SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF CIVIL ENGINEERING

QUESTION BANK

IV SEMESTER

CE3464 –IRRIGATION ENGINEERING

Regulation – 2023

Academic Year 2024 – 2025

Prepared by

Ms.K.Suganya Devi,

Assistant Professor / Civil

SRM VALLIAMMAI ENGINEERING COLLEGE
(An Autonomous Institution)
SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF CIVIL ENGINEERING

SUB. CODE: CE3464 **YEAR: II**
SUB. NAME: IRRIGATION ENGINEERING **SEM : IV**

QUESTION BANK

UNIT I – IRRIGATION AND CROP WATER REQUIREMENT

Need and classification of irrigation- historical development and merits and demerits of irrigation- physical properties of the soil that influence the soil moisture characteristic - types of crops, season, duty, delta and base period- consumptive use of crops - estimation of Evapotranspiration using experimental and theoretical methods.

PART-A (2 Marks)

1.	Define irrigation.	BT-1	Remember
2.	What are the necessities of irrigation?	BT-1	Remember
3.	Distinguish the advantages and disadvantages of irrigation.	BT-2	Understand
4.	What is the Gross command area and Culturable command area?	BT-1	Remember
5.	Name the types of irrigation.	BT-1	Remember
6.	List the techniques of water distribution in the farms.	BT-1	Remember
7.	Classify sprinkler systems.	BT-1	Remember
8.	Defend the advantages of sprinkler irrigation.	BT-2	Understand
9.	Enlist some major irrigation projects in India.	BT-1	Remember
10.	Recall the terms arid and semi-arid region.	BT-1	Remember
11.	Identify the factors on which duty depends.	BT-1	Remember
12.	Recall the term crop period.	BT-1	Remember
13.	Select the point at which the soil reaches the permanent wilting point.	BT-1	Remember
14.	Examine the term rotation period.	BT-1	Remember
15.	Write the duty, delta and base period relation.	BT-1	Remember
16.	Characterize the term delta of a crop.	BT-1	Remember
17.	What do you mean by wilting co-efficient?	BT-1	Remember
18.	Compare Kharif and Rabi crops.	BT-2	Understand

19.	Brief about Rabi crops.	BT-1	Remember
20.	Define the term irrigation efficiency.	BT-1	Remember
21.	Define effective rainfall.	BT-1	Remember
22.	Classify irrigation efficiencies.	BT-1	Remember
23.	Write about the Field Capacity.	BT-1	Remember
24.	What is Evapotranspiration?	BT-1	Remember

PART-B (16 Marks)

1.	Define Irrigation? What are the merits and demerits of irrigation?	BT-3	Application
2.	What is meant by Duty? List the factors affecting duty. How to improve duty?	BT-3	Understand
3.	A channel is to be designed for irrigating 5000 hectares in Kharif crop and 4000 hectares in Rabi crop. The water requirements for Kharif and Rabi are 60 cm and 25 cm respectively. The Kor period for Kharif and Rabi is 3 weeks and 4 weeks respectively. Determine the discharge of the channel for which it is to be designed.	BT-4	Analyze
4.	Define consumptive use of water. Explain the Factors affecting consumptive use of Water.	BT-3	Application
5.	Summarize the types of flooding methods with a neat sketch.	BT-3	Application
6.	The gross command area of an irrigation project is 1 lakh hectares. The culturable command area is 75% of G.C.A. The intensities of irrigation for Kharif and Rabi are 50% and 55% respectively. If the duties for Kharif and Rabi are 1200 hectares/cumec and 1400 hectares/cumec respectively. Determine the discharge at the head of the canal considering 20% provisions for transmission loss, overlap allowance, evaporation loss etc.	BT-3	Application
7.	The gross command area of an irrigation project is 1.5 lakh hectares, where 7,500 hectare are unculturable. The area of kharif crop is 60,000 hectares and that of Rabi crop is 40,000 hectares. The duty of kharif is 3000 hectares/cumec and the duty of Rabi is 4000 hectares/cumec. Find the design discharge of channel assuming 10% transmission loss and Intensity of irrigation for Kharif and Rabi crop.	BT-4	Analyze
8.	The consumptive use requirements of a crop are 0.3cm per day 1 to 15; 0.4 cm per day for days 16 to 40; 0.6cm per day for days 41 to 50 and	BT-4	Analyze

