SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF CIVIL ENGINEERING

QUESTION BANK

VII SEMESTER

1903702 –IRRIGATION ENGINEERING

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Prepared by

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SRM VALLIAMMAI ENGINEERING COLLEGE

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SUB. CODE: 1903702 **YEAR:** IV

SUB. NAME: IRRIGATION ENGINEERING **SEM :** VII

QUESTION BANK

UNIT I –CROP WATER REQUIREMENT

Need and classification of irrigation- historical development and merits and demerits of irrigation- types of crops-crop season-duty, delta and base period- Consumptive use of crops-Estimation of Evapotranspiration using experimental and theoretical methods.

PART-A

1.	Define irrigation.	BT-1	Remember
2.	What are the necessities of irrigation?	BT-1	Remember
3.	Compute 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.	Illustrate some major irrigation projects in India.	BT-2	Understand
10.	Explain the terms arid and semi-arid region.	BT-1	Remember
11.	Identify the factors on which duty depends.	BT-3	Application
12.	Develop the term crop period.	BT-1	Remember
13.	Select the point at which the soil reaches the permanent wilting point.	BT-3	Application
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-3	Application
17.	Explain wilting co-efficient.	BT-1	Remember
18.	Compare Kharif and Rabi crops.	BT-2	Understand
19.	Discuss on Rabi crops.	BT-1	Remember
20.	Elaborate the term irrigation efficiency.	BT-3	Application
21.	Define effective rainfall.	BT-1	Remember
22.	Classify irrigation efficiencies.	BT-2	Understand
23.	Explain Field Capacity.	BT-3	Application
24.	What is Evapotranspiration?	BT-1	Remember
25.	Evaluate the factors affecting the Evapotranspiration.	BT-2	Understand

PART-B

1.	Define Irrigation? What are the merits and demerits of irrigation?	BT-1	Remember
2.	With a neat sketch, show the modes of applying water to Crops.	BT-2	Understand
3.	What is meant by Duty? List the factors affecting duty. How to improve duty?	BT-3	Application
4.	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
5.	List the types of irrigation requirement of crops. Write a brief note on it.	BT-1	Remember
6.	Define consumptive use of water. Explain the Factors affecting consumptive use of Water.	BT-3	Application
7.	Give a detailed outline on the direct methods to measure the consumptive use of water.	BT-3	Application
8.	Summarize the types of flooding methods with a neat sketch.	BT-2	Understand
9.	Interpret the relationship between duty, delta and base period with appropriate explanations.	BT-2	Understand
10.	Develop the terms: G.C.A., C.C.A., Kor depth, Kor period, outlet factor,	BT-1	Remember

	capacity factor, nominal duty, rabi and kharif crops.		
11.	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 0.2cm per day for days 51 to 55. Effective rainfall of 3.5cm, distributed uniformly during the 36^{th} and 45^{th} 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.	BT-4	Analyze
12.	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.	BT-4	Analyze
13.	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.	BT-4	Analyze
14.	(i) Explain different types of soil water with a neat sketch (7) (ii)Elaborate Permanent, Temporary and Ultimate Wilting Point (6)	BT-1	Remember
15.	List and Explain the theoretical methods to calculate the Evapotranspiration.	BT-2	Understand
16.	Write short note on the factors influencing duty, delta and base period.	BT-3	Application
17.	Estimate, after how many days will you supply water to a clay loam soil in 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 5. Daily consumptive use of water for the given crop is 10mm.	BT-4	Analyze

