UNIVERISTY OF ESWATINI

DEPARTMENT OF GEOGRAPHY, ENVIRONMENTAL SCIENCE AND PLANNING

FINAL EXAMINATION, DECEMBER 2018

B.A.,B.Ed., BSc.,BASS, (FT/PT)

TITLE OF PAPER:	INTRODUCTION TO THE NATURAL ENVIRONMENT
COURSE NUMBER:	GEP111
TIME ALLOWED:	THREE (3) HOURS
INSTRUCTIONS:	THIS PAPER IS DIVIDED INTO TWO SECTIONS
SECTION A:	TECHNIQUES AND SKILLS 1. ANSWER ALL QUESTIONS (COMPULSORY) 2. THIS SECTION CARRIES 40 MARKS.
SECTIONB:	SHORT ANSWERS / ESSAYS 1. ANSWER QUESTION TWO (35 MARKS) . 2. ANSWER EITHER QUESTION 3 OR QUESTION 4. EACH CARRIES 25 MARKS.

SPECIAL REQUIREMENTS: Graph paper, Tracing paper, Map of Swaziland (1:50 000 Mhlosheni Sheet No. 28)

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

GEP111: INTRODUCTION TO THE NATURAL ENVIRONMENT –DECEMBER 2018

SECTION A: TECHNIQUES AND SKILLS (40 MARKS)
COMPULSORY

QUESTION 1

(For all questions requiring a map, refer to 1:50 000 Map of Swaziland: Mhlosheni Sheet No. 28).
For all questions show your workings.

a) Using the map provided give the 6-figure grid reference of the following locations.
   i) Jericho School (2 marks)
   ii) Mbulungwane Trigonometric Station (2 marks)
   iii) Themba School (2 marks)

b) Explain three ways in which map scales can be expressed on a map. (3 marks)

c) Explain your understanding of windchill factor (3 marks)

d) Calculate the straight line distance between Silele Clinic and Hosea School in both metres and kilometres. (3 marks)

e) Calculate the distance along the road between Silele Clinic and Hosea School in both metres and kilometres. (4 marks)

f) Using the map provided calculate the total surface area for Farm no. R/1229 in hectares and square kilometres. (6 marks)

g) Copy and complete Table 1 below (6 marks)
Table 1: The relationship between area of maps, scale and true area on earth

Area on Map	Scale of Map	True area on Earth
18.5cm²	1:250 000	.....km²
.....cm²	1:150 000	1125.4 ha

h) Using the information in Tables 2.1, 2.2, 2.3 and 2.4 copy and complete the Table 2 below (calculate the incoming, out-going and net radiation in the following table for the month of December) (9 marks)

Table 2: Copy and complete missing values

Location	es	T (°C)	n (hours)	Ri	Ro	H
25 °N	11	21.5	7.7			
0 °	10.0	28	10.1			
30 °S	9.6	24	10.6			

(40 Marks)

ANSWER SECTIONS B AND C IN A SEPARATE ANSWER BOOK FROM SECTION A

SECTION B: COMPULSORY

QUESTION 2

a) Describe the term 'Ring of Fire' in the context of the theory of plate tectonics, and explain the existence of this 'ring'. (15 marks)

b) Discuss WHY the inclination of the earth's axis is an important factor in regulating the temperature of the earth. (10 marks)

c) Explain any FIVE of the following terms or concepts BRIEFLY: (10 marks)

i) The Big Bang theory

ii) Aquifer

iii) Groundwater table

iv) Troposphere

v) Shield volcano

vi) Metamorphic aureole

vii) Constructive plate margin

viii) The ozone layer **(35 Marks)**

SECTION C: ANSWER EITHER QUESTION 3 OR QUESTION 4

QUESTION 3

a) Describe the vertical structure of the earth's atmosphere in relation to temperature. (8 marks)

b) Describe HOW the ***oceanic*** circulation contributes to the heat balance of the earth. (5 marks)

c) Draw a simple diagram to illustrate how a stream may transport sediment. (5 marks)

d) i) Name two examples of sedimentary rocks (2 marks)

ii) Briefly explain the formation and the basis for the classification of igneous rocks. (5 marks)

(25 Marks)

QUESTION 4

a) Describe the term 'Global Climate Change', and explain how human behaviour has contributed to this. (4 marks)

b) Briefly explain why scientists no longer support the idea of 'continental drift', but rather talk of the 'theory of plate tectonics'. (3 marks)

c) Sketch the hydrological cycle, and then explain how humans have modified components of this cycle. (7 marks)

d) Describe why scientists have concluded that there is a heat exchange between the earth's poles and the equator. (4 marks)

e) i) Name two igneous rocks. (2 marks)

ii) Sedimentary rocks are classified according to how they form. Give a detailed account of this classification system. (5 marks)

(25 Marks)

