



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

Faculty of Engineering & Technology

DEPARTMENT OF CIVIL AND BUILDING ENGINEERING

**HIGHER DIPLOMA IN BUILDING AND CIVIL ENGINEERING
(HD 09)**

END OF COURSE EXAMINATIONS

APRIL/MAY 2010 SERIES

HYDROLOGY

TIME: 2 HOURS

Instructions to Candidates

This paper consists of **FIVE** questions.

Answer Question **ONE** and any other **TWO** Questions giving your results clearly.

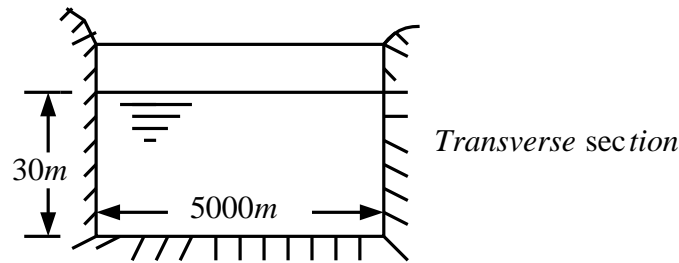
Question ONE

- (a). Briefly describe the process of evapo-transpiration. **(12 Marks)**
- (b). Explain **SIX** factors that affect evaporation. **(12 Marks)**
- (c). Give the general equation for the total evaporation and explain the terms used. **(6 Marks)**

Question TWO

- (a). (i). State Darcy's equation and explain the terms. **(2 marks)**
- (ii). State the importance of the extension of Darcy's law to ground water flow. **(3 marks)**

(b).



Im permeable

Fig. 1

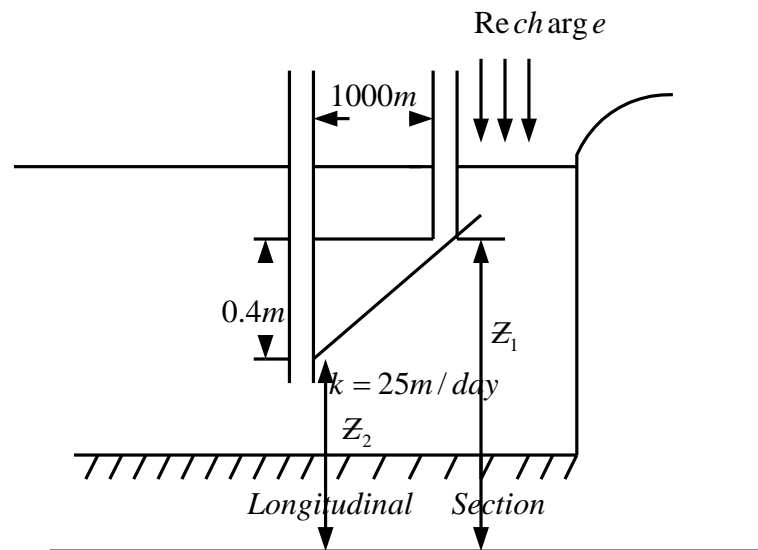


Fig. 2

Figure 1 and Figure 2 shows a cross-section through an aquifer.

Using the information given,

- (i). Calculate the velocity. (5 marks)
- (ii). Calculate the Discharge (5 marks)
- (iii). Calculate Transmissivity (5 marks)

Question THREE

- (a). Define the instantaneous unit Hydrograph. (6 Marks)
- (b). Define the Unit Hydrograph. (5 Marks)
- (c). Give the general discrete equation for the unit hydrograph and give an explanation of the terms used. (3 Marks)
- (d). Mention **THREE** assumptions that give the TUH simple properties assisting in its application. (6 Marks)

Question FOUR

- (a). A well with a radius of 0.5m completely penetrates an unconfined aquifer with $k=30\text{m/day}$ and $H=50\text{m}$. The well is pumped so that the water level in the well remains at 40m above the bottom. Assuming that pumping has essentially no effect on water-table height at $r=500\text{m}$ and that well losses are zero, Calculate the steady-state well-discharge. (10 Marks)
- (b). Using the Gumbel approach with:
$$x = 700$$
$$\bar{x} = 288$$
$$\Gamma = 113.3$$
 - (i). Calculate the theoretical recurrence interval for a flood flow 700,000 cfs. (8 Marks)
 - (ii). Calculate the probability P. (2 Marks)

Question FIVE

- (a). Outline **EIGHT** commonly accepted measures for reducing flood damage. (20 Marks)

(b). Define the following terms:

- (i). Anisotropic,
- (ii). Transmissivity,
- (iii). Piezometric surface,
- (iv). Storage coefficient
- (v). Transient flow

(10 Marks)