<table>
<tr><td></td><td>0.2cm per day for days 51 to 55. Effective rainfall of 3.5cm, distributed uniformly during the 36th and 45th days (both inclusive) is predicted. Compute the total quantity of water (in cu. M) to be delivered to a 60 hectares plot for the whole crop season with a pre-sowing requirement of 5cm of water.</td><td></td><td></td></tr>
<tr><td>9.</td><td>A water course has a culturable commanded area of 1200 hectares. The intensity of irrigation for crop A is 40% and for B is 35%, both the crops being Rabi crops. Crop A has a Kor period of 20 days and crop B has Kor period of 15 days. Calculate the discharge of the water if the depth for crop A is 10 cm and for B it is 16 cm.</td><td>BT-4</td><td>Analyze</td></tr>
<tr><td>10.</td><td>The field capacity of a soil is 20%, its permanent wilting point is 14% and specific dry unity weight is 15KN/m^3. If the effective depth of root zone of a crop is 75 cm. Consumptive use of water for crop is 11mm.After how many days will you supply water to the soil to ensure effective irrigation.</td><td>BT-4</td><td>Analyze</td></tr>
<tr><td>11.</td><td>A certain crop is grown in an area of 3000 hectares, which is fed by a canal system. The data pertaining to irrigation are as follows:
Field capacity of soil =26%
Optimum moisture = 12%
Permanent wilting point = 10%
Effective depth of root zone = 80cm
Apparent relative density of soil = 1.4
If the frequency of the irrigation is 10 days and the overall irrigation efficiency is 22% find the daily consumptive use and the water discharge in m^3/s required in the canal feeding the area.</td><td>BT-4</td><td>Analyze</td></tr>
<tr><td>12.</td><td>Write short note on the factors influencing duty, delta and base period.</td><td>BT-3</td><td>Application</td></tr>
<tr><td>13.</td><td>Determine the head discharge of a canal from the following data. The value of time factor may be assumed as 0.75.</td><td>BT-4</td><td>Analyze</td></tr>
<tr><td>14.</td><td><table><tr><th>Crop</th><th>Base Period in days</th><th>Area in hectare</th><th>Duty in hectares/cumec</th></tr><tr><td>Rice</td><td>120</td><td>4000</td><td>1500</td></tr><tr><td>Wheat</td><td>120</td><td>3500</td><td>2000</td></tr><tr><td>Sugarcane</td><td>310</td><td>3000</td><td>1200</td></tr></table></td><td></td><td></td></tr>
<tr><td></td><td>Estimate, after how many days will you supply water to a clay loam soil in</td><td>BT-3</td><td>Application</td></tr>
</table>

order to ensure efficient irrigation of the given crop, if

1. Field capacity of the soil is 25%
2. Permanent wilting point is 12%
3. Density of the soil is 1.65 g/cc
4. Effective depth of root zone is 70cm and

Daily consumptive use of water for the given crop is 10mm.

15. Table given below shows the details for a certain crop: — BT-4 — Analyze

Month	**Average Monthly Temperature (^{0} C)**	**Monthly % of day time hours of the year**	**Useful Rainfall (cm)**
November	19	7.19	-
December	16	7.15	1.2
January	12.5	7.30	0.8
February	13	7.03	-

Using Blaney Criddle equation and a crop factor of 0.75, Determine: Consumptive Use, Consumptive Irrigation Requirement, Field Irrigation Requirement and Gross Irrigation Requirement. Given, Water Application Efficiency = 70% Water conveyance efficiency = 60% Latitude of the place = 30^0 N

