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UNIVERSITY OF RUHUNA  
FIRST EXAMINATION IN B.Sc GREEN TECHNOLOGY (PART I)

June – 2022

EN1102-Environmental Pollution Remediation and Toxicology

M.C.Q. Type

TIME: 30 Minutes

Index Number

**INSTRUCTIONS**

Answer all questions.

Mark your answers by placing "√" against the selected alternative among the five alternatives.

Only one answer should be marked in each question.

Only non-programmable calculators are permitted.

Mobile phones are not permitted.

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1. Select the INCORRECT statement
  - I. Environment supports for the wellbeing of the people
  - II. Environment is dynamic in nature
  - III. Environment provides appropriate conditions for life by interrelations of different component in environment
  - IV. Lithosphere, atmosphere, hydrosphere and biosphere are strongly interlinked
  - V. Environment does not include the components in biosphere
  
2. The INCORRECT statement would be,
  - i. Aquatic organisms (except anaerobic microbes) need dissolved oxygen and other gases to survive.
  - ii. Amount of gas dissolved in an aqueous solution increase when the atmospheric pressure and temperature increase.
  - iii. Dissolved oxygen sources are atmospheric re-aeration due to turbulence, ripples and waves, waterfalls, and photosynthesis by aquatic vegetation
  - iv. Dissolved oxygen sinks are decomposition of organic matter and respiration by microorganisms
  - v. More oxygen sinks lead to the higher degree of contamination
  
3. The list "I" and "II" show types of pollutants and names of pollutants, respectively. Select the correct answer that shows correct match of two lists.

**List I**

- A- Radioactive
- B- Biological
- C- Chemical
- D- Physical

**List II**

- 1- Bacteria, virus, fungi
- 2- Radon, Cobalt, Uranium
- 3- Silica, asbestos, organic particle
- 4- DDT, PCB, Cr

- i. A-3, B-2, C-1, D-4
- ii. A-3, B-4, C-1, D-2
- iii. A-2, B-1, C-4, D-3
- iv. A-3, B-4, C-2, D-1
- v. A-4, B-3, C-1, D-2

4. The CORRECT statement would be,
- Ground water is held under sub atmospheric pressure
  - The ground water content in an aquifer is greater than its porosity and bulk density
  - Hydraulic head measurements are not important for determining direction and magnitude of groundwater flow
  - Darcy's law can be used to describe the ground movement in the soil
  - Hydraulic conductivity is higher in clay soils than sandy soils
5. The CORRECT statement would be,
- Pollution potential of a contaminant is the ability of the chemical to contaminate the medium of interest.
  - Persistence contaminants are susceptible to the resistant to natural degradation.
  - Contaminants that readily move and persistent show lower pollution potentials.
  - Contaminants that are persistent and highly toxic are less health risk.
  - Harmful effects of a contaminant depend on the concentration of it in the environment.
6. Select the **correct** answer based on the given two statements
- Statement A:** Retardation factor determines the degree of movement of contaminant in the soil.
- Statement B:** Chemicals which have low retardation factors move in the soil faster.
- Both statements A and B are individually true and B is the correct explanation of A
  - Both statements A and B are individually true but B is not the correct explanation of A
  - Statement A is true and B is false
  - Statement B is true and A is false
  - Both two statements are false
7. Gravitational and pressure head of a well is 5 m and 12 m, respectively. Hydraulic head of the well is
- 7 m
  - 2.4 m
  - 60 m
  - 17 m
  - 7 m
8. The steps of restoration of polluted or degraded land in order are,
- Restoration goals, restoration objectives, conceptual plan, site assessment, site design and implementation
  - Restoration objectives, restoration goals, conceptual plan, site assessment, site design and implementation
  - Conceptual plan, site assessment, restoration objectives, restoration goals, site design and implementation
  - Conceptual plan, site assessment, restoration goals, restoration objectives, site design and implementation
  - Site assessment, conceptual plan, restoration objectives, restoration goals, site design and implementation

9. The study of adverse effects of chemicals on health and the conditions under which those effects occur are

- i. Bacteriology
- ii. Environmental study
- iii. Toxicology
- iv. Zoology
- v. Virology

10. The list "I" and "II" show agents and illness created by the agents, respectively. Select the correct answer that shows correct match of two lists.

