

M. Tech Odd Semester Examination, February, 2023

Agricultural Engineering
Water Resources Development and Management
(1st Semester)

Course No.: 1AE113
(Soil Water and Crop Environmental Engineering)

Full Marks: 70

Pass Marks: 28

Time: 3 hours

- Note:**
1. Attempt 05 (Five) questions by taking one from each unit.
 2. Begin each answer in a new page.
 3. Answer parts of a question at a place.
 4. Assume reasonable data wherever required.
 5. The figures in the right margin indicate full marks for the question.

UNIT-I

1. Define: 2x7=14
 - i. Field capacity
 - ii. Permanent wilting point
 - iii. Capillary water
 - iv. Adhesion and Cohesion
 - v. Soil moisture tension
 - vi. Ultimate wilting point
2.
 - i. Discuss the different kinds of water available in soil. 4

- ii. Differentiate between capillary and non-capillary pores; Soil texture and soil structure and Gravimetric potential and pressure potential. 6
- iii. Why are loamy soils considered more favourable to crop production? Write down the classification of soil size according to ISSS. 4

UNIT-II

- 3. i. What is evapotranspiration? Discuss the different methods of estimation of crop water requirement. 8
- ii. Discuss the effect of different growth stages of crops on K_c . 6
- 4. i. Discuss the crop response to water at different stages of crop with an example. 8
- ii. Discuss the relation between crop yield and water supply to crop. 6

UNIT-III

- 5. Write short notes on 2x7=14
 - i. Water vapour movement in soil
 - ii. Effective root zone depth
 - iii. Drought tolerance of plants
 - iv. Hydraulic conductivity
 - v. Poiseuille's law of flow of water
 - vi. Deep percolation
 - vii. Permeability
- 6 i. Explain Darcy's law of flow of fluid through a porous medium. What are the limiting factor for

the application of Darcy's law in flow through soils and aquifers? 6

- ii. Discuss the different methods to measure transpiration loss from plants. 8

UNIT-IV

- 7. i. Discuss the environmental factors affecting the root growth of plants. 7
- ii. Discuss about the water-uptake root profile relations. 7
- 8. i. What are the principles of operation of a tensiometer? What are its limitations? 6
- ii. Write short notes with diagram on: 8
 - a. Pressure plate apparatus
 - b. Neutron moisture meter

UNIT-IV

- 9. i. Discuss the factors affecting infiltration rate of water into the soil. 6
- ii. Explain the different infiltration models used to test infiltration rate of soil. 8
- 10. i. Explain the factors which influence the value of K_c . 8
- ii. Discuss water as a plant component. 6