16. A sandy loam soil holds water at 140mm/m depth between field capacity and permanent wilting point. The root depth of the crop is 30cm and the allowable depletion of water is 35%. The daily water used by the crop is 5mm/day. The area to be irrigated is 60 hectare and water can be diverted at 28l.p.s. The surface irrigation application efficiency is 40%. There are no rainfall and ground water contribution. — BT-3 — Application

17. The base period, intensity of irrigation and duty of water for various crops under the canal system is given. Determine the reservoir capacity if the culturable commands area is 4000 hectares, canal losses are 25% and reservoir lossses are 15% — BT-4 — Analyze

Crop	**Base Period(days)**	**Duty at field (hec/cumec)**	**Intensity of Irrigation (%)**
Wheat	120	1800	20
Sugarcane	360	1700	20
Cotton	180	1400	10
Rice	120	800	15
Vegetable	120	700	15

UNIT II - IRRIGATION METHODS

Tank irrigation — Well irrigation — Irrigation methods: Surface and Sub-Surface and Micro Irrigation design of drip and sprinkler irrigation — ridge and furrow irrigation- Irrigation scheduling – Water distribution system- Irrigation efficiencies- planning and development of irrigation projects.

PART-A (2 Marks)

1.	Define tank irrigation.	BT-1	Remember
2.	What is Micro irrigation?	BT-1	Remember
3.	Where and when the direct irrigation is adopted?	BT-1	Application
4.	Name a suitable method of irrigation for a hilly terrain. Justify your answer.	BT-1	Remember
5.	Define Net irrigation.	BT-1	Remember
6.	What is meant by contour farming?	BT-1	Remember
7.	Compare lift and flow irrigation.	BT-2	Understand
8.	Infer the advantages of sprinkler irrigation.	BT-2	Understand
9.	Summarize the limitations of sprinkler irrigation.	BT-2	Understand
10.	Classify the types of canals.	BT-2	Understand
11.	Plan a distribution system for canal irrigation.	BT-1	Application
12.	Develop the term tank irrigation.	BT-2	Application
13.	Construct the concept of watershed canal.	BT-1	Remember
14.	Simplify the term alluvial soil.	BT-1	Remember
15.	Analyze aboutthe border irrigation system.	BT-2	Application
16.	Discover the advantages of drip irrigation.	BT-2	Understand
17.	Explain seepage line irrigation.	BT-1	Remember
18.	Explain afflux of water.	BT-1	Remember
19.	Discuss the disadvantages of sub surface irrigation.	BT-2	Understand
20.	Elaborate on contour farming.	BT-1	Remember
21.	Define lift irrigation.	BT-1	Remember
22.	Explain crop rotation and what are its advantages?	BT-2	Understand
23.	Simplify and write a note on sprinkler irrigation system.	BT-2	Understand
24.	Discuss on the term non-alluvial soil.	BT-1	Remember

PART-B (16 Marks)

1.	Explain Canal Irrigation? What are the classifications of canal?	BT-4	Analyze
2.	Why should lining be provided in canals? What are the merits and demerits of canal lining?	BT-4	Analyze
3.	Define surface irrigation. Why it is widely practiced method of irrigation? What are the advantages and disadvantages of the method?	BT-3	Application
4.	Write a short note on Lift irrigation. What are the pumps used for Lift irrigation?	BT-3	Application
5.	Write a short note on Tank irrigation. Explain its type.	BT-3	Application
6.	Explain the different types of flooding methods.	BT-4	Analyze
7.	Explain in detail about sprinkler method of irrigation and how far it is suitable in Indian conditions.	BT-3	Application
8.	Write a note on drip irrigation? Identify the components of drip irrigation system.	BT-4	Analyze
9.	List the merits and demerits of tank irrigation.	BT-4	Analyze
10.	List the merits and demerits of lift Irrigation.	BT-4	Analyze
11.	Infer the advantages and disadvantages of drip irrigation system.	BT-4	Analyze
12.	Evaluate the advantages and disadvantages of Sprinkler System.	BT-4	Analyze
13.	Compile the different types of Irrigation Efficiencies. Explain the types in detail.	BT-3	Application
14.	Compare drip irrigation and Sprinkler irrigation in detail.	BT-3	Application
15.	A stream of water of 125 liters/sec was diverted from a canal and 100 liters/sec were delivered to the field. An area of 1.6 hectares was irrigated in 8 hours. The effective depth of root zone was 1.7m. The runoff loss in the field was 420 m^3. The depth of water penetration varied linearly from 1.7m at the head end of the field to 1.1m at the tail end. Available moisture holding capacity of the soil is 20cm/m depth of soil. Determine the various irrigation efficiency.Irrigation was started at a moisture extraction level of 50% of available moisture.	BT-4	Analyze
16.	Briefly explain about irrigation scheduling.	BT-3	Application

