Total No. of Questions : 8]

SEAT No. :

PE-2158

[Total No. of Pages : 3

[6584]-57
B.E. (Civil)
IRRIGATION AND DRAINAGE
(2019 Pattern) (Semester - VIII) (401013-C) (Elective - V)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or Q8.***
2) ***Answers to the all questions should be written in single answer-book.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain characteristic curves of centrifugal pump. **[6]**

b) What are the advantages and disadvantages of drip irrigation system. **[6]**

c) Enlist component parts of lift irrigation system. Explain how to calculate power requirement of centrifugal pump in lift irrigation. **[6]**

OR

Q2) a) Define following terms related to centrifugal pump: **[6]**

i) static head, ii) manometric head, iii) delivery head,

iv) gross head, v) suction head, vi) manometric efficiency

b) Draw a neat sketch of centrifugal pump and explain component parts. **[6]**

c) What is the NPSH of centrifugal pump? Distinguish between available NPSH and required NPSH. **[6]**

P.T.O.

Q3) a) Explain hydraulic design of sprinkler irrigation system. **[9]**

b) Determine the system capacity for a sprinkler irrigation system to irrigate 25 hectares of a crop. Design moisture use rate is 7.5 mm/day. Moisture replaced in soil at each irrigation is 8 cm. Irrigation efficiency is 75 %. Irrigation period is 11 days in a 14-day interval. The system is to be operated for 19 hours per day. **[8]**

OR

Q4) a) Determine the required capacity of a sprinkler system to apply water at the rate of 1.35 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) Draw a labelled sketch showing components of a sprinkler irrigation system. What are advantages and disadvantages of sprinkler irrigation system. **[6]**

c) Explain with neat sketch Fertilizer Applicator in sprinkler irrigation system. **[5]**

Q5) a) What is osmotic potential? How to calculate osmotic potential energy in saturated soils? **[5]**

b) Explain different engineering practices for salinity management. **[6]**

c) Estimate the leaching requirement when the electrical conductivity (EC) of the saturation extract of the soil is 11 mmhos/cm at 25 percent reduction in the yield of cotton. The EC of irrigated water is 1.5 mmhos/cm. **[6]**

OR

Q6) a) What is leaching fraction? Explain how to compute leaching fraction. **[6]**

b) Explain in brief – water stress coefficient. **[5]**

c) A quantity of 100 ml of gypsum solution, having 29 meq/l concentration as calcium, on reacting with 6.5 gm of an alkali soil showed 30 meq/l of Ca+Mg concentration in the filtrate. Estimate the gypsum requirement in meq/100 gm soil. **[6]**

Q7) a) Explain different types of sub surface drainage system layouts. **[6]**

b) It is required to design surface drainage for a new agricultural farm to drain out irrigation tail-water and seasonal rainfall runoff. The maximum rainfall intensity at the site in 30 years record is 38 mm/h. The tertiary drain would have to carry runoff from 6.0 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. **[8]**

c) Enlist different types of drain pipes used for subsurface drainage and brief about anyone. **[4]**

OR

Q8) a) Explain different surface drainage system layouts. **[6]**

b) What is composite drainage system? **[3]**

c) Determine the required drain spacing (L) for the basic design criteria q = 7.9 mm/d, H = 0.87 m, pipe with outer diameter = 0.3 m and wet entry perimeter (u) = 0.45 m. K_1 = 3.5 m/day, K_2 = 2.0 m/day. W= 1.7 m, D = 3 m. Refer Fig. 8 (c).
Use Hooghoudt's formula. Take only two trials. **[9]**

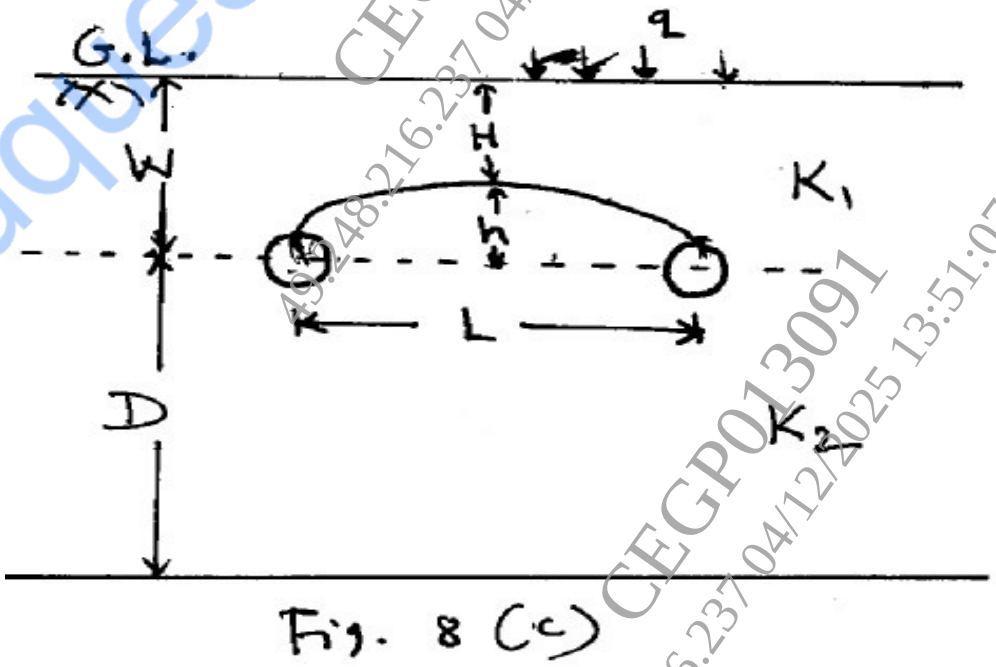

Fig. 8 (c)