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Table 2.1:Solar Radiation (R_a) expressed in equivalent evaporation (mm/day)

Latitude	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
60°N	1.4	3.6	7	11.1	14.6	16.4	15.6	12.6	8.5	4.7	2	0.9
50°N	3.7	6	9.2	12.7	15.5	16.6	16.1	13.7	10.4	7.1	4.4	3.1
40°N	6.2	8	11.1	13.8	15.9	16.7	16.3	14.7	12.1	9.3	6.8	5.6
30°N	8.1	10.5	12.8	14.7	16.1	16.5	16.2	15.2	13.5	11.2	9.1	7.9
20°N	10.8	12.4	14	15.2	15.7	15.8	15.8	15.4	14.4	12.9	11.3	10.4
10°N	12.8	13.9	14.8	15.2	15	14.8	14.9	15	14.8	14.2	13.1	12.5
Equator	14.6	15	15.2	14.7	13.9	13.4	13.6	14.3	14.9	15	14.6	14.3
10°S	14.6	15	15.2	14.7	13.9	13.4	13.6	14.3	14.9	15	14.6	14.3
20°S	16.8	15.7	15.1	13.9	12.5	11.7	12	13.1	14.4	15.4	15.7	15.8
30°S	17.2	15.8	13.5	10.9	8.6	7.5	7.9	9.7	12.3	14.8	16.7	17.5
40°S	17.3	15.1	12.2	8.9	6.4	5.2	5.6	7.6	10.7	13.8	16.5	17.8
50°S	16.9	14.1	10.4	6.7	4.1	2.9	3.4	5.4	8.7	12.5	16	17.6
60°S	16.5	12.6	8.3	4.3	1.8	0.9	1.3	3.1	6.5	10.8	15.1	17.5

Source: Shaw, 1983. *Hydrology in Practice*

Table 2.2:Values of σT^4										
°F	0	1	2	3	4	5	6	7	8	9
30	11	11.1	11.2	11.3	11.4	11.5	11.6	11.6	11.7	11.9
40	11.9	12	12.1	12.2	12.3	12.4	12.5	12.6	12.7	1 2.8
50	12.9	130	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.9
60	14	14.1	14.2	14.3	14.4	1.5	14.6	14.5	14.8	14.9
°C										
-0	11.2	11								
0	11.2	11.4	11.5	11.7	11.9	12	12.2	12.3	12.5	12.7
10	12.9	13.1	13.3	13.5	13.7	13.9	14	14.2	14.4	14.6
20	14.8	15	15.2	15.4	15.6	15.8	16	16.2	16.4	16.6

Source: Shaw, 1983. *Hydrology in Practice*

Equations:

Fahrenheit to Celsius: $^{\circ}C = \frac{5}{9}(^{\circ}F - 32)$

Celsius to Fahrenheit: $^{\circ}F = \frac{9}{5}{}^{\circ}C + 32$

Kelvin to Celsius: $K = {}^{\circ}C + 273.15$

Celsius to Kelvin: $^{\circ}C = K - 273.15$

Fahrenheit to Kelvin: $K = {}^{\circ}F + 457.87$

Kelvin to Fahrenheit: $^{\circ}F = K - 457.87$

1 centimeter	= 10 millimeters	1 cm	= 10 mm
1 meter	= 100 centimeters	1 m	= 100 cm
1 kilometer	= 1000 meters	1 km	= 1000 m
1 inch	= 2.54 centimeters	1 in	= 2.54 cm
1 foot	= 30.48 centimeters	1 ft	= 30.48 cm
1 yard	= 91.44 centimeters	1 yd	= 91.44 cm
1 yard	= 0.9144 meters	1 yd	= 0.9144 m
1 mile	= 1609.344 meters	1 mi	= 1609.344 m
1 mile	= 1.609344 kilometers	1 mi	= 1.609344 km

$R_o = \ldots \sigma T^4 \left\{0.56 - 0.09\sqrt{e_s}\right\}\left\{0.1 + \left(0.9 \times \left(n \div N\right)\right)\right\} \; {}^{mm}/_{day}$

${}^{e}/_{e_s} \times 100$

$K = \left(120.6 - T\right)\left(4\sqrt{v+5} - {}^{v}/_{4}\right)$

$R = \dfrac{\left(1 \div A\right)\left(\sum R_j a_j\right)}{n}$

$R = \left(1 \div n\right)\left(\sum R_j\right)$

$R = \left(1 \div A\right)\left(\sum r_i a_i\right)$

$R_i = 0.95 R_a \times \left(n \div N\right) \; {}^{mm}/_{day}$

$Q = \; {}^{m^3}/_{s}$

$q_j = \dfrac{\left(v_j + v_{j+1}\right)}{2}\dfrac{\left(y_i + y_{i+1}\right)}{2} b_j$

$Q = \sum q_j$