

**UNIVERSITY OF SWAZILAND
DEPARTMENT OF GEOGRAPHY, ENVIRONMENTAL SCIENCE AND
PLANNING
SUPPLEMENTARY EXAMINATION, JULY 2005
B.A., B.Ed., B.Sc., B.A.S.S.**

TITLE OF PAPER: INTRODUCTION TO THE NATURAL ENVIRONMENT

COURSE NUMBER: GEP 111

TIME ALLOWED: THREE (3) HOURS

INSTRUCTIONS: THIS PAPER IS DIVIDED INTO THREE SECTIONS

SECTION A: MULTIPLE CHOICE

(ii) ANSWER ALL QUESTIONS ON THE ANSWER SHEET PROVIDED

(ii). THIS SECTION CARRIES 30 MARKS

SECTION B: SHORT ESSAY

(ii) ANSWER ANY TWO QUESTIONS ONLY

(ii). EACH QUESTION CARRIES 15 MARKS

SECTION C: TECHNIQUES AND SKILLS

(ii) ANSWER ANY ONE QUESTION ONLY

(ii) YOU ARE PROVIDED WITH A TOPOGRAPHIC MAP, TRACING PAPER AND GRAPH PAPER

(iii). EACH QUESTION CARRIES 40 MARKS

THIS PAPER SHOULD NOT BE OPENED UNTIL PERMISSION IS GRANTED BY THE INVIGILATOR

SECTION A: MULTIPLE CHOICE QUESTIONS
ANSWER ALL QUESTIONS

1. Energy transformations in the ecosystem occur by means of a series of steps or levels referred to as:
 - A. Decomposers
 - B. Amino acids
 - C. Biological oxidation
 - D. Food chain
2. The organisms which are able to manufacture their own foods from inorganic substances by using sunlight or chemical energy are called:
 - A. Heterotrophs
 - B. Oxidation
 - C. Autotrophs
 - D. Respiration
3. The driving force of an ecosystem is:
 - A. Predator
 - B. Biomes
 - C. Solar energy
 - D. Equilibrium
4. Potential evapotranspiration and water balance are mainly determined by the relationship between:
 - A. Trophic level
 - B. Primary productivity
 - C. Herbivores and light
 - D. Temperature and moisture
5. Phosphorous is available to plants directly from the soil which also supplies other major nutrients such as:
 - A. Calcium, magnesium, potassium and sulphur
 - B. Oxygen. Carbon dioxide and carbohydrates
 - C. Nitrogen, ammonia and nuclear acids
 - D. Sugars, carbon monoxide and sulphur dioxide
6. The nitrogen gas is converted into forms that plants can use by two processes:
 - A. Fossil fuels and energy
 - B. Biological fixation and atmospheric fixation
 - C. Animal wastes and ammonia
 - D. Lithification and carbon dioxide
7. Denitrification is a process carried out by other specialised group of bacteria which convert:
 - A. Proteins into urea
 - B. Ammonia into nitrate
 - C. Nitrate into sugars
 - D. Nitrate into nitrogen gas
8. One important component of the oxygen cycle involves:
 - A. Oxygen and ammonia
 - B. Photosynthesis and respiration

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- C. Atmospheric fixation
 - D. Oxidation and respiration
9. Greenhouse effect is caused by:
- A. Sea-level rise
 - B. Dramatic increase in carbon dioxide and methane
 - C. Chlorofluorocarbons (CFCs) and pollution
 - D. Acid rain
10. Large-scale movements of lithospheric plates cause either a convergence or divergence of the plates. Which of the following landforms is associated with plate convergence?
- A. Shallow focus earthquakes
 - B. Andesitic volcanoes
 - C. Basaltic volcanoes
 - D. Oceanic ridge
11. The critical temperature at which saturation occurs as a consequence of cooling is called:
- A. Relative temperature
 - B. Dew-point temperature
 - C. Adiabatic temperature
 - D. Saturation temperature
12. Saturation occurs when:
- A. Vapour pressure is greater than saturation pressure
 - B. Vapour pressure is less than saturation vapour pressure
 - C. Vapour pressure is equal to saturation vapour pressure
 - D. Vapour pressure is insignificant
13. The movement of material down-slope under the influence of gravity is known as:
- A. Erosion
 - B. Weathering
 - C. Mass wasting
 - D. Denudation
14. Which of the following is a dry climatic region?
- A. Am
 - B. ET
 - C. Bsh
 - D. Cwb
15. A normal fault occurs in response to:
- A. Compressional forces
 - B. Tensional forces
 - C. Horizontal displacement
 - D. Vertical displacement
16. The material carried in liquid within a river is called:
- A. Suspended load
 - B. Dissolved load
 - C. Bed load
 - D. Siltation

