12226

15116

3 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory*.

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. a) **Attempt any <u>THREE</u> of the following:** **12**

(i) Write four points which will justify the importance of micro irrigation in India.

(ii) Define:

1) Hygroscopic water

2) Capillary water

3) Gravitational water

4) Field capacity

(iii) Define sprinkler irrigation and drip irrigation. Name the crop in each case where these systems are more beneficial.

(iv) Enumerate four important factors for selection of type of sprinkler.

Marks

b) **Attempt any <u>ONE</u> of the following:** **6**

(i) Explain modified Penman method of determination of evapotrianspiration and/or consumptive use.

(ii) Explain in short the steps involved in the design of sprinkler irrigation system.

2. Attempt any <u>FOUR</u> of the following: **16**

a) Compare micro irrigation method with other irrigation method on the following points:

(i) quantity of water required

(ii) weed growth

(iii) quantity of yield

(iv) quality of yield

b) What is water audit? Write three important benefits of water audit.

c) Determine the storage capacity of soil from the following data:

(i) Field capacity = 32%

(ii) Wilting point = 15%

(iii) Depth of root zone = 1 m

(iv) Dry unit weight of soil = 18 kN/m^3

d) Dry a typical layout of sprinkler irrigation system with well as source of water. Label the component.

e) Write the formula for calculating the discharge of an individual sprinkler giving the meaning of each term.

Marks

3. Attempt any FOUR of the following: **16**

a) Write any four important advantages of drip irrigation over sprinkler irrigation system.

b) Define fertigation and filtration. State the importance of each in drip irrigation in one sentence.

c) Enumerate the basic steps involved in the design of drip irrigation system.

d) Determine the system capacity of sprinkler irrigation system to irrigate 20 hectares of wheat crop. Depth of irrigation to be applied is 5 cm. Number of days required to complete one irrigation is 15 days. The system is to be operated for 20 hours per day. Assume the irrigation efficiency as 80%.

e) Write four important limitations of micro irrigation system.

4. a) Attempt any THREE of the following: **12**

(i) 12 cumec of water is delivered to a 35 hectare field for 5 hours. Soil proving after the irrigation indicates that 0.3 metre of water has been stored in the root zone. Compute the water application efficiency.

(ii) Describe the process of fertigation by using venturi.

(iii) Enumerate the basis steps involved in the design of drip irrigation system.

(iv) Explain in short, the screen filter with neat sketch.

b) Attempt any ONE of the following: **6**

(i) Explain soil moisture regime concept for estimating depth and frequency of irrigation.

(ii) Enumerate the steps involved in the installation and commissioning of drip irrigation system.

Marks

5. Attempt any FOUR of the following: **16**

a) Determine the required capacity of a sprinkler system to apply water at the rate of 1.25 cm/hr. Two 186 metres long sprinklers lines are required. Sixteen sprinklers are spaced at 12 metres intervals on each line. The spacing between lines is 18 metres.

b) Calculate the frictional head loss through a lateral of drip irrigation system for following conditions:

(i) no. of emitters = 50

(ii) emitter discharge = 4 lit/hour

(iii) Hazen and William constant = 120

(iv) Lateral diameter = 16 mm

(v) Lateral length = 50 metre

(vi) Outlet factor = 0.36

(vii) lateral equivalent length per emitter = 0.35 metre

c) Write two advantages and two limitations of fertigation.

d) Enumerate the methods of fertilizer injection in case of drip irrigation system.

e) Compare sprinkler irrigation and drip irrigation on the following points:

(i) water use

(ii) cost

(iii) weed growth

(iv) maintenance

f) Explain in short the classification of sprinkler irrigation system on the basis of spraying arrangement.

Marks

6. Attempt any TWO of the following: **16**

a) Determine the frequency of irrigation and discharge of a sprinkler suitable for following requirement:

(i) Type of crop - cotton

(ii) Area of crop - four hectare

(iii) Area peak moisture requirement - 4 mm/day

(iv) Total moisture requirement of crop - 100 mm

(v) Pump operation hours - 18 hours

b) Design specific discharge rate of lateral and submain suitable for following field requirements.

(i) Type of crop - Banana

(ii) Area of crop - 150 m × 150 m on submain.

(iii) Spacing of plant - 1.5 m × 1.5 m

(iv) Discharge per dripper - 4 LPH

c) Calculate the power of pump in kW suitable for following data:

(i) Rate of flow required = 7 lit/sec

(ii) Suction head = 2.4 m

(iii) Delivery head = 5.7 m

(iv) Losses in main and submain = 2.50 m

(v) Fitting and other losses = 2.0 m

(vi) Operating pressure = 25 m

(vii) Efficiency of pump = 80%

(viii) Efficiency of motor = 85%

(ix) Overhead factor = 1.1