



**UNIVERSITY OF SWAZILAND  
MAIN EXAMINATION PAPER**

**PROGRAMME: BSC IN LAND AND WATER MANAGEMENT  
YEAR 4**

**COURSE CODE: LUM 403 (NEW PROGRAMME)**

**TITLE OF PAPER: IRRIGATION WATER MANAGEMENT**

**TIME ALLOWED: TWO (2) HOURS**

**SPECIAL MATERIAL REQUIRED: NONE**

**INSTRUCTIONS: ANSWER QUESTION ONE AND ANY TWO  
OTHER QUESTIONS**

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**QUESTION 1**

- a) Sugarcane is to be irrigated by furrows at 1m spacing, on a loam soil. The design crop water requirements have been determined as 8 mm/day, with a maximum allowable deficit of 50 mm and a design application efficiency of 60%. The conveyance efficiency is expected to be 90%. Irrigation is always to field capacity. The length of each furrow is 300m, and the stream size suggested is 2.5 l/s.

Determine the following:

- i) Net irrigation
- ii) Irrigation interval
- iii) Gross irrigation
- iv) Volume of water irrigated per furrow
- v) Irrigation time

[20 marks]

- b) What do the following terms mean with regard to canal design for furrow irrigation system.

- i) Freeboard
- ii) Command
- iii) Seepage
- iv) Wetted perimeter
- v) Stream size

[20 marks]

**QUESTION 2**

Swaziland has embarked on construction of large dams in an attempt to provide water for irrigation. Discuss the viability of such projects; in as far as returns to investment are concerned, hydrological challenges, and the social and environmental impacts that accompany such big projects.

[30 marks]

**QUESTION 3**

Government has in the past been encouraging the irrigation mostly of non-food crops. In fact 92% of irrigated area in Swaziland is sugarcane which is a non-food crop. Some people find fault in that and blame it for the prevailing food shortage in the country. Discuss.

[30 marks]

**QUESTION 4**

Clogging is a problem in trickle irrigation due to the narrow passages and small orifices. Thus the quality of water used in irrigation should be of a high standard, but sometimes there is no alternative supply with good quality water. Filtration and chemigation will thus be required. Describe the two processes as they are carried out in trickle irrigation system maintenance.

**[30 marks]**