EXAMINATIONS OF: Semester II – 2011/2012

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. Who or what are Hiroshima and Nagasaki?
   a. Japanese scientists who won the Nobel Prize.
   b. Japanese cities destroyed by atomic bombs.
   c. Japanese cities that generate energy using nuclear power plants.
   d. Genetically modified viruses.

2. Which of the following is partly responsible for shifts from NORMAL science to REVOLUTIONARY science?
   a. Incompetent scientists
   b. More knowledgeable young scientists
   c. Theory-laden facts and observations
   d. Imperfect mathematical logic

3. The outer atomic shells bond different types of atoms in various combinations to form which of the following?
   a. Elements
   b. Protons
   c. Neutrons
   d. Molecules

4. In relation to water security in the Caribbean which of the following statements is/are correct?
   I) The quantity of water may not be of immediate concern in the Caribbean but water quality should be.
   II) Most Caribbean nations are water-scarce.
   III) No Caribbean country depends on water desalination or imports water.
   a. I only.
   b. II and III only.
   c. I and IV only.
   d. I, II and III.
5. Energy stored in a chemical substance is
   a. potential energy
   b. thermal energy
   c. kinetic energy
   d. light energy

6. Foot and mouth disease
   a. is always fatal.
   b. severely reduces milk and meat production.
   c. causes the brain to develop holes like a sponge.
   d. is easily passed to humans.

7. Fractional distillation separates hydrocarbons according to their
   a. purity.
   b. usefulness.
   c. molecular size.
   d. water content.

8. Which of the following is NOT a possible long-term impact of global warming?
   a. Increased desertification
   b. Melting glaciers causing a rise in sea levels
   c. Loss of coral reefs
   d. Tsunamis caused by earthquakes

9. Solar panels that produce electricity are made of
   a. silicon.
   b. copper pipes.
   c. spinning generators.
   d. large metal sheets painted black.

10. 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.
11. Fertilization occurs when gametes merge to produce
   a. a foetus.
   b. a zygote.
   c. an embryo.
   d. spermatozoa.

12. Who promoted the idea that it was important to test scientific theories by conducting experiments with the aim of showing that they are false?
   a. William Harvey
   b. Isaac Newton
   c. Galileo Galilei
   d. Karl Popper

13. What is the process whereby genes from one organism are inserted into the chromosomes of another organism of the same or different species?
   a. Cloning
   b. In vitro fertilization
   c. Gene therapy
   d. Genetic engineering

14. Deductive reasoning is logically valid and safe but induction
   a. is a better scientific approach.
   b. opens new horizons.
   c. always produces better predictions.
   d. is more cost-efficient.

15. What is the process used to obtain aluminium from alumina?
   a. Fractional distillation
   b. Electrolysis
   c. Precipitation
   d. Crystallization
16. Warm oceans fuel hurricanes which can be therefore be thought of as
   a. heat engines.
   b. light engines.
   c. kinetic engines.
   d. sound engines.

17. People with a BMI greater than 30 are defined as
   a. pre-obese.
   b. malnourished.
   c. obese.
   d. iron deficient.

18. Induction leads to universal scientific laws through a process that
   a. is rational and follows rules of logic.
   b. preserves the truth.
   c. is completely objective.
   d. is based on the repetition of specific observations.

19. 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.

20. When scientists understand the basic science of a phenomenon or illness then
   a. useful technology or medical cures ALWAYS immediately follow.
   b. all debates about the science are settled forever.
   c. it ALWAYS results in a paradigm shift.
   d. useful technology or cures do NOT ALWAYS immediately follow.

21. What distinguishes science from other cognitive practices?
   a. Experiment and observation
   b. Insightful theories
   c. Careful research
   d. Peer-reviewed findings
22. 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.

23. Power is
   a. equivalent to work.
   b. equivalent to energy.
   c. measured in joules.
   d. the rate of doing work.

24. Most Caribbean countries have
   a. energy and water security but not food security.
   b. food and water security but not energy security.
   c. energy security but not food and water security.
   d. water security but not food and energy security.

25. What type of chemical reaction releases energy from hydrocarbons?
   a. Endothermic
   b. Combustion
   c. Neutralization
   d. Esterification

26. 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.

27. The price of crude oil is controlled largely by
   a. China
   b. The USA
   c. The United Nations
   d. OPEC
28. The dominant alleles of chromosome 4 bear the mutation responsible for
   a. Huntington's disease
   b. Cystic Fibrosis
   c. Sickle Cell Anaemia
   d. Down's Syndrome

29. Scientists who practice NORMAL science within a particular paradigm
   a. always produce the expected results.
   b. are able to control all of the possible environmental variables.
   c. all subscribe to the same set of fundamental assumptions.
   d. are often ridiculed.

