# THE UNIVERSITY OF THE WEST INDIES

**EXAMINATIONS OF:** **Semester II – 2012/2013**

**CODE AND NAME OF COURSE:** **FOUN 1210 – Science, Medicine and Technology in Society**

**DATE AND TIME:** **DURATION: 3 Hours**

## INSTRUCTIONS TO CANDIDATES:

**This paper has 12 Pages and 58 Questions.**

**This examination consists of three Sections: Part A Multiple Choice Questions, and Parts B and C, Essay Questions.**

**Answer ALL questions in Part A in the Multiple Choice answer section of the examination booklet.**

**Answer ONE (1) question from Section B AND ONE (1) question from section C.**

**Section A is worth FIFTY (50) marks and each question in Sections B and C has a value of TWENTY FIVE (25) marks.**

## SECTION A

1. Evidence suggests that the greenhouse gases are directly responsible for:

   a. an increase in UV radiation entering the atmosphere.
   b. an increase in the average global temperature.
   c. a decrease in the average global temperature.
   d. destruction of the ozone layer.

2. The key objective of the Kyoto protocol is to

   a. limit the emission of gases that produce acid rain.
   b. balance the level of carbon dioxide released naturally with that consumed naturally.
   c. establish global strategies for limiting the emissions of chlorofluorocarbons.
   d. establish global strategies for limiting the emissions of greenhouse gases.

3. Which of the following is NOT a greenhouse gas?

   a. Nitrogen
   b. Methane
   c. Carbon Dioxide
   d. Nitrous Oxide

4. The steps observation ⟶ pattern ⟶ hypothesis is typical of

   a. deductive reasoning.
   b. inductive reasoning.
   c. a hypothetico-deductive approach.
   d. a scientific law.

5. A scientist who follows the **W** is aware of a problem and goes about solving it by first researching and formulating a new hypothesis. She then does **X** which require careful **Y** and data collection. Finally she **Z** and comes to conclusions. Which order of steps below is correct for what W, X, Y and Z represent?

   a. W = inductive method; X = experiments; Y = analysis; Z = makes observations
   b. W = deductive method; X = data analysis; Y = experimentation; Z = makes observations
   c. W = hypothetico-deductive approach; X = experiments; Y = observation; Z = analyses the data
   d. W = a paradigm; X = data analysis; Y = induction; Z = experiments

6. What did Karl Popper argue was a key characteristic of a scientific theory?

   a. Revolutionary science
   b. Paradigm shifts
   c. Falsifiability
   d. Perfect mathematical logic

7. Who introduced the notions of "**paradigm shifts**" and "**extraordinary science**" into the discussion of how science progresses?

   a. Karl Popper
   b. Thomas Kuhn
   c. Charles Darwin
   d. Albert Einstein

8. What do scientists mean when they say that facts are "**theory-laden**"?

   a. Facts always remain the same.
   b. Scientific facts must be given meaning by scientists.
   c. Facts may change when the associated theories and their assumptions change.
   d. Facts are unchangeable pieces of knowledge.

9. The "Black Florence Nightingale" was a Caribbean doctress who traveled to Panama and worked during the Crimean War to deliver her unique brand of medical expertise. Her name was

   a. Mary Seacole.
   b. Cicely Williams.
   c. Nita Barrow.
   d. Laura Secord.

10. Who was William Harvey?

    a. A natural philosopher who discovered that blood circulates.
    b. A mathematician who proposed the heliocentric model.
    c. The inventor of the microscope.
    d. The father of microbiology.

11. Which of the following diseases is transmitted by a vector?

    a. Lou Gehrig's disease
    b. Dengue
    c. Skin cancer
    d. Leukaemia

12. Which of the following statements is correct?

    a. Antibiotics will cure bacterial infections but not viral infections.
    b. Antibiotics will cure viral infections but not bacterial infections.
    c. Antibiotics will cure all infections.
    d. Antibiotics are a form of placebo.

13. The number of chromosome sets in a normal human (non-reproductive) cell is called what number?

    a. Diploid
    b. Triploid
    c. Tetraploid
    d. Haploid

14. The division of cells to produce reproductive cells (gametes) is called

    a. Mitosis
    b. Stenosis
    c. Meiosis
    d. Narcosis

15. When females with sickle cell trait have children from males with sickle cell trait, what proportion of their children will have sickle cell disease?

    a. 0%
    b. 25%
    c. 50%
    d. 100%

16. What is the central concept in computer science?

    a. The internet
    b. TCP/IP
    c. HTML
    d. The algorithm

17. "Gilder's law" states that

    a. e-commerce transactions decreases cost.
    b. all technology will increase in price as it becomes more complex.
    c. the power of the computer doubles every eighteen months.
    d. the amount of bandwidth available globally triples every year.

