PVP23

WATER RESOURCE ENGINEERING
(SYLLABUS)

Course Code	23CE4602C	Year	III	Semester	II
Course Category	Professional Elective - III	Branch	CIVIL	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Mechanics of Fluids
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks:	100

Course Objectives:

The objective of this course is to:

- Learn the types of irrigation systems.
- Understand the concepts of planning and design of irrigation systems.
- Study the relationships among soil, water and plant and their significance in planning an irrigation system.
- Understand design principles of erodible and non-erodible canals.
- Know the principles of design of weirs on permeable foundations.
- Know the concepts for analysis and design of storage head works.
- Learn design principles of canal structures.

Course Outcomes:

Course will enable the student to:

CO	Statement	Blooms level
CO 1	Analyse soil–water–plant relationships and estimate crop water requirements to select suitable irrigation methods.	**L4**
CO 2	Apply standard theories to design irrigation canals and evaluate canal lining efficiency.	**L3**
CO 3	Describe the functions of canal structures and explain their design principles.	**L3**
CO 4	Analyse and plan diversion headworks using seepage theories to ensure hydraulic safety.	**L4**
CO 5	Evaluate reservoirs and dams and examine design aspects of gravity dams, earth dams, and spillways.	**L5**

Course Articulation Matrix:

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

Syllabus

Unit	Content	Mapped COs
I	**Irrigation:** Necessity and importance, principal crops and crop seasons, types, methods of application, soil-water-plant relationship, soil moisture constants, consumptive use, crop water requirement, duty and delta, factors affecting duty, depth and frequency of irrigation, irrigation efficiencies, water logging and drainage, standards of quality for irrigation water, crop rotation.	**CO1**
II	**Canals:** Classification, economics of canal lining, design of erodible canals -Kennedy's silt theory and Lacey's regime theory, balancing depth of cutting.	**CO2, CO1**
III	**Canal Structures:** **Falls:** Types and location, design principles of Sarda type fall and straight glacis fall. (Description only). **Regulators:** Head and cross regulators, design principles (Description only) **Cross Drainage Works:** Types, selection, design principles of aqueduct, siphon aqueduct and super passage. (Description only), types of outlets.	**CO2, CO3**
IV	**Diversion Head Works:** Types of diversion head works, weirs and barrages, layout of diversion head works, components. causes and failures of weirs on permeable foundations, Bligh's creep theory, Khosla's theory.	**CO3, CO4**
V	**Reservoir Planning:** Investigations, site selection, zones of storage, yield and storage capacity of reservoir, reservoir sedimentation. **Dams:** Types of dams, selection of type of dam, selection of site for a dam. **Gravity dams:** Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile and practical profile of a gravity dam, limiting height of a dam, stability analysis. **Earth Dams:** Types, causes of failure, seepage, measures for control of seepage-filters. Spillways- types of spillways crest gates.	**CO4, CO5**

Learning Resource(s)

Text Book(s)

1. 'Irrigation and Waterpower Engineering' by Punmia B C, P.B.B Lal, A.K. Jain and A.K. Jain (2009), Laxmi Publications Pvt. Ltd., New Delhi
2. 'Irrigation and Water Resources Engineering' by Asawa G L (2013), New Age International Publishers
3. 'Irrigation Engineering' by Raghunath H.M (2012), Wiley India.
4. 'Irrigation Water Resources and Waterpower Engineering' by Modi P N (2011), Standard Book House, New Delhi

Reference Book(s)

1. ''Water Resources Engineering' by Mays L.W (2013), Wiley India Pvt. Ltd, New Delhi.
2. 'Irrigation Engineering' by Sharma R.K. and Sharma, T. K (2012), S. Chand & Co Publishers.
3. 'Water Resources Engineering' by Satyanarayana Murthy Challa (2008), New Age International Publishers.

Web Materials:

1. https://archive.nptel.ac.in/courses/105/105/105105110/