



UNIVERSITI
TEKNOLOGI
PETRONAS

**FINAL EXAMINATION
MAY 2013 SEMESTER**

COURSE : CBB 2012 / CCB 2012
HEALTH, SAFETY AND ENVIRONMENT
DATE : 3rd SEPTEMBER 2013 (TUESDAY)
TIME : 9:00 AM – 11:00 AM (2 HOURS)

INSTRUCTIONS TO CANDIDATES

SECTION A

1. There are 50 multiple choice questions.
2. Answer **ALL** questions in the OMR sheet.
3. Shade the right answer using 2B pencil only.
4. Erase clearly answers that are cancelled, if any.

SECTION B

1. There are 2 subjective questions.
2. Answer **ALL** questions in the answer booklet.
3. Do not open this Question Booklet until instructed.
4. This Question Booklet **MUST NOT** be taken out from the examination room.

Note: There are **TWELVE (12)** pages in this Question Booklet including the cover page.

SECTION A(50 marks)

Answer **ALL** questions in the OMR sheet provided.

1. What is the primary function of NIOSH?
 - A. To provide education and training on environmental management issues
 - B. To provide a platform for research on quality assurance
 - C. To provide socio-economic insurance to workers in high-risk industries
 - D. To provide consultancy on workplace health and safety matters

2. An oil refinery that employs over 500 workers is making huge losses. Should the refinery spend additional funds to hire a safety and health officer?
 - A. No, it is unnecessary as the refinery is not a high-risk area
 - B. No, not until the refinery starts being profitable
 - C. Yes, to ensure the well-being and safety of the workers
 - D. Yes, it is required by government regulations

3. Which of the following is the direct responsibility of a safety and health officer?
 - A. Inspect the workplace for possible hazards
 - B. Act as the treasurer to the safety and health committee
 - C. Provide training for the safe use of complex machineries
 - D. File a complaint on any accident, poisoning or other incident

4. According to OSHA 1994, which of the following is a responsibility of an employee?
 - A. Establish a safety and health committee and hire a health and safety officer
 - B. Avoid unsafe acts that may endanger yourself or those around you
 - C. Provide training and information for the safe use of complex machineries
 - D. Ensure the workplace is safe with sufficient entry and exit points

5. Which of the following statements is **TRUE** about Health, Safety and Environment movement?
 - A. Redundancy is one of the widely used accident prevention techniques.
 - B. The development of HSE movement is characterised by professionalism and integration.
 - C. Enforcement in "Three E's of Safety" ensure the employees knows what are the hazards present in their workplace.
 - D. Department of Environment is the government agency responsible to enforce the Environmental Quality Act 1974 in Malaysia

6. Which of the following is **NOT** the purpose of Environmental Quality Act?
 - A. Abatement of pollution
 - B. Control of pollution
 - C. Occupational health problems
 - D. Prevention of pollution

7. The Department of Occupational Safety and Health (DOSH) in Malaysia have the following functions **EXCEPT** to _____.
- A. ensure public safety who may be affected by the activities of persons at work
 - B. conduct strategic and effective enforcement to any organisation in complying with regulations
 - C. perform environmental impact assessment at workplace in accordance with regulations
 - D. ensure the safety, health and welfare of persons at work in accordance with regulations
8. Which of the following statements does **NOT** reflect the general principles of Environmental Management Systems?
- A. A process not an event
 - B. About words and aspirations
 - C. Serves organization and its mission
 - D. Start from the top and implement throughout
9. What was the first scientific theory of accident causation?
- A. System Theory
 - B. Combination Theory
 - C. Domino Theory
 - D. Human Factors Theory
10. According to the Iceberg Model, which of the following statement is **FALSE**:
- A. Accidents result in direct and indirect costs.
 - B. Direct costs include medical expenses and lost wages.
 - C. **Direct costs outweigh indirect costs.**
 - D. Indirect costs include lost production and clean up expenses
11. Which one of the following is **NOT** a Causal Factor relating to an Organization?
- A. Culture
 - B. Leadership
 - C. Communications
 - D. Personality
12. Which one of the following is **TRUE** for an incident?
- A. An incident is a planned but unwanted event.
 - B. An incident results in fatality only
 - C. An incident disrupts the work process
 - D. An incident always results in death

