



SIR ARTHUR LEWIS COMMUNITY COLLEGE
ACADEMIC YEAR (2024/2025) – SEMESTER TWO
END OF SEMESTER EXAMINATION
ALTERNATE

COURSE CODE : ENV113
COURSE TITLE : Climate and Climate Change
LECTURER(S) : B. Robinson-Charlery
DATE :
TIME :
DURATION : 2 Hours
STUDENT ID # : _____

GENERAL INFORMATION AND INSTRUCTIONS

- Students must sign **IN** and **OUT** on the examination class list.
- Write your ID number on the question paper.
- This paper has two Sections (Section A - 30 multiple Choice questions and Section B - three structured questions and one essay)
- Section A - Circle the correct answer on the question paper.
- Section B – Write your answers on paper provided.

Instructions:

1. Answer **ALL** questions in all sections.
2. Write your answers clearly and concisely.
3. Use diagrams where appropriate to support your answers.
4. Allocate your time wisely. Suggested time allocations are provided for each section.
5. Calculators may be used where necessary.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

SECTION A: MULTIPLE CHOICE QUESTIONS (MCQs)

Time: 40 minutes

Total Marks: 30

Instructions: This section has 30 questions. **Answer ALL questions** by shading the letter next to the most correct response. **Each question is worth 1 mark.**

1. In what form does light emitted from the sun reach the Earth
 - A. Heat radiation
 - B. Microwave radiation
 - C. Long-wave radiation
 - D. Short-wave radiation
2. In the troposphere, the temperature decreases with increasing altitude. If the opposite happens, this is called a/ an _____.
 - A. Noctilucent cloud
 - B. Isothermal inversion
 - C. Thermal convection
 - D. Temperature inversion
3. Why is the thermosphere the hottest layer of the atmosphere?
 - A) Absorbs high-energy solar radiation (e.g., X-rays/UV)
 - B) Proximity to the sun
 - C) Interaction with cosmic rays
 - D) Contains ionized gases
4. Which of the following is NOT a way heat is transferred vertically?
 - A. Latent heat
 - B. Convection
 - C. Ocean currents
 - D. Long-wave radiation
5. What is meant by the term albedo?
 - A. The amount of latent heat in an object
 - B. The difference between energy gain and loss
 - C. The amount of insolation stored by an object
 - D. The amount of insolation reflected by an object
6. Which of the following is NOT a factor that influences the amount of insolation that reaches the earth's surface
 - A. Albedos
 - B. Climate change
 - C. Length of day and night
 - D. The tilt of the earth
7. During which of the following is there a transfer of latent heat to the atmosphere?
 - A. Burning of bush
 - B. During evaporation
 - C. Contact between two objects (conduction)
 - D. Decrease in temperature (due to expansion)
8. At which layer of the atmosphere do meteors burn up?
 - A. Mesosphere
 - B. Troposphere
 - C. Thermosphere
 - D. Stratosphere

9. Which of the following regions experience a net loss of radiation (they lose more radiation than they receive)?
- A. The poles
 - B. The tropics
 - C. Forested regions
 - D. Tropical grasslands
10. Within the stratosphere, temperature _____ with increasing altitude.
- A. Increases
 - B. Decreases
 - C. Remains constant
 - D. Fluctuates randomly
11. Dew point is:
- A. Water seen on the grass on cold mornings
 - B. The amount of water vapour present in an air parcel
 - C. The height at which a given parcel of air becomes saturated
 - D. A temperature at which a given parcel of air becomes saturated
12. What is the major role of a greenhouse gas that contributes to temperature rise of the Earth's surface?
- A. Stops both incoming and outgoing radiation
 - B. Transparent to both incoming and outgoing radiation
 - C. Let's outgoing radiation go through but restricts short-wave radiation
 - D. Allows incoming short-wave radiation through but restricts outgoing long-wave radiation
13. Temperature generally decreases towards the poles because _____.
- A. Cold polar air masses prevent heating
 - B. Air movement is generally towards the equator
 - C. Cold surfaces do not absorb heat as readily as warm surfaces
 - D. Less insolation per unit area, falls on the earth's surface as we move towards the poles.
14. The capacity of the air to hold water vapour:
- A. Increases as temperature increases
 - B. Decreases as temperature increases
 - C. Increases as temperature decreases
 - D. Decreases as temperature increases
15. The instrument used for measuring relative humidity in the air is:
- A. Barograph
 - B. Pantograph
 - C. Hydrograph
 - D. Hygrometer
16. When the wind is deflected due to the rotation of the earth, it is called
- A. Polar winds
 - B. Westerlies
 - C. Trade winds
 - D. Geostrophic winds
17. The instrument used for finding wind direction
- A. Wind vane
 - B. Wind gauze
 - C. Hygrometer
 - D. Anemometer
18. All the meteorological incidents occur in the _____.
- A. Exosphere
 - B. Ionosphere
 - C. Troposphere
 - D. Stratosphere

