systems, other extinguishing systems; smoke control systems.
Documentation of fire protection, its preparation and management, Repressive fire protection.
12. Fire intervention – water extinguishing, foam extinguishing, water supply, portable fire extinguisher.
Authority of the state (public administration) and owner (operator) in the repressive fire protection.
13. Evacuation – basic requirements, factors influencing the evacuation process (building solution, active fire protection, population characteristics, visibility, effects of smoke and heat).
Fire protection units.
14. Evacuation – basic design parameters of evacuation, escape time (RSET-ASET), evacuation strategies.
Procedures of the owner and units in dealing with fires.
15. Fire modelling –zone models, CFD (field) models.
Fire-fighting training.

Integration of HSE

1. Systematic approach to risk management - individual steps of risk management, their mutual relationships and links.
Basic terms: environment, pollutant, hazardous substance, environmental pollution, environmental hazard, environmental vulnerability, major environmental accident.
2. Basic management principles - the Deming scheme (plan-do-check-act).
Major environmental accident – criteria for the notification of a major accident to the Commission.
3. Elements of the risk management system as a continuous and cyclic process, under conditions of industry 4.0.
SEVESO Directive – rules for the prevention of environmental major accident.
4. Risk management strategies (risk avoidance/risk elimination, risk reduction, risk transfer), risk matrix.
SEVESO Directive – environmental risk analysis/risk assessment.
5. Evaluation criteria for strategy and risk management measures.
Risk Analysis: accident scenario with environmental impact; major accident consequences for the environment.
6. Cost-benefit compensation, risk-based decision making.
Hazard and Vulnerability Index method.
7. Risk management measures (examples).
Environment Accident Index method.
8. Introduction to quality management system ISO 9000:2015.
Safety management system – PDCA cycle.
9. Introduction to ILO guidelines on occupational health and safety management systems, OHS, ISO 45001.
Water contamination. Emergency plan.
10. Introduction to the system of prevention of major accidents.
IPPC - Integrated pollution prevention and control.
11. Possibilities of integration of various risk management systems within the company.
Incident investigation process.
12. Additional approaches: Inherent safety approach, Control – Process and workplace design, Hazard and risk control, Safety by design, Cleaner production, Green design.
Methods of analysis: MORT, security barriers analysis.
13. Strategies for defining a problem in relation to change management.
Developing hypotheses about extraordinary events.
14. Stakeholders in risk management in the framework of HSE and their relations - risk owners, risk bearers, manager HSE, regulator, regulation enforcement.
Primary and root causes, their relationship and importance.
15. Hazardousness as an intensive and hazard as an extensive parameter, possible endangered targets, main hazard types in HSE management.
Importance of accidents and incidents investigations for the company, industrial segment and society.