Total No. of Questions : 8]

SEAT No. :

PD4566

[Total No. of Pages : 3

[6404]-71
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 Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q. 6, Q.7 or Q.8.***
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) What is the NPSH of centrifugal pump? Distinguish between available NPSH and required NPSH. **[6]**

b) Explain with neat sketch arrangement of various possible fittings at a submain intake from the main in a 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) What is the general information required for the design of a drip irrigation system? **[6]**

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

Q3) a) Explain the steps for sprinkler irrigation system design. **[9]**

b) Determine the system capacity for a sprinkler irrigation system to irrigate 20 hectares of a crop. Design moisture use rate is 7 mm/day. Moisture replaced in soil at each irrigation is 7.5 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

P.T.O.

Q4) a) A sprinkler irrigation system is to be designed to irrigate 8 hectares of vegetables crops in deep silt loam soil in moderate dry climate. The field is flat. Determine the irrigation period, the net depth of water per application, the depth of water pumped per application and the required system capacity in hectare-cm per day. Assuming that the system is operated for 15 hours each day, determine the pump capacity in lit/sec.

Assume following data: **[6]**

Limiting application rate = 1.3 cm/hr

Moisture holding capacity of the soil = 9.5 cm/meter depth

Root zone depth = 60 cm

Irrigation to be stated at 50 % moisture depletion.

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) Explain influence of salts on the physical properties of soil. **[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) What is sodicity? Explain how to calculate SAR? **[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 steps involved in land forming in surface drainage. **[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 40 mm/h. The tertiary drain would have to carry runoff from 6.5 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 **[8]**

i) tertiary,

ii) secondary, and

iii) main drain.

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 = 8 mm/d, H = 0.85 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 = 1.5 m, D = 3 m. Refer Fig. 8 (c). Use Hooghoudt's formula. Take only two trials. **[9]**

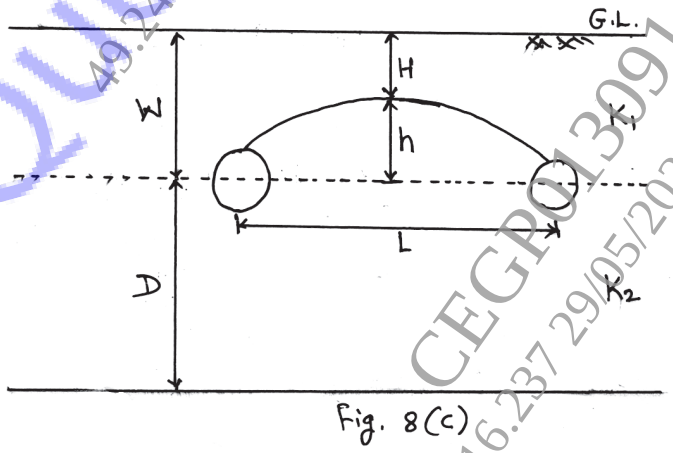

Fig. 8(c)