

SEMESTER END EXAMINATION

B. Tech. (Agril. Engineering)

Semester	: VI (Old)	Academic Year	: 2011-12
Course No	: IDE 363	Title	: Advanced Irrigation System Design
Credits	: 3(2+1)		
Day & Date	: Thursday 26-4-2012	Time	: 09:00-12:00
		Max. Marks	: 80

- Note:
1. Solve ANY FIVE questions, from SECTION "A".
 2. All questions from SECTION "B" are compulsory.
 3. All questions carry equal marks.
 4. Draw neat diagrams wherever necessary.
 5. Make appropriate assumptions if required.

SECTION "A"

- Q.1 a) Derive an equation for advance of water front in Border by Parker's and Israelson's approach. (5)
- b) An irrigation stream of 27litre/second is diverted to a check basin of size 12x10 m. The field capacity of soil is 24% while average moisture content of soil before irrigation is 16%. Calculate the time for which water should be released to the check basin to bring the soil root zone of 1.20 m to the field capacity. Assume apparent specific capacity of soil equal to 1.50 gm/cc. (5)
- Q.2 a) A furrow having length of 90 m and spaced at 75 cm is irrigated by stream of initial discharge of 2 lps. The stream size was reduced to 0.5 lps, when initial stream reached at the end of furrow after 50 minutes. Find the average depth of irrigation, if cut back stream is continued for 1 hour. (5)
- b) Explain with figure the advance and recession characteristics of water in check basin (5)
- Q.3 a) Describe different basic variables involved in design of irrigation systems. (5)
- b) Classify different irrigation methods and write adaptability of furrow irrigation. (5)
- Q.4 a) Describe the operation of twin nozzle rotating sprinkle head with its neat sketch showing all components in details (5)
- b) Explain the moisture distribution patterns of rotating head sprinkler with appropriate diagrams/figure under (i)favourable conditions of wind and pressure and (ii) windy conditions. (5)
- Q.5 a) Determine the required capacity of sprinkler system to apply water at the rate of 1.25 cm/hr. Two 186 meters long sprinkler lines are required. 16 sprinklers are spaced at 12 meter intervals on each line. The spacing between lines is 18 meters. (5)
- b) Explain the types of sprinkler irrigation system? (5)
- Q.6 a) Describe various components of drip irrigation system. (5)
- b) A dripper is to deliver a discharge of 4 lit./hr. The distance between the dripper is 1 m. and the distance between the laterals is 4 m. Determine the application rate of the dripper in mm/hr. (5)
- Q.7 a) Enlist different fertilizer applicators and discuss the working of any one of them. (5)
- b) What are the causes of clogging of emitters and laterals in drip irrigation system. (5)

SECTION "B"

Q.8

Fill in the Blanks

- 1) The width of border usually varies from ____ to ____ m.
- 2) Venturi is device, which creates _____ pressure.
- 3) The recommended safe limits of land slope for border in clay to clay loam soil is _____ to _____ %
- 4) The inflow-outflow method measuring the infiltration in furrow irrigation is also known as _____ method
- 5) The minimum satisfactory value of uniformity coefficient in sprinkler irrigation under normal condition of pressure and wind velocity is _____ %
- 6) If index of jet break-up (Pd) is greater than _____ the condition of drop size is good.
- 7) The major factor influencing the efficiency of well designed sprinkler irrigation system is _____.
- 8) Soil moisture between field capacity and permanent wilting point is referred as _____.
- 9) For laminar flow the emitters discharge exponent, $x =$ _____.
- 10) One centimeter depth of water over an area of one hectare = _____ cubic meter.

Q.9

State whether true or false.

- 1) Furrow irrigation reduces the labour requirements in land preparation and irrigation.
- 2) In check basin irrigation sandy and sandy loam soils permit the use of large size basins.
- 3) Corrugation irrigation is most suitable in loamy soils.
- 4) A portable sprinkler system has portable main lines, laterals and a portable pumping plant.
- 5) Sprinkler irrigation is most suitable for jute.
- 6) Gravel filters/sand filters are used principally for filtering out heavy loads of very fine sands and organic matter.
- 7) Land leveling is essential for irrigation with drip irrigation system
- 8) In trickle irrigation, the design criteria is generally based on emitter flow variation of 20%
- 9) Check basins are useful when when leaching is required to remove salts from the soil profile.
- 10) With higher pressure, the water from the nozzle breaks into very fine drops and fall very near the sprinkler

Q 10

Define the following.

- | | |
|----------------------------------|--------------------------------|
| 1) Infiltration opportunity time | 2) Water conveyance efficiency |
| 3) Field capacity | 4) Fertigation |
| 5) Accumulated infiltration. | |