

UNIVERSITY OF SWAZILAND

DEPARTMENT OF GEORAPHY, ENVIRONMENTAL SCIENCE AND PLANNING

MAIN EXAMINATION: MAY, 2014

MSc.

TITLE OF PAPER : LAND AND WATER RESOURCES MANAGEMENT

COURSE NUMBER : ERM 622

TIME ALLOWED : THREE (3) HOURS

INSTRUCTIONS : ANSWER ONE QUESTION FROM EACH SECTION
ILLUSTRATE YOUR ANSWERS WITH
APPROPRIATE DIAGRAMS

MARKS ALLOCATED : ALL QUESTIONS CARRY 50 MARKS.

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

SECTION A: ANSWER ONE QUESTION

QUESTION 1:

- (a) Discuss and distinguish between renewable and non-renewable energy resources. Give examples for their respective use and application. (25 marks)
- (b) Evaluate the significance and prospects of renewable energy resources for the economic development of Swaziland. Give examples. (25 marks)

50 marks

QUESTION 2:

Diamonds, gold, coal and petroleum.

Evaluate the natural occurrence and economic significance for each of them in southern Africa.

50 marks

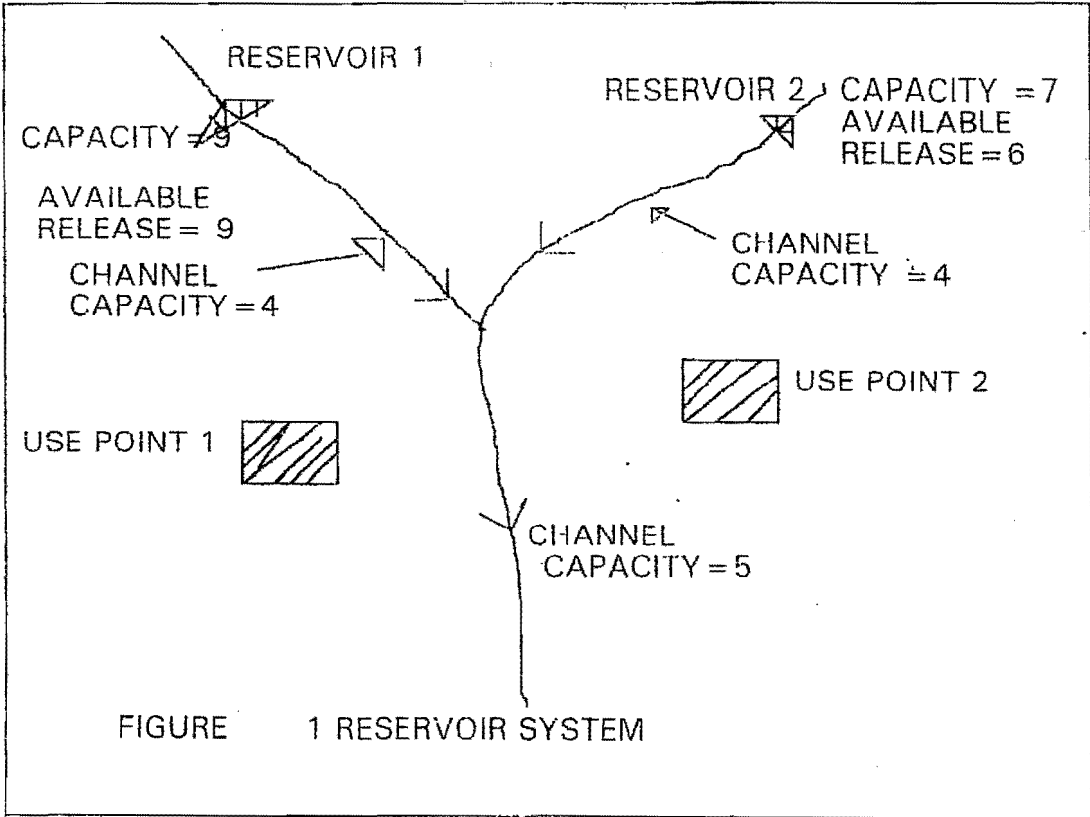
SECTION B: ANSWER ONE QUESTION

QUESTION 3

- (a) Discuss the importance of optimization in water resources management. (25 marks)
 - (b) Write a general mathematical formulation of a linear programming problem using the information presented in Figure 1. (25 marks)
- (50 marks)**

