



The Open University of Sri Lanka  
 Faculty of Engineering Technology  
 Industrial Studies & Technology (Engineering)  
 Programme of Study  
 Final Examination – 2015/2016  
**AEX4237 Irrigation and Drainage  
 Engineering**

**Date** : 11-12-2016  
**Time** : 9.30 – 12.30  
**Duration:** Three (03) hours

**SECTION II** : Answer any **four** (04) questions. All questions carry equal marks.

- (1) (a) Differentiate between reference evapotranspiration ( $ET_0$ ) and crop evapotranspiration ( $ET_c$ ).  
 (b) Discuss direct methods to estimate evapotranspiration.  
 (c) When  $p=0.29$  and mean daily temperature is  $21.5^\circ\text{C}$ , calculate the reference evapotranspiration ( $ET_0$ ) in mm/day using Blaney-Criddle method.
- (2) (a) State the importance of making an irrigation schedule.  
 (b) Define the following terms regarding an irrigation system.  
 i. Application Efficiency ( $E_a$ )  
 ii. Conveyance efficiency ( $E_c$ )  
 iii. Project efficiency ( $E_p$ )
- (c) (i) The Reddish Brown Earth in the dry zone of Sri Lanka holds 21% and 9.5% of water respectively at field capacity and permanent wilting point (by weight). If the dry bulk density of soil is  $1.3\text{ g/cm}^3$ , determine the total water available for plants in this soil.  
 (ii) If a Maize crop grown in the soil, mentioned in section (c) above, with a root depth of 1.2m and consumptive use of

8mm/day, determine the irrigation interval and volume, assuming irrigation at 50% depletion of the total available water.

- (3) (a) List the basic knowledge needed for the alignment of canals.  
 (b) Discuss the water control and measuring structures in canals.  
 (c) The discharge of a pipe turnout is  $0.58 \text{ m}^3/\text{s}$ . The bed level is 25.50 m and the full supply depth is 3.35 m. In a tail canal the Full Supply Depth (FSD) is 0.46 m. The bed width is 3.56 m and free board is 0.43 m. The turnout pipe diameter is 0.78 m and Manning's  $n$  is 0.015. The pipe length is 15.15 m. Calculate
- The velocity through the pipe
  - Maximum Allowable Velocity (MAV)
  - Friction loss of the pipe
- (4) (a) King Parakramabahu I was considered as the greatest ruler in Polonnaruwa era. Describe the great irrigation works by him?  
 (b) 'Ancient Engineers are good technological and technical inventors' critically evaluate this statement.  
 (c) State the functions of Irrigation Department in Sri Lanka.
- (5) (a) What are the basic methods of irrigation?  
 (b) Compare the advantages and disadvantages of each method.  
 (c) What are the crops suitable to be grown under each method and why?  
 (d) Calculate the scheme water requirement in February for a 30 ha farm growing the following crops.

Crop	Area (ha)	Crop Water Requirement in February (mm/d)
Maize	15	5.4
Cotton	10	4.3
Vegetables	5	3.0

Assume that: Water application efficiency is 65%, Conveyance efficiency is 70% and Irrigation only takes place for 14 hours each day and 5 days each week.

- (6) Write short notes on any **three** (03) of the following.
- Acid Sulphate soils
  - Earth moving equipment
  - Canal operation and maintenance
  - 'System A' management structure
  - Class A Open Pan

.....END OF PAPER.....