# UNIVERSITY OF MINES AND TECHNOLOGY, TARKWA

FIRST SEMESTER EXAMINATIONS, DEC 2014

COURSE NO: **PE 379**
COURSE NAME: Environmental Management, Health and Safety
CLASS: **PE III** TIME: **3 HOURS**

Name: _____Index Number: _____

***Section A*** ***(20 Marks)***

***Read the following questions carefully and provide the correct answer to each of them. Note that for every wrong answer half a mark is deducted so do not guess***

| Questions | True or False |
|---|---|
| 1. Fugitive emissions are a source of hydrocarbon emission. | |
| 2. If a material is highly toxic, then only a small concentration will be lethal and the numerical values of the lethal doses and concentrations- $LD_{50}$, and $LC_{50}$, would be high. | |
| 3. Accident investigations in the oil and gas industry must be both fact and fault finding. | |
| 4. Heavy cotton glove usually afford ample protection against scratch and abrasive hazards. | |
| 5. Athlete's foot is an infection of the feet caused by fungus. | |
| 6. The primary impact of salt concentration in cellular fluids is the disruption of the fluid chemistry balance within cells. | |
| 7. Steel-toed boots or shoes protect toes against the crushing hazard of falling objects and chemical hazards. | |
| 8. High osmotic pressure produced by soluble salts accelerates water imbibition by seeds, resulting in increased germination and faster seedling emergence rates, and helps the uptake of nutrients in plants. | |
| 9. One limitation of gas flotation is that, it can create foam that is difficult to break | |
| 10. The most widely used system for precipitation is to add lime (CaOH) or sodium hydroxide (NaOH) to increase the pH of the water. | |
| 11. Any incident that could have resulted in a dangerous occurrence is called near miss | |
| 12. Earmuffs offer a far better reduction of all sound frequencies than ear plugs | |
| 13. Produced water can be disposed of by evaporation, as long as the volumes are relatively high | |
| 14. The toxicity of aromatic hydrocarbons is relatively low, while that of straight-chain alkane is relatively high. | |
| 15. The functional purpose of the closely space plates found in plate separators is to decrease the settling distance required to separate the oil droplet from water. | |
| 16. In bioaugmentation, for microbes to work efficiently there has to be enough phosphorus, nitrogen and carbon. | |
| 17. Stress is the natural reaction to excessive pressure that can lead to improved performance. | |
| 18. Personal protective equipment includes all clothing and other work accessories designed to create a barrier and eliminate hazard. | |
| 19. Ergonomics is the science of matching the physical capacity of the worker with the physical requirements of the job. | |
| 20. Excess concentrations of metals inhibit normal biochemical processes in cells. | |

***Choose the correct letter, A, B, C or D***

1. Which of the following is identified in your text as a moderator of stress?
   A. Lifestyle
   B. Heart disease
   C. Alcohol or substance abuse
   D. Poor memory

2. Concentration:
   I. Fraction of the substance in air or water that causes a particular effect when the target animal is placed in that environment.
   II. Normally as mass per unit volume in milligrams per liter (mg/l).
   A. I only
   B. II only
   C. I &II only
   D. None of the above

3. Which of the following is not a method of treating petroleum waste?
   A. Heater treaters
   B. Gas floatation
   C. Filtration
   D. Sodium Absorption Ratio

4. The behavioural outcomes of stress can include
   A. Poor memory
   B. Absenteeism
   C. Burnout
   D. Depression

5. The suitability of a solid waste for surface discharge can be assessed through the following except
   A. Electrical conductivity
   B. Sodium adsorption ratio
   C. Oil and grease level
   D. None of the above

6. Salt:
   I. Salt can directly impact plant growth by altering the physical properties of soil.
   II. Salt can limit the access of air and water to the plant roots.
   A. I only
   B. II only
   C. I &II only
   D. None of the above

7. Which of the following is NOT a hazard to consider when selecting footwear?
   A. Impact

B. Compression
C. Slipping
D. Flexibility

8. Heavy metal concentrations allowed in drinking water vary for each metal, but are generally below:
   A. 0.06 mg/l
   B. 1 mg/l
   C. 0.09 mg/l
   D. 0.01 mg/l

9. Which of the following waste treatment method can be used to remove dissolved hydrocarbons from the water?
   A. Ultraviolet radiation
   B. Precipitation
   C. Biological process
   D. All the above

10. All the statements are true about gas flotation, EXCEPT:
   A. Gas flotation can create foam that is difficult to break.
   B. Gas flotation is often aided by the addition of chemical coagulants.
   C. Gas flotation is often used to remove dissolved oil droplet.
   D. Gas flotation systems can reduce oil concentrations to 15-100 mg/l, with a typical average of 40 mg/l.

11. Understanding the hazard associated with a job or process is provided by training and educating:
   A. Managers
   B. Supervisors
   C. Employees
   D. All the above

12. Engineering controls involve:
   A. Workplace policy, procedures, and practices that minimize the exposure of workers to risk conditions.
   B. Workplace policy, procedures, and practices that maximize the exposure of workers to risk conditions
   C. Application of proper personal protective equipment
   D. None of the above

13. Chemical Coagulant:
   I. It can aid in the removal of small, dissolved oil droplets.
   II. The electrostatic repulsion charges on the individual droplets are overcome by the chemicals used.
   III. Common chemicals used include lime, alum, and polyelectrolytes.

