



THE UNIVERSITY OF THE WEST INDIES

EXAMINATIONS OF: Summer – 2014/2015

**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. 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 do not display any symptoms.
 - d. Countries do not share information.

2. 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.

3. William Harvey's approach is said to be innovative and experimental because he
 - a. interrupted the normal flow of nature in living organisms to observe the results.
 - b. used instruments.
 - c. used mathematics.
 - d. speculated on reality by using existing theories.

4. How is modern genetic engineering different from older methods in biotechnology?
 - a. It operates at the molecular level.
 - b. It operates at the cellular level.
 - c. It operates at the level of the whole organism.
 - d. It is safer.

5. 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.

6. In genetic engineering, what do geneticists use to cut long strands of DNA into shorter pieces?
- Sulphuric acid
 - Fine-beam lasers
 - Micro-scalpels
 - Enzymes
7. Meiosis
- reduces the number of chromosomes by half.
 - produces identical copies of cells.
 - occurs in every cell.
 - only occurs in females.
8. *Escherichia coli* that are modified with human genes are called
- stem cells.
 - retroviruses.
 - transgenic organisms.
 - cloning.
9. When an antigen invades the body, protection is provided by the immune system when
- red blood cells produce antibodies.
 - all white cells attack the foreign substance.
 - B cells produce antibodies.
 - thrombocytes clot around the foreign body.
10. Which of the following is NOT true of petroleum based fuels?
- They are currently more accessible than alternative sources of energy.
 - Their energy originated with the sun.
 - They are renewable.
 - They are distilled from Crude Oil.

11. The key objective of the Kyoto protocol is to
- limit the emission of gases that produce acid rain.
 - balance the level of carbon dioxide released naturally with that consumed naturally.
 - establish global strategies for limiting the emission of chlorofluorocarbons.
 - establish global strategies for limiting the emission of greenhouse gases.
12. Which of the following is NOT a greenhouse gas?
- Nitrogen
 - Methane
 - Carbon Dioxide
 - Nitrous Oxide
13. There is evidence that the average temperature of the world is increasing slowly. This statement is:
- True during the summer and false during the winter.
 - Being debated.
 - False.
 - True.
14. Evidence suggests that greenhouse gases are directly responsible for
- an increase in UV radiation entering the atmosphere.
 - an increase in the average global temperature.
 - a decrease in the average global temperature.
 - destruction of the ozone layer.
15. The process of arriving at a specific scientific conclusion through simple rules of logic that start with a general premise is known as
- paradigm shifts.
 - induction.
 - hypothetico-deduction.
 - deduction.

16. The occurrence of paradigm shifts suggests that the scientific method is NOT
- completely honest.
 - completely objective.
 - very careful.
 - productive.
17. Which of the following conditions must the inductive process fulfill in order for a general scientific law to be legitimate?
- The number of observations leading to the generalization must be large.
 - The observations must be repeated under a wide variety of conditions.
 - The syllogism must be valid.
 - The major premise must be sound.
 - No observation should conflict with the derived universal law.
- I and IV only
 - I, II, and V only
 - I, III and V only.
 - II, III, IV only.
18. Scientists who practice NORMAL science
- always function within the established paradigm.
 - are able to control all of the possible environmental variables.
 - do not subscribe to the normal set of fundamental assumptions.
 - are often NOT immediately embraced by the scientific community.
19. A shift from one set of fundamental assumptions to another set of fundamental assumptions is called
- falsification.
 - theory-ladenness.
 - hypothesis formulation.
 - a paradigm shift.

20. 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?
- W = inductive method; X = experiments; Y = analysis; Z = makes observations
 - W = deductive method; X = data analysis; Y = experimentation; Z = makes observations
 - W = hypothetico-deductive approach; X = experiments; Y = observation; Z = analyses the data
 - W = a paradigm; X = data analysis; Y = induction; Z = experiments
21. In science, facts are based on evidence but are always
- mere guesses.
 - theory-laden.
 - unchanging laws.
 - changing arbitrarily.
22. Litmus paper is used to
- test the acidity and alkalinity of liquids.
 - test for lithium.
 - check for the truth value of a theory.
 - determine the presence of lipids.
23. The theory of evolution was explained in Charles Darwin's book published in 1859 and titled
- Evolution versus Creationism.*
 - The Origin of Species.*
 - The Origin of Man.*
 - The Origin of the Big Bang.*
24. Darwin's theory of evolution states that
- humans descended from monkeys.
 - humans and primates have a common ancestor.
 - we should be able to see monkeys becoming human during our life time.
 - the universe started with a Big Bang.

