



UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF CHEMICAL AND BIO-ENGINEERING TECHNOLOGY

FINAL EXAMINATION
OCTOBER 2025 SEMESTER

COURSE CODE : CQB 10903
COURSE TITLE : INDUSTRIAL SAFETY AND HEALTH
PROGRAMME NAME : BACHELOR OF FOOD SAFETY AND QUALITY TECHNOLOGY
DATE : 25 JANUARY 2026
TIME : 9:00AM - 12:00PM
DURATION : 3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
 2. This question paper is printed on both sides of the paper.
 3. This question paper consist of TWO sections.
 4. Answer ALL questions for Section A.
 5. Section B consist of four questions. Answer THREE (3) questions only.
 6. Please write your answer on the answer booklet provided.
 7. Please answer all questions in English only.
 8. Please answer MCQ/EMQ questions using OMR sheet. ☒ Tick if applicable
 9. Refer to the attached Formula/ Appendies. ☐ Tick if applicable
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THERE ARE 16 PAGES OF QUESTIONS INCLUDING THIS PAGE

SECTION A (Total: 40 marks)

Answer ALL questions.

Please use the answer booklet provided.

1. Two control strategies are compared:
 - 1) Strategy A: Strict containment
 - 2) Strategy B: PPE relianceStrategy A is more effective because it
 - A. Eliminates medical surveillance
 - B. Is cheaper to implement
 - C. Controls hazards at the source
 - D. Requires less maintenance

2. An enclosed chemical process significantly reduces worker exposure without additional PPE requirements.
This result highlights the advantage of controls that
 - A. Focus on emergency response
 - B. Operate at the source of the hazard
 - C. Rely on behavioural compliance
 - D. Require frequent retraining

3. A comprehensive emergency plan integrates communication systems, trained personnel, and response equipment.
This integration mainly ensures
 - A. Reduction in daily operational hazards
 - B. Coordinated and effective emergency response
 - C. Elimination of emergency incidents
 - D. Compliance with documentation requirements

4. A safety study aims to identify both obvious and hidden process deviations with strong documentation for regulatory review.
The most appropriate technique is
- A. What-If analysis only
 - B. Informal brainstorming
 - C. HAZID only
 - D. HAZOP
5. An ergonomic risk assessment prioritizes task redesign over worker behaviour changes.
This priority reflects the principle that
- A. Administrative controls are unnecessary
 - B. Workers should adapt to tasks
 - C. Engineering solutions are more effective
 - D. Ergonomic risks are unavoidable
6. Fire and explosion protection systems integrate prevention, detection, and mitigation.
This integration ensures
- A. Comprehensive risk reduction
 - B. Reduced operational cost
 - C. Single-layer protection
 - D. Elimination of all hazards
7. A noise management program integrates monitoring, engineering controls, training, and health surveillance.
This integration ensures
- A. Reduced production output
 - B. Compliance through documentation only
 - C. Comprehensive noise risk control
 - D. Elimination of all workplace hazards

8. A safety improvement plan prioritizes elimination and substitution before other measures.
This approach reflects
- A. Administrative-focused risk control
 - B. Effective application of hierarchy of control
 - C. Compliance-based safety management
 - D. Behaviour-based safety
9. An analysis technique is required to evaluate the effectiveness of safety barriers following an initiating event.
The most appropriate technique is
- A. HAZID
 - B. Checklist analysis
 - C. Event Tree Analysis
 - D. Fault Tree Analysis
10. During a HIRARC review, multiple hazards show low likelihood but catastrophic severity.
This assessment suggests that risk decisions should emphasize
- A. Severity impact
 - B. Likelihood only
 - C. Worker experience
 - D. Historical accident data only
11. Explosion risk assessment prioritizes control of confined flammable atmospheres.
This priority is based on the relationship between confinement and
- A. Flame colour
 - B. Fuel type
 - C. Pressure rise
 - D. Detection sensitivity

12. A comprehensive biohazard management system integrates containment, PPE, training, and waste management.
This integration mainly ensures
- A. Reduced regulatory requirements
 - B. Elimination of all laboratory risks
 - C. Multiple layers of risk reduction
 - D. Single-layer protection
13. Long-term health trends are reviewed to evaluate control effectiveness.
This evaluation mainly supports
- A. Continuous improvement in occupational health management
 - B. Administrative reporting only
 - C. Hazard elimination
 - D. Emergency response planning
14. Quantitative risk assessment uses event tree and fault tree results together.
This combined use supports
- A. Administrative reporting
 - B. Qualitative judgment only
 - C. Probability-based risk evaluation
 - D. Elimination of hazards
15. A safety audit identifies unsafe worker behaviour, unclear procedures, and absence of supervision.
These findings are best classified as
- A. Chemical hazards
 - B. Mechanical hazards
 - C. Human and organizational factors
 - D. Environmental hazards

