

**UNIVERSITY OF SWAZILAND
DEPARTMENT OF GEOGRAPHY, ENVIRONMENTAL SCIENCE AND
PLANNING
FINAL EXAMINATION, MAY 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

(i) ANSWER ALL QUESTIONS ON THE ANSWER SHEET PROVIDED

(ii). THIS SECTION CARRIES 30 MARKS

SECTION B: SHORT ESSAY

(i) ANSWER ANY TWO QUESTIONS ONLY

(ii). EACH QUESTION CARRIES 15 MARKS

SECTION C: TECHNIQUES AND SKILLS

(i) 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. Which of the following is not an igneous rock?
 - A. Basalt
 - B. Diorite
 - C. Limestone
 - D. Gabbro
2. The lines that connect areas of equal pressure are known as:
 - A. Isohyets
 - B. Isotherms
 - C. Isobars
 - D. Contours
3. The most abundant element in the earth's crust is:
 - A. Hydrogen
 - B. Silicon
 - C. Oxygen
 - D. Aluminium
4. The solidification of magma results in:
 - A. Lava flow
 - B. Breakdown of pre-existing rocks
 - C. Sand particles cemented together by silica
 - D. Formation of igneous rocks
5. The critical temperature at which saturation occurs as a result of cooling is called:
 - A. Relative
 - B. Dew point
 - C. Adiabatic
 - D. Saturation
6. Within a soil profile, there are a number of layers which can be observed by a set of properties. The layer characterised by a high content of organic material is known as:
 - A. A horizon
 - B. O horizon
 - C. B horizon
 - D. C horizon
7. Plant succession is characterised by progressive changes in the structure and composition of a community until a stable condition is achieved. This stable community is called:
 - A. Pioneer
 - B. Plagio-climax
 - C. Climax
 - D. None of the above
8. Under normal climatic conditions, temperature decreases at an average rate of $6.5^{\circ}\text{C} / 35^{\circ}\text{F}$ with increasing altitude within the troposphere. However, where temperature increases with increasing height within the lower troposphere, it is known as:
 - A. Temperature subsidence
 - B. Temperature inversion

- C. Pollution
 - D. Albedo
9. There are several forms of mass wasting, and the tearing of material from the face of an escarpment along concave slip planes is called:
- A. Rockslide
 - B. Landslide
 - C. Slumping
 - D. Soil creep
10. Which of the following is an igneous rock?
- A. Gabbro
 - B. Shale
 - C. Gneiss
 - D. Marble
11. Which of the following contributes to the occurrence of temperature inversion within the troposphere?
- A. Subsidence of air
 - B. Ascending air
 - C. Reflection
 - D. Insolation
12. Which of the following is associated with the movement of air masses?
- A. Convictional rainfall
 - B. Relief rainfall
 - C. Cyclonic rainfall
 - D. Adiabatic rainfall
13. The pressure belt located at about 30°N and 30°S of the Equator is called:
- A. Subtropical high
 - B. Equatorial high
 - C. Temperate high
 - D. Sub – polar low
14. All black bodies emit radiation, and the earth's surface emits:
- A. Shortwave radiation
 - B. Long-wave radiation
 - C. Electromagnetic spectrum
 - D. None of the above
15. The zone of the atmosphere with the highest concentration of ozone is called:
- A. Stratosphere
 - B. Troposphere
 - C. Mesosphere
 - D. Thermosphere
16. Metamorphic rocks are:
- A. Solidified from magma
 - B. Layered accumulations of minerals
 - C. Rocks subjected to intense heat and / or pressure
 - D. Rocks that have not undergone mineral alterations
17. The disintegration and decay of rocks is known as:
- A. Denudation