18. In information technology, the translation of an algorithm into a program is known as

    a. mechanical realization.
    b. linguistic realization.
    c. computational logic.
    d. transmission control protocol.

19. Which hydrocarbon comes off at the top of a fractionating column?

    a. Tar
    b. Kerosene
    c. Methane
    d. Heating oil

20. Which of the following statements is correct?

    a. There is evidence that the average temperature of the world is rising.
    b. All scientists agree that the rise in the world's average temperature is caused by large amounts of Carbon Dioxide produced by human activity.
    c. All scientists agree that the rise in the world's average temperature is normal.
    d. There is NO evidence that the average temperature of the world is rising.

21. A GMO differs from a hybrid produced by cross-breeding in all of the following ways EXCEPT it

    a. contains the genes from a different species.
    b. is produced artificially.
    c. is patented.
    d. looks the same.

22. Genes are found within the nuclei of cells and

    a. are a set of genetic instructions which define the characteristics of an organism.
    b. are the precursors of vitamins.
    c. are NOT found in gametes.
    d. separate from chromosomes during cell division.

23. The smallest units of compounds are

    a. subatomic particles.
    b. molecules.
    c. hydrogen and oxygen.
    d. vibrating strings.

24. Male and female gametes fuse to form a

    a. Stem cells
    b. Mitosis
    c. New virus
    d. Zygote

25. Darwin's theory of evolution says that

    a. humans descended from monkeys.
    b. humans and primates have a common ancestor.
    c. we should be able to see monkeys becoming human during our life time.
    d. the universe started with a Big Bang.

26. Atoms form bonds using their

    a. outer shells.
    b. protons.
    c. nuclei.
    d. neutrons.

27. The time allowed for HIV to develop into AIDS is called the

a. infection cycle.
b. incubation period.
c. response rate.
d. immune health index.

28. Photovoltaic cells are typically made of silicon which is

a. a semi-conductor.
b. an energy producing compound.
c. an energy storage compound.
d. a plant chemical that absorbs sunlight.

29. Dr. Cicely Williams found that Ghananian children were particularly prone to

a. leukemia.
b. energy-protein malnutrition (EPM).
c. iron deficiency.
d. Iodine deficiency.

30. OTEC is a source of energy that

a. is distilled from crude oil.
b. originates with the sun.
c. is harnessed from ocean tides.
d. utilizes the difference in the temperature of the water at the surface of the ocean and the water about 1000 metres deep.

31. The technique by which genes from one organism can be inserted into the chromosomes of another organism of the same or different species is termed

a. Gene Therapy.
b. DNA profiling.
c. In vitro fertilization.
d. Genetic Engineering.

32. Hundreds of new plants can be produced by stimulating very small portions of an original parent plant through the biotechnological technique known as

a. Cloning.
b. Hybridization.
c. Genetic modification.
d. Tissue Culture.

33. Herman's female offspring are less likely to get mastitis because he is a

a. transgenic mouse.
b. transgenic bull.
c. cloned sheep.
d. hybrid human male.

34. Meiosis differs from mitosis. This is because

a. meiosis reduces the number of chromosomes by half while mitosis does not.
b. meiosis produces identical copies of cells while mitosis does not.
c. meiosis occurs in every cell while mitosis only occurs in gametes.
d. meiosis only occurs in females.

35. Scientists who practice EXTRAORDINARY science

a. always function within the established paradigm.
b. are able to control all of the possible environmental variables.
c. do not subscribe to the normal set of fundamental assumptions.
d. are not often ridiculed.

36. Galileo Galilei's work was experimental because he

a. had an hypothesis.
b. made predictions.
c. constructed artificial environments to minimize or ignore some variables.
d. interrupted the flow of nature.

37. Von Humboldt, Snider-Pellegrini and Alfred Wegener all contributed to the paradigm shift of

a. continental drift.
b. phlogiston.
c. heliocentrism.
d. space-time curvature.

38. Solar panels that produce electricity are made of

a. silicon.
b. copper pipes.
c. spinning generators.
d. large metal sheets painted black.