16. A healthcare worker handles blood samples that may contain infectious agents. This exposure route is primarily categorized as
- A. Vector-borne transmission
 - B. Inhalation
 - C. Ingestion
 - D. Percutaneous contact
17. Air monitoring indicates exposure to airborne contaminants above permissible limits. The most appropriate immediate action is to
- A. Implement exposure control measures
 - B. Stop health surveillance
 - C. Record the result only
 - D. Transfer workers permanently
18. A factory installs acoustic enclosures around noisy machinery. This measure is classified as
- A. Administrative control
 - B. Health surveillance
 - C. Engineering control
 - D. Personal protective equipment
19. A fuel storage area is designed to remove ignition sources. This control mainly targets the elimination of
- A. Confinement
 - B. Oxygen
 - C. Heat
 - D. Fuel

20. A workstation is redesigned so that the monitor is at eye level, and the chair provides lumbar support.

This action represents

- A. Administrative control
- B. Personal protective equipment
- C. Ergonomic risk control
- D. Job rotation

21. An emergency plan assigns specific roles for evacuation, first aid, and communication.

This arrangement mainly ensures

- A. Faster production recovery
- B. Clear coordination during emergencies
- C. Reduced training requirements
- D. Elimination of emergency drills

22. A chemical process generates hazardous vapours during operation. A local exhaust ventilation system is installed near the source.

This measure represents

- A. Engineering control
- B. Administrative control
- C. Elimination
- D. Personal protective equipment

23. A noisy machine is enclosed with soundproof barriers to reduce worker exposure.

This control measure is classified as

- A. Administrative control
- B. Elimination
- C. Substitution
- D. Engineering control

24. A safety engineer analyzes the causes leading to a system failure using logic gates such as AND and OR.
This analysis approach represents
- A. Job Safety Analysis
 - B. Event Tree Analysis
 - C. Fault Tree Analysis
 - D. HAZID
25. A multidisciplinary team reviews an operating plant using guidewords such as "No," "More," and "Less" to identify deviations.
This review approach corresponds to
- A. Job Safety Analysis
 - B. HAZID
 - C. What-If analysis
 - D. HAZOP
26. A hazard has been identified and assessed as significant during a HIRARC study.
The most appropriate immediate action is to
- A. Accept the risk without action
 - B. Implement suitable risk control measures
 - C. Document the hazard only
 - D. Transfer the task to another worker
27. A task involves working at height with frequent exposure and severe injury potential.
This condition indicates that the risk is
- A. Acceptable
 - B. Negligible
 - C. Significant
 - D. Eliminated

28. A chemical storage area contains flammable liquids stored close to ignition sources. The most effective immediate action to reduce risk is
- A. Issuing warning signage
 - B. Providing fire extinguisher only
 - C. Conducting safety briefing
 - D. Separating ignition sources from storage area
29. A laboratory handles microorganisms that can cause mild disease but are unlikely to spread in the community. These microorganisms are classified under
- A. Biohazard Risk Group 3
 - B. Biohazard Risk Group 4
 - C. Biohazard Risk Group 2
 - D. Biohazard Risk Group 1
30. A worker develops skin irritation after regular contact with cleaning chemicals. This condition is most appropriately classified as
- A. Ergonomic disorder
 - B. Occupational disease
 - C. Acute injury
 - D. Physical hazard effect
31. A worker is exposed to continuous noise at 90 dB(A) during an 8-hour shift. This exposure level indicates a risk of
- A. Hearing damage
 - B. Heat stress
 - C. Temporary visual fatigue
 - D. Vibration disorder

32. A flammable liquid is released and forms vapor near an ignition source.
This condition completes the fire requirement known as
- A. Fire square
 - B. Explosion pentagon
 - C. Combustion cycle
 - D. Fire triangle
33. A worker performs repetitive wrist movements for long periods while typing.
This situation presents a risk mainly related to
- A. Thermal discomfort
 - B. Noise-induced stress
 - C. Chemical exposure
 - D. Musculoskeletal disorders
34. A manufacturing plant conducts regular evacuation drills to ensure personnel respond correctly during an incident.
This activity supports emergency planning by
- A. Eliminating emergency risks
 - B. Reducing hazard severity
 - C. Improving emergency response readiness
 - D. Replacing emergency equipment
35. A laboratory replaces a highly toxic solvent with a less hazardous alternative for routine analysis.
This control action is classified as
- A. Personal protective equipment (PPE)
 - B. Substitution
 - C. Administrative control
 - D. Engineering control

36. A hazardous solvent used in a process is replaced with a non-toxic alternative. This action represents
- A. Engineering control
 - B. Administrative control
 - C. Substitution
 - D. Personal protective equipment
37. A worker operates a grinding machine without wearing eye protection. Sparks are generated continuously during operation. The most appropriate safety control measure for this situation is
- A. Personal protective equipment (PPE).
 - B. Emergency response plan.
 - C. Engineering control.
 - D. Administrative control.
38. A workshop activity has a likelihood rating of 3 and a severity rating of 4. The calculated risk level is
- A. 10
 - B. 12
 - C. 16
 - D. 7
39. A safety study begins with an initiating event and examines multiple possible outcome sequences based on system successes and failures. The most suitable analysis technique for this purpose is
- A. HAZOP
 - B. Event Tree Analysis
 - C. Fault Tree Analysis
 - D. What-If analysis

40. A maintenance task involves rotating machinery with exposed moving parts. The likelihood is rated as moderate, and the severity is rated as high. Based on HIRARC principles, the risk level is considered
- A. High and requires control
 - B. Insignificant and negligible
 - C. Low and acceptable
 - D. Medium and tolerable

SECTION B (Total: 60 marks)

Answer **THREE (3)** questions only.