19. Which of the following is **WRONGLY** matched?
- A. An area sheltered from rain bearing winds by a hill – rain shadow area
 - B. Rain caused by vertical circulation of air currents – orographic rainfall
 - C. Rainfall caused by mountain standing in the way of moisture-laden winds – relief rainfall
 - D. Rain caused by a warm moist air mass moving upward over cold air mass – cyclonic rainfall
20. In the earth's atmosphere, the atmospheric pressure:
- A. Increases with height
 - B. Decreases with height
 - C. Remain constant with height
 - D. First increases and then decreases with height
21. What factor contributes to coral bleaching due to climate change?
- A. Rising sea temperatures
 - B. Decreased solar radiation
 - C. Enhanced growth of coral reefs
 - D. Increased submarine volcanic activity
22. Which strategy would best address the impacts of coastal flooding?
- A. Planting drought-resistant crops
 - B. Reducing volcanic activity globally
 - C. Developing more cattle ranching programs
 - D. Investing in natural infrastructure like beaches and mangroves
23. Why do anthropogenic causes such as cattle ranching significantly contribute to climate change?
- A. They increase solar radiation at the poles.
 - B. They decrease volcanic activity globally.
 - C. They lead to increased atmospheric oxygen.
 - D. They release large amounts of methane, a potent greenhouse gas.
24. What role does global temperature data play in climate adaptation planning?
- A. It prevents rainfall variability.
 - B. It reduces coral reef bleaching.
 - C. It eliminates anthropogenic causes of climate change.
 - D. It enables targeted mitigation and adaptation strategies.
25. How does deforestation contribute to increased greenhouse gas concentrations?
- A. Forest removal blocks the sun's radiation.
 - B. Trees emit carbon dioxide during photosynthesis.
 - C. Deforestation reduces carbon sequestration by trees.
 - D. Tree planting programs replace greenhouse gas emissions.
26. Why are strategic investments in built infrastructure, such as levees, considered effective climate change mitigation strategies?
- A. They reduce the frequency of natural disasters.
 - B. They protect against localized impacts like flooding.
 - C. They stabilize global atmospheric carbon dioxide levels
 - D. They eliminate the need for natural infrastructure conservation.
27. What is the most immediate environmental impact of coral bleaching?
- A. Increased sea level rise in coastal areas
 - B. Expansion of agricultural land near oceans
 - C. Reduced biodiversity in marine ecosystems
 - D. Stabilization of global surface temperatures

28. What role does poverty play in the societal impacts of climate change?
- Poverty eliminates the need for climate change policies.
 - Poverty leads to stabilization of global climate variability.
 - Poverty increases greenhouse gas emissions in urban areas.
 - Poverty limits access to resources needed for climate adaptation.
29. Which of the following best illustrates the effectiveness of climate change education as a mitigation strategy?
- It stabilizes historical climate change trends.
 - It increases the rate of deforestation in tropical regions.
 - It reduces volcanic eruptions through advanced techniques.
 - It enhances public awareness and promotes behavioral changes.
30. How do fossil fuel emissions influence climate change at a global scale?
- They decrease the frequency of droughts.
 - They reduce greenhouse gas concentrations.
 - They reduce the variability in global temperatures.
 - They contribute to the increase of heat-trapping gases in the atmosphere.

SECTION B: STRUCTURED QUESTIONS AND ESSAY

Time: 1 hr. 20 minutes

Total Marks: 60

Instructions: There are **FOUR** questions in this section. **Answer ALL questions** on the sheets provided.

- (a) Explain how the greenhouse effect influences Earth's surface temperature, including the roles of:

 - Incoming solar radiation.
 - Longwave radiation from earth.
 - Key greenhouse gases.

(6 marks)

(b) Account for the latitudinal variation in insolation receipt and its impact on global temperature distribution.

(8 marks)

Total: 14 marks
- (a) Describe the formation and characteristics of the polar front jet stream. In your answer, include:

 - The role of temperature gradients between air masses.
 - Its influence on mid-latitude weather systems (e.g., depressions).

(A well-labelled diagram may be used.)

(6 marks)

(b) Analyse how the Coriolis effect influences the direction of prevailing surface winds (e.g., trade winds, westerlies) in the Northern and Southern Hemispheres.

(4 marks)

(c) Explain why tropical cyclones typically form in regions of low pressure near the ITCZ, while mid-latitude cyclones develop along the polar front.

(4 marks)

Total: 14 marks
- (a) (i) Define the term dew point temperature.

(2 marks)

(ii) Explain how the dew point is used to predict weather conditions.

(2 marks)

(b) Differentiate between stable and unstable atmospheric conditions, providing an example of weather associated with each.

(4 marks)

(c) Using a well-labelled diagram, explain the process of orographic precipitation and its impact on local rainfall patterns. (6 marks)

Total: 14 marks

4. Write an essay evaluating the statement: “Mitigation strategies, such as renewable energy adoption and carbon pricing, are insufficient to limit global warming to 1.5°C without simultaneous systemic societal changes.”

[Word count: 250–300 words]

Total: 18 marks