



**FINAL ASSESSMENT/EXAMINATION NOVEMBER-DECEMBER 2015**

**Course Code and Title:** SCIE 4001 – EARTH AND LIFE SCIENCES II  
**Programme:** Bachelor of Education.  
**Date:** [Date]                      **Time:** [Start Time] - [End Time]                      **Duration:** 3 hours

**PLEASE READ ALL INSTRUCTIONS CAREFULLY BEFORE YOU BEGIN THIS EXAMINATION**

**Instructions to Candidates**

- 1. This paper has ten (10) pages with FOUR (4) sections A, B, C and D and a multiple choice answer sheet.**
- 2. Section A consists of twenty-five (25) questions. You are required to detach and answer this section on the Multiple Answer Sheet provided on page 10.**
- 3. Section B, C and D consists of TWO (2) questions each. You are required to answer ONLY ONE question from EACH of these sections in your answer booklet.**
- 4. You must return the MULTIPLE CHOICE ANSWER SHEET along with your answer booklet and other writing paper to the Invigilator at the end of the examination.**
- 5. The question paper does NOT have to be returned.**

**Key Examination Protocol**

1. Students please note that academic dishonesty (or cheating) includes but is not limited to plagiarism, collusion, falsification, replication, taking unauthorised notes or devices into an examination, obtaining an unauthorised copy of the examination paper, communicating or trying to communicate with another candidate during the examination, and being a party to impersonation in relation to an examination.
2. The above mentioned and any other actions which compromise the integrity of the academic evaluation process will be fully investigated and addressed in accordance with UTT's academic regulations.
3. Please be reminded that speaking without the Invigilator's permission is **NOT** allowed.

SECTION A (25 marks)  
MULTIPLE CHOICE QUESTIONS

*This Section contains twenty five (25) multiple choice questions. You are required to answer all the questions on the answer sheet provided. You must indicate ONLY ONE (1) response per question by shading the appropriate letter on the answer sheet. Changes to your response must be made by placing a large X through the answer to be changed and initialling next to the changed response.*

1. A wet shirt is put on a clothesline to dry on a sunny day. The shirt dries because water molecules
  - A. gain heat energy and condense
  - B. gain heat energy and evaporate
  - C. lose heat energy and condense
  - D. lose heat energy and evaporate
  
2. When an acid is added to a base it produces a
  - A. salt only
  - B. salt and water only
  - C. salt and gas only
  - D. gas and water only
  
3. All of the following statements are correct except
  - A. liquids of lower densities float in liquids of higher densities
  - B. the density of a substance is its mass per unit volume
  - C. substances become denser when they are hotter
  - D. the mass of a substance cannot be changed by the location and shape of the substance
  
4. When the temperature of a liquid is decreased, the particles slow down, the attractive forces between them become stronger and stronger until their positions become fixed. This change in the arrangement and motion of particles is referred to as
  - A. melting
  - B. freezing
  - C. condensing
  - D. boiling
  
5. A mixture contains particles of solids suspended in a small volume of liquid. Heating will decompose the solid. What process is most effective for separating the particles in this suspension?
  - A. Evaporation
  - B. Heating
  - C. Freezing
  - D. Filtration

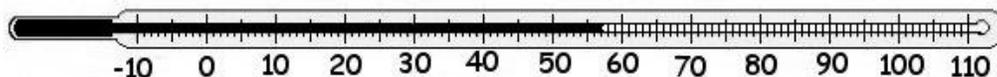


Fig. 1

6. What is the range of the thermometer in fig. 1?
- 57 degrees Celsius
  - 0 degrees Celsius to 110 degrees Celsius
  - 10 degrees Celsius to 110 degrees Celsius
  - 110 degrees Celsius
7. The reading of the thermometer in fig. 1 will drop most if the bulb is
- exposed to sunlight
  - exposed to steam
  - placed in tap water
  - placed in ice water
8. Temporary hardness of water can be removed by
- filtering
  - boiling
  - addition of aluminum
  - addition of scum
9. Which class of elements best conducts electricity?
- Metals
  - Non metals
  - Semi metals
  - Noble (inert) gas