17. The scientific study that examines the differences in average weather conditions of various places is known as:
- A. Meteorology
 - B. Climatology
 - C. Hydrology
 - D. Seismology
18. The difference in the rate of movement around an orbit during aphelion and perihelion is explained by:
- A. Harmonic law
 - B. Elliptic law
 - C. Universal gravitation law
 - D. Equal areas law
19. Conical projections are characterised by:
- A. Vertical lines converging at the poles
 - B. Horizontal lines intersecting at right angles
 - C. Constant areas
 - D. None of the above
20. Succession may be driven by modifications of the environment by the plants themselves or by external changes in the physiographic conditions. Therefore, the succession driven by external changes is called:
- A. Allogenic
 - B. Autogenic
 - C. Primary
 - D. Secondary
21. The cementation of sediments by a solution of iron, silica and calcium to form sedimentary rock is known as:
- A. Oxidation
 - B. Frost wedging
 - C. Hydrolysis
 - D. None of the above
22. There are different forms of parent material from which soils develop. It could be the weathered underlying rock or superficial deposits. Rock debris deposited under the influence of gravity lead to:
- A. Alluvium
 - B. Colluvium
 - C. Loess
 - D. Glacial uplift
23. Mineral matter in soil consists of rock fragments of different sizes which can be categorised into fractions. However, the fraction whose diameter ranges between 0.05 and 0.002 mm is called:
- A. Sand
 - B. Silt
 - C. Clay
 - D. Gravel
24. The most abundant element in the earth's crust is:
- A. Silicon

- B. Oxygen
 - C. Hydrogen
 - D. Aluminium
25. The increase in temperature with increasing height within the troposphere is known as:
- A. Pollution
 - B. Albedo
 - C. Temperature inversion
 - D. Temperature subsidence
26. Which of the following is an igneous rock?
- A. Shale
 - B. Gneiss
 - C. Gabbro
 - D. Marble
27. The pressure belt located at about latitude 30°N and 30°S of the equator is known as:
- A. Equatorial low
 - B. Temperate high
 - C. Sub-polar low
 - D. Sub-tropical high
28. The lower part of the troposphere has the highest concentration of:
- A. Dust only
 - B. Smoke only
 - C. Water vapour and ozone
 - D. Moisture only
29. Plants and algae exist in an ecosystem as:
- A. Primary consumers
 - B. Biomass
 - C. Primary producers
 - D. Detritus
30. Organisms that eat either plants or other animals are called:
- A. Herbivores
 - B. Omnivores
 - C. Carnivores
 - D. Heterotrophs

SECTION B: SHORT ESSAYS
ANSWER ANY TWO QUESTIONS

QUESTION 1

Discuss the heating and cooling of the earth-atmosphere system. (15 marks)

QUESTION 2

Examine how water revolves in a never-ending cycle between the ocean, atmosphere and land. (15 marks)

QUESTION 3

With illustrations, discuss the carbon cycle. (15 marks)

SECTION C: TECHNIQUES AND SKILLS
CHOOSE AND ANSWER ONE QUESTION ONLY
QUESTION 1

(a) Define the following: (10 marks)

- (i) A Map
- (ii) Conjugate Principal Point
- (iii) Satellite Image
- (iv) Aerial Photograph
- (v) Map Projection

(b). If the time is 12:00 midnight at the Greenwich Meridian, what longitude will it be at: (10 marks)

- (i) 5:00 pm
- (ii) 11:00 pm
- (iii) 12:00 noon
- (iv) 9:00 am
- (v) 8:00 pm

(c) Given the following hypothetical wind and temperature conditions, calculate the wind chill factor. (6 marks)

Temperature ($^{\circ}$ C)	Wind-Speed (mph)	Wind Chill Factor (kcal./m ² /hr)
(i). 40	55	
(ii). -8	10	
20	35	

(d) Outline the steps involved in constructing a profile. (14 marks)

QUESTION 2

(a) Explain the following: (10 marks)

- (i) Relative Humidity
- (ii) Adiabatic Rate
- (iii) Environmental Lapse Rate
- (iv) Drainage basin
- (v) Law of stream numbers

(b) (i) Distinguish between vertical and oblique aerial photographs. (4 marks)

(ii) A camera with a focal length of 12.0 cm mounted on an aircraft flying at an altitude of 11 250 meters above sea level was used to take photographs of two border areas of Swaziland, namely Oshoek (1410 m) and Lomahasha (580 m) respectively. Considering the altitude of both locations what would be the mean scale of the photographs?

(6 marks)

(iii) If the same camera was used to take photographs of both locations at a scale of about 1:50 000 what would be the respective flying height of the aircraft above each location?

(4 marks)

(c) Outline the steps involved in the Barium Sulphate method. (10 marks)

(d) Express the following as representative fractions and arrange the scales according to size starting with the smallest (6 marks)

- (i) 1 cm to 750 m
- (ii) 20 cm to 3 km
- (iii) 5 cm to 2.5 km