

\*注意：請於答案卷上作答；本份試卷共四大部份，合計題數：38 題\*

I. 單選題：每題 2 分，24 題，共 48% (※注意：請於試卷上「選擇題作答區」依序作答。)

1. Which of the following process is related to the "glomerular filtration rate"? (A) skin absorption; (B) urinary excretion; (C) biliary excretion; (D) inhalation
2. Which of the following state of Chromium is generally considered as the most toxic? (A)  $\text{Cr}^{1+}$ ; (B)  $\text{Cr}^{3+}$ ; (C)  $\text{Cr}^{4+}$ ; (D)  $\text{Cr}^{6+}$
3. Which of the following air pollutants does not have an ambient standard in Taiwan yet? (A)  $\text{PM}_{2.5}$ ; (B) CO; (C)  $\text{SO}_2$ ; (D)  $\text{NO}_2$
4. Which of the following air pollutants is usually deemed as a product of photochemical reaction in atmosphere? (A) ozone; (B) VOCs; (C)  $\text{NO}_x$ ; (D)  $\text{SO}_x$
5. Temperature inversion usually refers to which of the following phenomenon? (A) a decrease in temperature with height; (B) an increase in temperature with height; (C) an increase in temperature with relative humidity; (D) temperature change is not related to height
6. Which of the following analytical technique is most suitable for measuring low-volatility organic compounds? (A) ICP-MS; (B) GC-MS; (C) LC-MS; (D) XRD
7. Which of the following size range is commonly used to define nanoparticles? (A)  $<100\text{nm}$ ; (B)  $<1000\text{nm}$ ; (C)  $<10\mu\text{m}$ ; (D)  $<100\mu\text{m}$ ;
8. Which of the following are not disinfection by-products? (A) trihalomethanes; (B) haloacetic acids; (C) bromate; (D) humic acids
9. Which is the most common exposure route for the Legionnaires' disease? (A) inhalation; (B) dermal absorption; (C) ingestion; (D) excretion
10. Which of the following radiation has wavelength covering both the ionization and non-ionization range? (A) x ray; (B) gamma ray; (C) UV; (D) IR
11. When gaseous chemicals in the atmosphere is removed by dissolving into rain droplets, this phenomenon is referred to: (A) settling; (B) impaction; (C) diffusion; (D) wet deposition
12. Which of the following statement is not correct regarding Clostridium botulinum? (A) requires air to grow; (B) produces a neurotoxin; (C) is commonly found in soil; (D) is a rod-shaped microorganism
13. Impingers are effective for the collection of particles in the 1- $\mu\text{m}$  to 20- $\mu\text{m}$  size range. Why aren't particles larger than 20- $\mu\text{m}$  in diameter collected effectively in an impinger? (A) Larger particles cannot follow the air streamlines into the relatively small impinger inlet; (B) Larger particles tend to clog the relatively small impinger jet; (C) Larger particles resist collection in the impinger liquid and pass through the device uncollected; (D) Larger particles cannot be detected in the microscope counting cell, because of the very small distance between the two glass surfaces of the cell
14. Which of the following filter types would be expected to present the greatest problems when collecting a dust sample from highly humid air? (A) Glass fiber filter; (B) Cellulose fiber filter; (C) Polycarbonate membrane filter; (D) Polyvinyl chloride membrane filter
15. Which statement best defines 'Anthropometry'? (A) Data gathering to identify the average size or shape of human limbs; (B) The measuring of various response times of muscle contraction; (C) The study of human size and shape data to aid in workspace design and the arrangement of tools and equipment; (D) Measuring male and female hand, arm, and leg lengths to better design sitting workstations
16. Which of the following is not used in vibration control? (A) Absorption; (B) Damping; (C) Isolation; (D) Enclosure

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17. A worker is gaining heat from radiation at a rate of 260 BTU/h when the air velocity at the worker's location is 300 ft/min. What is the rate of heat exchange by radiation if the air velocity is reduced to 80 ft/min? (A) 70 BTU/h; (B) 120 BTU/h; (C) 260 BTU/h; (D) 570 BTU/h

18. Which of the following respirator types would be the most difficult for someone to use while wearing contact lenses? (A) Half-mask air-purifying respirator; (B) Full facepiece air-purifying respirator; (C) Full facepiece powered air-purifying respirator; (D) Full facepiece airline respirator operated in the demand mode

19. In gas chromatography, the separation of sample components is determined primarily by what physical property of substances? (A) Number of carbon atoms; (B) Boiling point; (C) Heat of vaporization; (D) Ability to absorb UV

