

Hydrology And Water Resources

Sem -VIII

General Course Information

Course Code: PCC-CVE404-T Course Credits: 3 Mode: Lecture (L) Type: PCC Contact Hours: 3 hours Examination Duration: 03 hours.	Course Assessment Methods (Internal: 30; External: 70) Two minor test each of 20marks, class performance measured through percentage of lecture attended (4 marks), assignments and quiz etc. (6 marks) and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answer type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.
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Course outcomes

S. No.	Course outcomes	RBT* Level
	At the end of the course students will be able to:	
CO1	State and outline the concepts of Irrigation Engineering	L1 (Remembering)
CO2	Understand the basics of groundwater and hydraulics of subsurface flows.	L2 (Understanding)
CO3	Illustrate abstractions from precipitation	L3 (Applying)
CO4	Analyze the water requirement of crops, capacities of Distributaries and Canal.	L4 (Analyzing)
CO5	Plan and design Irrigation System (Canal network, irrigation structures, diversion head works, spillways and energy dissipations works etc.)	L6 (Creating)

*Revised Bloom's Taxonomy

Course Content Unit I

HYDROLOGY: Hydrologic cycle, Precipitation: introduction, forms of precipitation, types of precipitation, measurement of precipitation, selection of rain gauge station. Hyetograph and mass curve of rainfall, Evaporation: Definition, factors affecting, measurement, evaporation control. Evapo-transpiration, Infiltration.

Definition, components of hydrographs, unit hydrograph, base flow separation, Prepositions of unit hydrograph- problems.

Types of Aquifers – Darcy's Law – Dupuit's Assumptions – Confined Aquifer – Unconfined Aquifer – Recuperation Test – Transmissibility – Specific Capacity – Pumping Test – Steady Flow Analysis Only.

Unit II

Soil-water relationship and irrigation methods: Soil-water relationship, root zone soil water, infiltration, consumptive use, field capacity, wilting point, available moisture in soil, Gross Command Area, Culturable Command Area, intensity of irrigation, delta, base period, Kor depth, core period, frequency of irrigation, duty of water, relation between delta, duty and base period, irrigation requirement, **Methods of Irrigation**-flooding methods, border strip method, check basin and furrow method, assessment of irrigation water, sprinkler irrigation system.

Canal irrigation: Component of canal distribution system, alignment of channels, losses in irrigation channels, design discharge, silt theories and design of alluvial channels, comparison of Kennedy's and Lacey's theories, canal section and design procedure, Garrets and Lacey's diagrams.

Command Area, intensity of irrigation, delta, base period, Kor depth, core period, frequency of irrigation, duty of water, relation between delta, duty and base period, irrigation requirement, **Methods of Irrigation**-flooding methods, border strip method, check basin and furrow method, assessment of irrigation water, sprinkler irrigation system.

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Unit III

Cross Drainage Works:Classification and their selection, Hydraulic Design Aspects of Aqueducts, Syphon Aqueducts, Super Passage, Canal Syphon and Level Crossing, Design of Canal Transitions.

Diversion Canal Headworks:Various components and their functions, layout plan, selection of site for diversion headworks, Causes of failure of weir/barrages on permeable foundation, Bligh's creep theory, Khosla's method of independent variables, use of Khosla's curves, various corrections..

Unit IV

Regulation works:Canal falls-necessity and location, development of falls, design of cistern element, roughening devices.Design of Sarda type fall.Design of straight Glacis fall. Off-take alignment, Cross-Regulator and DistributoryHeadRegulators, devices to control silt entry into the off-taking channel and Silt Ejector, Canal Escapes.**Dams:** Design principles for gravity and earthen dams

Reference Books

1. Irrigation, Water Resources and Water Power Engg. by P.N.Modi.
2. Fundamentals on Irrigation Engg. by Bharat Singh
3. Irrigation Engg& Hydraulic Structures by S.K.Garg.
4. Irrigation Engg. by S.K.Sharma.

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	-	-	-	-	-	-	2	2	1	1	1
CO2	3	2	1	1	-	-	-	-	-	-	2	2	1	1	1
CO3	2	3	1	1	2	-	-	-	-	-	2	2	-	1	1
CO4	2	3	2	2	2	-	-	-	-	-	2	2	3	2	1
CO5	2	2	3	3	2	-	-	-	-	-	3	2	2	3	3