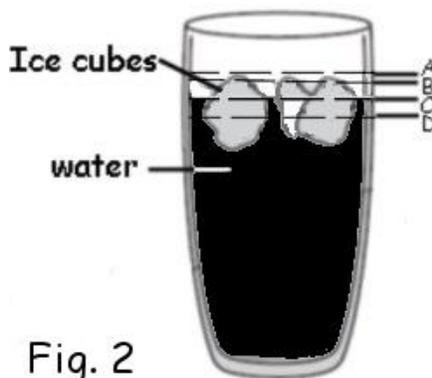


Fig. 2

10. When the ice cubes in Fig 5 are completely melted, the water level in the glass will
- increase to A
  - increase to B
  - remain at C
  - decrease to D
11. Which one of the following statements best describes the particles in a gas? They

- A. are moving very fast and are far apart
  - B. are very close together and are able to vibrate and rotate
  - C. are moving very slow and are far apart
  - D. are stationary and able to vibrate and rotate
12. Which one of the following is NOT a property of solids?
- A. Definite shape
  - B. Definite volume
  - C. Incompressible
  - D. Flow
13. As the gas in a rigid sealed container is heated, its
- A. pressure increases
  - B. temperature decreases
  - C. pressure decreases
  - D. volume decreases
14. Which of the following is NOT a physical property of a material?
- A. Color when viewed
  - B. Burn when heated
  - C. Odor when smelt
  - D. Texture when felt
15. A teacher sweeps the floor near the grinding machine to collect iron filings in the metalwork shop. How does she separate iron filings from the 'dirt'?
- A. Sieving with a fine wire mesh
  - B. Hand picking the filings
  - C. Evaporating to dryness
  - D. Using a strong magnet
16. Which of the following is an example of a homogeneous mixture?
- A. Compound
  - B. Colloid
  - C. Suspension
  - D. Solution
17. According to the scientific definition of work, pushing on a rock accomplishes no work unless there is
- A. an applied force greater than its weight
  - B. a net force greater than zero
  - C. an opposing force
  - D. movement in the same direction as the force
18. Mary-Ann records the length, tension and thickness of a rubber band and the pitch of the sound when plucked in an investigation of how its length affects the pitch of the sound. The manipulated variable is

- A. thickness of the rubber band
  - B. tension on the rubber band
  - C. length of the rubber band
  - D. pitch of the sound
19. Most energy comes from the sun and leaves the earth in the form of
- A. sound energy
  - B. gravitational potential energy
  - C. electromagnetic energy
  - D. mechanical kinetic energy
20. A student lowers one end of his pencil in a glass of water and to his amazement he observes that it looks bent. Which statement below best explains the behaviour of light waves that accounts for the student's observation?
- A. Some materials absorb light waves of certain frequencies.
  - B. Some materials reflect some of the waves and absorb some.
  - C. Light waves change direction when they meet a new medium.
  - D. Light waves are emitted by some materials
21. The Law of Conservation of Energy is a statement that
- A. energy must be conserved and you should not waste energy
  - B. the supply of energy is limited so we must conserve
  - C. energy cannot be created or destroyed
  - D. energy cannot be used faster than it is created
22. Which of the following is a renewable source of energy?
- A. Coal
  - B. Hydropower
  - C. Natural gas
  - D. Petroleum
23. If you are using biomass as a source of energy you might be cooking with
- A. coal
  - B. natural gas
  - C. petroleum
  - D. wood
24. When natural gas is burnt to produce electricity, the electrical energy produced is less than the chemical energy of the coal because some of the chemical energy is
- A. destroyed by the moving parts of the turbine and the generator
  - B. destroyed by the intense heat required to release its chemical energy

- C. is converted into heat and sound energy
- D. is converted into nuclear energy

25. Sublimation is a change directly from a
- A. solid to a gas
  - B. solid to a liquid
  - C. liquid to a solid
  - D. liquid to a gas

SECTION B (25 marks)

*This Section contains two (2) questions. You are required to answer ONLY ONE (1) question in the answer booklet provided.*

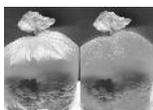
1. (a) Your standard four class has compiled a list of observations. Explain in detail, with the aid of diagrams, any FIVE (5) of the following using the kinetic theory of matter: (20 marks)



(i) Liquid candle wax solidifies as it drips down the side of the candle.