**List I**

- A- Neurotoxins
- B- Teratogens
- C- Carcinogens
- D- Mutagens

**List II**

- 1- Substances that affect the DNA of developing fetus
- 2- Substances that make inheritable changes in DNA
- 3- Substances that trigger uncontrolled cell growth
- 4- Substances that are poisonous or destructive to nerve tissues

- i. A-3, B-1, C-2, D-4
- ii. A-3, B-4, C-1, D-2
- iii. A-2, B-3, C-4, D-1
- iv. A-4, B-2, C-1, D-3
- v. A-4, B-1, C-3, D-2

11. Fuels (mineral oil), chlorinated solvents, and polychlorinated biphenyls are named as

- i. Aqueous phase liquids
- ii. Volatile liquids
- iii. Non volatile liquids
- iv. Nonaqueous phase liquids
- v. Dissolved liquids

12. .... is not a transformation reaction

- i. Dispersion
- ii. Biodegradation
- iii. Hydrolysis
- iv. Oxidation
- v. Radioactive decay

13. The effect of sorption on transport and fate of a contaminant is explained by

- i. Dissolved factor
- ii. Transport factor
- iii. Henry's factor
- iv. Retardation factor
- v. Degradation factor

14. The fractions of contaminants in the soil gas phase under following conditions;  $\theta_w = 0.25$ ,  $\theta_g = 0.25$ ,  $\rho_b = 1.5 \text{ g/cm}^3$ ,  $K_d = 1 \text{ mL/g}$ ,  $C_w = 1 \text{ mL/g}$  and  $H = 1$  are
- 0.50
  - 1.00
  - 0.25
  - 0.75
  - 0.125
15. Select the correct answer based on the given statements.
- A -Toxic effects of a chemical are decided by exposure and dose.  
B -Dose is decided by the amount of particular chemical present in the medium and the amount of chemical containing medium consumed in a given period of time.  
C -Exposure concentration may differ from the dose owing to biochemical transformations in living organisms.
- Statement "A" and "B" are incorrect
  - Only statement "C" is incorrect
  - Only statements "B" and "C" are correct
  - All statements are incorrect
  - All statements are correct
16. A high volume sampler collected 0.09 g of suspended particulate matter by using filter paper with 68.  $\text{m}^3/\text{h}$  average flow rate for 24 hours. What is the SPM concentration in  $\mu\text{g}/\text{m}^3$
- 55
  - 39
  - 65
  - 50
  - 65
17. Chemiluminance method can be used to measure
- $\text{NO}_x$
  - $\text{SO}_2$
  - $\text{O}_3$
  - SPM
  - CO
18. What is the most correct statement about vehicular emissions?
- If the amount of fuel burnt at less than the required amount of air available for combustion, some unburned fuel will remain after combustion occurs.
  - Any carbon not oxidized in the cylinder of vehicular engine ends up as soot in the exhaust
  - Having enough  $\text{O}_2$  available for complete oxidation (combustion) some of the carbon in the fuel ends up as CO instead of  $\text{CO}_2$ .
  - The amount of CO and HC are NOT function of the relative air-fuel ratio
  - HC, CO and  $\text{CO}_2$  are air pollutants possible from vehicles with fuel cell technology.

cumulative sound level in dB s

- i. 111
- ii. 99
- iii. 104
- iv. 132
- v. 116

20. Catalytic converters are fitted into automobiles to reduce emission of harmful gases. Catalytic converters change un-burnt hydrocarbons into:

- i. Carbon dioxide and water
- ii. Carbon monoxide
- iii. Methane
- iv. Carbon dioxide and Methane
- v. Carbon dioxide and Hydrogen

21. What is the main objective to remove sulphur from petroleum products?

- i. To reduce the emission of sulphur dioxide in exhaust fumes
- ii. To increase efficiency of automobiles engines
- iii. To use sulphur removed from petroleum for commercial purposes
- iv. To increase the life span of silencers
- v. To increase the fuel economy of the engine.

22. What is the method for measuring SO<sub>2</sub> in ambient air?

- i. Chemiluminasence
- ii. UV pulse Fluorescent
- iii. UV absorption
- iv. NDIR
- v. High Volume Sampling

23. What cannot be considered as a criteria air pollutant out of the following?

- i. CO
- ii. NO<sub>2</sub>
- iii. O<sub>3</sub>
- iv. Pb
- v. CO<sub>2</sub>

24. What is not a favorable condition to support the temperature inversions?

- i. 25% or less cloud cover
- ii. Wet soil surface
- iii. Light and variable winds (especially below 3 mph)
- iv. Dry soil surface
- v. Low elevation areas such as valleys and basins

25. What is not considered as a major indoor air pollutant source?

- i. Chemical from cleaning products
- ii. Combustion gases from wood burning stoves
- iii. Animal hair
- iv. Cigarette smoke
- v. Chemical fumes from paints and solvents

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