A. I &II only
B. I &III only
C. II & III only
D. I, II & III

14. Which of the waste treatment method is usually the simplest and most economical way to remove large quantities of free oil from water?
A. Gravity separation
B. Biological degradation
C. Filtration
D. All the above

15. Which of these is the first step to take when conducting a risk assessment?
A. Evaluate the risk
B. Identify the hazards
C. Review your findings
D. Update risk assessments

16. Which of these is most likely to cause an accident in a workplace?
A. Administration
B. Manual handling
C. Adequate lighting
D. Excessive noise

17. Which of these might be a concern of ergonomics?
A. Environmental noise
B. Indoor air quality
C. Fitting the job to the person
D. All of the above

18. Which of these best describes “the likelihood of an incident occurring”?
A. Risk
B. Hazard
C. An event
D. An episode

19. Which of the following methods have limited application in the removal of high oil concentration from most wastewater streams in the petroleum industry?

A. Heat treaters
B. Gas floatation
C. Filtration
D. Biological processes

20. What should you do if your PPE needs to be repaired?
    A. Share with a co-worker until yours can be fixed
    B. Carry on with your task; it won't matter if you don't use PPE this one time
    C. Take your PPE home to fix
    D. Tell your supervisor and get your PPE replaced

21. As a new worker, you have the right to be told about:
    A. The hazardous materials being used in your workplace
    B. Procedures for safely handling the chemicals
    C. The PPE you will need to wear
    D. All of the above

22. The toxicity of mercury is best described as
    A. How mercury enters the environment
    B. A measure of the harm mercury does to a person
    C. The persistent of mercury in the environment
    D. How much mercury a person experiences in a given time

23.
    he dosage of sulphur dioxide is best described as
    A. A measure of the harm sulphur dioxide does to a person.
    B. The amount of sulphur dioxide a person experience in a given time.
    C. The amount of sulphur dioxide absorbed by a person in a given time.
    D. The amount of sulphur dioxide entering the environment in a given time.

24. Which one of the following gases is not included in the category “greenhouse gases”?
    A. Methane
    B. Hydrogen
    C. Carbon dioxide
    D. Nitrous oxide

25. The use of microorganism metabolism to remove pollutants such as oil spills in the water bodies is known as:
    A. Biostimulation
    B. Bioremediation
    C. Bioaugmentation
    D. Bioreduction

**SECTION C** ***15 MARKS***

***Provide the answers to the following questions***

List the ***two (2)*** most effective ways of preventing fires and explosions at oil and gas facilities ***.2 marks***

1. Identify the following Symbols

***3 marks***

| SYMBOL | | |
|---|---|---|
|  |  |  |
| | | |

2. Injuries are caused by several factors. Categorise these factors into three.

***3 marks***

3. Wastes from drilling and production activities must be properly be treated before disposal. State the purpose of treating these wastes before disposal.

***3 marks***

*4.* State the objective of risk assessment.

***2 marks***

5. State ***two (2)*** common measures used to control ergonomic ill-health effects.

***2 marks***

**SECTION D** ***45 MARKS***

**QUESTION 1** **15 MARKS**

a. Give ***three reasons*** why a biological process is not a preferred option in the removal of both suspended and dissolved hydrocarbon.

***3 marks***

**b.** Onshore discharges of waste may include land spreading and land farming. Differentiate between land spreading and land farming.

***3 marks***

**c.** There are ***two (2)*** significant problems with land spreading and land farming that may limit their future applications. State these problems.

***2 marks***

d. State ***three (3***) limitations of using incineration to remove hydrocarbon from solid.

***3 marks***

e. The weathering of oil spill at the sea or marine involves several processes. Make a well labelled diagram only indicating the processes.

***4 marks***

**QUESTION 2**
**20 MARKS**

a. Explain the meaning of the following terms in relation to noise control:

***8 marks***

i. Silencing.
ii. Absorption.
iii. Damping.
iv. Isolation.

b. Identify possible routes of entry of biological organisms into the body.

***2 marks***

c. Outline ***three (3)*** control measures that could be used to reduce the risk of infection from biological organisms.

***3 marks***

d. In relation to Work-Related Upper Limb Disorders (WRULDs):

(i) Identify ***four (4)*** typical symptoms that might be experienced by affected individuals. ***4 marks***

(ii) Outline ***three (3***) factors that would increase the risk of developing WRULDs.

***3 marks***

**QUESTION 3** **20 MARKS**

a. Define the following terms; ***6 marks***
(i) Stress
(ii) Near miss
(iii) Incidence
(iv) Dangerous occurrence
(v) Lockout-tagout
(vi) Permit to Work (PTW)

b. Give ***three (3) major safety*** techniques (measures) that must be adopted to prevent the occurrence of well blowout. ***3 marks***

c. Discuss ***two (2)*** problems associated with in-situ burning of hydrocarbon. ***2 marks***

d. Give ***four (4)*** major areas of drilling fluid exposure to oilfield workers. ***2 marks***

e. The purpose of incident investigation is in two fold. State them. ***2 marks***

f. Enumerate the ***five*** steps to accidents investigation ***2.5 marks***

g. What is oil spill? Enumerate ***three (3)*** effects of oil spillage ***2.5 marks***

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