(iii) The sweet smell from the perfume tree can be smelt by neighbours, even when there is no wind.



(v) Clear drops of water form on the outside of a cold bottle of coloured drink.

(vi) Sealed plastic bags inflated with air decrease in volume when place in the freezer.

(ii) A wet pavement in the sun dries faster than one in the shade.



(iv) Crystals of orange powder 'disappear' when clean water is added to make an orange coloured liquid.



(b) Anna's family uses rain water at home and she notices that the soap makes a lot of lather and is difficult to wash off. She is intrigued that the tap water on campus uses more soap to make the same amount of lather and washes off much easier.

(i) Explain fully why the soap works differently on campus. (3 marks)

(ii) Write down a word equation for your explanation in part (i) (2 marks)

2. (a) Vidya helps her mother to make guava syrup. She notices that her mother boils the ripe guavas in water and then strains the mixture through a fine cloth to obtain a yellow liquid extract. After she adds sugar to the cold guava extract, Vidya was only able to get a little sugar to dissolve by stirring vigorously. Her mother explains, "When we heat it all the sugar will melt into the mixture." On cooling, Vidya notices that some sugar crystals reappear in the syrup.

- (i) Explain, with a diagram, the science of the straining process used to produce the liquid extract. (3 marks)
- (ii) Explain fully how some sugar crystals dissolved into the liquid. (4 marks)
- (iii) Explain Vidya's mother misunderstanding of the process melting. (2 marks)
- (iv) Why must the liquid be heated for all the sugar to disappear? (3 marks)
- (v) Why do sugar crystals appear on cooling the syrup? (2 marks)

(b) Copy and complete the following table in your answer booklet to indicate whether solutions A to E are acidic, basic or neutral and give an example of a common household material for each solution: (6 marks)

| Solution | pH value | Acid/ Base / Neutral | Common household material |
|----------|----------|----------------------|---------------------------|
| A        | 4        |                      |                           |
| B        | 7        |                      |                           |
| C        | 12       |                      |                           |

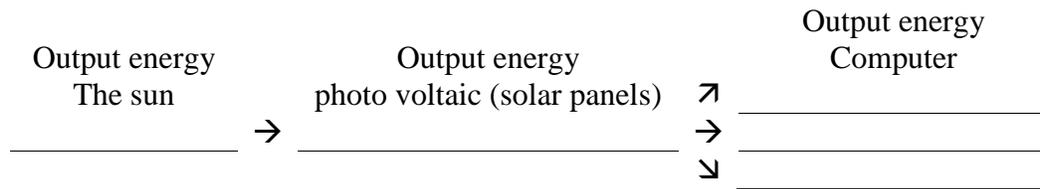
- (c) (i) What are the active ingredients in baking powder which makes bakes and sada roti rise? (2 marks)
- (ii) Explain fully how the active ingredient in (c)(i) works. (3 marks)

### SECTION C (25 marks)

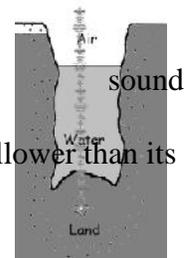
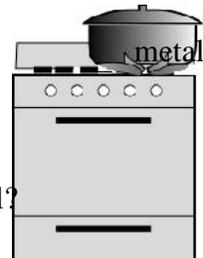
*This Section contains two (2) questions. You are required to answer ONLY ONE (1) question in the answer booklet provided.*

- 3. (a) Define the term energy. (1 mark)
- (b)(i) Draw a diagram of a circuit with two cells, and one switch to control three bulbs in parallel. (5 marks)

- (ii) What is the minimum number of additional switches that would be needed to modify the circuit to control each bulb independently? Draw the modified circuit. (5 marks)
- (c)(i) Electricity is carried from the mains to the outlet plugs by wires made of plastic and copper. Describe the function of the plastic and the copper. (2 marks)
- (ii) What materials which can replace the copper and plastic? (2 marks)
- (iii) What safety device is placed in circuits to prevent overloading the circuit? (1 mark)
- (d) Describe how you would determine if an iron nail is a magnet. (4 marks)
- (e) The sun shines on photo voltaic cells (solar panels) which are used to power a computer which can play music, show video on a screen and feels quite warm. Copy and complete the following diagram to indicate the forms of energy which are output from each stage: (5 marks)