17.	Design a sprinkler irrigation system to irrigate 5 hectare Wheat crop. Assume Soil type = silt loam, Infiltration rate at field capacity = 1.25 cmh^{-1}, Water holding capacity = 15 cm m^{-1}, Root zone depth = 1.5 m, Daily consumptive use rate = 6 mm day^{-1}, Sprinkler type = Rotating head.	BT-4	Analyze

UNIT III - DAMS, DIVERSION AND IMPOUNDING STRUCTURES

Factors affecting the location of dam-Forces on a dam– Gravity dam -Design of Gravity dams, Earth dams, Arch dams- Spillway- Energy dissipaters. Diversion Head works - Weirs and Barrages- Types of Impounding structures.

PART-A (2 Marks)

1.	What is meant by Waste weir?	BT-1	Remember
2.	List the various kinds of dams.	BT-1	Remember
3.	Name the different types of spillways.	BT-1	Remember
4.	What is a weir?	BT-1	Remember
5.	Define tank sluices.	BT-1	Remember
6.	List the forces acting on arch dams.	BT-1	Remember
7.	Explain the term sluiceway.	BT-2	Understand
8.	Summarize on spillway.	BT-2	Understand
9.	Classify the types of earthen dams.	BT-2	Understand
10.	Explain barrage.	BT-1	Application
11.	Illustratethe modes of failure in gravity dams.	BT-1	Remember
12.	Develop the term gravity dam.	BT-1	Remember
13.	Dramatize the term stream line.	BT-2	Application
14.	Analyze the limitations of blights creep theory.	BT-2	Understand
15.	List the functions of weir.	BT-1	Remember
16.	List the uses of dams.	BT-1	Remember
17.	Determine the different types of diversion head works.	BT-1	Remember
18.	Compare weir and dam (barrage).	BT-2	Understand
19.	Discuss how a spillway differs from a sluice?	BT-2	Understand
20.	Estimate the failures that occur during the construction of earth dam.	BT-2	Application
21.	Define Percolation pond.	BT-1	Remember
22.	Illustrate the functions of scouring sluices.	BT-2	Understand
23.	Identify the component parts of diversion headwork.	BT-1	Remember
24.	Categorize the purposes of diversion headwork.	BT-2	Understand

PART-B (16 Marks)

1.	Write in detail about the component parts of diversion works.	BT-3	Application
2.	What are the types of weirs and Explain various components of weir?	BT-3	Application
3.	What are the causes of failure of Earth dam and Gravity dam? State its remedies.	BT-3	Remember
4.	Explain the factors affecting the selection of type of a dam.	BT-2	Understand
5.	Give an outline on the causes of Failure in weir on permeable foundation and how to overcome it?	BT4	Remember
6.	Summarize the criteria for safe design of earth dam.	BT-3	Understand
7.	Identify the forces acting on a gravity dam.	BT-4	Remember
8.	Identify the forces acting on an earth dam.	BT-4	Remember
9.	Classify types of dams and list the comparative merits and demerits of various types of dams.	BT-3	Understand
10.	Categorize the various types of spillways and types of gates used in spillways.	BT-4	Analyze
11.	Analyze in detail about Percolation pond and factors to be considered for a percolation pond.	BT-3	Understand
12.	Explain the types of cross drainage works.	BT-4	Remember
13.	Discuss the types of dams and dam arches.	BT-3	Application
14.	Discuss the advantages and disadvantages of Gravity dam.	BT-3	Application
15.	The head regulator of a canal has 3 openings each 3 m wide. The water is flowing between the upper and lower gates. The vertical opening of the gate is 1 m. The head on the regulator is 0.45 m (Afflux). If the upstream water level rises by 0.20 m, find how much the upper gates must be lowered to maintain the canal discharge unaltered.	BT-4	Analyze
16.	Compare the Earthen dams and gravity dams in general.	BT-5	Understand
17.	Illustrate factors to be considered during hydraulic design of dams.	BT-5	Understand