- B. Weathering
 - C. Mass movement
 - D. Erosion
18. In which month is the sub-polar point directly over the Tropic of Capricorn?
- A. September
 - B. June
 - C. March
 - D. December
19. Which of the following does not belong to the group?
- A. Olivine
 - B. Carbonates
 - C. Sulphides
 - D. Phosphates
20. The material carried in solution within a river is called:
- A. Suspended load
 - B. Dissolved load
 - C. Bed load
 - D. Saltation
21. Rainfall may occur in the eastern slopes and not in the western part of the Lubombo mountain ranges in Swaziland due to:
- A. Frontal uplift
 - B. Convectional uplift
 - C. Depression
 - D. Orographic
22. Which are the most significant aspects of Köppen's climate classification scheme / system?
- A. Precipitation and pressure
 - B. Precipitation and temperature
 - C. Temperature and pressure
 - D. Temperature and wind
23. In which of the following major climate groups is the average temperature of the warmest month below 10°C ?
- A. D climate
 - B. C climate
 - C. B climate
 - D. E climate
24. If surface (A) has an albedo of 15%, surface (B), has an albedo of 25%, and surface (C) has an albedo of 30%, which of the surface(s) will lose most heat at any given time?
- A. Surface (B)
 - B. Surface (C)
 - C. Surface (A)
 - D. (A), (B) and (C)
25. Organisms in the environment influence each other's existence through various interaction modes. If one or two organisms benefit from each other's existence leads to:
- A. Negative interaction
 - B. Neutral interaction

- C. Positive interaction
 - D. None of the above
26. The scientific study that examines differences in average weather conditions of various environments is called:
- A. Seismology
 - B. Hydrology
 - C. Climatology
 - D. Meteorology
27. Amongst the factors of soil formation, topography influences:
- A. Mineralogy of soil
 - B. Nutrient status of soil
 - C. Movement and depth of soil
 - D. Degree of soil development
28. The law which explains the differences in the rate of movement around the earth's orbit during aphelion and perihelion is called:
- A. Law of equal areas
 - B. Law of universal gravitation
 - C. Harmonic law
 - D. Elliptic law
29. Changes in the position and arrangement of the planet earth, moon and sun have an influence on:
- A. Incoming solar radiation
 - B. Oceanic tides
 - C. Rotation period
 - D. Revolution period
30. Plants and large algae exist in an ecosystem as:
- A. Detritus
 - B. Primary consumers
 - C. Biomass
 - D. Primary producers

SECTION B: SHORT ESSAYS
ANSWER ANY TWO QUESTIONS

QUESTION 1

With specific illustrations discuss the nitrogen cycle. (15 marks)

QUESTION 2

Discuss the major processes involved in mechanical weathering. (15 marks)

QUESTION 3

With illustrations, describe the nature and composition of the atmosphere. (15 marks)

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

QUESTION 1

- (a) List six attributes of a map. (3 marks)
- (b) Copy and complete table 1 below. (12 marks)

Distance / Area on Map	Scale	True Distance / Area on Map
(i). 55 cm	1:50 000	_____ km
(ii). _____ cm	1:40 000	13 250 m
(iii). 84cm ²	_____	28.18 km ²
(iv). 42 cm ²	_____	12.5 km ²
(v). _____ cm ²	1:150 000	48 km ²
(vi). _____ cm ²	1:100 000	127.7 ha

- (c) Use the topographical map of Swaziland (PWD 12) to answer the following questions.
 - (i) Draw the drainage net (including the watershed) of the Mbuluzane river at the Ekukhanyeni Manzini road bridge. (10 marks)
 - (ii) Label the streams according to orders to state the drainage pattern. (5 marks)
 - (iii) Count the number of streams in each order and calculate the average bifurcation ratio. (5 marks)
 - (iv) Calculate the area of the basin in km² (5 marks)

QUESTION 2

- (a) Name the meteorological variables in the Koppen's climate classification system. (3 marks)
- (b) Atmospheric pressure decreases with an increase in altitude at an approximate rate of 12.9 millibars (mb) per 100 meters. Estimate the atmospheric pressure in mb at the following areas: (10 marks)

- (i) Bulembu Mountain (1320 m)
- (ii) Mount Meru (4800 m)
- (iii) Piggs Peak (1300 m)
- (iv) Winnipeg (225 m)
- (v) Sigombeni (912 m)

(c) Copy and complete table 2 below. (12 marks)

Location	Time	Day	Location	Time	Day
(i). 164°E	7:30 am	Monday	95°W		
(ii). 27°W			41°E	9:00 pm	Thursday
(iii). 155°W	11:00 am	Saturday	25°E		

- (d) Describe how you will measure the discharge of a river using the floating object method. (5 marks)
- (e) Use a vertical exaggeration of 10 and index contours only to draw a profile from Phowe dipping tank (334116) to Mapopoma dipping tank (439139). (10 marks)

SURNAME:.....INITIALS:.....FACULTY:.....ID:.....

GEP 111 ANSWER SHEET

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