B. TECH.
(SEM. VIII) EXAMINATION. 2006-07
IRRIGATION & DRAINAGE EQUIPMENT DESIGN

Time: 3 Hours] [Total Marks: 100

Note: (1) Attempt all questions.
(2) All questions carry equal marks.
(3) In case of numerical problems assume data wherever not provided.
(4) Use of calculator is permitted.
(5) Be precise in your answer.

1 Attempt any four parts of the following: 5x4=20
(a) Discuss the characteristics of “Dripplers” that affect the system efficiency of drip irrigation?
(b) What are the advantages of sub-surface drainage?
(c) Describe the frictional losses in sprinkler pipe lines?
(d) Describe the construction of centrifugal pump. Why priming for these pumps are essential?
(e) Describe the functioning of festigation unit in drip irrigation system.

2 Attempt any four parts of the following: 5x4=20
(a) Define a well. What are their types? Differentiate between shallow and open wells.

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(b) What are the criteria for selection of a pump?
(c) What are the components of drip irrigation system? Describe any two components in detail.
(d) For what purposes the interceptor drains are installed? Describe with a neat sketch.
(e) Name few indigenous water lifts and mention the power for operation. Enumerate the design parameter for Persian wheel?

3 Attempt any two parts of the following: 10×2=20
(a) What do you understand by specific well yield and co-efficient of storage? A open well, 2.5 m in diameter has its normal water level 3.5 m below ground surface. Water level depressed to 10 m below ground surface by pumping. After stopping the pumping the water level raised by 5 m in the duration of 3 hours. Calculate the specific yield of the well?
(b) How will you determine the size of plastic pipes used for sub-surface drainage. Discuss the importance of perforations in drain pipes and relation with relative increase in flow through the drain pipe?
(c) Explain the step by step drip irrigation design procedure for a peach garden of one hectare. The plants have row to row and plant to plant spacing as 10 m x 10 m. Assume the necessary data as per requirement.

4 Attempt any two parts of the following: 10×2=20
(a) How will you proceed for designing of the capacity of individual sprinkler? Determine the required capacity of a sprinkler system to apply water at the rate of 1.25 cm/hour. Two 186 m
long sprinkler lines are required. Sixteen sprinklers are spaced at 12 m interval on each line. The spacing between lines is 18 meters.

(b) Explain the process of installing tile drain? How many hectors will a 15 cm diameter tile drain with slope of 0.15% and drainage coefficient as 27 cm, is placed by tile drains?

(c) By showing the correct arrangement of pipe fittings and accessories describe the centrifugal pump installations on:
   (i) Tube well boring
   (ii) In the open well.

5 Attempt any two parts of the following: $10 \times 2 = 20$

(a) What are the basic requirements of any well screen? How will you design a well screen for non gravel packed well. A fully penetrating well in a confined aquifer has the maximum discharge capacity of 1000 lit/min. The aquifer is overlain and underlain by impervious layers. The thickness of aquifer is 20 m. Design the length of well screen assuming percentage open area of the available strainer to be 30% and bore hole diameter 20 cm.

(b) With the help of a neat sketch determine the Hooghoudts equation for spacing of the drain?

(c) Write short note on:
   (i) Filter design
   (ii) Drainage well and pumping unit.