Please use the answer booklet provided.

Question 1

Answer all questions.

- (a) A warehouse worker manually lifts boxes weighing 15–20 kg repeatedly during an 8-hour shift. The task involves bending, twisting of the trunk, and minimal rest breaks. The worker has reported frequent lower back and shoulder pain. Analyze the task using an ergonomic risk assessment approach by answering the following:

- i. Analyze **THREE (3)** ergonomic risk factors associated with the manual handling task.

(6 marks)

- ii. Propose **TWO (2)** ergonomic control measures that should be implemented to reduce the risk of musculoskeletal disorders (MSDs).

(4 marks)

- (b) A wood-processing factory operates saws, planers, and compressors continuously throughout an 8-hour shift. Noise measurements indicate levels exceeding recommended occupational exposure limits. Several workers have reported headaches and reduced hearing sensitivity.

Analyze the noise hazard by answering the following:

- i. Analyze **THREE (3)** factors that contribute to excessive noise exposure in the factory.

(6 marks)

- ii. Propose **TWO (2)** appropriate control measures that should be implemented to reduce noise exposure based on the Hierarchy of Control.

(4 marks)

Question 2

Answer all questions.

- (a) A workshop uses an abrasive cutting machine to cut metal components. The operation produces flying sparks, loud noise, and fine metal dust that may harm workers.

Apply the Hierarchy of Control to this situation by:

- i. Identify **FOUR (4)** levels of the Hierarchy of Control that can be applied to reduce the risks in this activity.

(4 marks)

- ii. Propose **ONE (1)** suitable control measure for **THREE (3)** identified level in Item (i) related to the cutting operation.

(6 marks)

- (b) A laboratory frequently uses corrosive acids and volatile organic solvents for experimental work. Recent safety audits reported improper chemical storage, inadequate ventilation, and inconsistent use of personal protective equipment (PPE).

Analyze the chemical hazard control measures by answering the following:

- i. Analyze **THREE (3)** chemical hazards present in the laboratory and explain their potential health or safety effects.

(6 marks)

- ii. Propose **TWO (2)** appropriate control measures that should be implemented to reduce the chemical hazards identified, based on the Hierarchy of Control.

(4 marks)

Question 3

Answer all questions.

- (a) A manufacturing company conducts a workplace risk assessment and identifies the following hazards:

- 1) Exposure to high noise levels near heavy machinery.
- 2) Manual handling of heavy materials.
- 3) Occasional chemical spills in the storage area.
- 4) Slips and trips due to wet floors.

Analyze the hazards and

- i. Choose the **TWO (2)** most significant risks from the listed hazards and justify your choices.

(4 marks)

- ii. Analyze **THREE (3)** criteria used to determine whether a risk is classified as a significant risk in occupational safety and health management.

(6 marks)

- (b) A maintenance technician is required to service a conveyor belt system in a manufacturing plant. The task involves isolating the power supply, working near moving parts, and using hand tools at height.

Apply the HIRARC process to this task by:

- i. Identify **TWO (2)** hazards associated with the task.

(4 marks)

- ii. Assess the level of risk for each hazard in Item (i) by stating the likelihood and severity.

(4 marks)

- iii. Propose **ONE (1)** suitable control measure for each identified hazard.

(2 marks)

Question 4

Answer all questions.

- (a) A hospital housekeeping team is responsible for cleaning wards, handling clinical waste, and disposing of used needles and contaminated materials. Workers may be exposed to blood, body fluids, and infectious microorganisms.

Apply biohazard safety principles by answering the following:

- i. Identify **FOUR (4)** biohazards present in the workplace.

(4 marks)

- ii. Apply **THREE (3)** appropriate control measures to reduce exposure to biohazards.

(6 marks)

- (b) At a construction site for a multi-story building, a worker on the third floor was struck by a falling concrete block that dislodged from an improperly secured hoisting platform, resulting in a fractured skull. During the emergency response, a site supervisor rushing to the scene tripped over a loose electrical cable on the ground floor and sprained his ankle. The investigation further revealed that the hoisting mechanism had previously experienced two near-miss incidents involving falling tools, but these incidents were not formally reported.

- i. Analyze **FOUR (4)** types of incidents involved in this scenario and classify each event accordingly.

(4 marks)

- ii. Explain **THREE (3)** root causes that contributed to the occurrence of these incidents.

(3 marks)

- iii. Propose **THREE (3)** preventive or control measures that should be implemented to prevent similar incidents in the future.

(3 marks)

END OF EXAMINATION PAPER

