UNIVERISTY OF SWAZILAND
DEPARTMENT OF GEOGRAPHY, ENVIRONMENTAL SCIENCE AND PLANNING
FINAL EXAMINATION, DECEMBER 2016
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 THREE SECTIONS

SECTION A: TECHNIQUES AND SKILLS
ANSWER IN A SEPARATE ANSWER BOOK.
1. ANSWER ALL QUESTIONS (COMPULSORY)

2. THIS SECTION CARRIES 40 MARKS

SECTION B: COMPULSORY SHORT QUESTIONS (35 MARKS)

SECTION C: ANSWER ONE OF THE QUESTIONS (25 MARKS)

ILLUSTRATE YOUR ANSWERS WITH APPROPRIATE DIAGRAMS.

SPECIAL REQUIREMENTS: Graph paper, Tracing paper, Map of Swaziland 1:50 000 Sidvokodvo Sheet No. 17

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

GEP111: INTRODUCTION TO THE NATURAL ENVIRONMENT –DECEMBER 2016

SECTION A: TECHNIQUES AND SKILLS (40 MARKS)
COMPULSORY

QUESTION 1
(For all questions requiring a map, refer to 1:50 000 Map of Swaziland: Sidvokodvo Sheet No. 12)

a) What is a map projection?   (2 marks)

b) Using the map provided give the 6-figure grid reference of the following locations.
    i) Mandisa trigonometric station   (2 marks)
    ii) Lwandle diptank   (2 marks)

c) What features are found at the following locations?
    i)   -411343   (2 marks)
    iii)   -363405   (2 marks)

d) Calculate the straight line distance between Baxter dipping tank and Rands dipping tank in both metres and kilometres.   (4 marks)

e) Using the map provided calculate the total surface area for Farm no.522 in hectares and square kilometres.   (5 marks)

f) 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
31.5cm²	1:145 000	..............m²
.........cm²	1:95 000	132.7 ha

g) If the time at Greenwich is 0200 hours, what will the time be at the following locations?
    i)   30°N   (2 marks)
    ii)   67°E   (2 marks)
    iii)   171°W   (2 marks)

h) Using the information in Tables 1.1, 1.2 1.3 and 1.4 copy and complete the table below (calculate the incoming, out-going and net radiation in the following table for the month of September)   (9 marks)

Location	es	T (°C)	n (hours)	Ri	Ro	H
20 °N	5.8	9	7.0			
0 °	15.35	20	10.5			
30 °S	14.2	26	11.2			

(40 Marks)

Table 1.1: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 1.2: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*

Table 1.3: Relationship between noon solar angle and intensity of solar radiation

Solar angle	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°
0°	0	1.75	3.49	5.23	6.98	8.72	10.5	12.2	13.9	15.6
10°	17.4	19.1	20.8	22.5	24.2	25.9	27.6	29.2	30.9	32.6
20°	34.2	35.8	37.5	39.1	40.7	42.3	43.8	45.4	47	48.5
30°	50	51.5	53	54.5	55.9	57.4	58.8	60.2	61.6	62.9
40°	64.3	65.6	66.9	68.2	69.5	70.7	71.9	73.1	74.3	75.5
50°	76.6	77.7	78.8	79.9	80.9	81.9	82.9	83.9	84.8	85.7
60°	86.6	87.5	88.3	89.1	89.9	89.9	90.6	92.1	92.7	93.4
70°	94	94.6	95.1	95.6	96.1	96.6	97	97.4	97.8	98.2
80°	98.5	98.8	99	99.3	99.5	99.6	99.8	99.9	99.9	100

Table 1.4:mean daily duration of maximum possible sunshine hours (N)

