

Total No. of Questions : 8]

SEAT No. :

P-1420

[Total No. of Pages : 3

[6004]-470

B.E. (Civil)

IRRIGATION AND DRAINAGE

(2019 Pattern) (Semester - VIII) (401013C) (Elective - V)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.
- 2) Answer to the all questions should be written in single answer-book.
- 3) Figures to the right indicate full marks.
- 4) Neat diagrams must be drawn wherever necessary.
- 5) Assume suitable data if necessary.

- Q1) a) Draw a neat sketch of centrifugal pump and explain any three component parts. [6]
- b) Draw a layout of drip irrigation system. Explain three component parts of drip irrigation system. [6]
- c) Explain following component parts of lift irrigation: [6]
- i) Intake structure
 - ii) Rising main

OR

- Q2) a) Explain why priming is essential in centrifugal pump. [6]
- b) Explain the procedure for design of main line in drip irrigation system. [6]
- c) Discuss two empirical equations used to estimate head loss in drip irrigation. [6]

- Q3) a) Draw a labelled sketch showing components of a sprinkler irrigation system and explain any four component parts in brief. [8]
- b) Explain how to calculate water spread area using Cavazza formula. [3]
- c) Determine the system capacity for a sprinkler irrigation system to irrigate 20 ha of maize crop. Design moisture use rate is 5 mm per day. Moisture replaced in soil at each irrigation is 7 cm. Irrigation efficiency is 70 %. Irrigation period is 10 days in 12 day interval. The system is to be operated for 18 hours per day. [6]

OR

P.T.O.

- Q4)** a) Determine the required capacity of a sprinkler system to apply water at the rate of 1.25 cm/hr. Two 186 m long sprinkler lines are required. Sixteen sprinklers are spaced at 12 m intervals on each line. The spacing between lines is 18 m. [6]
- b) A lateral has 14 sprinklers spaced 16 m apart. The laterals are spaced 20 m on the main line. Determine the amount of fertilizer to be applied at each setting when recommended fertilizer dose is 90 kg/ha. [6]
- c) Explain with neat sketch Fertilizer Applicator in sprinkler irrigation system. [5]
- Q5)** a) Define the following terms : [6]
- Sodic soil
 - Alkaline soil
 - Cation exchange capacity (CEC)
 - Exchangeable sodium percentage (ESP)
 - Leaching requirement
 - Sodium adsorption ratio (SAR)
- b) A quantity of 100 ml of gypsum solution, having 32 meq/l concentration as calcium, on reacting with 5 gm of an alkali soil showed 29.5 meq/l of Ca+Mg concentration in the filtrate. Estimate the gypsum requirement in meq/100 gm soil. [6]
- c) Explain in brief - water stress coefficient. [5]

OR

- Q6)** a) Explain in brief - salinity stress coefficient. [5]
- b) Calculate osmotic potential in the soil at 28% water content if electrical conductivity of saturated paste extract is equal to 1.3 dS/m, and saturated water content is 50%. [6]
- c) Explain different engineering practices for salinity management. [6]

- Q7) a) Draw a neat sketch of pipe envelope and also explain functions of pipe envelope. [6]
- b) Determine the required drain spacing for the basic design criteria $q = 8$ mm/d, $H = 0.6$ m, pipe with outer diameter = 0.2 m and wet entry perimeter (u) = 0.3 m. $K_1 = 2.1$ m/day, $K_2 = 1.1$ m/day. $W = 1$ m, $D = 3$ m. Refer Fig. 7 (b). Use Hooghoudt's formula. Take only two trials. [9]

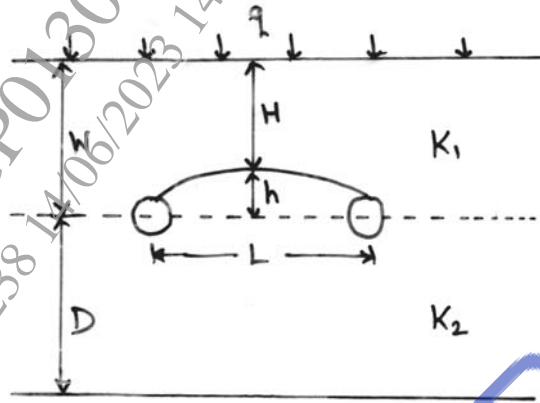


Fig. 7 (b)

- c) Write Glover-Dumm formula with meanings of all symbols. [3]

OR

- Q8) a) Surface drainage should be planned for a new agricultural farm to drain out irrigation tail-water and seasonal rainfall runoff. The maximum rainfall intensity at the site in 20 years record is 37 mm/h. The tertiary drain would have to carry runoff from 3.8 ha land. The secondary drain would have to carry thrice of tertiary, and the main drain to carry discharge of five secondary drains (of similar flow). Determine the design discharge capacity of the (i) tertiary, (ii) secondary, and (iii) main drain. [9]
- b) Explain different types of surface drainage system layouts. [6]
- c) What are the selection criteria for drain pipe? [3]

