UNIVERSITY OF SWAZILAND

DEPARTMENT OF GEORAPHY, ENVIRONMENTAL SCIENCE AND PLANNING

MAIN EXAMINATION: MAY, 2016

MSc

TITLE OF PAPER : LAND AND WATER RESOURCES MANAGEMENT

COURSE NUMBER : GEP 604/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 EACH

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

ERM 622: LAND AND WATER RESOURCES PLANNING AND MANAGEMENT

SECTION A: ANSWER ONE QUESTION

QUESTION 1:

(i) Mining of Asbestos has contributed for many years to the economic wealth of Swaziland. Discuss why the mining has been abandoned. (15 marks)

(ii) Ngwenya Iron Ore Mine in northeast Swaziland had large capacities of unused tailings. Discuss what was the potential for their exploitation and on the other side their hazardous risk for the environment. (15 marks)

(iii) Discuss the usefulness of building additional big dams for the production of electricity in Swaziland. (20 marks)

(50 Marks)

QUESTION 2:

(i) Discuss and distinguish between renewable and non-renewable energy resources. Give examples for their respective use and application. (25 marks)

ii) Evaluate the significance and prospects of renewable energy resources for the economic development of Swaziland. Give examples. (25 marks)

(50 Marks)

SECTION B: ANSWER ONE QUESTION

QUESTION 3

(a) Discuss the importance of optimization in water resources management. (25 marks)

(b) Write a linear programming formulation of the reservoir management problem presented in Figure 1. (25 marks)

(50 Marks)

QUESTION 4

a) Explain two methods of economic analysis. (25 marks)

b) E75500.00 is borrowed to finance the development of a rural water supply scheme. The project life is 25 years and the interest rate is 10%. Using the information in Table 1 determine the annual amount required to repay the loan. (25 marks)

(50 Marks)

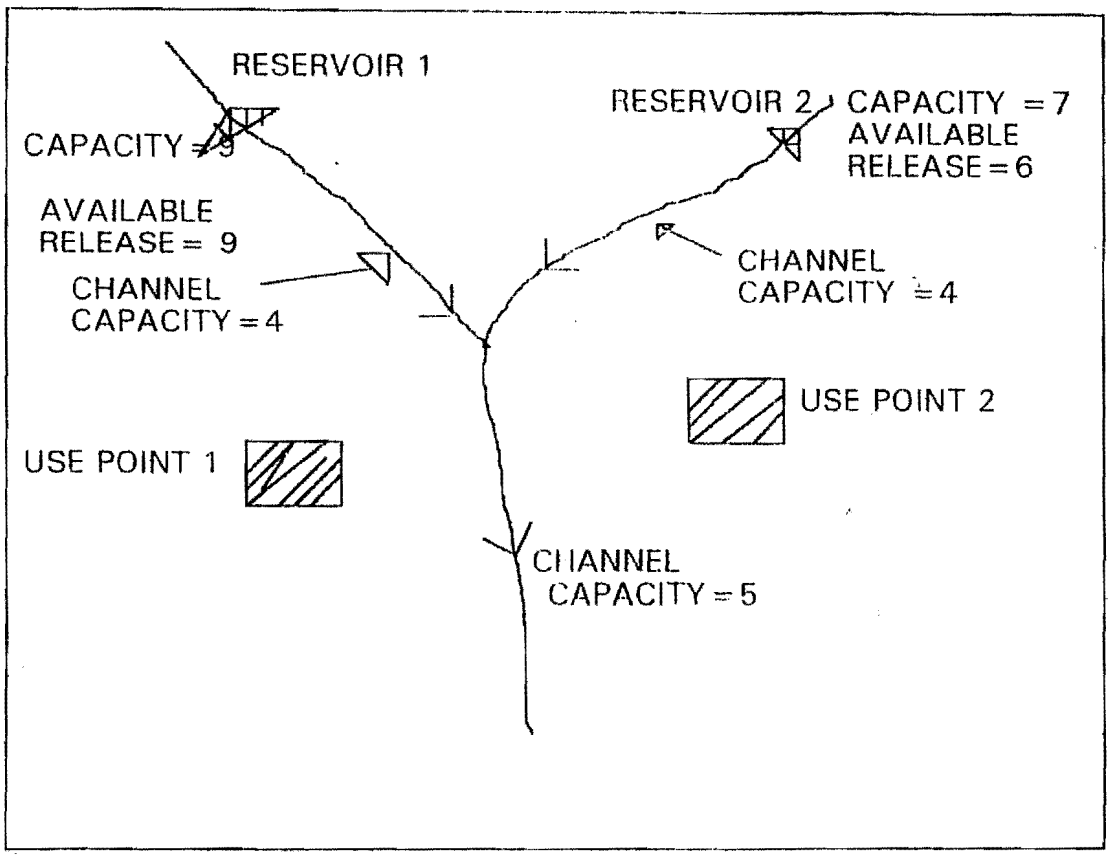

Figure 1 Reservoir system

Table 1

Interest Per Period i = .10000

	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)	n
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	.6830	.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	.1228	.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	9.096	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	304.482	.0033	.00033	.10033	3034.816	9.967	9.802	97.701	60