39. In Type I diabetes

a. normal levels of insulin may be secreted but the cells that should, do not respond.
b. insulin-producing cells in the pancreas have been destroyed.
c. the blood glucose level is always low.
d. food is not digested properly.

40. One reason why aluminium is NOT produced from alumina during the process of refining bauxite ore in Jamaica and Guyana is the

a. complex nature of this final step.
b. radioactive nature of alumina.
c. high cost of electrolysis.
d. environmental hazard of red earth.

41. What distinguishes science from other cognitive practices?

a. Experiment and observation
b. Insightful theories
c. Careful research
d. Peer-reviewed findings

42. Why are very high fevers dangerous?

a. The body loses too much water.
b. The DNA breaks down.
c. Enzymes are destroyed and function less effectively.
d. Fatty tissue melts.

43. Hypertension and diabetes are

a. treatable using antibiotics.
b. communicable diseases.
c. caused by viruses.
d. chronic non-communicable diseases.

44. Which of the following presents a major problem in tracking Bovine Spongiform Encephalopathy?

a. The causal agent is unknown.
b. Many years elapse between exposure and the development of symptoms.
c. Cattle will not display any symptoms.
d. It is not passed to humans in any form.

45. The dominant alleles of chromosome 4 bears the mutation responsible for

a. Huntington's disease
b. Cystic Fibrosis
c. Sickle Cell Anaemia
d. Down's Syndrome

46. The 23$^{rd}$ pair of human chromosomes determines

a. sex.
b. gender.
c. intelligence.
d. eye colour.

47. It is understood academically that a model in science:

I) Represents a real mechanism or process.
II) Is a perfect replica of reality.
III) Allows for visualisation and aids our imagination.

a. I only.
b. II only
c. I and III only
d. I, II and III

48. A rise in temperature of the ocean

a. causes glaciers to melt more rapidly.
b. bleaches coral reefs.
c. makes it a less effective carbon sinks.
d. All of the above.

49. A rise in crude oil prices will lead to which of the following?

a. A fall in prices throughout the economy.
b. A reduction of investment into research for alternative energy.
c. A reduction of export revenues among OPEC countries.
d. An increase in costs across the economy.

50. Nuclear energy is released when: (i) the nuclei of atoms are split; (ii) the bonds holding the protons and the neutrons in the atom's nucleus are broken; (iii) there is a reaction between hydrocarbons and oxygen; (iv) energy emanates from the interior of the earth. Which of the following is/are correct?

a. (i), (ii), (iii) and (iv)
b. (i) and (ii) only
c. (i), (ii) and (iii) only
d. (iii) and (iv) only

**END OF SECTION A**

## SECTION B

**Answer ONE (1) question ONLY. Each question is worth twenty five (25) marks.**

B.1. Explain scientifically the "green house effect" as the cause of global warming. Discuss the social and economic consequences of climate change in the Caribbean.

B.2. "Science is not absolutely objective. It therefore progresses through paradigm shifts." Discuss the above statement while making reference to the scientific method, induction, deduction, observation and paradigm shifts.

B.3. Discuss ancient and modern science, medicine and technology and their interplay.

B.4. Using your knowledge of food and resource security, biotechnology and health and nutrition, write an essay titled "The Science of Food in the Caribbean".

**END OF SECTION B**

## SECTION C

**Answer ONE (1) question ONLY. Each question is worth twenty five (25) marks.**

C.1. Write an essay on the ethics of science, medicine and technology mentioning some of the following and any other examples you: modification of the genetic make-up of a foetus to avoid a genetic disease or to have "desirable physical features"; eugenics; fogging with an insecticide to eliminate a disease-carrying insect; the 'morning after" contraceptive pill; genetically modified foods with sterile seeds; use of stem cells derived from unused embryos to cure a genetic disease; and genetic examination before being granted a job, life insurance or a license to marry.

C.2. Write an essay on the overall health status of the Caribbean with respect to sexually transmitted diseases and touch on prospects for their management in the future.

C.3. Write an essay to your government explaining the nature of energy while describing its critical role in Caribbean industrial development and the possibilities for conservation and the use of more accessible and cheaper alternative sources.

C.4. What might be the implication of creating global communities via the Internet? Consider both the positive and negative aspects of, for example, political interest groups, criminal/terrorist activity, privacy issues, interpersonal relations, nationhood, neighbourhood cohesion, and social networking.

**END OF PAPER**