13. Which one of the following actions is **NOT** required at the accident scene?
- A. Prevent people from leaving the scene
 - B. Check for danger
 - C. Help the injured
 - D. Gather facts and secure the scene
14. Which one of the following is a reason for conducting an investigation?
- A. Increase worker knowledge
 - B. Predict future incidents
 - C. Identify and eliminate hazards
 - D. Detect injury
15. Which of the following is one of the main steps of investigation?
- A. Collect facts
 - B. Interview all employers
 - C. Punish those responsible for the accident
 - D. Write a complaint
16. Which of the following is a requirement for interviewing witnesses of an accident/incident?
- A. Interview at any time that is convenient
 - B. Keep conversations formal
 - C. Choose a public place to talk
 - D. Get information from witness
17. Which of the following is **NOT** likely a direct source of groundwater contamination?
- A. Chemical spills
 - B. Industrial effluents
 - C. Underground leaks
 - D. Landfill leachate
18. Which of the following is **NOT** a primary air pollutant?
- A. lead
 - B. water vapour
 - C. suspended particulate matter
 - D. carbon monoxide
19. Which one of the following is a good conductor of electric current?
- A. Ceramic
 - B. Copper
 - C. Rubber
 - D. Wood

20. Which of the following is a point source of water pollution?
- A. City streets in an urban area.
 - B. A sewage treatment plant
 - C. Lawns and gardens in a suburban area
 - D. An area of farmlands
21. Why do the general public fear flames and smokes from the flare stack of a petrochemical plant **MORE** than they fear smoking a pack of cigarette daily?
- A. Risk of smoking is unfamiliar
 - B. Risk of smoking is uncertain
 - C. Risk of smoking is voluntary
 - D. Risk of smoking is uncontrollable
22. Risk assessment process among others involve three of the following **EXCEPT**
- A. identify hazards
 - B. estimate probability
 - C. physiological function test
 - D. risk management
23. The best description of hazard is
- A. an expression of possible loss in terms of severity and probability
 - B. injury and/or major system damage
 - C. is an after-the-fact process, triggered by an accident
 - D. conditions that have the potential to cause harm
24. Which of the following is **FALSE**?
- A. The carpal tunnel syndrome is a musculo-skeletal disorder
 - B. Effective workplace ergonomics leads to increased productivity
 - C. The Combination Theory is an ergonomic design theory
 - D. Adjustable workplaces reduce the risk of cumulative trauma disorders
25. Which of the following is the hazard that is concerned with motion and processes whereby energy forms are converted into motion hence resulting contact with human?
- A. Electrical
 - B. Mechanical
 - C. Nuclear
 - D. Chemical

26. Which of the following statements **DOES NOT** reflect a good urban air quality management?
- A. Structural planning of township, residential and industrial area
 - B. Park cars at the edge of city and use public transport
 - C. Driving alone into cities during peak hours
 - D. Companies encourage car-pooling among employees
27. Ethics is defined as
- A. area concerning who or what controls people behaviours.
 - B. study of morality within a context established by cultural and professional values, social norms, and accepted standards of behaviour
 - C. values that are subscribed to and fostered by society in general and individuals within society.
 - D. ability of people to undertake self-directed tasks and cope with tense situations
28. Ergonomics is
- A. science combining research and application of human data
 - B. a multidisciplinary science that seeks to conform the workplace and all of its physiological aspects to the worker
 - C. science and art devoted to anticipation, recognition/identification, measurement/evaluation and control of environmental factors arising from the workplace that may cause sickness or significant discomfort among workers
 - D. a composite of subsystems whose functions are integrated to achieve a mission/function (includes materials, tools, personnel, facilities, software, equipment)
29. Poor typing styles contribute to causing musculoskeletal injuries (MSIs). Which of the following statements is **FALSE** with regards to MSIs due to poor typing styles?
- A. Hard pounding of the keys can cause pain in the finger joints
 - B. Pressing the keys rather than lightly touching them strains the tendon of the fingers, hands and forearms
 - C. Pecking at the keys instead of touching them lightly can, over time, lead to forearm tendonitis
 - D. Light touching style normally leads to a mild tingling in the fingertips
30. Which of the following is the most preferred solution to noise control? Assume that cost is not a factor in the decision-making process
- A. Installing barriers between the source and the receiver
 - B. Moving the source away from the receiver
 - C. Replacing loose and/or unbalanced machine parts
 - D. Changing job schedules to reduce exposure time