4. (a) A covered pot of water is heated by a gas burner on a stove.
- (i) Explain with a diagram how heat travels from the inside to the outside of the pot cover. (3 marks)
- (ii) Describe, with a diagram, how the top of the water in the pot gets hot. (4 marks)
- (iii) Why does my face feels the heat from the burner when I am at the oven level? (2 marks)
- (b) Name and explain a suitable material for the following parts of the pot:
- (i) the handle (2marks)
- (ii) the body of the pot (2 marks)
- (c) Give three characteristics of the image in a plane mirror. (3 marks)
- (d) Sound waves from an underground explosion travel through the ground, then through a pool of water and finally emerge into the air. Compare the speed of the in all three media. (3 marks)
- (e) Using a diagram, explain how people are fooled when a pool of water look shallower than its actual depth. (6 marks)



#### SECTION D (25 marks)

*This Section contains two (2) questions. You are required to answer ONLY ONE (1) question in the answer booklet provided.*

5. (a) Define the term Technology. (3marks)
- (b) Describe the SIX (6) universal elements of technology. (12 marks)

(c) With reference to two appropriate examples discuss the statement that "Form follows Function". (6 marks)

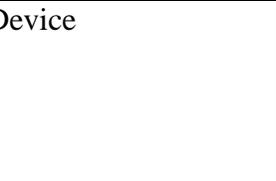
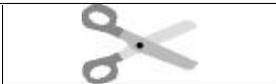
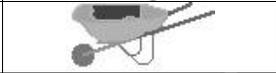
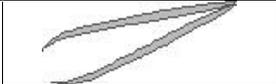
(d) State two ways in which technology is similar to science and two ways in which it is different from science. (4marks)

6. (a) Give a brief explanation with an example of how ANY THREE (3) of the following simple machines work: (9marks)

- (i) pulley
- (ii) wedge
- (iii) wheel and axle
- (iv) inclined plane

(b) Discuss with diagrams the THREE classes of levers. (9 marks)

(c) Copy the following table in your answer booklet and complete it. (7 marks)

| Device      |    | Le<br>ve<br>r<br>cla<br>ss |
|-------------|---|----------------------------|
| Scissors    |    |                            |
| Pliers      |   |                            |
| Wheelbarrow |  |                            |
| Tongs       |  |                            |
| Crowbar 1   |  |                            |
| Crowbar 2   |  |                            |
| Fishing rod |  |                            |

END OF EXAMINATION

Student ID # \_\_\_\_\_

Term I 2015/2016 Final Examinations  
SCIE 4001: EARTH AND LIFE SCIENCES II  
Multiple Choice Answer Sheet.

Please shade the correct response.

- |     |   |   |   |   |     |   |   |   |   |
|-----|---|---|---|---|-----|---|---|---|---|
| 1.  | A | B | C | D | 2.  | A | B | C | D |
| 3.  | A | B | C | D | 4.  | A | B | C | D |
| 5.  | A | B | C | D | 6.  | A | B | C | D |
| 7.  | A | B | C | D | 8.  | A | B | C | D |
| 9.  | A | B | C | D | 10. | A | B | C | D |
| 11. | A | B | C | D | 12. | A | B | C | D |
| 13. | A | B | C | D | 14. | A | B | C | D |
| 15. | A | B | C | D | 16. | A | B | C | D |
| 17. | A | B | C | D | 18. | A | B | C | D |
| 19. | A | B | C | D | 20. | A | B | C | D |
| 21. | A | B | C | D | 22. | A | B | C | D |
| 23. | A | B | C | D | 24. | A | B | C | D |
| 25. | A | B | C | D | 26. | A | B | C | D |
| 27. | A | B | C | D | 28. | A | B | C | D |
| 29. | A | B | C | D | 30. | A | B | C | D |