UNIVERSITY OF SWAZILAND
FINAL EXAMINATION PAPER

PROGRAMME: BSC AGRIC. 4 (CP, HORT & AEM)
BSC AGRIC. 5 (LWM)

COURSE CODE: LUM 402

TITLE OF PAPER: IRRIGATION MANAGEMENT

TIME ALLOWED: TWO (2) HOURS

SPECIAL MATERIAL REQUIRED: NONE

INSTRUCTIONS: ANSWER QUESTION ONE AND ANY TWO OTHER QUESTIONS.

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SECTION I: COMPULSORY QUESTION

QUESTION 1

(a)   Briefly but concisely, discuss the main factors that affect water requirements of a crop. (10 marks)

(b)   A tomato crop with an effective rooting depth of 105 cm and consumptive use coefficient of 0.71 is to be irrigated by a system with 90 % efficiency in Malkerns. An analysis of the soil profile of the field shows the following details:

Soil horizon	Depth (cm)	Soil material	θ_{FC} (% by weight)[#]	θ_{PWP} (% by weight)	Bulk density (kg/m^3)
A	0 – 74	Sandy clay loam	25	12	1350
B	74 – 100	Impervious hard pan	25	20	2160
C	100 – 200	Sand clay	30	15	1230
D	200 +	Consolidated bedrock	10	12	3340

[#] θ_{FC} = moisture content at field capacity; θ_{PWP} = moisture content at permanent wilting point.

Determine gross irrigation requirement and the irrigation interval during the month of October when mean average evaporation is 6.9 mm/day and the soil moisture depletion factor (p-factor) is 0.45. (30 marks)

SECTION II: ANSWER TWO QUESTIONS FROM THIS SECTION

QUESTION 2

(a)   Discuss the main factors that affect the uniformity of a sprinkler irrigation system (10 marks)

(b)   The following results were obtained from a uniformity test of a sprinkler irrigation system.

The catch can contents are in mm and the letter S represents the position of a sprinkler.

S			S
80	70	68	74
78	66	68	70
52	56	54	64
74	60	56	86
80	70	64	86
S			S

The sprinkler spacing is 12 m x 12 m, the sprinkler pressure is 240 kPa and the set time is 12 hours.

Determine the uniformity coefficient (Christiansen's C.U.) and comment on the results (20 marks).

QUESTION 3

Discuss the major possible causes of salinity on irrigated fields. (30 marks)

QUESTION 4

Discuss the importance of irrigation scheduling in the overall management of an irrigation system. (30 marks)