31. Which of the following is most constraining to operator movement?
- A. Pullback device
 - B. Electromechanical device
 - C. Photoelectric device
 - D. Infrared device
32. With reference to NFPA 704 Diamond System, the following fire hazards are classified **EXCEPT**
- A. Health hazards
 - B. Reactivity
 - C. Toxicity
 - D. Specific hazard
33. Engineering controls should not rely on which of the following strategies
- A. design or redesign
 - B. removal or substitution
 - C. barriers or ventilation
 - D. personal protective equipment
34. Which of the following is the definition of the risk?
- A. A chance or probability that a person will be harmed or experience an adverse health effect if exposed to a hazard
 - B. A chemical or physical condition that has potential to cause an accident and may lead to illness, or property damage
 - C. A systematic and proactive approach to identifying hazards and recommending corrective actions
 - D. A careful examination of what, in your work, could cause harm to people
35. What is the primary function of a fault tree?
- A. To identify possible consequences of a given event
 - B. To identify the most effective method to prevent a given event
 - C. To identify the events that may lead to a given event
 - D. To identify the most likely outcome of a given event
36. What is the primary purpose of a hazard analysis?
- A. To comply with environmental legislation
 - B. To identify and control risk and liability
 - C. To plan and prepare for emergencies
 - D. To state the company's commitment to safety

37. FMEA is Failure Mode and Effects Analysis, HAZOP is Hazard and Operability Review and HEA is Human Error Analysis. Which of the following is the most complete approach to hazard analysis?
- A. FMEA combined with HAZOP
 - B. HAZOP alone
 - C. FMEA combined with HEA
 - D. HEA alone
38. Select the best method of hazard analysis that uses a graphic model to visually display the analysis process
- A. Failure mode and effects analysis (FMEA)
 - B. Hazard operability review (HAZOP)
 - C. Risk analysis
 - D. Fault tree analysis (FTA)
39. Which of the following statement is **FALSE**?
- A. An "AND" gate is linked to an output event that occurs only if all related input events occur
 - B. An Event Tree Analysis is to provide information on how a failure can occur and the probability of occurrence
 - C. The first step in Fault Tree Analysis, a deductive reasoning process, is to clearly identify the top event
 - D. An Event Tree Analysis is to identify ways in which hazards can lead to accidents
40. Methods A to D are hazard control methods. Method A costs RM 100 and has an effectiveness of 40%. Method B costs RM 75 and has an effectiveness of 50%. Method C costs RM 50 and has an effectiveness of 40%. Method D costs RM 50 and has an effectiveness of 30%. Which method gives the most desirable cost-benefit ratio?
- A. Method A
 - B. Method B
 - C. Method C
 - D. Method D
41. Which of the following is the **CORRECT** hierarchy for risk control measures?
- A. Engineering controls, administrative controls, personal protective equipment
 - B. Administrative controls, personal protective equipment, engineering controls
 - C. Personal protective equipment, elimination of risks and administrative controls
 - D. Elimination of risks, administrative controls and engineering controls