30. The first commercially grown genetically modified food to be sanctioned by the USA's Food and Drug Administration is
   a. rot resistant "Flavr Savr" tomato.
   b. virus resistant papaya.
   c. pesticide resistant sugar cane.
   d. sweet corn that produces its own insecticide.

31. The "scientific method" is understood by most people to be
   a. the hypothetico-inductive method.
   b. the syllogism.
   c. the hypothetico-deductive method.
   d. falsification.

32. 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.

33. Hypertension and diabetes are
   a. treatable using antibiotics.
   b. communicable diseases.
   c. caused by viruses.
   d. chronic non-communicable diseases.
34. Scientific knowledge is considered “proven knowledge” by most people because
   a. its method is believed to be objective and reliable.
   b. science is inherently logical.
   c. empirical evidence based on observation is always interpreted truthfully.
   d. the mathematics behind science is rigorous.

35. \( E = mc^2 \) was derived by
   a. Karl Popper.
   b. Thomas Kuhn
   c. Albert Einstein.
   d. Isaac Newton

36. The 23rd pair of human chromosomes determines
   a. sex.
   b. gender.
   c. intelligence.
   d. eye colour.

37. It can be said that
   a. science controls the environment while technology explains.
   b. science always comes before technology.
   c. technology always comes before science.
   d. science explains while technology controls the environments.

38. 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
39. Which of the following statements is correct?
   a. Antibiotics will cure viral infections but not bacterial infections.
   b. Antibiotics will cure all infections.
   c. Antibiotics work as a placebo.
   d. Antibiotics will cure bacterial infections but not viral infections.

40. 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.

41. Which of the following is an example of a wireless connection?
   a. Bluetooth
   b. Cable Modem
   c. Web browser
   d. A computer server

42. What is ASCII?
   a. An American Standard for representing every word and image as discrete “on” and “off” states symbolized by ones and zeros.
   b. A method for assessing the amount of RAM available.
   d. One of the categories of computers.

43. What is E-commerce?
   a. The business of identity theft.
   b. The commerce associated with the energy trade.
   c. Use of electronic communications to do business.
   d. Spam.

44. Which of the following is ethical?
   a. Sterilizing people of low intelligence.
   b. Producing GMOs whose seeds are sterile.
   c. Modifying stem cells from a patient to cure their genetic disease.
   d. Patenting a natural product used by native peoples from time immemorial.
45. Which of the following was an unfortunate consequence of Darwin's theory?
   a. Eugenics
   b. Genetics
   c. Lamarckianism
   d. Paleontology

46. Evidence suggests that greenhouse gases are directly responsible for:
   a. Destruction of the ozone layer.
   b. An increase in the average global temperature.
   c. A decrease in the average global temperature.
   d. An increase in the UV radiation entering the atmosphere.

47. What is the name of the chromosome which determines that a human will be male?
   a. Y chromosome
   b. XY genotype
   c. AB blood type
   d. X chromosome

48. The "Black Florence Nightingale" was a Caribbean doctoress who travelled to Panama and worked during the Crimean War to deliver her unique brand of medical expertise. Who was she?
   a. Nita Barrow
   b. Mary Seacole
   c. Cicely Williams
   d. Mary Prince

49. The method used to detect genetic abnormalities in a human foetus is called
   a. hybridomas.
   b. stem cell therapy.
   c. amniocentesis.
   d. DNA profiling.
50. Which of the following conditions must the inductive process fulfill in order for a general scientific law to be legitimate?

I. The number of observations must be large.
II. The observations must be repeated under a wide variety of conditions.
III. The syllogism must be valid.
IV. The major premise must be sound.
V. No observation should conflict with the derived universal law.

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

END OF SECTION A
SECTION B

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

B.1. Thomas Kuhn defines Paradigms as "Universally recognized scientific achievements that for a time provide model problems and solutions to a community of practitioners". By citing examples, outline and assess Thomas Kuhn’s arguments on Paradigms, Paradigm Shifts and Scientific Revolutions and their influence on the development of modern science.

B.2. Explain the difference between "sex" and "gender." Naming two Nobel Prize winning female scientists, explain the social and structural challenges that women doing science generally encounter.

B.3. Discuss and assess the impact of global warming on resource security in the Caribbean. By providing specific examples, explain which resources need to be secured and by what means.

B.4. Write an essay on the reputed authority and objectivity of science. Name, explain and review the strengths and weaknesses of the scientific method.

END OF SECTION B

SECTION C

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

C.1. What do you understand by the term biotechnology? Discuss its history, benefits and dangers.

C.2. Write an essay on ethics in science, medicine and technology.

C.3. Critically assess and evaluate the problems of a future reliable energy supply for the Caribbean. Discuss how Caribbean leaders can implement or develop solutions for problems. Defend your answer.

C.4. Identify two non-communicable diseases commonly found in the Caribbean. Discuss their medical causes and the impact that they have on society. What steps should be taken to reduce their incidence?

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