North Lat.	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
South Lat.	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
60°N/S	6.7	9	11.7	14.5	17.1	18.6	17.9	15.5	12.9	10.1	7.5	5.9
58°N/S	7.2	9.3	11.7	14.3	16.6	17.9	17.3	15.3	12.8	10.3	7.9	6.5
56°N/S	7.6	9.5	11.7	14.1	16.2	17.4	16.9	15	12.7	10.4	8.3	7
54°N/S	7.9	9.75	11.7	13.9	15.9	16.9	16.5	14.8	12.7	10.5	8.5	7.4
52°N/S	8.38	9.94	11.8	13.8	15.6	16.5	16.1	14.6	12.7	10.6	8.8	7.8
50°N/S	8.58	10	11.8	13.7	15.3	16.3	15.9	14.4	12.6	10.7	9	8.1
48°N/S	8.8	10.2	11.8	13.6	15.2	16	15.6	14.3	12.6	10.9	9.36	8.3
46°N/S	9.1	10.4	11.9	13.5	14.9	15.7	15.4	14.2	12.6	10.9	9.5	8.7
44° N/S	9.3	10.5	11.9	13.4	14.7	15.4	15.2	14	12.6	11	9.7	8.9
42°N/S	9.4	10.6	11.9	13.4	14.6	15.2	14.9	13.9	12.6	11.1	9.8	9.1
40°N/S	9.63	10.7	11.9	13.3	14.4	15	14.7	13.7	12.5	11.2	10	9.3
35°N/S	10.1	11	11.9	13.1	14	14.5	14.3	13.5	12.4	11.3	10.3	9.86
30°N/S	10.4	11.1	12	12.9	13.6	14	13.9	13.2	12.4	11.5	10.6	10.2
25°N/S	10.7	11.3	12	12.7	13.3	13.7	13.5	13	12.3	11.6	10.9	10.6
20°N/S	11	11.5	12	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9
15°N/S	11.3	11.6	12	12.5	12.8	13	12.9	12.6	12.2	11.8	11.4	11.2
10°N/S	11.6	11.8	12	12.3	12.6	12.7	12.6	12.4	12.1	11.8	11.6	11.5
5°N/S	11.8	11.9	12	12.2	12.3	12.4	12.3	12.3	12.1	12	11.9	11.8
Equator	12	12	12	12	12	12	12	12	12	12	12	12

Source: Shaw, 1983. *Hydrology in Practice*

SECTION B: ANSWER QUESTION 2 (35 Marks)
ANSWER IN A SEPARATE ANSWER BOOK

QUESTION 2 (COMPULSORY):

a) Explain why earth scientists regard plate tectonics as the 'unifying theory' explaining many of the macro-scale features and phenomena of the earth's surface.   (15 marks)

b) The heat exchange between the equator and the poles takes place in both the atmosphere and the hydrosphere. Explain.   (10 marks)

c) Explain FIVE of the following terms or concepts BRIEFLY: (5 x 2 = 10 marks)
i) Hydrogen burning
ii) Aquifer
iii) Groundwater table
iv) Geothermal spring
v) Ecotope
vi) Metamorphic aureole
vii) Subduction zone
viii) Xenolith   (35 Marks)

SECTION C: ANSWER EITHER QUESTION 3 OR QUESTION 4 (25 Marks)

QUESTION 3:

a) i) Explain the concept of the 'Big Bang Theory' for the formation of the Universe.
                    (3 marks)
iii) Explain the beneficial consequences of the Earth having an inclined axis.   (5 marks)

b) i) Describe why scientists have concluded that there is a heat exchange between the equatorial and polar regions of the Earth.   (6 marks)
ii) Draw a labelled diagram of the hydrological cycle.   (5 marks)

c) Draw a simple sketch of the rock cycle and BRIEFLY explain it.   (6 marks)
                    (25 Marks)

OR :
QUESTION 4:

a) Describe the term 'Global Climate Change', and explain how human behaviour has contributed to this.   (6 marks)

b) Explain how humans have impacted on the components of the hydrological cycle.   (5 marks)

c) Using a suitable diagram, describe the structure of the earth's atmosphere.   (5 marks)

d) Explain the importance of the composition of the ozone layer within the atmosphere. (4 marks)

e) Describe the basis for the classification of igneous rocks and give two (2) appropriate examples to illustrate your answer.   (5 marks)
                    (25 Marks)

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