

Assume that head loss in pipe and bends and velocity head required = 3 m of water. 8

#### UNIT-IV

7. (a) What is pump curve? Briefly explain how you will select a pump for its best performance. 7
- (b) Write short note on the following (in connection to centrifugal pump):
- (i) Priming, (ii) Cavitation,
- (iii) Specific speed (iv) NPSH 8
8. (a) What is permanent flow measuring? What are the typical features of a flow measuring structure? 8
- (b) Explain the centrifugal pump and submersible pump used in irrigation. 7

#### UNIT-V

9. (a) Briefly describe the design steps and principles of surface drainage system. 8
- (b) In a tile drainage system the drains are laid with their centres 1.5 m below the ground level. The impervious is 9.0 m below ground level and the average annual rainfall in the area is 80 cm. If 1% of the annual rainfall is to be drained in 24 hr. to keep the highest position of the water table to 1 m below the ground level. Determine the spacing of the drain pipes. Coefficient of permeability may be taken as 0.001 cm/sec. 7
10. (a) Write the types of irrigation methods with their suitability, advantages and limitations for adopting in a particular field. 10
- (b) What are the factors to be considered in designing subsurface drainage system? Draw a schematic layout for a subsurface drainage system. 5

\*\*\*\*

## M. Tech Odd Semester Examination, February, 2023

### Agricultural Engineering

(1st Semester)

Course No.: 1AE-102

(On Farming Irrigation and Drainage Engineering)

Full Marks: 75

Pass Marks: 28

Time: 3 hours

- Note:**
1. Attempt 05 (Five) questions by taking one form 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. (a) How is the water lost while flowing through irrigation canal? What are the factor affecting of these losses and how will you estimate. 8
- (b) Define irrigation and its necessity on the tropical country like India. Write their ill effects of oversupply. 7
2. (a) Define: Duty, Intensity of irrigation, Evaporation, Net irrigation requirement and Field capacity. 8
- (b) The culturable command area for a distributary is 15,000 hectares. The intensity of Irrigation for rabi crop is 40% and for kharif crop is 15%. If the water requirements of two crops are 37.5 cm and 120 cm and their period of growth are 160 days and 140 days respectively. Determine the outlet discharge from average demand considerations. Also determine the peak demand discharge, assuming that the kor water depth

Turn Over

for two crops are 13.5 cm and 19 cm. and their kor periods are 4 weeks and 2 weeks respectively.

7

### UNIT-II

3. (a) What is the difference between crop water requirement and irrigation water requirement? 8
- (b) Estimate the leaching requirement when electrical conductivity (EC) value of a saturated extract of soil is 10 m mho/cm at 25 % reduction in the yield of a crop. The EC of irrigation water is 1.2 m mho/cm. what will be the depth of water to be applied to the field is the assumption use requirement of the crop is 80 mm? EC value of leaching water may be suitably assumed. 7
4. (a) Distinguish between: 8
- (i) Infiltration rate and Percolation
- (ii) Hygroscopic, Capillary and Gravitational water
- (b) A stream of 135 litres per second was diverted from a canal and 100 litres per second was diverted from a canal and 100 litre per second were delivered to the field. An area of 1.6 hec was irrigated in 8 hr. The effective depth of root zone was 1.8 m. the runoff loss in the field was 432 cm<sup>3</sup>. The depth of water penetration varied linearly from 1.8 m at the head end of the field to 1.2 m at the tail end. Available moisture capacity of the soil is 2 cm per depth of soil. Determine the water conveyance efficiency, water application efficiency, water storage efficiency and water distribution efficiency. Irrigation was started at a moisture extraction level of 50% of the available moisture. 7

### UNIT-III

5. (a) Distinguish between with examples:
- (i) Animal operated water lift and Manual operated water lift
- (ii) Parshall flume and V-Notch
- (iii) Orifice meter and Venturi meter
- (iv) Single acting and Double acting type positive displacement pump 8
- (b) For a wheat field, the following information is available:
- Field capacity = 41% by volume  
Wilting point = 19% by volume  
Effective root zone depth = 35 cm  
Irrigation is given upto field capacity considering the above root zone  
Average daily ET rate for that period = 6 mm/day
- Determine:
- (a) Maximum plant available water within the root zone
- (b) The time of irrigation (days from the moisture reading) allowing 70% depletion of plant available moisture
- (c) Depth of irrigation required 7
6. (a) Describe the factors influencing selection of an irrigation method. 7
- (b) In a sprinkler irrigation system, the lateral spacing along the mainline is 20 m and sprinkler spacing along laterals is 15 m. The application rate for fulfilling the peak demand of the proposed crop should be 8 mm/d. Find the discharge rate per sprinkler. Also, determine the pump capacity.