SARVAJANIK UNIVERSITY
Sarvajanik College of Engineering and Technology
Bachelor of Technology
Civil Engineering

B. Tech. IV Semester VII

Subject Name : Irrigation Engineering **Subject Code**: BTCL13702
Type of course : PCC
Prerequisite : Fundamentals of Fluid Mechanics (BTCL13303), Hydrology and Water Resources Management (BTCL13504)
Rationale : To develop understanding about water requirement of crops, irrigation methods, and irrigation engineering works like weir/barrage, storage and outlet works, distribution works, regulating and cross drainage works and importance of drainage in irrigated areas.

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	150
2	0	2	3	60	25	15	30	20	

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1.	**Module : 1 Irrigation Principles :** Need for irrigation, Advantages and ill effects, Development of irrigation, National Water Policy, Tamil Nadu scenario, Physical properties of soil that influence soil moisture characteristics, Concept of soil water potential and its components, Gravitational and Osmotic pressures, Retention of water in soils, Concept of available water, Movement of water into and within the soils, Measurement of soil moisture content.	5	15 %
2.	**Module : 2 Crop Water Requirement :** Necessity and importance, Crop and crop seasons in India, Duty, Delta, Base Period, Factors affecting Duty, Irrigation efficiencies, Consumptive use of water, Irrigation requirements of crops, Standards for irrigation water, Planning and Development of irrigation projects.	5	15 %

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W.e.f. AY 2021-22

3.	**Module : 3 Diversion And Impounding Structures :** Head works, Weirs and Barrages, Types of impounding structures, Factors affecting, location of dams, Forces on a dam, Design of Gravity dams, Earth dams, Arch dams, Spillways, Energy dissipaters.	**5**	**15 %**
4.	**Module : 4 Canal Irrigation :** Classification of canals, Alignment of canals, Design of irrigation canals, Regime theories, Canal Head works, Canal regulators, Canal drops, Cross drainage works, Canal Outlets, Escapes, Lining and maintenance of canals, Other methods of Irrigation, Surface, Subsurface, Merits and Demerits.	**10**	**40 %**
5.	**Module : 5 Irrigation Water Management :** Modernization techniques, Rehabilitation, Command Area Development, Systems of rice intensification, Water delivery systems, Participatory Irrigation Management, Farmers' organization and turn over, Water users' associations, Economic aspects of irrigation	**5**	**15%**

Suggested Specification table with Marks (Theory/Practical):

% Distribution of Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
15	20	20	15	15	15

Legends: R: Remembrance, **U:** Understanding; **A:** Application, **N:** Analyze, **E:** Evaluate **C:** Create and above Levels **(Revised Bloom's Taxonomy)**

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Text Books:

Sr. No.	**Title of book /article**	**Author(s)**	**Publisher and details like ISBN**	**Year of publication**	**Publication Edition**
1	Irrigation & Water Power Engineering	Dr. B.C.Punmia & B.B.Pande	Laxmi Publications, (P) Ltd, New Delhi	2010	16th
2	Irrigation, Water Resources & Water Power Engineering	Dr. P.N.Modi	Standard Book House, Delhi	2019	11th
3	Irrigation Engineering and Hydraulic Structures	S.K.Garg	Khanna Publishers, Delhi	2006	1st

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4	Text book of Irrigation Engineering and Hydraulic Structures	Sharma, R.K	Oxford and IBK Publishing House, New Delhi.	2017	1st
5	Principles and Practice of Irrigation Engineering	Sharma, S.K.	S. Chand & Company Pvt. Ltd, New Delhi	1987	1st

Course Outcome:

Sr. No.	CO Statement After learning this subject, students will be able to	Marks % weightage
CO-1	Describe the national water policy structure and soil plant water characteristics. (*R, U…Cognitive Level*)	20
CO-2	Describe the basics of requirements and estimation of crop water. (*U, A …Cognitive Level*)	15
CO-3	Design the various types of hydraulic structure includes dams, spillways and dissipaters. (*U, A…Cognitive Level*)	25
CO-4	Design the components of irrigation canal includes canal drops and cross drainage works. (*R, U, A… Cognitive Level*)	30
CO-5	Apply the concepts of Irrigation water management, water user association for participatory irrigation management. (*U, C…Cognitive Level*)	10

Mapping with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO-1	-	-	-	1	-	-	-	-	-	-	-	2	2	2	-
CO-2	-	1	-	-	2	-	-	-	-	2	2	2	3	3	-
CO-3	3	3	-	3	-	-	-	3	-	-	3	-	2	3	2
CO-4	2	3	-	-	-	-	-	2	-	-	2	-	2	3	2
CO-5	-	1	-	2	2	3	3	3	1	1	2	-	2	2	2
Rationale *	5	8	-	6	4	3	3	8	1	3	9	4	11	13	6

Rationale*: It will help to develop understanding about water requirement of crops, irrigation methods, and irrigation engineering works like weir/barrage, storage and outlet works, distribution works, regulating and cross drainage works and importance of drainage in irrigated areas.

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List of Practicals:

1. Measurement of irrigation water at farm using different devices.
2. Calculations on irrigation requirement of crops.
3. Calculations on irrigation efficiencies.
4. Determination of field capacity of soil.
5. Determination of permanent wilting point PWP) of soil.
6. Design weir floor using Khosla's theory.
7. Carry out stability analysis of gravity dam
8. Design unlined canal using silt theories
9. Design a lined canal section.
10. Compute design discharge and water way in case of cross-drainage work

List of Open Source/learning website:

1. https://nptel.ac.in/courses/105/102/105102159/ (Irrigation Water Management)

List of Open Source Software:

1. Q – GIS (http://www.qgis.org/)
2. HEC – RAS (http://www.hec.usace.army.mil/software/hec-ras/)