PART-C

1.	Write a detailed note about various equations to calculate the Evapotranspiration.	BT-3	Application

<table>
<tr><td>2.</td><td>Classify the crops based on crop season, Agricultural pattern and irrigation requirements, with suitable example.</td><td>BT-2</td><td>Understand</td></tr>
<tr><td>3.</td><td>Table given below shows the details for a certain crop:
<table><tr><th>Month</th><th>Average Monthly Temperature (^{0} C)</th><th>Monthly % of day time hours of the year</th><th>Useful Rainfall (cm)</th></tr><tr><td>November</td><td>19</td><td>7.19</td><td>-</td></tr><tr><td>December</td><td>16</td><td>7.15</td><td>1.2</td></tr><tr><td>January</td><td>12.5</td><td>7.30</td><td>0.8</td></tr><tr><td>February</td><td>13</td><td>7.03</td><td>-</td></tr></table>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</td><td>BT-4</td><td>Analyze</td></tr>
<tr><td>4.</td><td>Explain the following terms:
(i) G.C.A (3)
(ii) C.C.A (3)
(iii) Saturation capacity (3)
(iv) Paleo (4)</td><td>BT-1</td><td>Remember</td></tr>
<tr><td>5.</td><td>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%
<table><tr><th>Crop</th><th>Base Period(days)</th><th>Duty at field (hec/cumec)</th><th>Intensity of Irrigation (%)</th></tr><tr><td>Wheat</td><td>120</td><td>1800</td><td>20</td></tr><tr><td>Sugarcane</td><td>360</td><td>1700</td><td>20</td></tr><tr><td>Cotton</td><td>180</td><td>1400</td><td>10</td></tr><tr><td>Rice</td><td>120</td><td>800</td><td>15</td></tr><tr><td>Vegetable</td><td>120</td><td>700</td><td>15</td></tr></table></td><td>BT-4</td><td>Analyze</td></tr>
</table>

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.

PART-A

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-3	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-3	Application
12.	Develop the term tank irrigation.	BT-3	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-3	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
25.	What is alignment of canals?	BT-1	Remember

PART-B

1.	Explain Canal Irrigation? What are the classifications of canal?	BT-2	Understand
2.	Why should lining be provided in canals? What are the merits and demerits of canal lining?	BT-1	Remember
3.	Define surface irrigation. Why it is widely practiced method of irrigation? What are the advantages and disadvantages of the method?	BT-2	Understand
4.	Write a short note on Lift irrigation. What are the pumps used for Lift irrigation?	BT-1	Remember
5.	Write a short note on Tank irrigation. Explain its type.	BT-1	Remember
6.	Explain the different types of flooding methods.	BT-2	Understand
7.	Explain in detail about sprinkler method of irrigation and how far it is suitable in Indian conditions.	BT-2	Understand
8.	Write a note on drip irrigation? Identify the components of drip irrigation system.	BT-1	Remember
9.	Build the merits and demerits of Canal irrigation system, taking irrigation projects in account.	BT-3	Application
10.	List the merits and demerits of tank irrigation.	BT-1	Remember
11.	List the merits and demerits of lift Irrigation.	BT-1	Remember
12.	Infer the advantages and disadvantages of drip irrigation system.	BT-2	Understand
13.	Evaluate the advantages and disadvantages of Sprinkler System.	BT-2	Understand
14.	Compile the different types of Irrigation Efficiencies. Explain the types in detail.	BT-3	Application
15.	Write down the design procedure of Drip Irrigation.	BT-1	Remember
16.	Give a detailed outline on Sprinkler Irrigation. Explain its types, Efficiency and Limitations.	BT-3	Application
17.	Discuss the design procedure of Sprinkler Irrigation.	BT-3	Application

PART- C

1.	Briefly explain about irrigation scheduling.	BT-3	Application
2.	Develop the term sub-surface irrigation; state clearly the conditions under which this method is suitable. What are the essential requirements for a successful sub-surface irrigation?	BT-3	Application
3.	Compare drip irrigation and Sprinkler irrigation.	BT-2	Understand
4.	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
5.	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-5	Evaluate

UNIT III - DIVERSION AND IMPOUNDING STRUCTURES

Types of Impounding structures - Gravity dam – Forces on a dam -Design of Gravity dams; Earth dams, Arch dams- Diversion Head works - Weirs and Barrages

PART-A

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-3	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-3	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-3	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
25.	Explain diversion headwork.	BT-3	Application

PART-B

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.	Write in detail about the tank surplus works.	BT-3	Application
4.	What are the causes of failure of Earth dam and Gravity dam? State its remedies.	BT-1	Remember
5.	Explain the factors affecting the selection of type of a dam.	BT-2	Understand
6.	Give an outline on the causes of Failure in weir on permeable foundation and how to overcome it?	BT-1	Remember
7.	Summarize the criteria for safe design of earth dam.	BT-2	Understand