UNIT – IV CANAL IRRIGATION

Classification of canals - Canal regulations – direct sluice - Canal drop – Cross drainage works- Canal outlets — Design of prismatic canal-canal alignments-Canal lining - Kennedy 's and Lacey's Regime theory Design of unlined canal.

PART-A (2 Marks)

1.	List the classifications of canals based on nature of source of supply.	BT-1	Remember
2.	What are the classifications of canals based on financial aspect?	BT-1	Remember
3.	Recognize the classification of canals based on its functions.	BT-1	Remember
4.	Why canals are aligned?	BT-1	Remember
5.	State the methods of alignment.	BT-1	Remember
6.	Write any two factors to be considered while aligning the canal.	BT-1	Remember
7.	Define cross drainage work.	BT-1	Remember
8.	Enumerate the types of cross drainage works.	BT-1	Remember
9.	Define canal head works.	BT-1	Remember
10.	State the considerations needed before selecting the canal headwork.	BT-1	Remember
11.	Discuss the components of canal headwork?	BT-2	Understand
12.	Why training works are provided?	BT-2	Understand
13.	Define Super passage.	BT-1	Remember
14.	List out the necessities of cross drainage works.	BT-1	Remember
15.	Write about alluvial canals.	BT-1	Remember
16.	Distinguish between canal Syphon and Syphon aqueduct.	BT-2	Understand
17.	Define canal escape.	BT-1	Remember
18.	Define Regime channel.	BT-1	Remember
19.	Why canal lining provided?	BT-2	Application
20.	State the meaning of feeder canal.	BT-1	Remember
21.	What are the necessities of cross drainage works?	BT-1	Remember
22.	What are the different types of canal lining?	BT-1	Remember
23.	Write the assumptions made in Kennedy's theory.	BT-1	Remember
24.	Review the drawbacks of lacey's theory.	BT-1	Remember

PART-B (16 Marks)

1.	How canals are generally classified? Describe them briefly.	BT-3	Application
2.	Explain the various considerations for alignment of a canal.	BT-3	Application
3.	Why are canal falls necessary? Describe briefly with sketch the various types of canal falls.	BT-3	Application
4.	What are the types of cross drainage works? Describe them briefly with sketches.	BT-3	Application
5.	What is the necessity of river training works? Describe different types of river training works?	BT-4	Understand
6.	State the factors to be considered for the choice of a suitable type of cross drainage work.	BT-4	Understand
7.	Elaborate Kennedy's theory and write its assumptions.	BT-3	Remember
8.	What is mean by guide banks? What are their functions and effects?	BT-3	Understand
9.	Write briefly about the cross section of irrigation canal.	BT-3	Remember
10.	Write about the silt control devices employed in the cross drainage work.	BT-3	Remember
11.	What are the types of losses of water in a canal?	BT-4	Remember
12.	What are the criteria for locating the canal outlet? Explain.	BT-4	Application
13.	Design an irrigation channel for the following data using Kennedys theory: Full Supply Discharge = 14.16 cumec, Slope ,S = 1/5000, Kutters rugosity coefficient, N=0.0225,Critical Velocity ratio , m=1,Side slope Z= 1/2	BT-4	Analyze
14.	Design an irrigation Channel in alluvial soil from data using Laceys theory: Discharge = 15 cumec ; Laceys silt factor = 1.0; Side slope = ½:1	BT-4	Analyze
15.	List the types of canal lining and explain them in detail.	BT-4	Application
16.	Design an irrigation channel to carry 50 cumecs of discharge. The channel is to be laid at a slope of 1 in 4000. The critical velocity ratio for the soil is 1.1. Use Kutter's rugosity coefficient as 0.023.	BT-4	Application
17.	Design an irrigation channel to carry 40 cumecs of discharge, with B/D, base width to depth ratio as 2.5. The critical velocity ratio is 1.0. Assume a suitable value of Kutter's rugosity coefficient and use Kennedy's method.	BT-5	Evaluate

