UNIVERSITY OF ESWATINI

DEPARTMENT OF GEOGRAPHY, ENVIRONMENTAL SCIENCE AND PLANNING

MAIN EXAMINATION APRIL 2021

B.Sc. and B.Sc. Ed. IV

TITLE OF PAPER	:	WATER RESOURCES PLANNING
COURSE NUMBER	:	GEP413
TIME ALLOWED	:	THREE (3) HOURS
INSTRUCTIONS	:	SECTION A IS COMPULSORY ANSWER ANY TWO (2) QUESTIONS FROM SECTION B. ILLUSTRATE YOUR ANSWERS WITH APPROPRIATE DIAGRAMS AND SHOW YOUR WORKING IN ALL CALCULATIONS
MARKS ALLOCATED	:	QUESTION ONE CARRIES 40 MARKS AND THE OTHER QUESTIONS CARRY 30 MARKS EACH

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

GEP413: WATER RESOURCES PLANNING – APRIL 2021

SECTION A: COMPULSORY QUESTION

Question 1

a) Explain the two major objectives in water resources planning. (10 marks)

b) Discuss the consequences of lack of planning in water resources development. (12 marks)

c) Two alternate plans are available for increasing the capacity of existing water transmission lines between an unlimited source and a reservoir. The unlimited source is at a higher elevation than the reservoir. Plan A calls for the construction of a parallel pipeline and for flow by gravity. Plan B specifies construction of a booster pumping station. Estimated cost data for the two plans are as follows:

	Plan A(Pipe line)	Plan B (Pumping station)
Construction cost	E1000 000	E200 000
Useful life	40 years	40 years (structure) 20 years (equipment)
Cost of replacing equipment at the end of 20 years	0	E75 000
Operating costs	E1000/year	E50 000/year

Using the present worth method and 12% interest rate, determine which plan is more economical. Assume annual compounding, zero salvage value, and all other costs equal for both plans. (18 marks)

(40 Marks)

SECTION B: ANSWER ANY TWO QUESTIONS

Question 2

a) Discuss the importance of data in water resources planning. (15 marks)

b) Explain how the water demand of an urban area can be estimated. (15 marks)

(30 Marks)

Question 3

With the aid of diagrams, distinguish between aerobic and anaerobic lagoons in wastewater treatment.

(30 Marks)

Question 4

a) Explain the factors that are considered when selecting an irrigation method. (12 marks)

b) Explain any three irrigation methods, giving advantages and disadvantages of each. (18 marks)

(30 Marks)

Question 5

a) Explain the causes of floods. (15 marks)

b) Discuss any five (5) flood mitigation measures. (15 marks)

(30 Marks)