20. Since Phase II or conjugation reactions are biosynthetic, they \_\_\_\_\_. (A) Are quantitatively important; (B) Use cofactors; (C) Require energy; (D) Increase polarity

21. Inconsistencies may be observed between the information from air monitoring and biological monitoring due to: (A) Physiological makeup and health status of the worker; (B) Occupational exposure factors, such as the work rate, duration, skin exposure, work habits and the variable effectiveness of personal protective equipment; (C) Non-occupational exposure factors, such as community pollutants, diet, hobbies, smoking, alcohol and drug intake; (D) All of the above

22. During the testing of a newly-installed local exhaust ventilation system, you find that the air flow through all of the hoods is about 40% of the design values. What is the most likely cause of this (potential) disaster? (A) All of the ductwork was undersized during the design phase; (B) Poor construction and installation procedures by the HVAC contractor; (C) Reversed polarity on the fan motor, causing the centrifugal blower to rotate backwards; (D) Inadequate transport velocities in the horizontal runs of duct, causing dust to settle out and block the air flow

23. When determining if a gaseous mixture violates the combined TLV, which of the following assumptions is/are made? (A) Gases have similar densities; (B) Gases have similar reactivities; (C) Gases have similar toxic effects; (D) All of the above

24. Infrared (IR) radiation causes the greatest damage to the: (A) Iris; (B) Cornea; (C) Retina; (D) All equally

※下列各大題請於試卷上「非選擇題作答區」依序作答，並應註明作答之題號。

II. 填充題，每空格 3%，共 9% (請於答案卷上作答)

25. In risk assessment, the common four methods for hazard identification are: \_\_\_\_\_ (請於答案卷上作答) ; \_\_\_\_\_ (請於答案卷上作答) ; \_\_\_\_\_ (請於答案卷上作答) ; and human epidemiological study.

III. 簡答題，三題，共 23% (請於答案卷上作答)

26. Compared to personal monitoring, what are the advantages of using biomarkers for exposure assessment? (10%)

27. Please name three global environmental change processes that may impact human health. (7%).

28. What is third-hand smoke (THS)? How does THS occur in the environment? (6%)



IV 配合題：請自下列右方的選項中選擇最合適的答案；單選；選取兩個或以上者不給分。(每題 2 分，共 20%) (請於答案卷上作答)

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| 29) Rotameter                 | A) The wavelengths of the electromagnetic spectrum between $10^4$ cm and $10^5$ cm   |
|                               | B) Concentrations of airborne toxic materials weighted for a certain time duration   |
| 30) Temporary threshold shift | C) A disorder resulting from exposure to excess heat. It results from sweat suppression and increased storage of body heat           |
|                               | D) Caused by chlorinated naphthalenes and polyphenyls acting on sebaceous glands   |
| 31) Heat exhaustion           | E) The potential velocity exerted in all directions by a fluid at rest   |
|                               | F) A flow meter consisting of a precision-bored, tapered, transparent tube with a solid float inside                                 |
| 32) Action level              | G) The type of absorption unit used with a respirator for removal of low concentrations of specific vapors and gases                 |
|                               | H) The average concentration under which most people can work consistently for 8 hours a day, day after day, with no harmful effects |
| 33) Chemical cartridge        | I) The hearing loss suffered as the result of noise exposure   |
|                               | J) A term used by OSHA and NIOSH to express the level of toxicant that requires medical surveillance                                 |
| 34) Infrared radiation        | K) American Conference of Governmental Industrial Hygienists   |
|                               | L) Electromagnetic energy with wavelengths from 770 nm to 12,000 nm  |
| 35) Hypothermia               | M) Deposited anywhere in the human respiratory tract   |
|                               | N) A sample taken within a very short time period to determine the constituents at a specific time                                   |
| 36) Grab sample               | O) Deficiency in the hemoglobin and erythrocyte content of the blood   |
|                               | P) Intermixing of different substances to produce uniformity of concentration  |
| 37) Disintegration            | Q) A device to measure pressures near to atmospheric speed   |
|                               | R) A systemic effect of cold stress; condition of reduced body temperature   |
| 38) Chloracne                 | S) Threshold limit value   |
|                               | T) A condition usually caused by loss of body water because of exposure to excess heat   |
|                               | U) A disease of the lungs caused by inhalation of fine airborne fibers.  |
|                               | V) A nuclear transformation process that results in the release of energy in the form of radiation                                   |
|                               | W) Exposure to cold; vascular disease  |
|                               | X) A device for measuring air velocity   |