25. The knowledge that oxygen is responsible for the reactions referred to as combustion and its subsequent displacing of phlogiston theory is an example of
- normal science.
 - a paradigm shift.
 - incompetent scientists.
 - inductive progress.
26. The smallest units of compounds are
- enzymes.
 - molecules.
 - hydrogen and oxygen.
 - atoms.
27. Diamond is hard and expensive while coal is soft and cheap yet they are both
- easily dissolved in a solution of acid.
 - easily manufactured.
 - found in volcanoes.
 - made of carbon atoms in different configurations.
28. Individual cells were first seen in 1655 by
- Albert Einstein.
 - Thomas Kuhn.
 - Robert Hooke.
 - Antoine Lavoisier.
29. Atoms form bonds using their
- outer shells.
 - protons.
 - nuclei.
 - neutrons.
30. Which of the following diseases is transmitted by a vector?
- Lou Gehrig's disease
 - Dengue
 - Skin cancer
 - Leukaemia

31. 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.
32. The internet grew out of a project originally sponsored by
- a. IBM.
 - b. Microsoft.
 - c. The United Nations.
 - d. The US Department of Defense.
33. TCP/IP is the acronym for
- a. Technical Computer Process/ Internet Peripherals.
 - b. Total Compression Protocol/Interface Process.
 - c. Transmission Control Protocol/Internet Protocol.
 - d. Type C Peripheral or Interconnection Point.
34. An algorithm is a
- a. series of unambiguous executable steps to perform a task in a finite amount of time.
 - b. type of internet search engine.
 - c. programming language.
 - d. digital music channel.
35. E-commerce has the potential to “level the playing field” so that Caribbean countries can compete with larger more developed nations but they must first solve the problem/s of:
- a. Access to the internet and finding ways to penetrate markets.
 - b. The infrastructure of financial institutions to handle the e-commerce transactions.
 - c. Intellectual Property rights.
 - d. All of the above.

36. What is the central concept in computer science?
- The internet
 - TCP/IP
 - HTML
 - The algorithm
37. Oil was discovered in Trinidad and Tobago in
- 1866.
 - 1966.
 - 1838.
 - 1796.
38. Which hydrocarbon comes off at the top of a fractionating column?
- Tar
 - Kerosene
 - Methane
 - Heating oil
39. What is removed at the bottom when the complex mixtures of hydrocarbons in crude oil are separated through fractional distillation?
- Pitch and tar
 - Gas
 - Gasoline
 - Kerosene
40. Solar panels that produce hot water are made of
- silicon based panels.
 - copper pipes and large sheets of metal painted black.
 - heat-producing, spinning generators.
 - chemical catalysts activated by sunlight.
41. Normal blood sugar levels range between:
- 50 and 60 milligrams per decilitre.
 - 90 and 210 milligrams per decilitre.
 - 70 and 110 milligrams per decilitre.
 - 10 and 50 milligrams per decilitre.

42. The normal figures for blood pressure range between
- 120/80 mmHg and 130/85 mmHg
 - 80/20 mmHg and 100/60 mmHg
 - 160/120 mmHg and 200/150 mmHg
 - 80/120 mmHg and 100/130 mmHg
43. In gender theory, sex and gender are determined by
- genetics alone.
 - socialization and biology respectively.
 - parental lifestyles alone.
 - biology and socialization respectively.
44. The prevalence of women in science has historically been hindered by
- their lack of interest in scientific discovery.
 - the natural ability of men to more easily master scientific concepts.
 - the fact that women are not good at mathematics.
 - personal, structural and institutional bias.
45. The number of people contracting any disease within a given period in a population is measured by its
- virulence.
 - incubation period.
 - incidence.
 - prevalence.
46. What is the name of the chromosome which determines that a human will be male?
- Y chromosome
 - XY genotype
 - AB blood type
 - X chromosome

47. The dominant alleles of chromosome 4 bears the mutation responsible for
- Huntington's disease
 - Cystic Fibrosis
 - Sickle Cell Anaemia
 - Down's Syndrome
48. The price of crude oil is controlled largely by
- OPEC.
 - The USA.
 - The United Nations.
 - China.
49. Who or what are Hiroshima and Nagasaki?
- Japanese scientists who won the Nobel Prize.
 - Japanese cities destroyed by atomic bombs.
 - Japanese cities that generate energy using nuclear power plants.
 - Genetically modified viruses produced in Japan.
50. At fertilization, male and female gametes fuse to produce first
- a chromosome.
 - a foetus.
 - an embryo.
 - a zygote.

END OF SECTION A

SECTION B

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

- B.1. Describe “mad cow” and “foot and mouth” disease and discuss why they are of concern to the Caribbean.
- B.2. Review the strengths and weaknesses of induction, deduction and the hypothetico-deductive method and explain their role in the progress of science.
- B.3. Explain the difference between science, medicine and technology and discuss their interplay.
- B.4. Write an essay entitled “Gender and science.”

END OF SECTION B

SECTION C

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

- C.1. What are the benefits of modern biotechnology?
- C.2. How does inheritance work? Discuss three diseases that can occur when the mechanism of inheritance goes wrong.
- C.3. Select two major industries in the Caribbean and discuss their energy consumption and production while noting any social and economic impacts and the role of OPEC.
- C.4. Write an essay exploring the ethical issues that arise within Information and Communications Technology and Biotechnology.

END OF PAPER