QUESTION 4

- (a) Explain two methods of economic analysis. (25 marks)
 - (b) E55500.00 is borrowed to finance the development of a rural water supply scheme. The project life is 20 years and the interest rate is 10%. Determine the uniform annual amount required to repay the loan. (25 marks)
- (50 marks)**



Interest Per Period $i = .10000$

n	Single Payment		Uniform Series				Gradient		n
	Compound Amount (F/P)	Present Worth (P/F)	Sinking Fund (A/F)	Capital Recovery (A/P)	Compound Amount (F/A)	Present Worth (P/A)	Uniform Amount (A/G)	Present Worth (P/G)	
1	1.100	.9091	1.00000	1.10000	1.000	.909	.000	.000	1
2	1.210	.8264	.47619	.57619	2.100	1.736	.476	.826	2
3	1.331	.7513	.30211	.40211	3.310	2.487	.937	2.329	3
4	1.464	.6839	.21547	.31547	4.641	3.170	1.381	4.378	4
5	1.611	.6209	.16380	.26380	6.105	3.791	1.810	6.862	5
6	1.772	.5645	.12961	.22961	7.716	4.855	2.224	9.684	6
7	1.949	.5132	.10541	.20541	9.487	4.868	2.622	12.763	7
8	2.144	.4665	.08744	.18744	11.436	5.835	3.004	16.029	8
9	2.358	.4241	.07364	.17364	13.579	5.759	3.372	19.421	9
10	2.594	.3855	.06275	.16275	15.937	6.145	3.725	22.891	10
11	2.853	.3505	.05396	.15396	18.531	6.495	4.064	26.396	11
12	3.138	.3186	.04676	.14676	21.384	6.814	4.388	29.901	12
13	3.452	.2897	.04078	.14078	24.523	7.103	4.699	33.377	13
14	3.797	.2633	.03575	.13575	27.975	7.367	4.996	36.800	14
15	4.177	.2394	.03147	.13147	31.772	7.606	5.279	40.152	15
16	4.595	.2176	.02782	.12782	35.950	7.824	5.549	43.416	16
17	5.054	.1978	.02466	.12466	40.545	8.022	5.807	46.582	17
18	5.560	.1799	.02193	.12193	45.599	8.201	6.053	49.640	18
19	6.116	.1635	.01955	.11955	51.159	8.365	6.286	52.583	19
20	6.727	.1486	.01746	.11746	57.275	8.514	6.508	55.407	20
21	7.400	.1351	.01562	.11562	64.002	8.649	6.719	58.110	21
22	8.140	.1223	.01401	.11401	71.403	8.772	6.919	60.689	22
23	8.954	.1117	.01257	.11257	79.543	8.883	7.108	63.146	23
24	9.850	.1015	.01130	.11130	88.497	8.985	7.288	65.481	24
25	10.835	.0923	.01017	.11017	98.347	9.077	7.458	67.696	25
26	11.918	.0839	.00916	.10916	109.182	9.161	7.619	69.794	26
27	13.110	.0763	.00826	.10826	121.100	9.237	7.770	71.777	27
28	14.421	.0693	.00745	.10745	134.210	9.307	7.914	73.650	28
29	15.863	.0630	.00673	.10673	148.631	9.370	8.049	75.415	29
30	17.449	.0573	.00608	.10608	164.494	9.427	8.176	77.077	30
31	19.194	.0521	.00550	.10550	181.943	9.479	8.296	78.640	31
32	21.114	.0474	.00497	.10497	201.138	9.526	8.409	80.108	32
33	23.225	.0431	.00450	.10450	222.252	9.569	8.515	81.486	33
34	25.548	.0391	.00407	.10407	245.477	9.609	8.615	82.777	34
35	28.107	.0356	.00369	.10369	271.024	9.644	8.709	83.987	35
40	45.259	.0221	.00226	.10226	442.593	9.779	9.196	88.953	40
45	72.890	.0137	.00139	.10139	718.905	9.863	9.374	92.454	45
50	117.391	.0085	.00086	.10086	1163.909	9.915	9.570	94.889	50
55	189.059	.0053	.00053	.10053	1880.591	9.947	9.708	96.562	55
60	304.487	.0033	.00033	.10033	3034.816	9.967	9.802	97.701	60