UNIT V - WATER MANAGEMENT IN IRRIGATION

Automated Irrigation System and IoT system - Rehabilitation — Optimization of water use- Minimizing water losses- On form development works - Participatory irrigation management - Water resources associations- Changing paradigms in water management-Performance Evaluation- Economic aspects of irrigation.

PART-A (2 Marks)

1.	State the causes of water loss.	BT-1	Remember
2.	What are ways of water loss in the canal?	BT-1	Remember
3.	List out the factors on which seepage loss depends.	BT-1	Remember
4.	What are the remedial measures for losses?	BT-1	Remember
5.	Review the advantages of irrigation water management.	BT-1	Remember
6.	Discuss some components of water management.	BT-2	Application
7.	Summarize the impact of water user association.	BT-2	Understand
8.	Discuss about PPP.	BT-2	Understand
9.	What are optimizations of water user association?	BT-2	Understand
10.	Predict the factors which influence evaporation loss.	BT-2	Understand
11.	Explain the term land management.	BT-2	Application
12.	Show the various irrigation methods for cultivation.	BT-1	Remember
13.	What is meant by CAD?	BT-1	Remember
14.	Categorize the uses of irrigation waters.	BT-1	Remember
15.	Elaborate on farm development.	BT-2	Understand
16.	What are the components of on farm developments?	BT-2	Understand
17.	Estimate the optimum water depth of crops.	BT-1	Application
18.	What is called optimum utilization of irrigation?	BT-1	Remember
19.	Define Rehabilitation.	BT-1	Remember
20.	What do you mean by Participatory irrigation management?	BT-1	Remember
21.	Write about the conjunctive use of water.	BT-3	Application
22.	Define on-farm water management.	BT-1	Remember
23.	How can the water losses are controlled?	BT-2	Understand
24.	What are the benefits of Water use association?	BT-2	Understand

PART-B (16 Marks)

1.	Discuss the inadequacies of present – day canal irrigation management in India	BT-3	Application
2.	What are the methods adopted for improving canal irrigation management? Explain in detail?	BT-1	Remember
3.	Briefly explain about on farm development works.	BT-2	Understand
4.	What are the various ways of 'minimizing irrigation water losses'?	BT-3	Application
5.	What kinds of participation are necessary for irrigation management activities?	BT-2	Understand
6.	Elaborate the details about PPP and its impact on the water management.	BT-3	Application
7.	What is the need for optimization of water use?	BT-1	Remember
8.	What is the need of water user's association?	BT-1	Remember
9.	Write briefly about the Modernization techniques available in water management.	BT-1	Remember
10.	What are the techniques available to reduce water losses?	BT-1	Application
11.	Write about the challenges in water management.	BT-3	Application
12.	Discuss about the Economic aspects of irrigation	BT-2	Application
13.	Describe the causes of water logging .	BT-1	Application
14.	How does water logging affect the farmland?	BT-2	Remember
15.	Discuss different ways to reduce usage of water in Irrigation.	BT-1	Application
16.	Discuss the role of farmers in water management.	BT-3	Application
17.	What do you know about Water Users Association? Elaborate the function and obligations of WUA.	BT-3	Application