42. Which of the following tools is **NOT** relevant in conducting hazard analysis of a chemical plant?
- A. The process flow diagram (PFD)
 - B. The piping and instrumentation diagram (P&ID)
 - C. Work permits of all foreign workers (WPF)
 - D. Material Safety Data Sheet (MSDS)
43. The following are the elements of the emergency response plan, **EXCEPT**
- A. Plan administration and maintenance
 - B. Information
 - C. Complete the accident report
 - D. Action procedure and format
44. Some safety spectacles are made of polycarbonate (PC) plastics. What is the advantage of using PC against glass?
- A. Greater abrasion resistance
 - B. Greater scratch resistance
 - C. Greater crack resistance
 - D. Greater chemical resistance
45. What is the **PRIMARY** purpose of a company safety policy?
- A. To establish a safety and health committee
 - B. To outline the company's health and safety strategies
 - C. To state the company's commitment to health and safety
 - D. To guarantee the health and safety of employees
46. Emergency management is a comprehensive system set up to address and handle natural and man-made hazards. It has the following parts, **EXCEPT**
- A. Prevention
 - B. Preparedness
 - C. Sponsor
 - D. Response
47. Which of the following statements indicate air pollution episodes?
- I. Diminish visibility due to smog
 - II. Increase chronic lung illness
 - III. Bad odours from public water supply
 - IV. Increase concentration of hydrogen sulphide in the air
- A. I, II and III only
 - B. II, III and IV only
 - C. I, II and IV only
 - D. All of the above

48. Which of the following are noise control strategies?

- I. Noise can be reduced at the receiver by enclosing the worker
- II. Noise can be reduced along its path by moving the source farther away
- III. Noise can be reduced at its source by enclosing the source
- IV. Noise can be reduced at the receiver by conducting periodic audiometric tests

- A. I, III and IV
- B. II, III and IV
- C. I, II and III
- D. I, II and IV

49. Which of the following statements do describe the nature of ISO 14000?

- I. ISO 14000 family of standards has been developed to promote effective environmental management
- II. It is a quality system based on the participation of selected employees
- III. It is a compulsory international standard for use by any company, any size and anywhere in the world
- IV. It advocates sustainable development for every nation and every person

- A. I and III
- B. II and IV
- C. I and IV
- D. II and III

50. Adjustable workplaces reduce the risk of cumulative trauma disorders. Common indicators of the existence of ergonomics problems include the following:

- I. Incidence of cumulative trauma disorders (CTDs)
- II. Increase in accidents and injuries
- III. Employee complaints
- IV. Low absenteeism

- A. I and II
- B. I, II and III
- C. II and III
- D. II, III and IV

SECTION B(50 marks)

Answer **ALL** questions in the Answer Booklet.

1. a. Identify **TWO (2)** hazards for each of the following tasks:

- i. Sharpening a knife using a grinding tool
- ii. Operating pulleys or gears
- iii. Welding

[6 marks]

b. Six 10-year-old healthy school children jumped and fell from a height of about 2 m after being chased by a bull-dog. Three of the children suffered minor injuries, two suffered serious injuries, and one died. Discuss **THREE (3)** possible reasons for the different injuries and death, even though all of them fell from the same height.

[6 marks]

c. The Tsunami that struck Japan in March 2011 devastated the country. It led to the explosion of the Fukushima Dai-chi nuclear plant that generated global concerns about the safety of harnessing nuclear energy.

i. Discuss the effects that can be caused by ionizing radiation exposure and how it can be minimized.

[5 marks]

ii. Residents were allowed to resume commercial and educational activities at areas that were exposed to radioactive leakage after a few months. Discuss the immediate actions that must be taken before the start of any activities. Justify your answer.

[8 marks]

2. a. The Industrial Revolution in the 18th century gave a profound effect on the working community worldwide.
- i. Describe **THREE (3)** positive changes in production that was revolutionised during this period of time.
[6 marks]
- ii. Discuss how the Industrial Revolution gave an impact towards the safety and health of workers that eventually led to various legislations on HSE.
[5 marks]
- b. The collapsed of the Penang Second Bridge ramp on June 2013 caused at least one fatality. The Department of Occupational Safety and Health (DOSH) sent a team of investigators to the site with professional assistance from various sectors. The contractor company could be charged in court if investigations revealed that the company had not adhered to safe operating procedures and good engineering practices.
- i. Based on the Occupational, Safety and Health Act (OSHA) 1994, explain the reason for the involvement of DOSH in this incident and why assistance from professionals were necessary.
[6 marks]
- ii. Based on your knowledge of occupational disasters worldwide, discuss the consequences for companies who are implicated in court and the importance of establishing good safety and health standards at all times.
[8 marks]

END OF PAPER