P6541

[6181]-90

B.E. (Civil)

IRRIGATION AND DRAINAGE

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

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) Draw a neat sketch of centrifugal pump. Explain its working. **[6]**

     b) Draw a layout of drip irrigation system. Explain three component parts of drip irrigation system. **[6]**

     c) Discuss two empirical equations used to estimate head loss in drip irrigation. **[6]**

OR

Q2) a) Why can the suction lift of a pump not exceed a certain limit? **[6]**

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

     c) Discuss the design procedure for lateral line of drip irrigation system for uniform slope. **[6]**

Q3) a) Explain the steps for sprinkler irrigation system design. **[8]**

     b) A sprinkler system is to be designed to irrigate 8 ha of the vegetable crop (Root zone depth = 60 cm) in deep silt loam soil (Limiting application rate = 1.3 cm/h; Mositure holding capacity = 9.5 cm/m depth) in a moderate dry climate. The field is flat. Assuming the allowable depletion level = 50%, water application efficiency = 75% and peak rate of mositure use by crop = 5 mm/day. Determine the net depth of water per application, the depth of water pumped per application, irrigation period and the required system capacity in ha - cm per day. Assuming that system is operated for 15 h each day, determine the pump capacity in lit/sec. **[9]**

OR

Q4) a) Draw a labelled sketch showing components of a sprinkler irrigation system. What are advantages and disadvantages of sprinkler irrigation system. **[6]**

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

c) 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]**

Q5) a) What are the most common problems that result from using poor quality of irrigation water. **[6]**

b) Determine the depth of irrigation water which would change 30 cm depth of loam soil into saline soil condition, if the electrical conductivity of irrigation water is 1 millimhos/cm. The bulk density of the soil is 1.2 gm/cc and the density of water is 1 gm/cc. The saturation percentage of the soil is 40. **[6]**

c) Explain in brief-water stress coefficient. **[5]**

OR

Q6) a) Explain how to compute yield reduction due to salinity. **[5]**

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

c) A quantity of 100 ml of gypsum solution, having 30 meq/1 concentration as calcium, on reacting with 6 gm of an alkali soil showed 29.5 meq/1 of Ca+Mg concentration in the filtrate. Estimate the gypsum requirement in meq/100 gm soil. **[6]**

Q7) a) Explain in brief:
   i) clay tile pipe,
   ii) concrete pipe,
   iii) plastic pipe used for subsurface drainage system. **[6]**

b) Determine the required drain spacing (L) for the basic design criteria $q = 6$ mm/d, $H = 0.65$ m, pipe with outer diameter = 0.25m and wet entry perimeter (u) = 0.35 m. $K_1 = 2.0$ m/day, $K_2 = 1.0$ m/day. W = 1m, D = 3m. Refer Fig. 7(b). Use Hooghoudt's formula. Take only two trials. **[9]**

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 32 mm/h. The tertiary drain would have to carry runoff from 3.5 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 **[9]**

   i) tertiary.

   ii) secondary, and

   iii) main drain.

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

   c) What are the advantages of sub surface drainage system? **[3]**

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