8.	Identify the forces acting on a gravity dam.	BT-1	Remember
9.	Identify the forces acting on an earth dam.	BT-1	Remember
10.	Classify types of dams and list the comparative merits and demerits of various types of dams.	BT-2	Understand
11.	Categorize the various types of spillways and types of gates used in spillways.	BT-4	Analyze
12.	Analyze in detail about Percolation pond and factors to be considered for a percolation pond.	BT-2	Understand
13.	Explain the features of cross drainage works.	BT-1	Remember
14.	Discuss the types of dams and dam arches.	BT-3	Application
15.	Discuss the advantages and disadvantages of Gravity dam.	BT-3	Application
16.	State the functions of a under sluice and also list out the design considerations.	BT-1	Remember
17.	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

PART C

1.	What are the causes of Failure in weir on permeable foundation and how to overcome that?	BT-3	Application
2.	Illustrate factors to be considered during hydraulic design of dams.	BT-2	Understand
3.	Compare the Earthen dams and gravity dams in general.	BT-2	Understand
4.	What are the criteria for locating the diversion head work? Explain.	BT-3	Application
5.	Write down the design consideration for canal head regulator.	BT-1	Remember

UNIT – IV - CANAL IRRIGATION

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

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-3	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
25.	Distinguish between Kennedy's theory and lacey's theory.	BT-2	Understand

PART-B

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-2	Understand
6.	State the factors to be considered for the choice of a suitable type of cross drainage work.	BT-2	Understand
7.	Write the importance of canal alignment in canal irrigation. Also briefly write the general considerations for canal alignment.	BT-2	Understand
8.	Elaborate Kennedy's theory and write its assumptions.	BT-1	Remember
9.	What is mean by guide banks? What are their functions and effects?	BT-2	Understand
10.	Write briefly about the cross section of irrigation canal.	BT-1	Remember
11.	Write about the silt control devices employed in the cross drainage work.	BT-1	Remember
12.	What are the types of losses of water in a canal?	BT-1	Remember
13.	What are the criteria for locating the canal outlet? Explain.	BT-3	Application
14.	Elaborate lacey's theory and write its assumptions.	BT-2	Understand
15.	Compare Kennedy's Theory and Lacey's Theory.	BT-2	Understand
16.	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
17.	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

PART C

1	List the types of canal lining and explain them in detail.	BT-3	Application
2.	Explain briefly about the hydraulic design of canal drops.	BT-3	Application
3.	Explain briefly about the FSL and HFL and how it is fixed?	BT-3	Application
4.	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
5.	Write down the procedure for design of unlined canal alluvial soil according to IS 7112:1973.	BT-1	Remember

UNIT V - WATER MANAGEMENT IN IRRIGATION

Modernization techniques- 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

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-3	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-3	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-3	Application
18.	What is called optimum utilization of irrigation?	BT-1	Remember
19.	Recall the relation between efficiency and losses.	BT-1	Remember
20.	Define Rehabilitation.	BT-1	Remember
21.	What do you mean by Participatory irrigation management?	BT-1	Remember
22.	Write about the conjunctive use of water.	BT-3	Application
23.	Define on-farm water management.	BT-1	Remember
24.	How can the water losses are controlled?	BT-2	Understand
25.	What are the benefits of Water use association?	BT-2	Understand

PART-B

1.	Discuss the inadequacies of present – day canal irrigation management in India	BT-3	Application
2.	Describe the common criteria for judging the performance of an irrigation system.	BT-3	Application

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

PART C

1.	Briefly explain about on-farm-development works.	BT-3	Application
2.	Briefly explain about percolation pond.	BT-3	Application
3.	Discuss the role of farmers in water management.	BT-3	Application
4.	What is meant by 'participatory irrigation management'? Explain the concept briefly. Highlight the relative merits of 'participatory irrigation management' that of a conventional management approach' adopted in Engineering.	BT-2	Understand
5.	What do you know about Water Users Association? Elaborate the function and obligations of WUA.	BT-3	Application