· UNIVERSITY OF SWAZILAND

DEPARTMENT OF GEOGRAPHY, ENVIRONMENTAL SCIENCE AND
PLANNING

FINAL EXAMINATION (2010)

TITLE OF PAPER   :   Introduction to the Physical Environment

COURSE NUMBER   :   GEP 111

TIME ALLOWED   :   3 hours

INSTRUCTIONS   :   SECTION A IS COMPULSORY
                                         ANSWER ANY TWO QUESTIONS
                                         FROM SECTION B
                                         ILLUSTRATE YOURS ANSWERS
                                         APPROPRIATE DIAGRAMS

MARKS ALLOCATED   :   QUESTION 1 CARRIES 40 MARKS
                                         THE OTHER QUESTIONS CARRY
                                         30 MARKS EACH

THIS PAPER IS NOT TO BE OPENED UNTIL PERMISSION HAS BEEN
GRANTED BY THE INVIGILATOR

SECTION A: TECHNIQUES AND SKILLS

CHOOSE AND ANSWER ONE QUESTION ONLY

QUESTION 1

a) Complete the table below:

(12 marks)

Area on Map	Scale of Map	True area on Earth
144 cm^2	1:60 000	..............m^2
...........cm^2	1: 150 000	127.7 ha
84 cm^2	....	21.38 km^2

b) With reference to the topographical map of Swaziland (PWD 1 8), use the six-figure grid reference system to state the locati on of the following places/features:

(4 marks)

i) Mbovane dipping tank
ii) Farm R/ 659
iii) Sidvokodvo Town
iv) Moti Trigonometrical station

c) With reference to the topographical map of Swaziland (PWD 1 8), what features are found at the following locations?

(4 marks)

i) 474486
ii) 439472
iii) 346 473
iv) 378528

d) Explain fully how would you arrange aerial photographs to attain a stereoscopic view?

(12 marks)

e) A camera, with a focal length of 6.0 cm, mounted on an aircraft flying at an altitude of 7 000 metres above sea level was used to take photographs of an area located at approximately 1000 metres above sea level. What is the scale of those aerial photographs?

(8 marks)

QUESTION 2

a) Define the following terms: (10 marks)

    i) Geographic grid

    ii) Parallels

    iii) Horizontal equivalent

    iv) Satellite image

    v) Watershed

b) With reference to Tables 1, 2 and 3, calculate the amount of in-coming, out-going and the net solar radiation in Leeds under the hypothetical conditions shown below. Leeds is found at 53.48 S and 1.34 W.

(15 marks)

Month	e_s	T($^\circ$ C)	n(hours)	Ri	Ro	H
June	23.9	23.5	13.0			
September	15.1	15.8	6.5			
December	09.8	06.0	3.0			

c) Using the information in Tables 1, 2 and 3, calculate the incoming and outgoing net radiation in the following table for the month of October.

(15 marks)

Location	e_s	T (^{0}C)	n(hours)	Ri	Ro	H
22^{0}N	14	21	10.5			
0^0	16	27	12			
13^{0}S	12	15	8			

TABLE 1: SOLAR RADIATION (RA) 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	7.0	11.1	14.6	16.4	15.6	12.6	8.5	4.7	2.0	0.9
50°N	3.7	6.0	9.2	12.7	15.5	16.6	16.1	13.7	10.4	7.1	4.4	3.1
40°N	6.2	8.0	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	14.0	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	15.0	14.8	14.9	15.0	14.8	14.2	13.1	12.5
Equator	14.6	15.0	15.2	14.7	13.9	13.4	13.6	14.3	14.9	15.0	14.6	14.3
10°S	14.6	15.0	15.2	14.7	13.9	13.4	13.6	14.3	14.9	15.0	14.6	14.3
20°S	16.8	15.7	15.1	13.9	12.5	11.7	12.0	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	16.0	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: 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	9.0	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	15.0	12.7	10.4	8.3	7.0
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	10.0	11.8	13.7	15.3	16.3	15.9	14.4	12.6	10.7	9.0	8.1
48°N/S	8.8	10.2	11.8	13.6	15.2	16.0	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	14.0	12.6	11.0	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	15.0	14.7	13.7	12.5	11.2	10.0	9.3
35°N/S	10.1	11.0	11.9	13.1	14.0	14.5	14.3	13.5	12.4	11.3	10.3	9.86
30°N/S	10.4	11.1	12.0	12.9	13.6	14.0	13.9	13.2	12.4	11.5	10.6	10.2

25°N/S	10.7	11.3	12.0	12.7	13.3	13.7	13.5	13.0	12.3	11.6	10.9	10.6
20°N/S	11.0	11.5	12.0	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	12.0	12.5	12.8	13.0	12.9	12.6	12.2	11.8	11.4	11.2
10°N/S	11.6	11.8	12.0	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	12.0	12.2	12.3	12.4	12.3	12.3	12.1	12.0	11.9	11.8
Equator	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0

Source: Shaw, 1983. *Hydrology in Practice*

TABLE 3: VALUES OF σT^4

°F	0	1	2	3	4	5	6	7	8	9
30	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.6	11.7	11.87
40	11.9	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	1 2.8
50	12.9	130.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.9
60	14.0	14.1	14.2	14.3	14.4	1.5	14.6	14.5	14.8	14.9
°C										
-0	11.2	11.0								
0	11.2	11.4	11.5	11.7	11.9	12.0	12.2	12.3	12.5	12.7
10	12.9	13.1	13.3	13.5	13.7	13.9	14.0	14.2	14.4	14.6
20	14.8	15.0	15.2	15.4	15.6	15.8	16.0	16.2	16.4	16.6

Source: Shaw, 1983. *Hydrology in Practice*

(40 marks)

SECTION B: ANSWER ANY TWO QUESTIONS

QUESTION 3:

Erosion and weathering are processes that occur since the origin of Earth. Discuss then the obstacle why the solid Earth's surface has not yet disappeared below the surface of the oceans? (30 marks)

QUESTION 4:

Discuss why in the atmosphere the ozone layer currently is threatened, and how it may in future be better protected. (30 marks)

QUESTION 5:

Describe the inland water situation of southern Africa, and discuss how supply for its main population may sustainably be maintained.

(30 marks)

QUESTION 6:

Describe the processes that occur during continental drifting, and discuss why the ocean floor is generally of younger geological age than the continents. (30 marks)